SMART GRID
INNOVATION NETWORK

Smart Energy Benchmarking

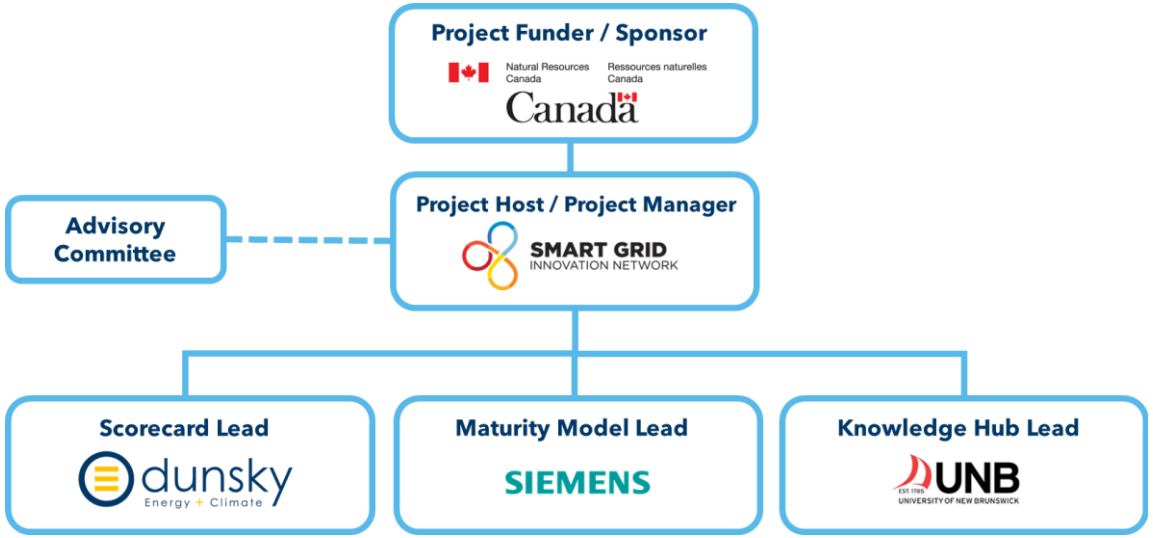
UTILITY SCORECARD RESULTS

June 2023

About the Project Team

The Smart Grid Innovation Network (SGIN) supports Canada's clean energy transition by advocating for the smart energy sector. SGIN promotes, identifies, and helps drive smart energy solutions in Canada. Our mission is to foster Canada's transition to a clean energy future.

The Smart Energy Benchmarking initiative project team includes SGIN, Dunsky Energy + Climate Advisors, Siemens Canada Ltd, & University of New Brunswick (UNB). The project is guided by an Advisory Committee that includes representatives from government, utilities, academia and subject matter experts.



About the Authors

Dunsky Energy + Climate Advisors supports leading governments, utilities, corporations and others across North America in their efforts to accelerate the clean energy transition, effectively and responsibly.

With deep expertise across the Buildings, Mobility, Industry and Energy sectors, we support our clients in two ways: through rigorous Analysis (of technical, economic and market opportunities) and by designing or assessing Strategies (plans, programs and policies) to achieve success.

Dunsky is proudly Canadian, with offices and staff in Montreal, Toronto, Vancouver, Ottawa and Halifax. Visit **www.dunsky.com** for more information.

List of acronyms

AB	Alberta
ADMS	Advanced Distribution Management System
AMI	Advanced Metering Infrastructure
BC	British Columbia
BIPOC	Black, Indigenous and People of Color
CCAB	Canadian Council of Aboriginal Business
DEI	Diversity, Equity, Inclusion
DERs	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
DSM	Demand-Side Management
DSO	Distribution System Operator
DR	Demand Response
EDTI	EPCOR Distribution & Transmission Inc.
EE	Energy Efficiency
ESG	Environmental, Social, Governance
EV	Electric Vehicle
FLISR	Fault Location Isolation and Service Restoration
GIS	Geographic Information Systems
GWh	Gigawatt-hours
IESO	Independent Energy System Operator (Ontario)
kW / kWh	Kilowatt / Kilowatt-hour
2SLGBTQI+	Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and additional sexual orientations and gender identities
MW	Megawatt
NB	New Brunswick
NRCan	Natural Resources Canada
NWAs	Non-Wires Alternatives
ON	Ontario
PAR	Progressive Aboriginal Relations
QC	Quebec
SCADA	Supervisory Control and Data Acquisition
SGIN	Smart Grid Innovation Network
SK	Saskatchewan
SREP	Smart Renewables and Electrification Pathways
TCFD	Task-Force on Climate-Related Financial Disclosures
T&D	Transmission & Distribution
UNB	University of New Brunswick

Executive Summary

Introduction

A clean, electrified economy is central to achieving Canada's net zero emissions goals by 2050. The accelerated rate to decarbonize the last 20% of our electricity grid and expand electricity energy use places us in uncharted territory creating significant challenges, as well as new opportunities.

Electric utilities play a pivotal role in the clean energy transition across three broad categories:

1. **Clean Energy Supply.** Shifting away from fossil fuel-based generation to clean or non-emitting sources such as solar, wind, hydro, geothermal and nuclear. This requires clear targets, comprehensive strategies and bold leadership that is mission driven, willing to take risks and determined in their actions.
2. **Modern Grid.** Building a modern, dynamic and resilient grid to optimize the integration of clean energy sources, manage greater electrification and prepare for a changing climate while maintaining a reliable and stable electricity supply.
3. **Customers and Society.** Taking a customer-centric, equitable approach in all decisions related to products, services and experiences that will enable all customers to participate in, and benefit from the energy transition.

The Smart Energy Benchmarking Initiative aims to help Canadian electric utilities acquire the knowledge, skills and tools to incorporate renewable energy, modernize the grid, and support equity, diversity and inclusion activities.

The project is divided into three phases:

Smart Energy Scorecard | **Capability Model** | **Knowledge Hub**

The scorecard benchmarks 12 electric utilities' current state (baseline year 2021) in the clean energy transition – the starting line. The scorecard will help utilities understand their baseline, work to their strengths, identify solutions in areas that are still developing and set standards against which they can measure progress.

The project is non-judgmental focused on fostering utility collaboration, building capabilities, celebrating successes and finding solutions. Each utility and the environment in which they operate is unique. The goals are the same, and we can learn from one another, but the path each utility takes will be their own.

"Your present circumstances don't determine where you can go, they merely determine where you start."

- Nido Qubein

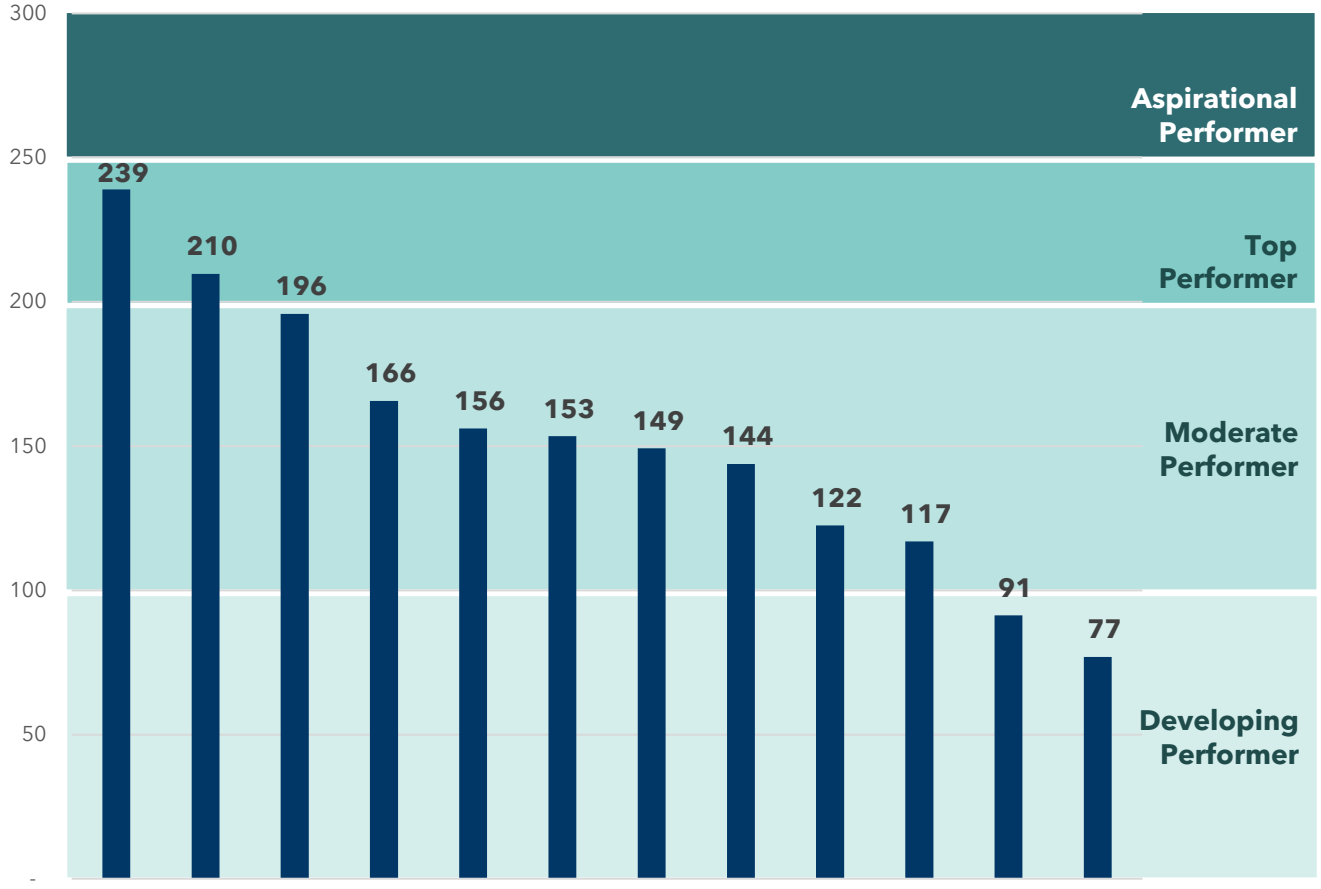
2021 Scorecard Results: The Baseline

Canadian electric utilities are at varying stages of preparedness for the energy transition.

While no utility achieved aspirational performance, three utilities are recognized as top performers and are showing leadership across all three categories (Clean Energy Supply, Modern Grid and Customers & Society).

Most utilities fall within the middle of the band. In many cases, utilities' actions are constrained by the boundaries of their regulatory and/or policy environment.

While the overall score is important, understanding how utilities scored across indicators that contributed to the total score tells a more complete story.



Clean Energy Supply: Key Findings

1 Clean Energy Supply

1.1 Planning & Designing to Decarbonize the Grid	1.2 Clean Energy Procurement & Deployment	1.3 Integration of Clean Energy Supply	1.4 Corporate Leadership

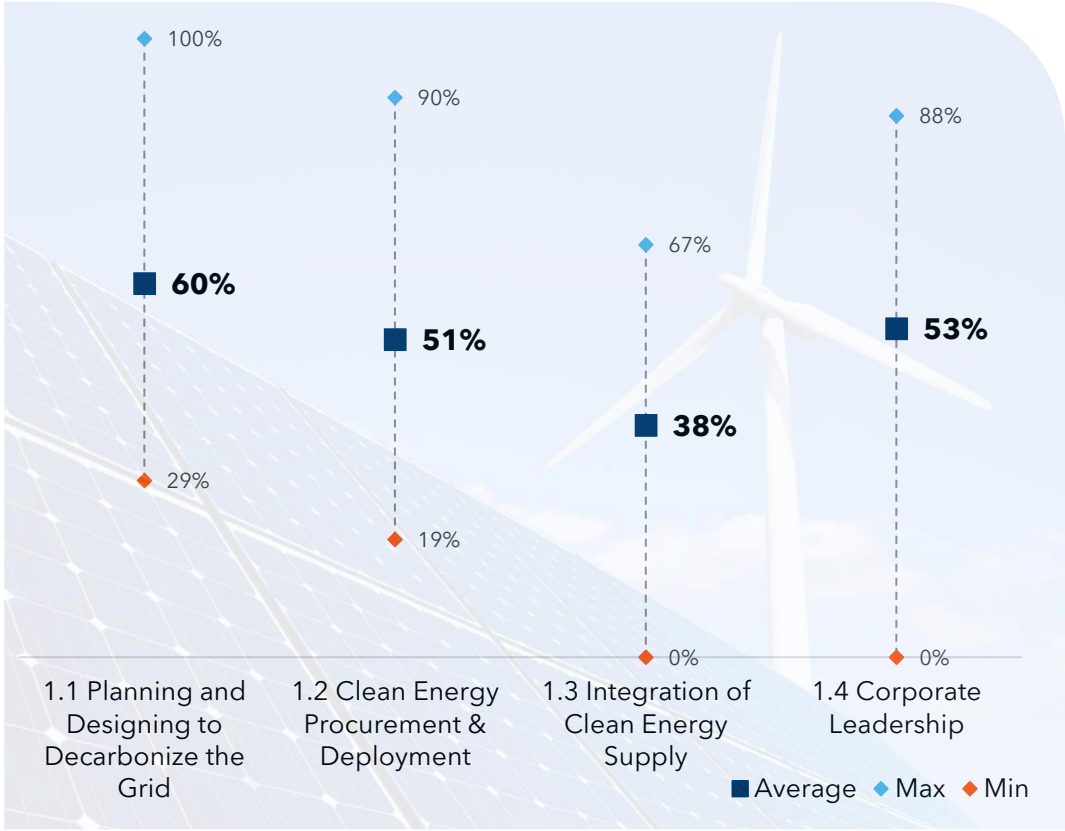
Benchmarked utilities were at different stages of their decarbonization journeys, levels of commitment, degree of control over their supply and experience integrating clean resources at scale. While some benefited from existing non-emitting resources, others had only begun the transition. Without bold leadership and accountability, utilities may be challenged to meet their corporate and community goals.

1.1 Goals & Plans: While most of the country was covered by varying clean grid goals, few jurisdictions had comprehensive (costed, timed) plans to achieve these. Ontario, the largest Canadian province, stood out for not having a defined clean grid goal.

1.2 Clean procurement: Two thirds of utilities and jurisdictions actively procured renewable generation and removed barriers to deployment, with the remaining third taking a passive approach and in some cases adding more fossil-fuel based electricity generation.

1.3 Clean resource integration: Most utilities had limited experience with large-scale renewable projects (> 5MW), or with enabling/valuing ancillary services for distributed resources.

1.4 Corporate leadership: Most utilities had sustainability initiatives and commitments to decarbonize their operations, but the depth of those commitments and the quality of reporting varies. Few utilities tied executive compensation to the achievement of decarbonization targets.



Modern Grid: Key Findings

2 Modern Grid

2.1 Enhanced Grid Planning & Management	2.2 DER Enablement & Integration	2.3 Visibility & Control Capabilities	2.4 Innovation & Emerging Technologies	2.5 Climate Resiliency

Canadian electric utilities were in the process of upgrading their grids and grid capabilities. Most followed incremental pathways, with only a few pursuing transformational visions. Overall, there was a gap between roadmaps, pilots, and control system investments, and limited amount of Distributed Energy Resources (DER) enablement and integration.

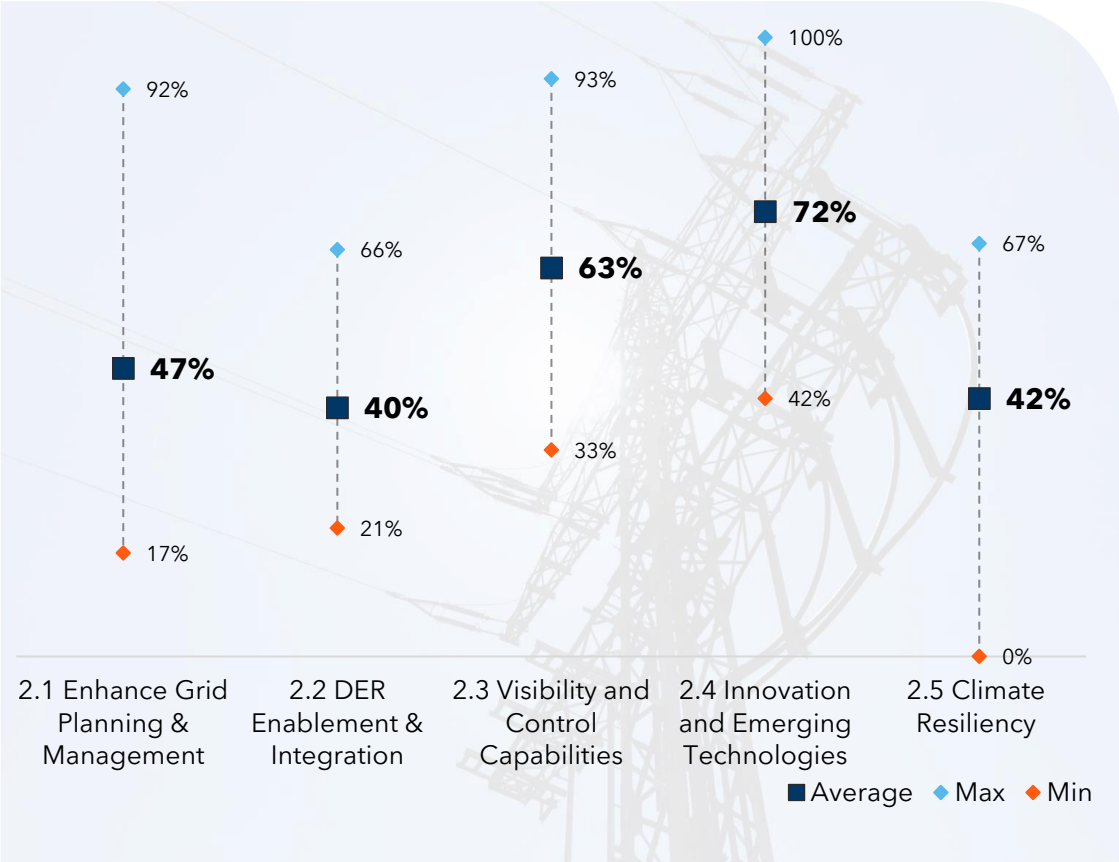
2.1 Grid planning: Most utilities were actively working to modernize their load forecasting and DER management processes. Capabilities varied in terms of data availability, model sophistication (top-down vs. bottom-up) and specificity (system-level annual vs. localized hourly forecasts).

2.2 DER enablement & integration: Most utilities had a DER strategy or roadmap, but DER's potential remained underutilized in 2021 (e.g., for ancillary services, non-wires alternatives, demand response, etc.). This was principally due to regulatory or market-based constraints.

2.3 Visibility & control: By 2021 utilities had invested significantly in visibility and control capabilities, with Advanced Metering Infrastructure (AMI), Advanced Distribution Management Systems (ADMS) and Supervisory Control and Data Acquisition (SCADA) deployed in most cases. DER Management Systems (DERMS) deployment remained nascent but was growing.

2.4 Innovation & technologies: Most utilities had innovation funds, resources, and pilot projects, often supported by government funding. Most were testing operational or technological upgrades, and a few utilities were planning for fundamental business model transformations.

2.5 Climate resiliency: Most utilities were upgrading their grid infrastructure and operations to face more adverse climate events, but few had systematically incorporated climate change scenario analysis into their planning processes.



Customers & Society: Key Findings

3 Customers & Society

3.1 Changing Customer Preferences	3.2 Enabling Transportation, Building and Industrial Electrification	3.3 Being Intentional about Diversity, Equity and Inclusion	3.4 Aligning Actions and Engagement

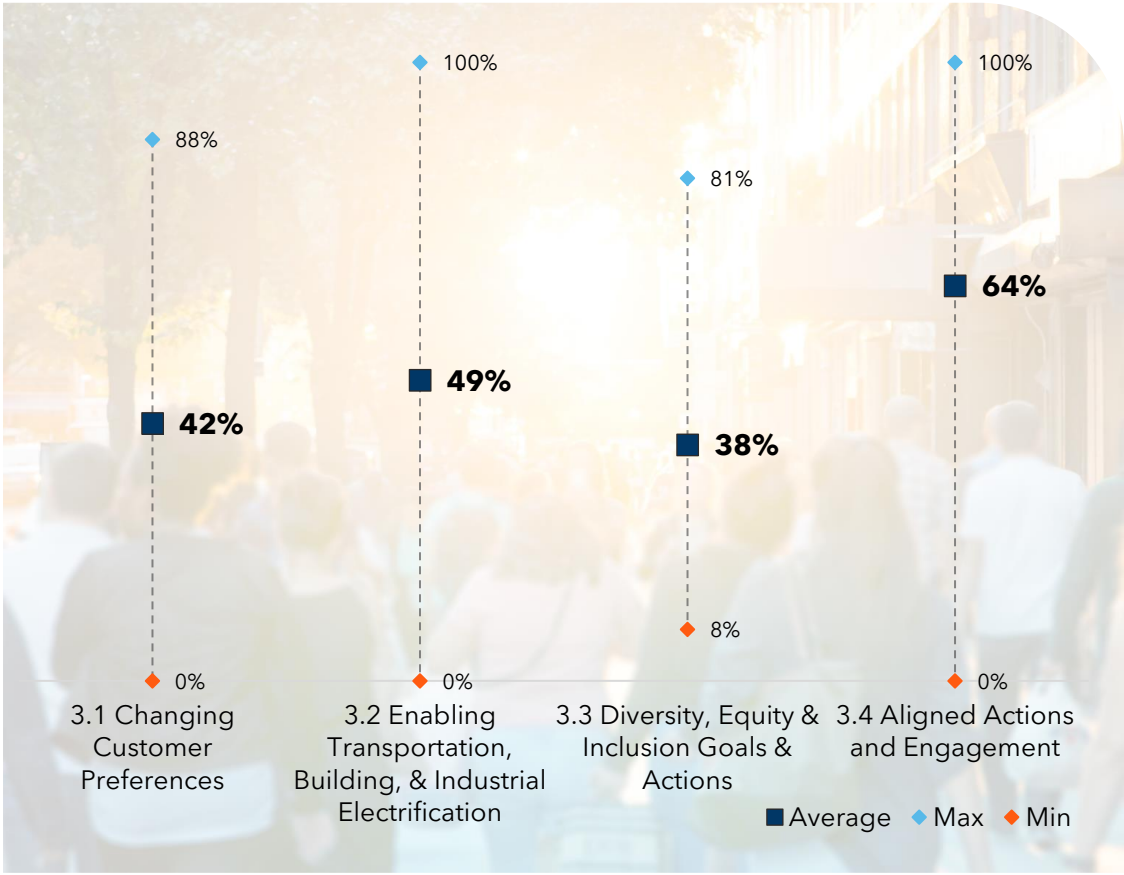
Utilities were increasingly engaging with multiple stakeholder groups to transform the electricity system. While few had developed comprehensive electrification strategies, many considered it for specific sectors. Utilities considered equity to varying degrees; vulnerable community groups will need to be prioritized to ensure an equitable transition.

3.1 Customer preferences: Most utilities offered services and solutions to encourage efficiency, decarbonization and/or electrification, such as incentives for DERs, Electric Vehicles (EVs), charging infrastructure, energy storage, efficient technologies, and, in some cases, rate-based solutions. Digital platforms to engage customers were common, although the level of sophistication varied.

3.2 Electrification: Few utilities had comprehensive electrification strategies, with most focused on a single sector (e.g., transportation) versus economy-wide solutions or perspectives.

3.3 Diversity & Equity: Many utilities had internal Diversity, Equity and Inclusion (DEI) strategies and/or initiatives for their organization and workforce. Community-oriented DEI strategies were less common, and principally addressed through income-eligible and First Nations programs. Benchmarked utilities were spending less than leading US-based jurisdictions on such programs.

3.4 Alignment & Engagement: Several utilities were completely or partially aligned with government climate goals, while some were constrained by a lack of such goals. Utilities were increasingly proactive in collaborating with governments, efficiency organizations, electricity systems operators and regulators to advocate for, and/or advance the energy transition.

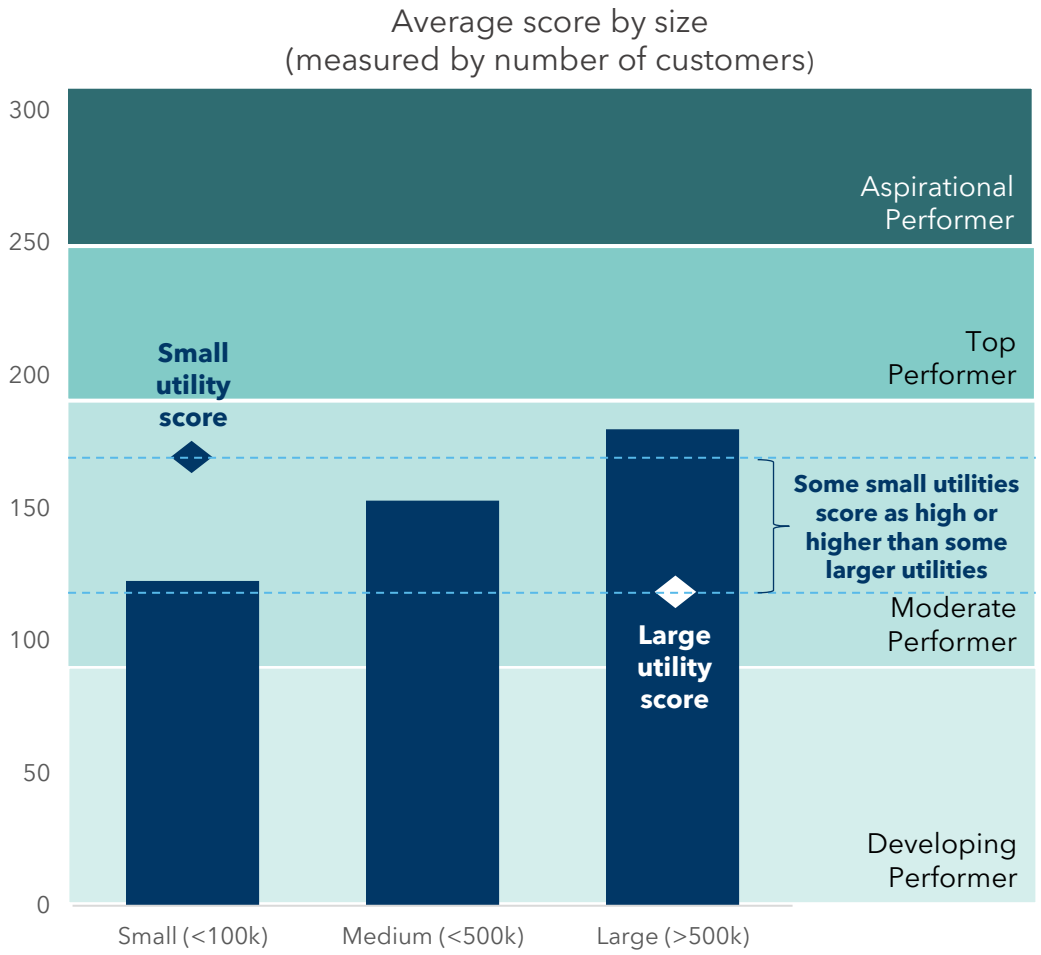


Scorecard Results by Utility Size

Utilities' average scores can be influenced by size, how clean the grid is, and ownership structure; however, these variables are not always indicators of success. Each utility is demonstrating leadership in various metrics and across the three main categories.

Size: Larger utilities tend to score more points, as they have more financial and non-financial resources to plan, execute, innovate and adopt best practices. However, some small utilities outperform their larger peers due to a combination of local innovation, jurisdictional opportunities and leveraging external funding sources. For example, one of the four small utilities achieves the fourth-best overall score.

Other factors that can influence scores are the **grid** and **ownership**. Those with already clean grids have a natural advantage in the "Clean Energy Supply" category. In turn, crown corporations and municipally owned utilities are organically aligned with government and community objectives in the "Customers & Society" category.

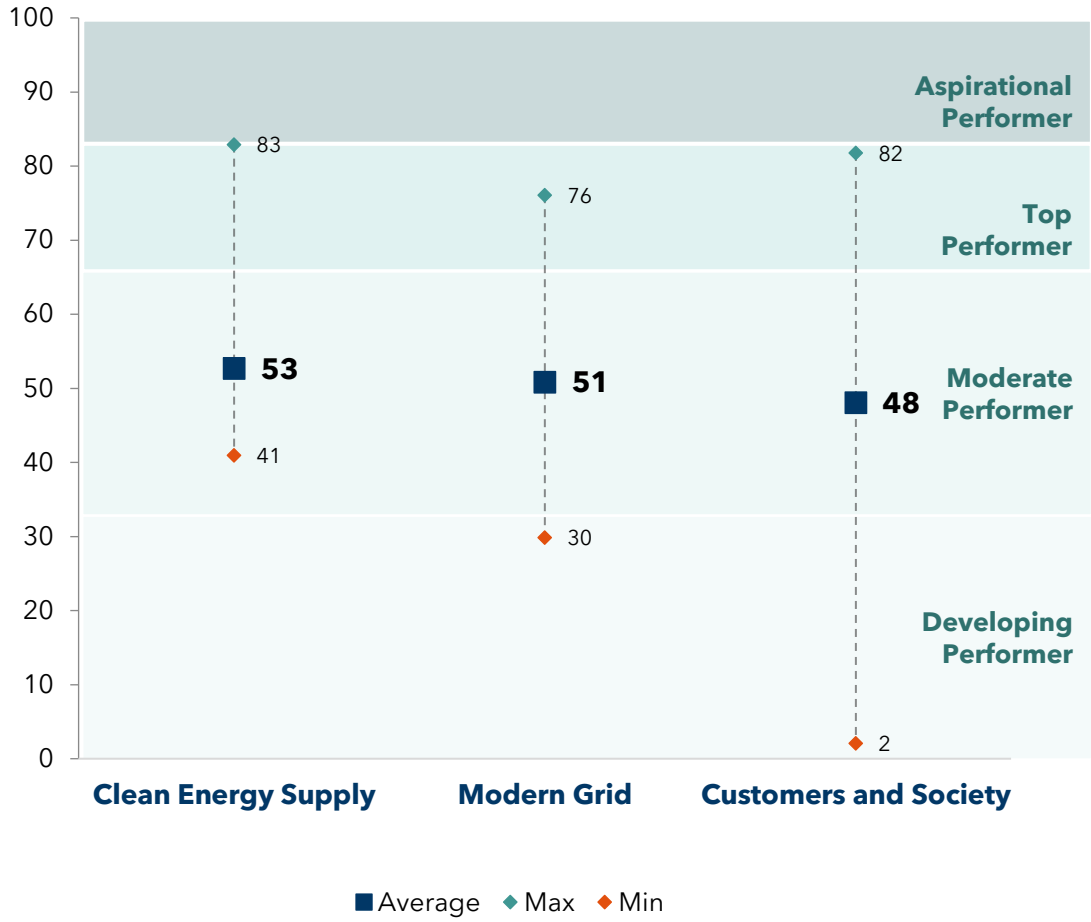


Note: given the limited number of participating utilities, no statistically significant conclusions can be drawn about correlations or causations between performance and any utility characteristics.

Scorecard Results Across Three Major Categories

On average, electric utilities performed **moderately** across the three dimensions crucial to a net zero pathway.

Average, low and high scores across the three major scorecard categories



Ten Key Insights from the Results

INSIGHT 1	**Canadian utilities have embarked on the energy transition journey**. They recognize the climate emergency and have established plans to reduce emissions. While utilities are at various stages in the transition, every benchmarked utility demonstrated leadership in certain areas.
INSIGHT 2	**More effort is needed.** The pace and scale required to meet our net zero goals by 2050 and avoid the worst climate change impacts, requires greater leadership and ambition, comprehensive decarbonization and electrification strategies, detailed inclusive roadmaps, and the tools and resources to act. The clock is ticking; without accelerated action, several actors will be challenged to achieve their targets.
INSIGHT 3	**Utilities are a diverse group, which must be considered when comparing scorecard results, opportunities and solutions.** Utilities vary in terms of size, structure, services, context, and control over their environment. We must recognize this diversity when interpreting the results and crafting policy and/or regulations that will affect utilities. Where possible, utilities and others can leverage diversity of thought and approaches to adapt innovative solutions to their unique context. Jurisdictions with less clean grids will require substantial and coordinated support to quickly live up to their own goals, and in some cases, even more ambitious federal targets.
INSIGHT 4	**Utilities are facing a massive transformation**. An already complex electricity system is under greater pressure to continue to deliver safe, affordable and reliable electricity along with being clean, resilient and equitable. If not managed carefully, this transformation could leave some groups – including some utilities and their communities – behind.
INSIGHT 5	**Utilities can't do it alone and current government commitments and regulatory structures have constrained some utilities**. Government and regulators must give utilities concrete climate targets, direction and support to guide their net-zero pathways. Utilities need latitude to implement needed action and support to make significant investments to balance DER integration, facilitate greater electrification and resiliency, and enable customers to contribute to, and benefit from, the transition. In many cases, legislation and regulation needs to evolve to enable utilities and financial support is needed to complement utility investment.

Ten Key Insights from the Results

INSIGHT 6	**Utilities need a comprehensive strategy that covers all three dimensions of this transition**. All the scanned utilities are making progress and demonstrating leadership in certain areas, but more work is needed to effectively address and coordinate actions across all elements of the clean energy transition.
INSIGHT 7	**Distribution-oriented utilities have historically not been the main drivers of grid innovation but will become increasingly important as gateways for the integration of DERs into the grid**. As such, utilities will require considerable support (policy, regulatory, financial, technological) to increase deployment of, and leverage, DERs, including valuing DERs in ancillary services. Canada lags American and European jurisdictions in enabling and leveraging distributed grid flexibility.
INSIGHT 8	**Utilities are anchored in their communities and are thus valuable partners to relay information both ways**. It will be important for utilities to communicate messaging related to the energy transition to partners and customers and provide diverse services and solutions to help customers participate in, and contribute to, the transformation. Vice-versa, utilities can communicate customer needs, expectations and reactions to policy-makers to inform future policy.
INSIGHT 9	**More attention needs to be paid to equity implications of the transition**. Utilities are actively considering equity in the workplace to ensure that it is diverse and inclusive, but internal action has not yet translated to community-wide equity impacts and strategies (e.g., several utilities have set internal diversity targets and implemented actions, but most have yet to study community needs and establish comprehensive strategies to measure and mitigate the transition's impact on those most vulnerable).
INSIGHT 10	**Ultimately, the clean energy transition presents a significant opportunity for electric utilities and society**. Utilities' core service – deliver clean, safe, reliable and affordable electricity – is at the heart of the energy transition and set for significant growth. By becoming more sustainable, resilient, and efficient, electric utilities can contribute to communities' as well as to their own prosperity.

Considerations

"If you're walking down the right path and you're willing to keep walking, you will eventually make progress"
- Barack Obama

The clean energy transformation requires collaboration and cooperation across stakeholders. Each has a unique role to play in promoting the adoption of cleaner energy sources and transitioning towards a sustainable energy future. We outline key considerations for utilities, SGIN, and government, regulators and system operators.

Utilities	• Participating utilities can use their scorecard results to **inform internal discussion**, diagnosis, planning and prioritization, as well as to **engage external partners** whose support is needed for progress, including regulators, governments, and others. They can also draw on the **community of practice** created by this initiative to share insights, good practices and lessons learned. • Other utilities in Canada can **review this scorecard to situate themselves,** obtain guidance for their own transition and consider participating in future scorecards.
SGIN	• SGIN should **publicize the scorecard** to promote its takeaways and raise awareness of the smart utility concept. • Phase B of this initiative – the Maturity Model – will **support select participating utilities** to build on their scorecard results and improve their specific capabilities. • Phase C of this initiative – the Knowledge Hub – will make smart energy benchmarking trends, and good practices **available to a broader audience**, such as other utilities across Canada as well as policy makers, regulators, system operators, and service providers. • SGIN intends to **repeat the scorecard** to monitor progress from existing utilities and include additional utilities. Future scorecards should include indigenous and northern utilities, and may consider other relevant metrics (e.g., cybersecurity).
Government, Regulators, and System Operators	• **Governments** can use this scorecard to help inform energy- and climate-policies, regulations and goals. They must guide, support, and as needed aid utilities in undertaking necessary actions, as well as support research and public engagement. • **Regulators** ensure that utilities comply with government policies and regulations. They can use the scorecard to set regulatory frameworks and observe the impact on utilities' abilities to accelerate the energy transition. Regulatory innovations are needed to enable required investments, accelerate the adoption of new technologies, processes, tariffs and programs, and ensure that no one is left behind. • **System operators** can use this scorecard to pinpoint barriers to the integration of DERs and intermittent generation assets into the grid and wholesale markets. They play key roles in outlining clear standards and pathways for decarbonization, and in some cases, in implementing demand response and demand side management programs.

Main Report

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1. Introduction

Context

To avoid the worst climate change impacts and benefit from the economic opportunity climate action presents, Canada has set a target to achieve net-zero emissions by 2050. To ensure Canada delivers on its targets, this commitment was enshrined in legislation under the Canadian Net-Zero Emissions Accountability Act.[1]

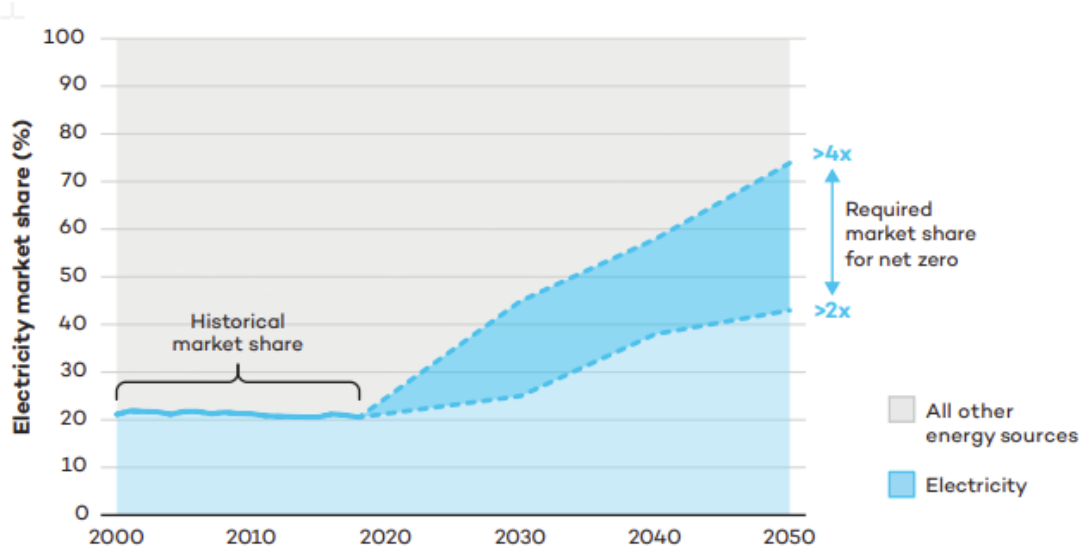
Substituting fossil fuels with clean, non-emitting electricity and electrifying our economy is vital to achieving net-zero emissions in Canada. To lay the groundwork, Canada has committed to net-zero electricity by 2035 through the Clean Electricity Regulation.[2]

Canada is fortunate where over 80% of our electricity is currently non-emitting; however, electricity only accounts for approximately 20% of energy demand. To achieve net-zero by 2050, Canada must increase the supply of clean, non-emitting electricity and ensure more parts of the economy are connected to the electricity system. This will require that Canada produce 2-3 times as much clean power as it does today.[3]

Utilities are at the center of climate targets and action plans. They have a key role in meeting clean electricity commitments by generating, procuring and integrating electricity from clean and non-emitting sources, and enabling, supporting and delivering on initiatives that will optimize the grid and help all customers electrify, including those most vulnerable.

THE CLEAN ELECTRIFICATION CHALLENGE

To achieve net-zero by 2050, Canada must increase the supply of non-emitting electricity and ensure more parts of the economy are electrified. Growing building, transportation, and industry electrification could increase Canada's electricity share by up to four times within the next 30 years.



Source: Produced by Dunsky Energy + Climate Advisors for Electrifying Canada, 2022

1. Canadian Net-Zero Emissions Accountability Act S.C. 2021, c. 22. Accessed at https://laws-lois.justice.gc.ca/eng/acts/c-19.3/fulltext.html
2. Government of Canada Clean Electricity Regulations. Accessed at https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/clean-electricity-regulation.html
3. 2030 Emissions Reduction Plan: Clean Air, Strong Economy. Accessed at https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html

Project Overview

In 2022, Smart Grid Innovation Network (SGIN) launched the Smart Energy Benchmarking Initiative to help Canadian electric utilities prepare for the clean energy transition. The initiative is funded by Natural Resources Canada's (NRCan) Smart Renewables and Electrification Pathways (SREP) Capacity Building stream. SREP supports projects that can transform our electricity sector to the 2050 net-zero economy, and help organizations acquire the knowledge, skills, and tools to incorporate renewable energy, modernize the grid, and support equity, diversity, and inclusion activities.

WHAT IS A SMART ENERGY SYSTEM?

A smart energy system is one that supports decarbonization in an affordable, safe, sustainable, resilient, and equitable way. It includes the whole energy system (gas, thermal, and electricity grids) that integrates clean energy, through a smart, dynamic, and customer-centric approach.

The Smart Energy Benchmarking initiative focuses on the role of electric utilities within the broader smart energy system.

The Smart Energy Benchmarking initiative has six objectives:

1. Stimulate the development of clean energy and grid modernization projects.
2. Increase Canadian utilities' capacities to meet emerging customer needs, modernize their grids, prepare for greater electrification and renewables integration.
3. Celebrate utility leadership in the energy transition and nudge those getting started through healthy competition.
4. Develop a body of knowledge that serves as a resource for utilities and others across Canada as they work to decarbonize.
5. Create a healthy ecosystem for collaboration between stakeholders.
6. Be intentional about equity, diversity, and inclusion goals and impacts

Smart Energy Benchmarking: A Phased Approach

This report summarizes results of Phase A: Smart Energy Scorecard.

Phase A

Scorecard

Benchmark **12 electric utilities'** current smart energy development and identity performance relative to peers and best-in-class practices

June 2022 – April 2023

Phase B

Maturity Model

Work with **a subset of utilities** to build on their strengths and develop their capabilities to improve preparedness and performance

April 2023 – September 2023

Phase C

Knowledge Hub

Share findings, trends, and best practices to a **broader audience** to support industry capacity-building

September 2023 – December 2023

Phase A: Smart Energy Scorecard

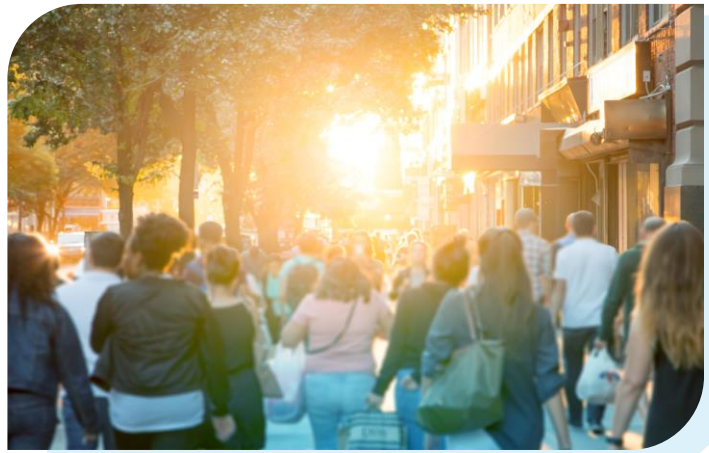
Electric utilities are responsible for generating, transmitting and distributing electricity to end users. In the context of the clean energy transition, the scorecard assesses utilities across three main functions:

1 Clean Energy Supply

To reduce greenhouse gas emissions and meet renewable energy targets, electric utilities must shift away from fossil fuel-based generation to clean or non-emitting sources such as solar, wind, hydro, geothermal, and nuclear.

2 Modern Grid

The electricity grid is complex system of generating stations, transmission lines, substations, and distribution networks that deliver electricity to end users. The grid must be managed to ensure a reliable and stable supply of electricity, and to optimize the integration of more variable clean energy sources.



3 Customers & Society

Utilities can offer programs and services to encourage and enable customers to electrify their buildings, transportation and industries and adopt clean energy technologies. Utilities must also consider impacts to those most vulnerable so that all customers can benefit from the transition.

The Smart Energy Scorecard

The Smart Energy Scorecard assesses participating Canadian electric utilities' efforts and progress in the clean energy transition across 3 categories, 13 metrics and 140+ indicators (baseline year 2021).

Electric utilities play a critical role in enabling the transition to a clean energy future by ensuring a reliable and sustainable supply of electricity from renewable sources while also meeting the needs of end users. Utilities plans, actions and abilities were benchmarked across 140+ indicators that are deemed crucial to facilitate a clean energy system that continues to be safe, affordable, and reliable, as well as **clean, resilient, and equitable**.

The following four guiding principles influenced the final scorecard metrics:

1. Align with NRCan's SREP objectives and the net zero emissions goal
2. Measure performance against best-in-class practices within Canada and abroad
3. Be relevant, measurable, and flexible, and focus on what utilities can control & influence
4. Develop in collaboration with utilities and other relevant industry stakeholders

1 Clean Energy Supply

- 1.1 Planning & Designing to Decarbonize the Grid
- 1.2 Clean Energy Procurement & Deployment
- 1.3 Integration of Clean Energy Supply
- 1.4 Corporate Leadership

2 Modern Grid

- 2.1 Enhanced Grid Planning & Management
- 2.2 DER Enablement & Integration
- 2.3 Visibility & Control Capabilities
- 2.4 Innovation & Emerging Technologies
- 2.5 Climate Resiliency

3 Customers & Society

- 3.1 Changing Customer Preferences
- 3.2 Enabling Transport, Building & Industry Electrification
- 3.3 Being Intentional About Diversity, Equity & Inclusion
- 3.4 Aligning Actions & Engagement

2. Approach

Project Approach and Timeline

Developing the smart energy scorecard was an iterative, collaborative approach that involved the project team, an advisory group and participating utilities.

Develop Preliminary Scorecard	Form & Engage Advisory Group	Recruit Utilities	Consult Utilities	Create Roadmap & Collect Data	Refine Data	Present Results
• Develop preliminary scorecard and metrics	• Form advisory group and gather input on project and approach	• Host information webinar • Invite electric utilities across Canada • 18 utilities enrolled	• Gather input to refine scorecard • Consult on data collection process • (2 utility workshops)	• Create utility roadmap • Collect scorecard inputs & supporting documents • 12 final utilities	• Address data questions • Refine scorecard inputs • Generate utility scores	• Present preliminary results • Create summary report & custom utility reports
Jul – Sep 2022	**Sep 2022**	**Oct 2022**	**Nov 2022 – Jan 2023**		**Feb – Mar 2023**	**April 2023**

Data for each indicator was provided by the utilities through a standardized data request form. Dunsky reviewed utility inputs for quality and consistency and assigned a score for each indicator against a pre-determined scoring grid. All 144 indicators are outlined in the appendix, along with scores and weights.

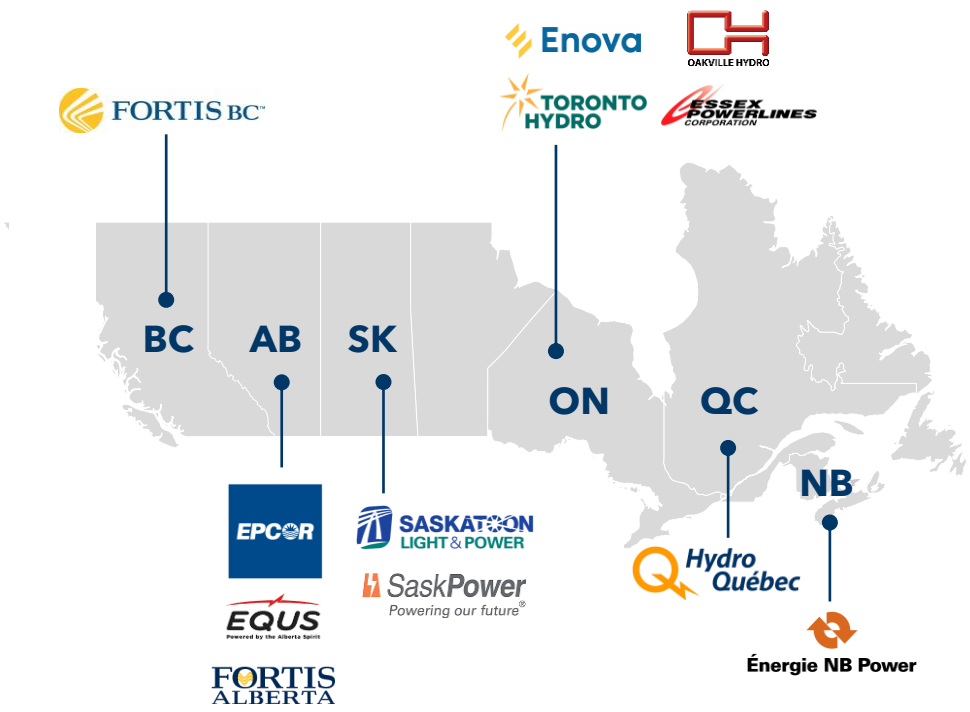
Overview of benchmarked utilities

The project team aimed to attract up to 20 utilities that represented the diversity across Canada in terms of utility size, type, ownership, and geography, clean vs not-so-clean grids and regulatory/policy environments. We summarize the targets set out at the beginning of the project and what was achieved. Additional comparisons are made on the following page.

Target	Achieved
Up to 20 electric utilities	• 18 utilities expressed interest • 12 electric utilities completed the scorecard
Focus on small, but include a range of utility sizes	• 4 small (<100K customers) • 4 medium (100K – 500K) • 4 large (>500K)
A range of utility types	• 4 vertically integrated utilites • 1 Transmission & Distribution (T&D) utility • 7 distribution-only utilities
A range of ownership structures, including indigenous owned	• 3 crown corporations • 6 municipally owned • 3 privately owned • 0 indigenous owned (one initially enrolled but could not complete the process due to resource constraints)
Geographic spread	• West (1 BC) • Prairie (3 AB, 2 SK) • Central (4 ON, 1 QC) • Atlantic (1 NB)

Overview of benchmarked utilities

Six provinces



Twelve utilities serving close to 7.5 million customers (presented West to East)

Utility	Type	Ownership	Nb. of customers	Provincial Electricity Market: Retail	Clean grid	¢/kWh[1]
Fortis BC	Generation, Transmission, Distribution	Private	< 100k	Regulated retail	>90% clean	11.4
FortisAlberta	Distribution	Private	≥ 100K to ≤ 500k	Competitive	<50% clean	19.9
EPCOR (EDTI)	Transmission, Distribution	Municipal	< 100k	Competitive	<50% clean	19.9
EQUS REA	Distribution	Coop	< 100k	Competitive	<50% clean	19.9
Sask. Light & P.	Distribution	Municipal	< 100k	Regulated retail	<50% clean	16.5
SaskPower	Generation, Transmission, Distribution	Crown corp.	≥ 100K to ≤ 500k	Regulated retail	<50% clean	16.5
Enova Power	Distribution	Municipal	< 100k	Hybrid	>90% clean	13.9
Essex Powerl.	Distribution	Municipal	< 100k	Hybrid	>90% clean	13.9
Oakville Hydro	Distribution	Municipal, Private	< 100k	Hybrid	>90% clean	13.9
Toronto Hydro	Distribution	Municipal	≥ 100K to ≤ 500k	Hybrid	>90% clean	13.9
Hydro-Québec	Generation, Transmission, Distribution	Crown corp.	≥ 100K to ≤ 500k	Regulated retail	>90% clean	7.6
NB Power	Generation, Transmission, Distribution	Crown corp.	< 100k	Regulated retail	>50% clean	13.9

Generation · Transmission · Distribution · Crown corp. · Municipal · Private · Coop

>90% clean · >50% clean · <50% clean · < 100k · ≥ 100K to ≤ 500k · > 500k

1 Electricity rates. Source for pricing data: Hydro-Québec, Comparison of Electricity Prices in Major North American Cities 2022 (2021 data for average residential prices in Vancouver, Edmonton, Regina, Toronto, Montréal, Moncton). Data is indicative only and may not represent the actual prices charged by the benchmarked utilities or others to consumers in their specific service areas in 2021.

This scorecard comes with several caveats

It is not a complete picture of Canadian utilities. While it covers 12 utilities from 6 jurisdictions of various sizes and ownership types, which collectively serve around 7.5 million customer accounts, it was not designed to be a representative sample.

Scores represent 2021 data, to the best of utilities' and SGIN's abilities. Utility plans, actions and contexts may have evolved since then, and will be captured in future scorecards.

Data was reviewed with care, but some limitations apply. Data for certain indicators or utilities was difficult to obtain, due to its confidential nature, or to varying definitions across organizations and jurisdictions. Dunsky exercised judgement to assign scores and, in some cases, modified utilities' self-ratings to ensure consistent scoring across all entities.

Utilities face different contexts and cannot be compared one-to-one, given differences in sizes, jurisdictions, ownership type, etc. Several utilities do not control their own generation assets or other factors that may influence their score. The scorecard is most useful when used as a tool to support utilities' own engagement and learning with their internal and external stakeholders and does not purely measure 'performance'.

3. Scorecard Results

Aggregate Results

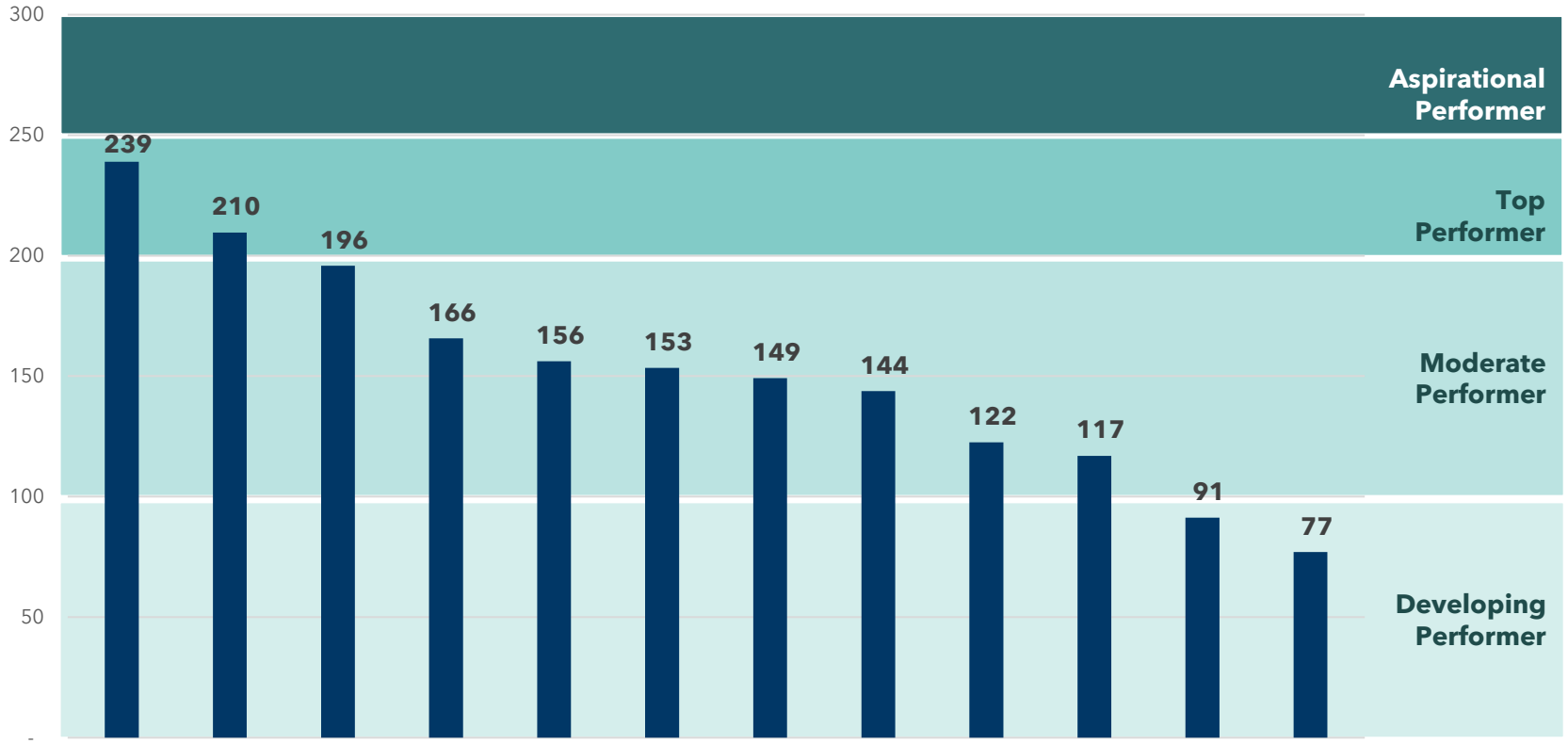
Canadian electric utilities are at varying stages of preparedness for the energy transition.

While no utility achieves aspirational performance, three utilities are recognized as top performers demonstrating leadership across all three categories (Clean Energy Supply, Modern Grid and Customers & Society).

Most utilities fall within the middle of the band.

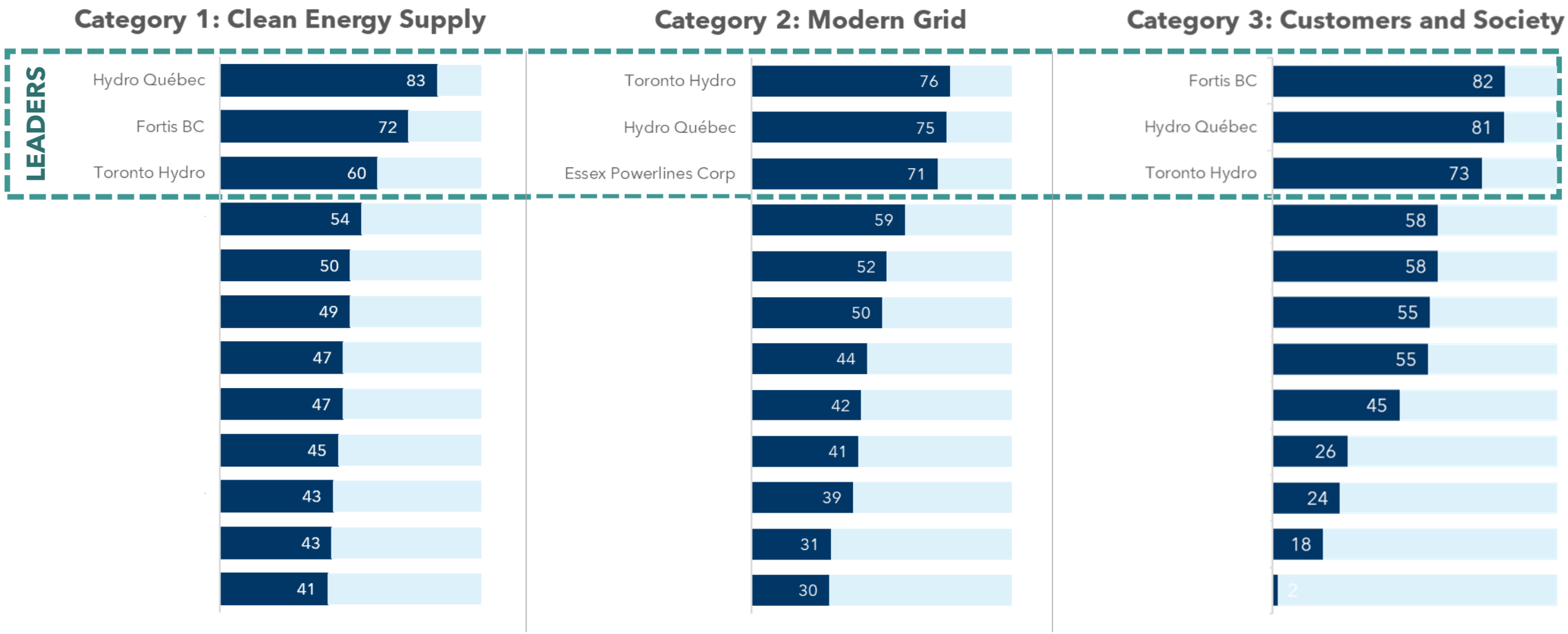
In many cases, utilities' actions are constrained by the boundaries of their regulatory and/or policy environment.

While the overall score is important, understanding how utilities scored across indicators that contributed to the total score tells a more complete story. We discuss this in more detail next.



Results by Category

There are 100 total possible points in each category and a different utility takes the top spot across each of the three major categories.



Clean Energy Supply: Overview

1 Clean Energy Supply

1.1 Planning & Designing to Decarbonize the Grid	1.2 Clean Energy Procurement & Deployment	1.3 Integration of Clean Energy Supply	1.4 Corporate Leadership

Planning, procuring and deploying clean energy is key to the clean energy transition. The current share of clean energy, the pace and approach to further decarbonize and corporate leadership is critical to transform our electricity sector to net zero by 2050.

Under Clean Energy Supply, we assess utilities on the following:

1.1. Planning & Designing to Decarbonize the Grid. Explicit clean energy commitments, the depth of those commitments, the timeframe to achieve them, and if utilities have a comprehensive plan to do it.

1.2 Clean Energy Procurement & Deployment. Utilities' current share of non-emitting supply and procurements for clean energy

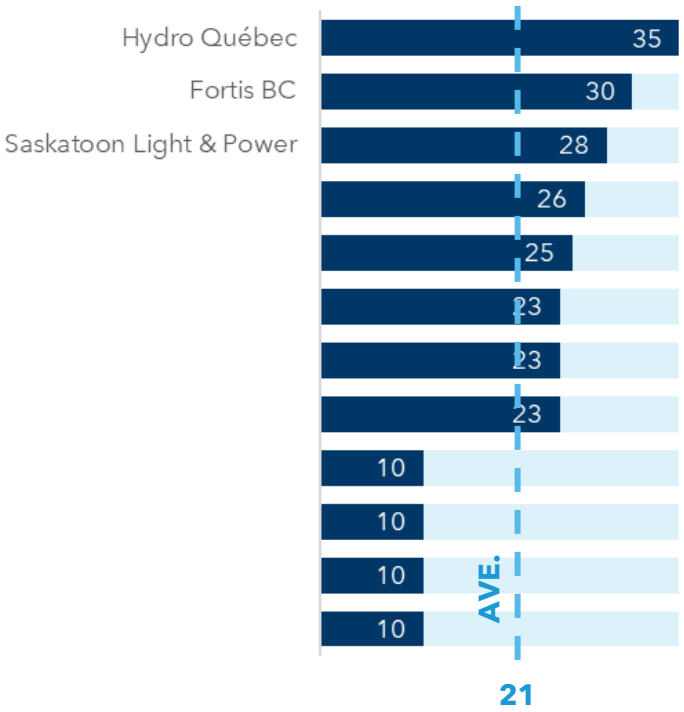
1.3 Integration of Clean Energy Supply. Where ancillary markets exist, do clean energy resources have access to ancillary services payments and what are utility DER interconnection times and processes.

1.4 Corporate Leadership. Leadership, transparency, and accountability needed to facilitate the transition.

1 Clean Energy Supply

1.1 PLANNING & DESIGNING TO DECARBONIZE THE GRID

POINTS AVAILABLE **35**



Utilities and their partners (e.g., system operators, provincial government) have a key role in developing robust and actionable visions for a decarbonized grid. To achieve our net zero goals we need provinces, territories and regulators to set clear direction and for utilities to align their plans with net-zero pathways.

- **Clean grid goals are more often set provincially than at the utility level**. Three out of four provinces with carbon emitting generation resources have established decarbonization goals. Ontario is the exception: despite having a relatively clean grid, it is the only province that has not committed to maintaining existing and/or further decreasing its grid carbon intensity in the coming years. Ontario is now soliciting bids for new gas-fired power plants when several nuclear stations will be refurbished. If it proceeds, this will be Ontario's biggest increase in gas-fired generation in over a decade.[1]

- **Declared clean grid goals vary substantially.** Alberta aims for 30% by 2030, Saskatchewan 40% by 2030, and New Brunswick 100% by 2035. The federal Clean Electricity Regulation requiring 100% non-emitting generation by 2035 thus represents a considerable acceleration for some provinces. BC's and Québec's grids are already 99% clean, with plans to decarbonize remaining remote generation. While remote microgrids make up a small amount of production, they can be challenging to decarbonize.

- **As of 2021, several participating utilities had undertaken preliminary assessments of net-zero pathways, but most had yet to put together comprehensive plans (budgeted and timed) to achieve their targets.** In at least one case, a plan was in development (expected 2023), and in other cases plans existed for initial steps without covering the whole transition. Two of the three provinces with clean grid goals were on or above track towards meeting them (Alberta and New Brunswick). Only Saskatchewan was slightly short of its target, due to construction delays resulting from the covid-19 pandemic.

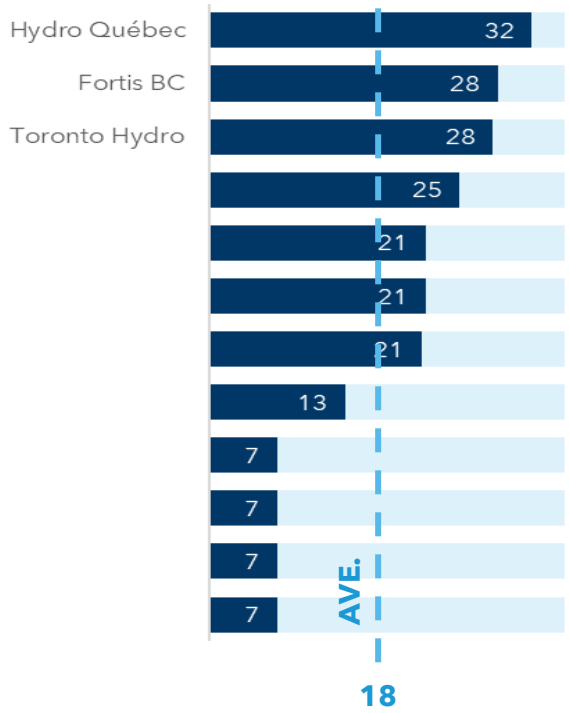
1. Source: IESO accessed at https://www.ieso.ca/en/Sector-Participants/Resource-Acquisition-and-Contracts/Long-Term-RFP-and-Expedited-Process In 2017, gas- and oil-fired generation was 4% of Ontario's electricity supply. By 2022, that figure reached 10.4%. Nuclear declined from 63% to 53.7% while Hydro Wind and Solar only increased from 33% to 36.3%. Source: IESO accessed at https://www.ieso.ca/en/Power-Data/Supply-Overview/Transmission-Connected-Generation..

SASKATOON LIGHT & POWER: Despite having limited control over provincial generation, the City of Saskatoon, which owns Saskatoon Light & Power, has developed a comprehensive implementation plan, *Alternative Currents*, for a low-emission energy transition, with specific actions and timelines to promote local baseload and distributed generation, storage, energy efficiency, and other measures.

1 Clean Energy Supply

1.2 CLEAN ENERGY PROCUREMENT & DEPLOYMENT

POINTS AVAILABLE **35**



A clean energy future requires the transformation of a utility's total retail energy supply, changes to energy procurements and actions to reduce barriers to clean energy technology deployment.

- **Most sampled utilities do not directly control generation and are thus dependent on the state of the provincial grid.** Large, vertically integrated crown corporations like Hydro-Québec, New Brunswick Power and SaskPower constitute the exception.
- **The share of non-emitting generation varied widely across Canada**, from 99% in BC and Québec, to 80-90% in New Brunswick and Ontario, and 15-25% in Saskatchewan and Alberta. The associated grid emission intensities accordingly also varied greatly. Utilities with significant share of non-emitting resources from legacy hydro and nuclear power had a natural advantage.
- **Procurement strategies for renewable energy generation varied from targeted to agnostic.** Half the reviewed jurisdictions (BC, NB and QC) exclusively procured renewable generation capacity, while two others (ON, SK) had released some dedicated renewable procurements. Only AB had not posted dedicated renewable procurements, though several projects were nonetheless under way.
- **As of 2021, a small majority of utilities were proactively undertaking actions that reduce or remove barriers to the deployment of clean technologies.** This includes seven of 12 utilities of various types, sizes, and regions. Actions include forms of information-sharing (e.g., feeder lists, developer manuals, hosting capacity maps, customer costing frameworks), integrated approaches to interconnections (such as a 'Power Generation Partners Program' to accompany clients through the journey), and transmission investments to increase the interconnection potential. The remaining five utilities reported no facilitating actions, beyond minimal regulatory requirements.

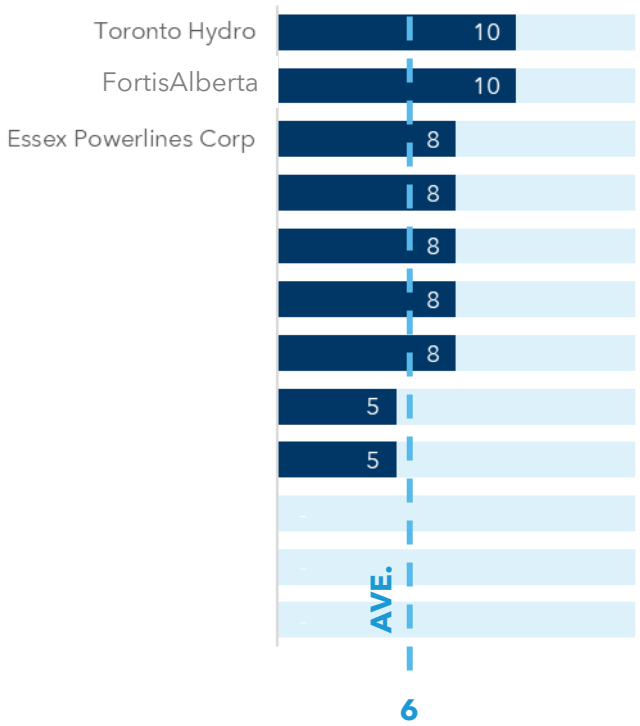
HYDRO-QUÉBEC: Hydro-Québec's own generation projects and procurement opportunities are exclusively for renewable energy – some exclusively for wind power, other for any type of renewable generation. Moreover, it has laid out a plan to decarbonize 80% of remote, diesel-powered microgrids by 2030, through a combination of transmission lines and distributed generation and storage.[1]

[1] See http://news.hydroquebec.com/en/press-releases/1815/hydro-quebec-reaches-a-major-milestone-in-the-decarbonization-of-its-off-grid-systems/.

1 Clean Energy Supply

1.3 INTEGRATION OF CLEAN ENERGY SUPPLY

POINTS AVAILABLE **15**



As the penetration of intermittent renewables increase, procurement mechanisms and ancillary services market designs and rules may need to be modified. Additionally, streamlining and improving interconnection procedures will increase efficiencies and allow utilities to process more large-scale renewable interconnection requests, and accommodate newer and more complex systems.

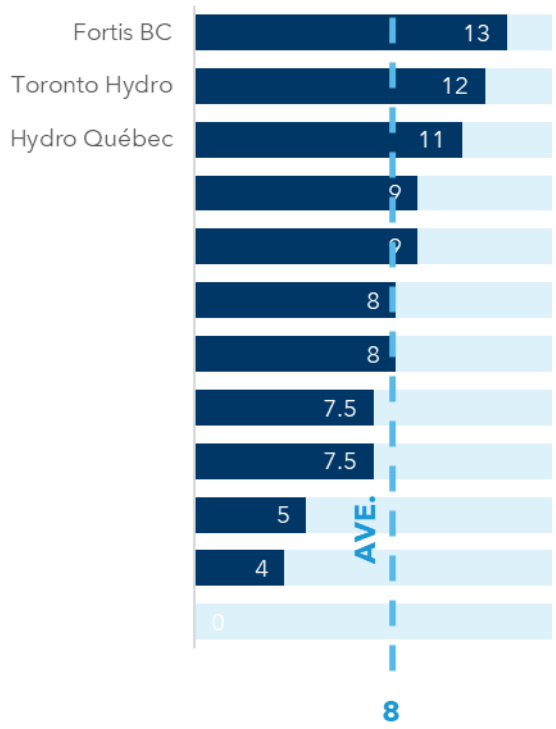
- **Canada is still "behind" in general with only one utility obtaining more than 50% of the points** in this metric.
- **Access to ancillary services payments for distributed energy resources (DERs) is limited**. As of 2021, no utility reported full access to ancillary services payments for clean and distributed energy resources. Such access was under consideration in the deregulated electricity markets (Alberta, Ontario), but its future remained unclear in other jurisdictions, which mostly do not operate through market mechanisms and include ancillary services on an ad hoc basis, if at all.
- **The typical time to *approve* interconnection requests for large-scale renewable projects (>5 MW) was half a year or less**, once correct documentation is submitted, and payment received. This period covers the part of the process within utilities' control (e.g., conducting a connection impact assessment) and usually varies depending on project size and regional requirements. Time to *commission* a project may be substantially longer, influenced by parties other than the utility. Of note, half of the reviewed utilities had not yet experienced any or enough large-scale renewable project requests to determine a 'typical time'.
- **As of 2021, only a third of utilities were undertaking or planning steps to improve/streamline large-scale interconnection processes**. Steps include undertaking customer journey mapping exercises, sharing documentation (e.g., hosting capacity maps, interconnection requirements), and engaging with developers. The remaining utilities were not undertaking or facilitating steps, mostly because they were not expecting large-scale interconnections in their service territory.

ONTARIO: Clean distributed energy resources (e.g., storage, distributed generation, demand response) have partial access to some IESO markets for ancillary services, such as operating reserves. The IESO is working with stakeholders to further enable DER participation in its' markets.

1 Clean Energy Supply

1.4 CORPORATE LEADERSHIP

POINTS AVAILABLE **15**



In addition to decarbonizing the grid and supporting customers, utilities will need to make the clean energy transition a core mandate within their organization and culture. This includes leading by example to decarbonize corporate buildings and operations, linking executive compensation to carbon-reduction goals, and being accountable through transparent tracking and reporting.

- **Corporate emission reduction targets and plans have become an industry standard. As of 2021, all but one utility had a corporate sustainability plan and/or initiatives**, **but the nature of the plans vary widely**. Several plans – mostly of smaller utilities - focused on isolated initiatives, such as employee days, safety training, local outreach, headquarter efficiency measures, etc. Some larger utilities had comprehensive environmental, governance and social (ESG) objectives related to their environmental impact, human resources practices, etc. Of note, some medium-sized utilities had comprehensive plans due to their links to a larger parent entity (e.g., municipality or large corporation).

- **As of 2021, two thirds of utilities had targets in place related to the decarbonization of their own operations (e.g., buildings, fleet), but the target years and depths vary**. The most ambitious utility aimed to be net zero by 2030, while another targeted 2040, three targeted 2050, and another three had interim decarbonization targets without any net zero commitment. Finally, four utilities (mostly small) had not declared their decarbonization ambitions, though some have pursued isolated initiatives to reduce their carbon footprint.

- **Three quarters of utilities had a public sustainability report to track their progress and accountability**. However, as with plans, the quality of reporting varied widely, ranging from general brochures about sustainability initiatives to consistent and comprehensive tracking and reporting on the indicators laid out in the corporate sustainability plan. Few utilities resorted to independent verification and reporting of their progress.

- **Only two utilities have tied executive performance and compensation to the achievement of corporate decarbonization objectives**, and none to grid decarbonization. See leader spotlight for an example.

FORTIS BC: At FortisBC, sustainability performance measures for annual incentive purposes focus on climate, people, and reliability. In 2022, the weighting of climate will increase to 40% from 30%, and long-term incentive plans will include a measure associated with reducing corporate carbon emissions for all executives.

Clean Energy Supply: Additional Spotlights

FORTIS BC: Fortis BC's 2021 Long Term Electric Resource Plan (LTERP) aligns with BC's environmental goals and ensures consistency with provincial energy policies and objectives.

1 Clean Energy Supply

- 1.1 Planning & Designing to Decarbonize the Grid
- 1.2 Clean Energy Procurement & Deployment
- 1.3 Integration of Clean Energy Supply
- 1.4 Corporate Leadership

TORONTO HYDRO: Toronto Hydro executives are eligible for performance-based compensation tied to corporate objectives. Two of these objectives aim at managing climate related risks and opportunities: Building Emissions Reduction and Fleet Electrification.

Modern Grid: Overview

2 Modern Grid

2.1 Enhanced Grid Planning & Management	2.2 DER Enablement & Integration	2.3 Visibility & Control Capabilities	2.4 Innovation & Emerging Technologies	2.5 Climate Resiliency

A modern, smart, and dynamic grid is crucial to enable utilities to decarbonize the grid, enable greater electrification, prepare for climate impacts, and respond to shifting customer needs and preferences. This will require advanced grid capabilities, planning and operations, greater visibility and control, and a willingness to innovate.

Under Modern Grid, we assess utilities on the following:

2.1 Enhanced Grid Planning & Management. Efforts to modernize or enhance load forecasting tools and planning processes.

2.2 DER Enablement & Integration. The portion of peak demand/system capacity represented by Demand Response (DR), share of energy savings from energy efficiency, how utilities are valuing Non-Wires Alternatives (NWAs), and whether utilities have a formalized DER strategy and/or roadmap.

2.3 Visibility & Control Capabilities. Current AMI coverage and capabilities, deployment of DERMS, SCADA, and ADMS.

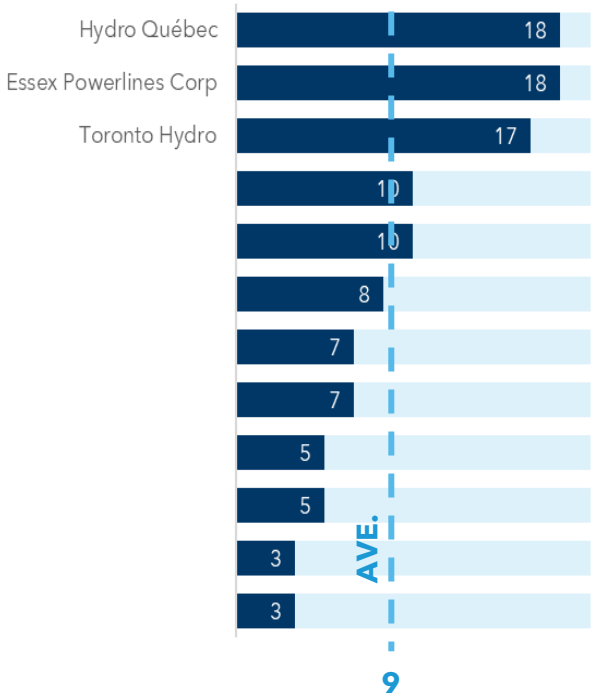
2.4 Innovation & Emerging Technologies. Funding and/or spending on innovation, research and innovative pilots.

2.5 Climate Resiliency. Actions taken to fortify the grid to protect critical infrastructure and/or services during extreme climate events.

1 Modern Grid

2.1 ENHANCED GRID PLANNING & MANAGEMENT

POINTS AVAILABLE **20**



Grid planning must evolve to manage a complex mix of diverse, distributed and intermittent resources, and address increasingly localized grid challenges. This includes updating load forecasting practices to enhance their granularity and ultimately may require reframing utilities' roles, from one-directional to bidirectional operators.

- **As of 2021, all but one utility were modernizing or enhancing their load forecasting tools and processes to account for renewable growth, climate change, and/or vehicle electrification.** Several utilities were working with consultants and specialized service providers. Some utilities reported facing challenges calibrating existing studies and tools to their local contexts and customers.
- **Three quarters of utilities had DER forecasting capabilities**. Of these, two thirds relied on basic, top-down forecasts, with only three utilities – including at least one small utility – using bottom-up or advanced modelling to forecast DER adoption.
- **Most load forecasts were at the system level and on an annual or seasonal basis**, but two utilities – including at least one small utility – generated load forecasts that are both localized (at the bus level) and on a year-round, hourly basis ("8760", for the number of hours in a year) to capture the increased pressure on their distribution systems.
- **Half of assessed utilities were actively updating their operational model in the context of the energy transition**, for instance by developing a "Grid Transformation Roadmap". The other half had not laid out a comprehensive plan as of 2021.[1] Moreover, only two utilities were explicitly planning changes to their business model, such as transitioning to a Distribution System Operator (DSO) model – see leader spotlight for an example.

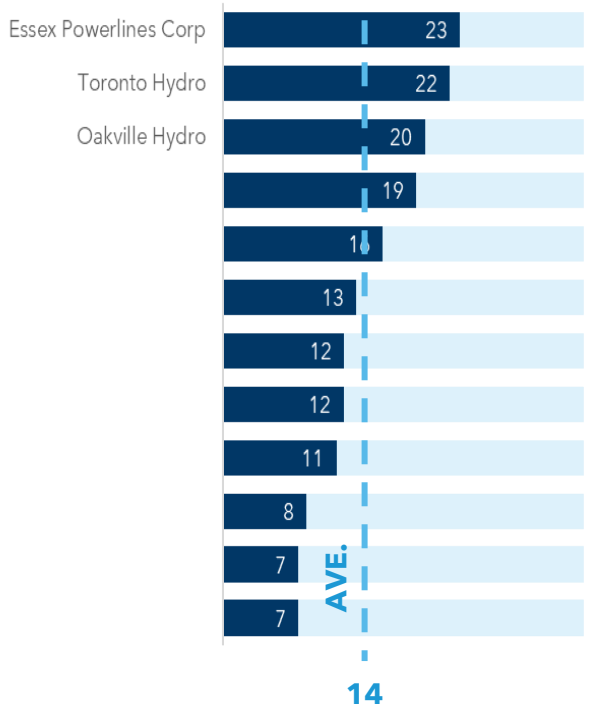
ESSEX POWERLINES CORP.: Essex implemented advanced temporal and spatial forecasting capabilities providing year-round hourly load forecasts. Moreover, their *SmartMAP* application, connected to their main dashboard, detects EV's and DER enhancing visibility of localized network impacts. Essex's 2021 application to the IESO Grid Innovation Fund outlines a roadmap to transform into a DSO.

[1] Some Ontario utilities pointed to the IESO's 2019 report about "Structural Options for Ontario's Electricity System in a High-DER Future", see https://ieso.ca/Sector-Participants/IESO-News/2019/06/ETNO-releases-report-on-system-options-in-a-high-DER-future.

2 Modern Grid

2.2 DER ENABLEMENT & INTEGRATION

POINTS AVAILABLE **35**



To support the transition, utilities will need to integrate more DERs, consider non-wires alternatives (NWAs), address peak demand and system capacity, incorporate energy efficiency (EE) and demand response (DR) initiatives, streamline and improve DER interconnection processes, and manage the distribution system.

- **Few utilities – principally vertically integrated crown corporations – had a mandate for delivering EE and DR programs and savings**. In several provinces, public agencies or system operators administer programs, if any. Scores here are thus based on provincial savings as a percentage of domestic electricity sales (GWh) or annual peak demand (MW). Savings were highest in ON (0.75% of sales, 7.5% of peak) and QC (0.75% of sales, 4.5% of peak), followed by SK for peak savings (2%) and by AB, NB and BC for energy savings (0.5-0.6% of sales). By contrast, leading American states achieve over 2% of sales in savings.[1]
- **As of 2021, no utility had developed a comprehensive process for valuing DERs as NWAs**. Half had conducted preliminary research, for instance developed an "NWA staff toolkit" or "DER Value Registry", or reviewed approaches in other jurisdictions. The other half had not yet undertaken any steps.
- **No utility used DERs for ancillary services**. Two utilities in deregulated markets (AB, ON) were awaiting regulatory enablement to do so, while one large utility was running pilots (black start, frequency regulation).
- **Two thirds of utilities had a DER strategy or roadmap**, **though the level of detail varied** from basic documents to comprehensive, costed plans. Some DER strategies were integrated into a wider transformation vision (e.g., a grid modernization roadmap). The remaining third of utilities – of various sizes – had no formal plan or strategy related to DERs.
- **Interconnection processes and timings for small-to-medium renewable projects varied across and within jurisdictions, with no harmonized steps.** Timelines range from 14 days to 3 years (avg of 150 days) for medium-scale projects of 10 kW to 5 MW, and from 1 day (automatic approval) to 365 days (avg 61 days) for small projects below 10 kW. Two thirds of utilities were actively working to reduce these times. Measures include distributed generation maps, customer journey maps, restricted feeder lists, developer manuals and outreach.

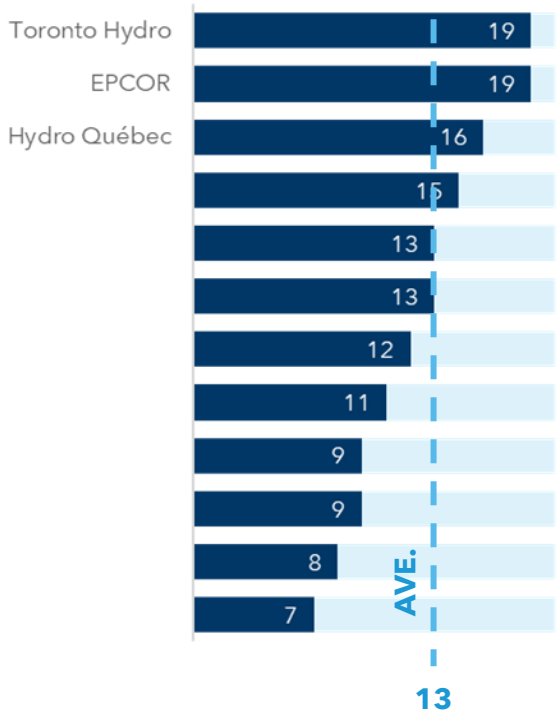
OAKVILLE HYDRO: Oakville Hydro's distribution plan was reviewed by third party consultants to assess DER/NWA opportunities as alternatives to planned grid investments. Additionally, all 12 micro-embedded generation facilities added to the local grid in 2021 were connected within planned timelines.

[1] Data for Canada from Efficiency Canada's 2022 Canadian Energy Efficiency Scorecard (data for 2021), and for the United States from the ACEEE State Energy Efficiency Scorecard: 2021 Progress Report, p.17 (data for 2020).

2 Modern Grid

2.3 VISIBILITY & CONTROL CAPABILITIES

POINTS AVAILABLE **20**



To effectively and safely operate increasingly diversified grids, utilities need an advanced understanding of assets' locations and capabilities. This requires enhanced visibility and control capabilities, using software solutions (e.g., AMI, ADMS, SCADA), and distribution automation.

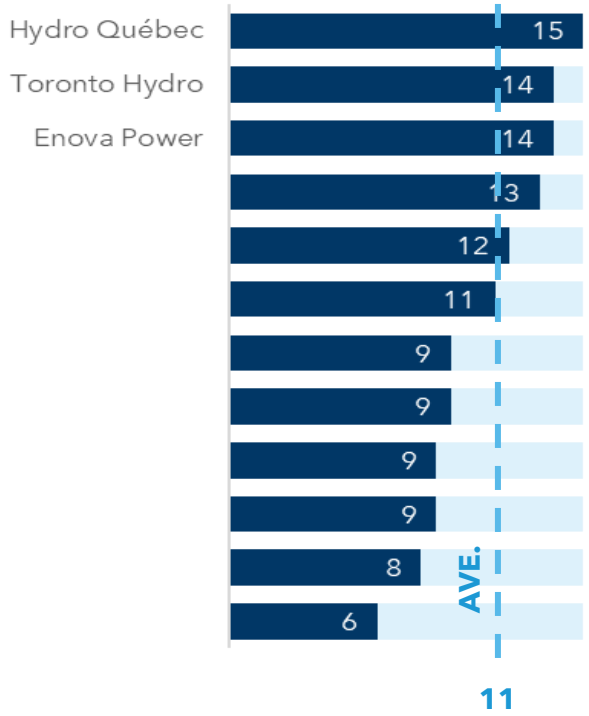
- **AMI deployment is very advanced across Canada**. As of 2021, all but two utilities had deployed AMIs to 90+% of customers. Both remaining utilities were planning mass deployment, although a global microchips shortage slowed plans in one case.
- **Just over half of utilities leverage AMI capabilities beyond basic metering**, such as two-way control (e.g., remote disconnection), outage detection, power quality analysis, energy theft detection, etc. The remainder of utilities had either metering-only capabilities or did not have AMIs.
- **Only two utilities had deployed DER Management Systems (DERMS)**, with two other utilities in advanced planning stages. Utilities using or considering DERMS were more likely to be large. Utilities were primarily drawing on DERMS from external service providers, with some using funding from Natural Resources Canada (NRCan) to support DERMS deployment.
- **All except one (small) utility had deployed a Supervisory Control and Data Acquisition (SCADA) system as of 2021 or were about to do so**. Some utilities had deployed SCADA for their transmission system only and were only about to deploy it at the distribution level.
- **Three quarters of utilities had deployed an Advanced Distribution Management System (ADMS)** as of 2021 or were about to do so. Only three utilities had no ADMS or short-term plans to deploy one, ranging across different provinces and size categories. Moreover, several utilities of various sizes have recently deployed Fault Location Isolation and Service Restoration (FLISR) technology.

EPCOR: Over 99.9% of customers have AMI, and EPCOR has deployed ADMS, SCADA, and DERMS. The DERMS was supported by NRCan funding in 2018 and was being tested with the integration of E.L. Smith solar farm and a Battery Energy Storage System (BESS).

2 Modern Grid

2.4 INNOVATION & EMERGING TECHNOLOGIES

POINTS AVAILABLE **15**



Innovation, deployment of new technologies, strategic investments and collaboration with external partners will be needed to overcome today's challenges and achieve net zero by 2050.

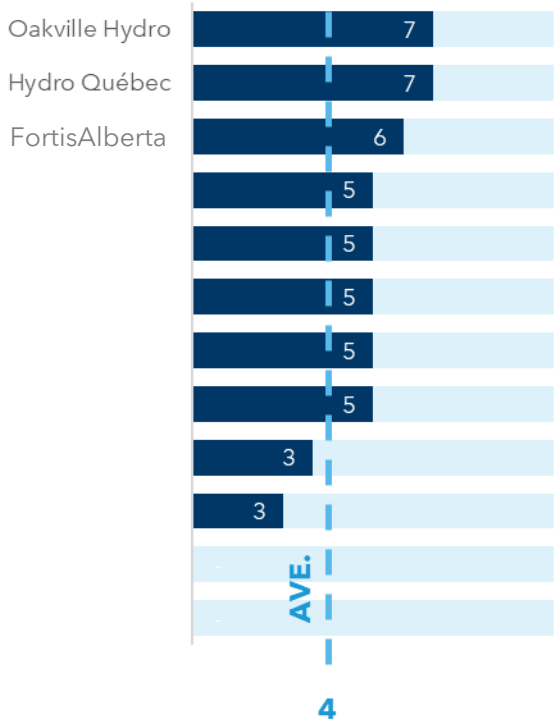
- **Two thirds of utilities had dedicated envelopes for innovation and research in 2021**, with a third spending more than 1% of revenue, another third less than 1%, and the final third unable to provide a figure as costs were distributed across multiple budget lines and not earmarked for "innovation" specifically.
- **Large utilities are more likely to afford dedicated research and innovation budgets** (e.g., Hydro Québec's research division), but one medium and one small utility also had large innovation budgets. Several are leveraging innovation funding, such as the IESO's Smart Innovation Fund, or NRCan's smart grid funding.
- **All but two utilities had a dedicated innovation resource team or staff member**. Innovation is sometimes, but not always, explicitly part of the role description, with one utility for instance describing its Grid Transformation Team as its innovation lead. The two remaining utilities noted they pursue innovation in a cross-cutting way, without a designated resource.
- **All but two utilities demonstrated practical applications of their investments into visibility and control capabilities**, such as improved geographic information systems (GIS), data and enterprise analytics, system interoperability (GIS, ADMS, SCADA, AMI), DER mapping, or outage management (see leader spotlights). However, the value of these applications could rarely be quantified.
- **All but one utility were running innovative pilots/projects as of 2021**, with innovation defined relative to their context. Initiatives include process innovations (robotic process automation, data visualization tools), program innovations (EV demand response pilot, smart water heater pilots), organizational innovations (transitioning towards an integrated distribution system operator role), and asset-based innovations (mobile battery energy storage system, use of optical ground wire as both transmission neutral wire and internet cable).

ENOVA POWER: Enova established an Innovation and Business Transformation department and created a Manager of Innovation position. A formal innovation strategy is under development and an additional resource is planned to assist advance innovation and new technologies. Already, the implementation of a Fault Location Isolation and Service Restoration (FLISR) technology led to a 33 percent decrease in Customer Minutes of Interruption in 2021 for residents in Waterloo, Woolwich and Wellesley.

2 Modern Grid

2.5 CLIMATE RESILIENCY

POINTS AVAILABLE **10**



As our climate changes, utilities will need to anticipate, plan for and mitigate impacts to critical infrastructure that can affect their ability to deliver safe and reliable service. Utilities' must also consider their exposure to climate risk, which could impact their financial risk rating.

- **As of 2021, three quarters of utilities were pursuing several actions to protect critical infrastructure and services during extreme climate events**. Actions include developing a climate adaptation and management plan, setting up a storm operations center, reducing vegetation risk, modifying pole design to withstand more extreme or frequent weather events (ice storm, fires, floods), modifying materials (composite poles, stainless steel transformers), oversizing equipment, funding battery storage in remote areas, etc. One (large) utility cited its ISO 14001:2015 certification in this regard, as well as using the Public Infrastructure Engineering Vulnerability Committee Protocol developed by Engineers Canada.
- **However, initiatives are rarely part of an integrated plan**. Only a few utilities have developed a comprehensive plan, such as the "Climate Adaptation and Management Plan" or the "Climate Change Adaptation Roadmap" developed by one medium and one large utility, respectively.
- **Moreover, only a third of utilities explicitly consider climate change scenarios in their planning processes**. While several utilities report on climate change risks and some consider climate change in weather forecasts (wind, rain), only four utilities (one small, one medium, two large) have incorporated scenario analysis into their planning. The most elaborate analyses were undertaken by utilities which have made an organizational commitment to analyse and report risks against global standards, for instance Fortis BC and FortisAlberta (see leader spotlight).

FORTISALBERTA: A Task-Force on Climate-Related Financial Disclosures (TCFD) report was completed in 2021. The TCFD analyzed four climate scenarios and their possible impacts (transition, physical climate risks). FortisAlberta has since developed asset management programs to build grid resiliency (e.g., Wildfire Risk Mitigation Plan with specific actions).

Modern Grid: Additional Spotlights

EQUS REA: Since 2018, EQUS REA has deployed a next generation Ultra-Rural Radio Frequency mesh network of advanced metering infrastructure to automate meter readings, and support the increased penetration of renewable energy sources, EV charging stations, and storage systems. The project aims to address challenges associated with serving rural customers while improving response times and repairs to outages. Separately, EQUS inaugurated a new near net-zero facility in Innisfail in 2020, which incorporates a solar array and a 15-kilowatt battery.

2 Modern Grid

2.1 Enhanced Grid Planning & Management	2.2 DER Enablement & Integration	2.3 Visibility & Control Capabilities	2.4 Innovation & Emerging Technologies	2.5 Climate Resiliency

NB POWER: NB Power is taking several climate resiliency actions to protect critical infrastructure and/or services. For example, both transmission and distribution have right of way line widening programs to reduce vegetation risks, transmission line designs consider expected weather events, and distribution line standards ensure structure designs do not exceed 75% of structure strength (to provide buffer for ice loading, etc.). Salt contamination zones due to potential flooding are defined, and special design considerations and materials are used in these areas.

Composite poles are being implemented through pilots in 2023.

Customers & Society: Overview

3 Customers & Society

3.1 Changing Customer Preferences	3.2 Enabling Transport, Building & Industry Electrification	3.3 Being Intentional About Diversity, Equity & Inclusion	3.4 Aligning Actions & Engagement

Electrification presents a significant economic opportunity for Canada's electric utilities. New technologies and platforms are increasing customers ability to participate in the energy transition and utilities can play an important role to educate, engage and enable customers to electrify their buildings, transportation and industry. Comprehensive and meaningful stakeholder engagement must be part of the process to inform all decisions, empower customers, obtain support and buy-in and ensure a just and equitable transition.

Under Customers & Society, we assess utilities on the following:

3.1 Changing Customer Preferences. Digital platforms, rate-based solutions, and awareness, education and energy services.

3.2 Enabling Transportation, Building & Industrial Electrification. Comprehensive electrification strategies and initiatives to catalyze transportation, buildings and industrial electrification.

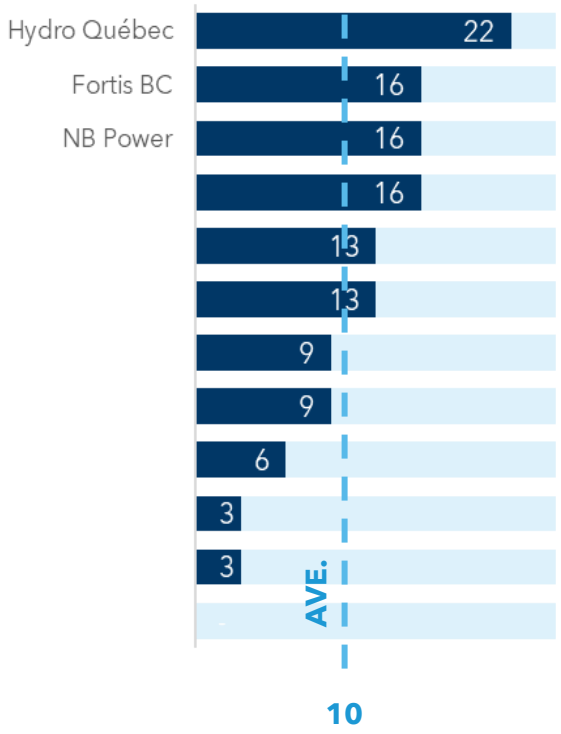
3.3 Being Intentional About Diversity, Equity & Inclusion. Diversity, equity and inclusion goals and actions to ensure a diverse and inclusive workforce and mitigate impacts to vulnerable populations.

3.4 Aligning Actions & Engagement. Alignment, strategic partnerships and collaboration to facilitate the transformation

3 Customers & Society

3.1 CHANGING CUSTOMER PREFERENCES

POINTS AVAILABLE **25**



Utilities have an important role to play in raising awareness and empowering their customers to participate in the clean energy transition. This includes offering tailored products and services that enhance customer experience.

- **As of 2021, most utilities offered portals that allowed customers to view their consumption, but less than half offered additional support to help customers to act on the data**. Only four utilities offered digital engagement tools to support energy efficiency and building energy benchmarking, such as Home Energy Reports, Energy Star Portfolio Manager, Green Button,[1] or an online rebate marketplace.
- **Canada was split in terms of dynamic pricing, with half the reviewed jurisdictions/utilities offering it**. All Ontario utilities as well as two other utilities offered dynamic pricing. The other six utilities had yet to introduce rate-based solutions or investigate cost-drivers that could influence consumer behavior.
- **All utilities worked to build awareness and educate customers on the clean energy transition**. All offered basic education to engage customers, such as dedicated webpages for EVs, DERs and/or energy saving tips, media campaigns, bill inserts and tools/resources (e.g., developer manuals). One leading utility offered information in multiple languages and established an Indigenous customer care center. In one jurisdiction, utilities flagged that they had filed regulatory requests to support education initiatives but were denied.
- **Half the utilities were delivering services and solutions to remove barriers to increased electrification and efficiency**. Solutions included incentive programs for EVs and building efficiency, investments in charging infrastructure, renewable subscription services for commercial and industrial customers to buy renewable energy certificates to support their own carbon reduction targets, heat pump and smart thermostat programs. Some utilities were working with clean tech companies and seeking external funding to explore, pilot and/or design new initiatives (e.g., renewable generators, energy storage systems).

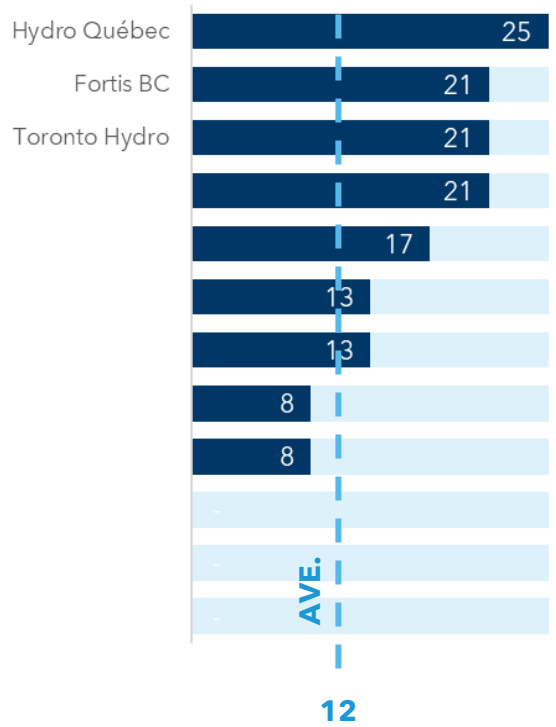
NB POWER: NB Power offers personalized energy management and peer-to-peer comparisons (e.g., Home Energy Reports and Energy Start Portfolio Manager). NB Power also launched new initiatives (e.g., Beat the Peak campaign and EV charging rebates) and is developing others, including a clean energy rate.

[1] The Green Button initiative is an industry-led effort that aims to provide utility customers with easy and secure access to their energy usage information in a consumer-friendly format for electricity, natural gas, and water usage.

3 Customers & Society

3.2 ENABLING TRANSPORT, BUILDING AND INDUSTRY ELECTRIFICATION

POINTS AVAILABLE **15**



As the grid decarbonizes, utilities should help to enable transportation, buildings and industrial electrification. To do so effectively requires careful planning and thoughtful discussion to identify and maximize opportunities.

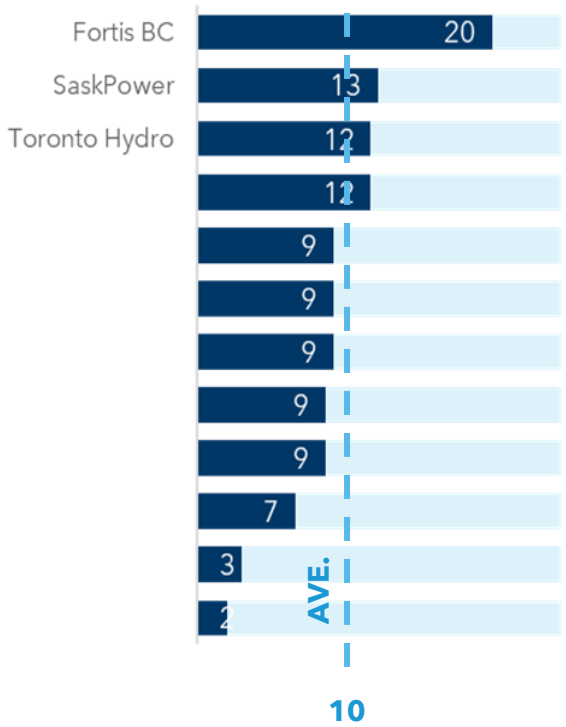
- **Only half the utilities had developed electrification strategies, and only two had done so in a comprehensive multi-sector way.** One utility had centered its strategic plan on enabling the electrification of the local economy, while another had developed a climate action plan that considers the role of the utility in supporting actions, like electrification, that combat climate change and spur equitable economic growth. Four other utilities had draft electrification strategies and the remaining six utilities had no plan as of 2021.
- **Most utilities were undertaking actions to enable electrification, but often in a siloed or *ad hoc* manner.** Nine utilities offered programs or services to catalyze electrification, for instance dedicated account managers supporting large customers with building or transport electrification, or pilot projects related to EV smart charging or tariffs. Of the nine utilities with services, four focused on electrification in only one sector (e.g., transportation or buildings), rather than across multiple.
- **Electrification in certain sectors is challenging, and several utilities are pursuing hybrid approaches**. One utility is partnering with a gas utility to encourage a dual-fuel approach for peak demand management along with a dual-energy rate. Another is investigating hybrid systems while focusing on decarbonizing the gas supply for thermal applications.

HYDRO-QUÉBEC: A key pillar in Hydro Québec's 2020-2024 Strategic Plan is to Electrify Quebec. Hydro Quebec subsidiaries (EVLO, Hilo, Cléo) offer energy storage, smart energy management and transportation electrification solutions that help reduce GHG emissions, while generating economic spin-offs and collective wealth across the company and society.

3 Customers & Society

3.3 BEING INTENTIONAL ABOUT DIVERSITY, EQUITY & INCLUSION

POINTS AVAILABLE **25**



The energy transition could disproportionately impact vulnerable communities unless utilities actively assess and consider the community impacts and prioritize and entrench equity in all decisions. Currently, Canada's electricity workforce has lower representation of women, BIPOC (black, indigenous and people of color), persons with disabilities, 2SLGBTQI+, and newcomers than what is reflected in the general population.[1] Establishing diversity, equity and inclusion (DEI) goals and actions, setting targets and tracking progress are necessary to create a diverse and inclusive workforce and to ensure a fair, just and equitable transition for all.

- **As of 2021, all but one utility had some kind of workplace DEI policy or strategy – but only five were comprehensive**, with baselines, representation targets, training, and dedicated DEI communications. Four utilities were signatories to the Leadership Accord on Diversity, Equity and Inclusion developed by Electricity Human Resources Canada, making a public commitment to advance, integrate and prioritize DEI. Others have achieved or are pursuing the Canadian Council of Aboriginal Business (CCAB) Progressive Aboriginal Relations (PAR) certification. The remaining half of utilities had only draft/basic plans, or no plan at all.
- **Community-wide DEI strategies, goals and targets were less common or clear, and there were few mechanisms to track progress and impacts.** Only one utility had a comprehensive strategy. Eight utilities offered underserved community programs (e.g., low-income, First Nations, multifamily, small business), with programs ranging from self-install energy saving kits to comprehensive turnkey solutions at zero upfront costs. Several utilities did not offer programs, but not always for lack of desire: one utility's regulatory application for a "Low Income Energy Efficiency Initiative" was rejected.
- **None of the benchmarked utilities or provinces spent 20+% of their Demand-Side Management (DSM) portfolio budgets on programs for vulnerable sectors in 2021.** Leading utilities in other jurisdictions have committed or been mandated to allocate 20% of DSM portfolio spend towards low-income programs.[3] This recognizes that different levels of investment and types of services and supports are needed to achieve the same outcomes for those most vulnerable.

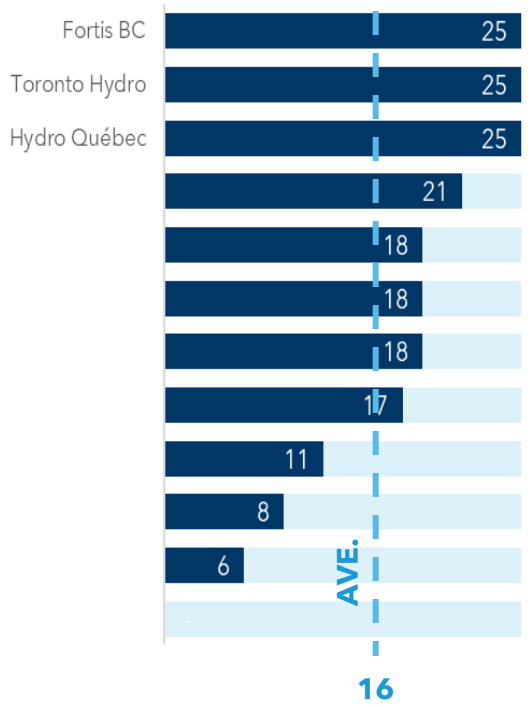
1 See https://electricityhr.ca/
2 The state of New York requires that 20% of any energy efficiency investments through the utilities be directed to the LMI market segment. For the 2017–21 District of Columbia program cycle, low-income spending requirement was 20% of expenditures. See Subramanian, S., W. Berg, E. Cooper, M. Waite, B. Jennings, A. Hoffmeister, and B. Fadie. 2022 State Energy Efficiency Scorecard. Washington, DC: ACEEE. www.aceee.org/research-report/u2206.

SASKPOWER: SaskPower has a robust Diversity & Inclusion Strategy, which outlines numerous initiatives, such as Advancing Women in Leadership and Trades, Indigenous Employees Network, Pride Employee Resource Group, Employees with Disabilities Network, Cultural Diversity Group, Women's Resource Group; and PowerGen (leadership development network) It also outlines a communications and tracking plan.

3 Customers & Society

3.4 ALIGNING ACTIONS AND ENGAGEMENT

POINTS AVAILABLE **25**



Aligning goals and conducting comprehensive engagement with a wide range of stakeholder groups is needed to ensure success. Engagement must be proactive, iterative and inclusive around key topics (e.g., clean energy, modern grid, electrification). This will help utilities to understand stakeholder needs and motivations; identify challenges, innovative solutions, and potential partnership opportunities; support decisions, and obtain buy-in for new investments and approaches required to meet net zero goals.

- **Only three utilities completely aligned with government climate ambition, while seven were partially or indirectly aligned.** There is large alignment by nature at utilities owned by provincial and municipal governments in Canada. In most cases, a municipality is the sole shareholder, and three utilities are crown corporations. Utilities that received lower scores in this metric are in jurisdictions that have noticeably lower GHG emissions objectives and no regulator and utility mandates. Utilities need clear direction from governments, regulators and system operators to focus planning and investments on net-zero pathways and expand their efforts beyond maintaining and decarbonizing the grid to increasing clean-electricity economy-wide energy use.
- **Utilities are increasingly proactive in collaborating with other stakeholders**, such as local and provincial governments, energy efficiency organizations, electricity systems operators and regulators to advocate for and advance clean energy, grid modernization and electrification. While all utilities had integrated resource planning engagement processes, only four had comprehensive engagement plans specific to the energy transition. Leading utilities had robust public relations/engagement and policy teams to proactively and deliberately engage on climate, regional planning and electrification. Five utilities only had a draft or basic engagement plan, while two had no plan.

TORONTO HYDRO: Toronto Hydro is working with the IESO on pilots and participates in numerous stakeholder sessions about the energy transition, DERs, NWAs, and regional planning process with other utilities. Toronto Hydro also works closely with the City of Toronto; Toronto Hydro's Climate Action Plan that details how they can support the City's Net Zero Strategy.

Customers & Society: Additional Spotlights

ONTARIO: All Ontario utilities offered time-of-use and tiered pricing. Price signals charge higher rates during peak periods and lower rates at off-peak hours to encourage customers to reduce their consumption and lower electricity costs by shifting their usage to lower price periods. Tiered pricing charges customers higher prices when consuming more.

A new ultra-low overnight rate was introduced in Ontario in 2023 for customers that use more electricity at night, including shift workers, those that heat their home or charge their electric vehicles at night to save money when peak demand is lower.

3 Customers & Society

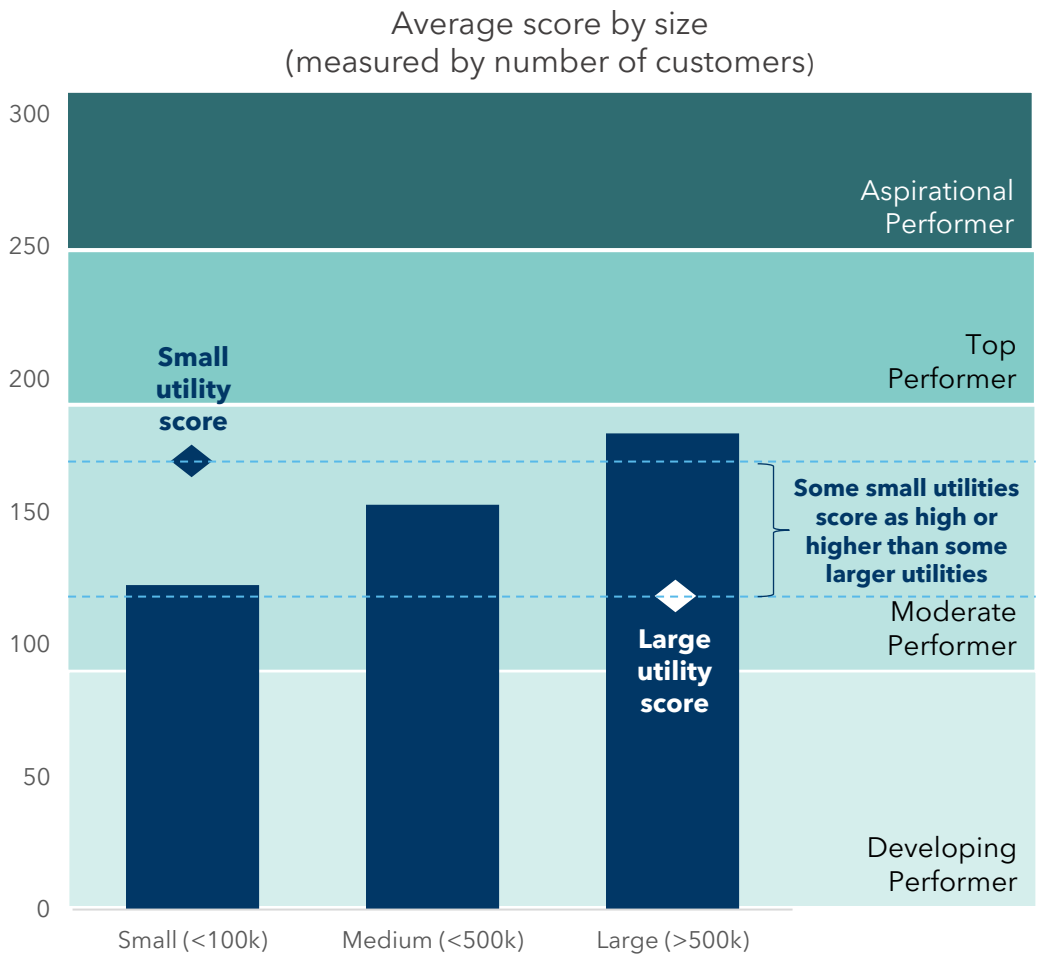
- **1.1** Changing Customer Preferences
- **1.2** Enabling Transport, Building & Industry Electrification
- **1.3** Being Intentional About Diversity, Equity & Inclusion
- **1.4** Aligning Actions & Engagement

EPCOR: EPCOR's 2021 comprehensive Environmental, Sustainability and Governance (ESG) Plan has established workplace DEI commitments and reports on the organization's progress. EPCOR has set targets at all levels across the organization and achieved or came close to achieving them in 2021. For example, the plan sets a Board Gender Diversity Target (at least 40% board are women), as well as an Employee Ethics Training Target (100% of eligible employees trained every second year).

Although no targets were set in 2021, EPCOR also reports on Diverse and Representative Workforce metrics (e.g., percentage of women, visible minorities, and women in senior leadership).

Utilities' average scores can be influenced by size, how clean the grid is, and ownership structure; however, these variables are not always indicators of success. Each utility is demonstrating leadership in various metrics and across the three main categories

- **SIZE:** Larger utilities tend to score more points, as they likely have more financial and non-financial resources to plan, execute, innovate and adopt best practices. However, some small utilities do well due to a combination of local innovation, jurisdictional opportunities and leveraging external funding sources. For example, one of the four small utilities achieves the fourth-best overall score.
- **GRID:** Utilities in jurisdictions with cleaner grids score higher on average. Those with already clean grids have a natural advantage in the clean energy supply category; however, this trend also applied to the two other dimensions (modern grid and customers & society). This may be because utilities with already-clean grids are able to devote attention elsewhere.
- **OWNERSHIP:** Crown corporations score highest on average, partly driven by their size, followed by municipally owned utilities, some of which are small. These utilities are organically aligned with government and community objectives.



Note: given the limited number of participating utilities, no statistically significant conclusions can be drawn about correlations or causations between performance and any utility characteristics.

4. Key Takeaways & Considerations

Ten Key Insights from the Results

INSIGHT 1	**Canadian utilities have embarked on the energy transition journey**. They recognize the climate emergency and have established plans to reduce emissions. While utilities are at various stages in the transition, every benchmarked utility demonstrated leadership in certain areas.
INSIGHT 2	**More effort is needed.** The pace and scale required to meet our net zero goals by 2050 and avoid the worst climate change impacts, requires greater leadership and ambition, comprehensive decarbonization and electrification strategies, detailed inclusive roadmaps, and the tools and resources to act. The clock is ticking; without accelerated action, several actors will be challenged to achieve their targets.
INSIGHT 3	**Utilities are a diverse group, which must be considered when comparing scorecard results, opportunities and solutions.** Utilities vary in terms of size, structure, services, context, and control over their environment. We must recognize this diversity when interpreting the results and crafting policy and/or regulations that will affect utilities. Where possible, utilities and others can leverage diversity of thought and approaches to adapt innovative solutions to their unique context. Jurisdictions with less clean grids will require substantial and coordinated support to quickly live up to their own goals, and in some cases, even more ambitious federal targets.
INSIGHT 4	**Utilities are facing a massive transformation**. An already complex electricity system is under greater pressure to continue to deliver safe, affordable and reliable electricity along with being clean, resilient and equitable. If not managed carefully, this transformation could leave some groups – including some utilities and their communities – behind.
INSIGHT 5	**Utilities can't do it alone and current government commitments and regulatory structures have constrained some utilities**. Government and regulators must give utilities concrete climate targets, direction and support to guide their net-zero pathways. Utilities need latitude to implement needed action and support to make significant investments to balance DER integration, facilitate greater electrification and resiliency, and enable customers to contribute to, and benefit from, the transition. In many cases, legislation and regulation needs to evolve to enable utilities and financial support is needed to complement utility investment.

Ten Key Insights from the Results

INSIGHT 6	**Utilities need a comprehensive strategy that covers all three dimensions of this transition**. All the scanned utilities are making progress and demonstrating leadership in certain areas, but more work is needed to effectively address and coordinate actions across all elements of the clean energy transition.
INSIGHT 7	**Distribution-oriented utilities have historically not been the main drivers of grid innovation but will become increasingly important as gateways for the integration of DERs into the grid**. As such, utilities will require considerable support (policy, regulatory, financial, technological) to increase deployment of, and leverage, DERs, including valuing DERs in ancillary services. Canada lags American and European jurisdictions in enabling and leveraging distributed grid flexibility.
INSIGHT 8	**Utilities are anchored in their communities and are thus valuable partners to relay information both ways**. It will be important for utilities to communicate messaging related to the energy transition to partners and customers and provide diverse services and solutions to help customers participate in, and contribute to, the transformation. Vice-versa, utilities can communicate customer needs, expectations and reactions to policy-makers to inform future policy.
INSIGHT 9	**More attention needs to be paid to equity implications of the transition**. Utilities are actively considering equity in the workplace to ensure that it is diverse and inclusive, but internal action has not yet translated to community-wide equity impacts and strategies (e.g., several utilities have set internal diversity targets and implemented actions, but most have yet to study community needs and establish comprehensive strategies to measure and mitigate the transition's impact on those most vulnerable).
INSIGHT 10	**Ultimately, the clean energy transition presents a significant opportunity for electric utilities and society**. Utilities' core service – deliver clean, safe, reliable and affordable electricity – is at the heart of the energy transition and set for significant growth. By becoming more sustainable, resilient, and efficient, electric utilities can contribute to communities' as well as to their own prosperity.

1 Clean Energy Supply

53/100

AVERAGE SCORE | High (80%+) | Mid (50-80%) | Low (>50%)

Reviewed utilities are at different stages of their decarbonization journeys, levels of commitment, degree of control over their supply and experience integrating variable clean resources at scale. While some benefit from existing non-emitting resources, others have only just begun the transition. Without bold leadership and accountability, utilities may be challenged to meet their corporate and community goals.

1.1 Planning & Designing to Decarbonize the Grid — 21/35

- Most jurisdictions had varying clean grid goals and timelines to achieve. These are often set provincially versus by utilities.
- Without commitment and accelerated action, several utilities will be challenged to meet federal clean energy regulations by 2035. Ontario demonstrates that procurements of fossil-based resources will continue in the absence of clean grid targets.
- As of 2021, almost all participating utilities have undertaken preliminary net-zero pathway assessments; however, few with clean grid goals had outlined a comprehensive plan to achieve these.

1.2 Clean Energy Procurement & Deployment — 18/35

- The share of provincial non-emitting generation varies widely, ranging from 15% to 99%. Jurisdictions with existing hydro and nuclear power have a natural advantage.
- Renewable energy procurement varies. While half of provinces studied procured renewable generation exclusively, 2 had some dedicated renewable procurements, and 1 (AB) did not earmark any.
- Distribution utilities rely on the state of the provincial grid with little control over the pace or scale of grid decarbonization, which affects scores (positively or negatively). However, they are expected to play an increasingly important role as a DER gateway into the grid.
- Several utilities were pursuing initiatives to reduce clean technology deployment barriers like information-sharing, integrated interconnection approaches, and transmission investments.

1.3 Integration of Clean Energy Supply — 6/15

- Canada appears “behind” in this metric, with a low average score.
- Most benchmarked utilities had limited to no experience with large-scale renewable projects (> 5MW). For those that did, approval times varied; thus, no ‘typical time’ could be established. Utilities explored opportunities to improve/streamline processes, for instance through customer journey mapping exercises.
- DER access to ancillary services payments remained limited across all utilities in 2021. While some were exploring how to integrate DERs into ancillary services markets, regulatory or market barriers remain.

1.4 Corporate Leadership — 8/15

- Corporate emission reduction targets and plans have become the standard, but the nature of plans vary. Smaller utilities tended to focus on isolated initiatives, while larger utilities had more comprehensive environmental, social and governance (ESG) plans and objectives. However, the level of accountability and quality of reporting varied widely.
- Most utilities had corporate decarbonization targets for their own buildings and fleet, but the target depths and timeframe differs (e.g., net zero by 2030, 2040 or 2050). Three have interim decarbonization targets without a net zero commitment and four (mostly small) have none.
- Tying executive performance and compensation to clean grid goals is limited across most utilities.

2 Modern Grid

51/100

AVERAGE SCORE High (80%+) | Mid (50-80%) | Low (>50%)

Canadian utilities are in the process of upgrading their grids and grid capabilities. Most are following incremental pathways, with only a few pursuing transformational visions. Overall, there remains a gap between the roadmaps, innovative pilots, and control system investments, and the limited amount of actual DER enabled and integrated.

2.1 Enhanced Grid Planning & Management — 9/20

- Modernizing load forecasting to account for DERs, climate change, and electrification was common. External service providers, tools and studies are useful, but must be calibrated to local contexts.
- Most utilities took a basic, top-down approach to DER forecasting, while leading utilities used bottom-up or advanced modelling to forecast adoption.
- Most load forecasts were at the system level and seasonal; leading load forecasts were localized (at the bus level) and on a year-round, hourly basis to better capture distribution system impacts.
- Many utilities focused on changing operational models in the context of the energy transition; however fewer are explicitly planning changes to their business models.

2.2 DER Enablement & Integration — 14/35

- Demand side management (DSM) responsibilities vary. Vertically integrated Crown Corporations are typically responsible for DSM. Conversely, DSM was non-existent in some provinces.
- No utility had a comprehensive process for valuing DERs as NWAs.
- DER access to ancillary services markets was limited. A few utilities were awaiting regulatory approvals or in an exploratory pilot phase.
- Interconnection processes and approval times for small-to-medium renewable projects varied widely across jurisdictions. There are opportunities to improve and/or streamline.

2.3 Visibility & Control Capabilities — 13/20

- Visibility and control capabilities were advancing and expected to continue to grow.
- All but two utilities had deployed AMIs to 90+% of customers. Most utilities had access to AMI capabilities beyond basic metering, such as power quality analysis.
- Similarly, most utilities had deployed an Advanced Distribution Management System (ADMS) and Supervisory Control and Data Acquisition (SCADA) as of 2021.
- Other systems like DER Management Systems (DERMS) and Fault Location Isolation and Service Restoration (FLISR) technology were less common but growing.

2.4 Innovation & Emerging Technologies — 11/15

- Most utilities had dedicated research and innovation envelopes in 2021, and a dedicated innovation team or staff. A third were unable to provide a figure as innovation resources are distributed across multiple budget lines.
- Large utilities are more likely to afford dedicated research and innovation budgets, with some allocating over 1% of overall revenue to research and development.
- Running innovative pilots/ projects related to process, automation, programs, organization, and/or technology was common in 2021, with innovation defined relative to their context (i.e., what is innovative to one utility may not be innovative to another).

2.5 Climate Resiliency — 4/10

- Most utilities were pursuing actions to protect critical infrastructure and services during extreme climate events (e.g., Storm Operations Center, funding battery storage in remote areas, adding remote sensing and control devices).
- However, initiatives were in many cases siloed. Only some utilities had comprehensive Climate Adaptation and Management Plans.
- While several utilities report on climate change risks and/or consider climate change in weather forecasts, few considered explicit climate change scenarios in their planning processes, potentially exposing them to greater climate, operational and financial risk

3 Customers & Society

48/100

AVERAGE SCORE | **High (80%+)** | **Mid (50-80%)** | **Low (>50%)**

Utilities are increasingly engaging with key stakeholders to transform the electricity system. While few had developed comprehensive electrification strategies, many had focused on electrification in specific sectors. Many utilities considered equity within their organizations to varying degrees; vulnerable community groups will need to be prioritized to ensure an equitable transition.

3.1 Changing Customer Preferences

10/25

- While basic digital platforms with consumption and billing data are commonplace, tailored customer reports that support action, such as Home/Business Energy Reports, are offered by only a few utilities.
- There is partial penetration of dynamic pricing (e.g., time of use, tiered pricing) to encourage customers to reduce their consumption and lower electricity costs.
- All utilities delivered basic education and awareness campaigns through traditional channels, while leading utilities worked to communicate more equitably (e.g., information in multiple languages, Indigenous customer care centers, hands-on customer support).
- Half of utilities delivered solutions to remove barriers, enable electrification and enhance efficiency (e.g., incentives, charging infrastructure investments, emerging technology pilots). Several utilities' efforts to offer programs were stymied by regulators.

3.2 Enabling Transportation, Building and Industrial Electrification

12/25

- Comprehensive multi-sector electrification strategies are rare. Only one utility has developed and implemented a comprehensive electrification strategy, and another had a climate action plan.
- Most utilities are helping to enable electrification in various ways, but often taking a siloed approach. Only one had a coordinated, wholistic approach that considers all sectors.
- While greater electrification is needed to meet our climate goals, there are certain economic sectors where electrification will be challenging (at least in the near-term), requiring a diverse portfolio of solutions. A few utilities are implementing and/or exploring dual fuel approaches, dual-energy rates, and hybrid systems in parallel with decarbonizing the gas supply.

3.3 Being Intentional About Diversity, Equity and Inclusion

10/25

- Canada's electricity workforce has lower representation of women, BIPOC (black, indigenous and people of colour), persons with disabilities, 2SLGBTQI+, and newcomers. While some utilities had comprehensive workplace DEI strategies and initiatives, more work is needed to breakdown systemic barriers and create a diverse, inclusive workforce.
- Community-wide DEI strategies, goals and targets were less common or unclear. Accountability mechanisms to track progress and impacts were limited or non-existent.
- Spending on programs for vulnerable and underrepresented communities varied and was below other leading North American jurisdictions that mandate minimum budget allocations for lower-income communities.

3.4 Aligning Actions and Engagement

16/25

- There is large alignment by nature with utilities owned by provincial and municipal governments.
- Utilities that received lower scores in this metric are in jurisdictions that have noticeably lower GHG emissions objectives and no regulator or utility mandates.
- Utilities are increasingly proactive in collaborating with key stakeholders to advocate for, and/or advance the clean energy transition; however, many do not have comprehensive engagement plans to guide the process.
- Leading utilities had robust public relations/engagement and policy teams to proactively and deliberately engage on clean energy and electrification.

Considerations

The clean energy transformation requires collaboration and cooperation across stakeholders. Each has a unique role to play in promoting the adoption of cleaner energy sources and transitioning towards a sustainable energy future. We outline key considerations for utilities, SGIN, and government, regulators and system operators.

Utilities	• Participating utilities can use their scorecard results to **inform internal discussion**, diagnosis, planning and prioritization, as well as to **engage external partners** whose support is needed for progress, including regulators, governments, and others. They can also draw on the **community of practice** created by this initiative to share insights, good practices and lessons learned. • Other utilities in Canada can **review this scorecard to situate themselves,** obtain guidance for their own transition and consider participating in future scorecards.
SGIN	• SGIN should **publicize the scorecard to promote its takeaways as well as awareness of the smart utility concept**. • Phase B of this initiative – the Maturity Model – will **support select participating utilities** to build on their scorecard results and improve their specific capabilities. • Phase C of this initiative – the Knowledge Hub – will make smart energy benchmarking trends, and good practices **available to a broader audience**, such as other utilities across Canada as well as policy makers, regulators, system operators, and service providers. • SGIN intends to **repeat the scorecard** to monitor progress from existing utilities and include additional utilities. Future scorecards should include indigenous and northern utilities, and may consider other relevant metrics (e.g., cybersecurity).
Government, Regulators, and System Operators	• **Governments** can use this scorecard to help inform energy- and climate-policies, regulations and goals. They must guide, support, and as needed aid utilities in undertaking necessary actions, as well as support research and public engagement. • **Regulators** ensure that utilities comply with government policies and regulations. They can use the scorecard to set regulatory frameworks and observe the impact on utilities' abilities to accelerate the energy transition. Regulatory innovations are needed to enable required investments, accelerate the adoption of new technologies, processes, tariffs and programs, and ensure that no one is left behind. • **System operators** can use this scorecard to pinpoint barriers to the integration of DERs and intermittent generation assets into the grid and wholesale markets. They play key roles in outlining clear standards and pathways for decarbonization, and in some cases, in implementing demand response and demand side management programs.

5. Appendix –
Individual Utility Scorecard Results

Category 1: Clean Energy Supply

ID	Sub Metric	Total Points[1]
Metric 1.1: Planning and Designing to Decarbonize the Grid		
1.1.1	Does the utility or their partners have clean grid goals (e.g., the Clean Energy Standard or similar clean energy penetration targets)?	5.0
1.1.2	What is the depth of the clean energy supply target (as % of MWh energy delivered)?	5.0
1.1.3	What is the timeframe to reach their clean energy supply target?	5.0
1.1.4	Does the utility have a clear roadmap to achieve its targets?	10.0
1.1.5	Has the utility followed through with their clean energy supply plan and commitments?	10.0
Metric 1.2: Clean Energy Procurement & Deployment		
1.2.1	What is the current share of clean energy (in % of MWh energy delivered) on the grid?	7.5
1.2.2	What is the current grid emission intensity (for MWh energy delivered)?	7.5
1.2.3	Has the utility or their partners released procurement opportunities and/or developed projects (if the utility builds its own generation) exclusively for non-emitting resources?	10.0
1.2.4	Has the utility demonstrated actions that reduce or remove barriers to the deployment of clean technologies (e.g., energy storage or distributed energy resources)?	10.0

1. Total points may not add up due to rounding.

Category 1: Clean Energy Supply

ID	Sub Metric	Total Points[1]
Metric 1.3: Integration of Clean Energy Supply		
1.3.1	Do clean resources have access to ancillary services payment to promote their use across all grid services such as through the utility, parent company, market, etc.?	5.0
1.3.2	What is the typical time for interconnection approval of large-scale renewable projects (5>MW)?	5.0
1.3.3	Is the utility taking steps to improve/streamline its interconnection process of large-scale renewable projects (5>MW)?	5.0
Metric 1.4: Corporate Leadership		
1.4.1	Does the utility have a corporate sustainability plan and/or initiatives (e.g., ESG plan)?	3.8
1.4.2	Does the utility have a corporate commitment to become carbon neutral in its own operations?	3.8
1.4.3	Are executives' compensation tied to a reduction in carbon emissions of clean energy supply and/or corporate operations?	3.8
1.4.4	Does the utility have a public corporate sustainability report to track progress and accountability?	3.8

1. Total points may not add up due to rounding.

Category 2: Modern Grid

ID	Sub Metric	Total Points[1]
Metric 2.1: Enhance Grid Planning & Management		
2.1.1	Is the utility modernizing or enhancing load forecasting tools and planning processes (e.g., IRPs, IDPs)?	5.0
2.1.2	Does the utility have DER forecasting capabilities?	5.0
2.1.3	At what level of granularity does the utility load forecast/planning consider the impacts of electrification/ decarbonization on load growth?	5.0
2.1.4	Does the utility have a plan, feasibility study, or assessment to consider whether changes to its business and operation model is warranted (e.g., DSO)?	5.0
Metric 2.2: DER Enablement & Integration		
2.2.1	What portion of peak demand/system capacity is represented by DR?	7.0
2.2.2	What was the average share of annual energy savings provided by energy efficiency initiatives in the utility's service area?	7.0
2.2.3	Has the utility determined the value or a process for valuing DERs as NWAs?	6.0
2.2.4	Is the utility considering DERs for ancillary services?	2.0
2.2.5	Does the utility have a formalized DER strategy and/or roadmap?	4.0
2.2.6	What is the typical time for interconnection approval for medium-scale renewable projects (10kW to 5MW)?	3.0
2.2.7	What is the typical time for interconnection approval for small-scale renewable projects (<10kW)?	3.0
2.2.8	Is the utility taking steps to improve/streamline its interconnection process for small-scale (<10kW) and/or medium-scale (10kW to 5MW) renewable projects?	3.0

1. Total points may not add up due to rounding.

Category 2: Modern Grid

ID	Sub Metric	Total Points[1]
Metric 2.3: Visibility and Control Capabilities		
2.3.1	What is the current coverage of AMIs (% of total costumer coverage)?	4.0
2.3.2	What capability does the utility have access using AMIs? (ex:, remote reading, connect/disconnect, outage detection, system voltage monitoring, IoT, etc.)	4.0
2.3.3	Has the utility deployed DERMS?	4.0
2.3.4	Has the utility deployed SCADA?	4.0
2.3.5	Has the utility deployed ADMS?	4.0
Metric 2.4: Innovation and Emerging Technologies		
2.4.1	How much is the utility funding and/or spending on innovation and research (as % of overall revenue)? (innovation is defined as outside of BAU)	3.8
2.4.2	Has the utility demonstrated applications of their investment under Visibility and Control Capabilities (AMIs, DERMs, ADMs, etc.)?	3.8
2.4.3	Is the utility running innovative pilots/projects?	3.8
2.4.4	Does the utility have an innovation resource (team or person)?	3.8
Metric 2.5: Climate Resiliency		
2.5.1	What actions are being taken to harden the grid to protect critical infrastructure and/or services during extreme climate events?	5.0
2.5.2	Is climate change included in the forecasts for the utility's planning process?	5.0

1. Total points may not add up due to rounding.

Category 3: Customers and Society

ID	Sub Metric	Total Points[1]
Metric 3.1: Changing Customer Preferences		
3.1.1	Is the utility leveraging digital platforms to engage customers?	6.3
3.1.2	Is the utility offering rate-based solutions to encourage and influence electrification and/or behaviour?	6.3
3.1.3	Is the utility providing energy services and solutions to customers?	6.3
3.1.4	Is the utility building awareness and educating its customers on clean energy issues/energy transition?	6.3
Metric 3.2: Enabling Transportation, Building, & Industrial Electrification		
3.2.1	Has the utility or their partners developed and implemented comprehensive electrification strategies that sends a clear signal to investors on the increasing need for decarbonization?	12.5
3.2.2	Is the utility or their partners catalyzing building (C&I and/or residential), transportation, and/or industrial process electrification?	12.5

1. Total points may not add up due to rounding.

Category 3: Customers and Society

ID	Sub Metric	Total Points[1]
Metric 3.3: Diversity, Equity & Inclusion Goals & Actions		
3.3.1	Does the utility have a diversity, equity & inclusion (DEI) plan or is DEI considered during the planning/decision-making process?	6.3
3.3.2	Is the utility actively engaging indigenous, low-income, or other under-served communities to ensure their voices are considered in the decision-making process for a clean energy transition?	6.3
3.3.3	How much (as a share of total revenue) is the utility investing in electrification and/or distributed energy resources (DER) programs targeting indigenous, low-income, or other under-served communities?	6.3
3.3.4	Does the utility promote diversity and inclusion in the workplace (reducing barriers and challenges for women, minorities groups, etc.)?	6.3
Metric 3.4: Aligned Actions and Engagement		
3.4.1	Does the utility have a stakeholder engagement plan that addresses related topics (i.e., clean energy, grid modernization, IRP and IDP, electrification, regulatory requirements, etc.)?	8.3
3.4.2	Is the utility undertaking proactive efforts and/or supporting initiatives within or across jurisdictions to realize the clean energy transition?	8.3
3.4.3	Has the utility aligned its planning and investment decisions with governmental (provincial/municipal) climate ambitions?	8.3

1. Total points may not add up due to rounding.

“NO DISCLAIMERS” POLICY

This report was prepared by Dunsky Energy + Climate Advisors, an independent firm focused on the clean energy transition and committed to quality, integrity and unbiased analysis and counsel. Our findings and recommendations are based on the best information available at the time the work was conducted as well as our experts' professional judgment. **Dunsky is proud to stand by our work.**