Modernizing energy sector planning and oversight for a net-zero world

How Canadian provinces can use pathway assessments, net-zero energy strategies, and governance and regulatory reforms to thrive in the global energy transition

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Introduction

The world is facing a fundamental shift in how we power our economy. For decades, fossil fuels have been the dominant way we heat our homes, power our businesses, and fuel our cars. But this is rapidly changing, with electricity now poised to be the backbone of future energy systems.

Driven by the need to eliminate greenhouse gas emissions, the global energy system is undergoing a transition that, in both size and speed, has never occurred before. To limit global temperature increases, electricity must go from around 20% of global final energy consumption to 30-53% of global final energy consumption by 2050.[1] In Canada, electricity must grow from 17% of total end-use consumption today to as much as 41% by 2050, according to the Canada Energy Regulator.[2]

With national electricity generation needing to potentially double from 2021 to 2050, and capacity potentially needing to more than triple, governments, regulators, and utilities must undertake a massive re-evaluation of how governments plan and how we think about paying for the energy we use—and how individuals interact with energy systems.[3] Doing so will require policy reform, economic restructuring, and behavioural change all in the next 25 years.

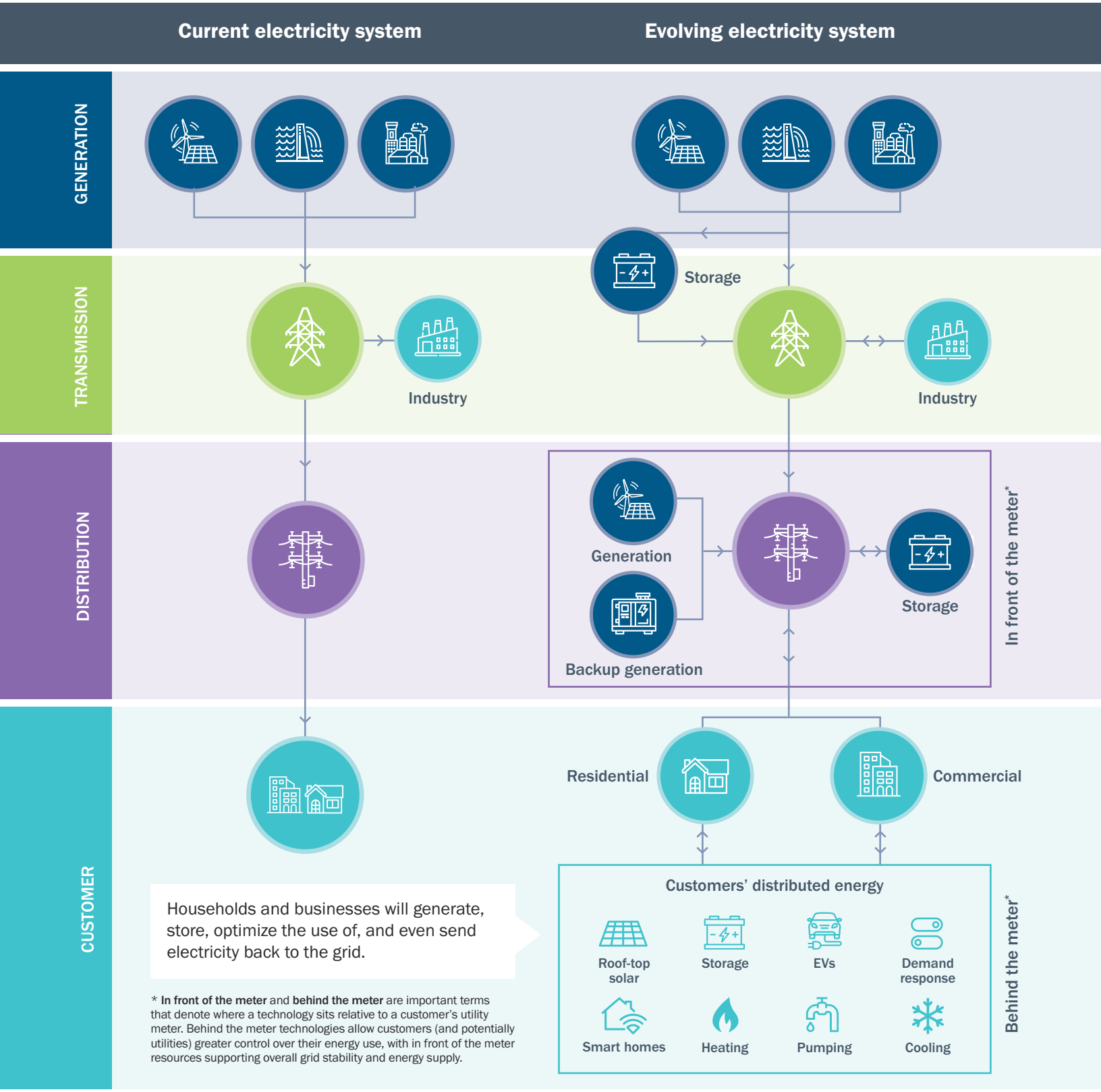
In Canada, this challenge is compounded by the fact that there are essentially 13 individual energy markets, with each province and territory having jurisdiction over its own electricity generation, intra-provincial transmission, and distribution assets.[4] While many Canadian provinces and American states have climate plans with commitments to net-zero emissions by 2050, few sub-national jurisdictions have outlined comprehensive plans translating what achieving net-zero emissions would mean for their energy systems and economies. Transitioning economies off of fossil fuels in a way that maintains economic and social systems requires thoughtful planning starting immediately.

Uncertainty is already one of the hallmarks of the energy transition.[5] Whether we can achieve a cost-effective and affordable transition will be determined by how we deal with these uncertainties—including the pace and scale of new innovation, a changing climate, technology costs, and the speed of technology adoption. There are significant risks of both increased costs and energy insecurity if provinces fail to adequately modernize their approach to energy planning and regulation.[6]

This paper focuses on the three most important tools provincial governments should employ to prepare for the energy transition: pathway assessments, comprehensive energy strategies, and governance and regulatory reform. It offers some initial recommendations on best practices, components, and considerations for each of these important building blocks of the energy transition.

Understanding our evolving electricity system

In our evolving electricity system, there will no longer be a straight line from electricity generation to consumer as numerous new technologies are integrated. Increasing reliance on cheap, renewable energy sources will be balanced out by a growing role for energy storage, and in particular battery technology. At both the distribution and customer level, new technologies will play a significant role in generating, storing, and managing the demand for electricity.



* **In front of the meter** and **behind the meter** are important terms that denote where a technology sits relative to a customer's utility meter. Behind the meter technologies allow customers (and potentially utilities) greater control over their energy use, with in front of the meter resources supporting overall grid stability and energy supply.

Why today's system needs to evolve

Existing electricity sector governance structures and provincial regulatory landscapes were originally designed to maintain grid reliability and keep rates reasonable. These same structures are not currently sufficient to support provinces in achieving today's imperative: to transform their energy systems to align with net-zero objectives.

Indeed, the status quo systems and structures make it nearly impossible for Canadian provinces to meet their climate targets, advance economic reconciliation through clean energy, and seize the many economic opportunities presented by the energy transition. Current challenges include:

1. **Lack of clarity from governments on planning objectives:** Across much of Canada, energy system actors do not have adequate direction on how they should prioritize or execute on government priorities such as affordability, reconciliation, climate action, and economic development. The lack of policy coordination across these issues sends mixed signals to regulators, system planners, utilities, and broader energy system stakeholders—creating uncertainty for the market and risks in increasing energy system costs.[7]

2. **Lack of updated, publicly available data and information:** In many jurisdictions, there is a lack of updated and public information concerning the costs, reliability, and supply of renewables and other innovative technologies. There are also few comprehensive studies available provincially to help make informed decisions on energy pathways.[8]

3. **Siloed planning of different energy sources:** Evaluation of and decision-making around different energy sources is often siloed, especially when it comes to natural gas and electricity—both of which will have evolving roles in powering industry, transportation, and buildings going forward.[9]

4. **Governance structures are poorly aligned with net-zero, reconciliation, and economic development goals:** Legislative frameworks governing regulators, utilities, and system operators were not designed to manage the rapid technological transformation required to address climate change and navigate a rapid energy transition. This misalignment with a government's other objectives leads to uncertainty and can drive up costs.

5 **Regulatory frameworks lack the flexibility required:** Similar to governance, the regulatory structures that are used by regulators, utilities, and system operators require modernization. Current frameworks lack flexibility and struggle to embrace innovation, both necessary in embracing new approaches, such as novel financial tools for utilities to deploy transmission and distribution infrastructure, or proactively planning and procuring electricity in advance of anticipated demand.

6 **Interest in maintaining the status quo:** Limited public and institutional acceptance, or, at times, lack of creativity, undermines the consideration and integration of technologies like renewables, batteries, and distributed energy resources (DERs). Institutions and markets that have largely been built around specific technologies are often resistant to the deployment of new resources, fearing they will undermine the economics that existing resources depend on—even if overall costs could be reduced.[8]

The modernization of governance structures and regulatory landscapes is necessary for energy regulators, utilities, and system operators to ensure adequate planning, resource procurement, infrastructure deployment, and innovation is achieved to realize net-zero targets. This modernization will also help them properly integrate governments' other objectives—including Indigenous reconciliation and economic development—into energy planning.

This paper focuses on three key tools to modernizing energy planning and oversight: pathway assessments, comprehensive net-zero energy strategies, and governance and regulatory reform.

A note on the importance of clear roles and responsibilities

Addressing these challenges will require a willingness to evolve current governance and regulatory structures, including introducing new tools and approaches to planning and regulation. However, in contemplating any changes, it is important that governments, regulators, system-operators, and utilities have clearly established roles and are properly empowered to operate within them.

Electricity Canada breaks these roles down into three general but distinct categories in its report, *Back to Bonbright: Economic regulation fundamentals can enable net zero.*[5]

ELECTED GOVERNMENT	INDEPENDENT REGULATORS	UTILITIES/SYSTEM-OPERATORS
Sets clear, outcome-based policy to provide regulators and utilities a common understanding of required objectives and outcomes.	Sufficiently resourced and empowered to review, reject, modify, or approve an increased number of novel proposals.	Provided the flexibility to make innovative proposals with respect to investments, rate-setting structures, incentive structures, benefit-cost assessments, and rate design.

Governments retain a key role in articulating clear, outcome-based policies and objectives that drive the actions of regulators, system-operators, and utilities (i.e. energy roadmaps). Governments can use "right-sized mechanisms" (mandate letters, regulation, or legislation) to communicate clear and specific outcomes and even issue action plans to fulfill them.[5,*] However, governments should be careful to leave operational decisions regarding the procurement of specific resources to the system operator and/or utility and enhance the ability of the independent regulator to review these resourcing plans. This recommendation was mirrored in the Ontario Electrification and Energy Transition Panel's final report, which calls for clearly articulated government objectives and properly empowered roles and responsibilities for the system-operator and the regulator.[10]

* Similar advice can be found in the Electrification and Energy Transition Panel's final report, which ultimately did not recommend an immediate reform to the Ontario Energy Board (OEB) mandate (despite the regulator identifying in their own submission a number of amendments that would allow them to be more proactive). However, the panel did note that "it may become necessary to provide the OEB with additional objectives, authority or functions in order to ensure it is able to effectively regulate the evolving energy sector and support the province's clean energy economy goal."

Pathway assessments

Why pathway assessments are important

Good decision-making requires high-quality data, information, and evidence to ground it. With a challenge as large and complicated as the energy transition, there isn't any one model that can—or should—be relied upon to provide answers. Instead, governments need processes that invite diverse stakeholders into the conversation about the feasibility of different energy pathways for achieving net-zero. This sort of process will help ensure decisions and planning are based on a shared understanding of the available evidence. A growing number of jurisdictions are using a tool called "pathway assessments" to inform better energy planning and decision-making.

A pathway assessment is a comprehensive study of all credible energy pathways to achieve net-zero objectives at a given point in time.[11] It sits at the centre of an orderly and affordable energy transition, helping to evaluate choices and tradeoffs, understand costs, identify no- and low-regret options, and bring key stakeholders together for an evidence-based discussion about a jurisdiction's future energy mix.

Key elements of a good pathway assessment

Not all pathway assessments are equal. A review of international examples and conversations with energy experts and modellers across Canada identify these six best practices:

1. **Independent:** While engagement with government and system operators will be essential, the pathway assessment should be led by independent experts to ensure all credible net-zero pathways are considered, regardless of political preferences.
2. **Evergreen:** Pathway assessments should be regularly recommissioned every three to five years to incorporate new information about technology costs, incorporate new data and policy decisions, and leverage new insights regarding specific industrial pathways.
3. **Transparent:** A pathway assessment is about establishing a credible, independent process that facilitates discussion and information sharing between stakeholders. It must be published in a timely and accessible manner, allowing for scrutiny of the approach, assumptions, and outcomes.

4 **Foundational:** A pathway assessment is not a replacement for detailed modelling such as utility or system operator-led resource planning, decision-making around specific policies, or the creation of industry decarbonization pathways. Instead, a pathway assessment acts as a foundational input into these processes, providing information for decision-makers and planners regarding the trade-offs and cost considerations of different energy transition pathways.*

5 **Relevant:** For a pathway assessment to be relevant to key decision-makers and stakeholders, it must engage them early in the scenario design process, ensuring it is linked to the key questions they are confronting. This engagement should extend to government and department staff, system operators, utilities, and regulators, as well as non-governmental energy stakeholders.

6 **Robust:** A pathway assessment should be a whole energy system modelling exercise, providing an assessment of potential energy demand from different sectors based on a set of established scenarios, identifying all reasonable pathways for achieving net-zero objectives. In scoping a pathway assessment, governments should keep in mind the primary purpose they serve—that is, to provide a **process** that: (i) helps build a shared understanding of the different energy pathways to achieve a net-zero economy by 2050; and (ii) works to build consensus among energy system actors around what inputs should be used and how those inputs will influence the findings of the model.[12]

Regardless of the specific model used, a pathway assessment must at a minimum include the full energy system, examining the interaction between:

- All energy sources used in the jurisdiction (electricity, hydrogen, natural gas, etc.).
- All sources of emissions within the province.
- A depiction of the regional diversity of the jurisdiction.

Assessing progress to-date in Canadian provinces

While Canada has a number of models that identify pathways to achieving net-zero emissions nationally, there are far fewer detailed assessments that have looked at provincial energy pathways to decarbonization—and even fewer that are publicly available.[3,**] We must fill this gap. In Canada, only Quebec and New Brunswick have published an initial pathway assessment, with Ontario having commissioned one due to be complete later this year.[17,16,18] While none of these pathway assessments meet all of the best practices outlined above, they are important steps in the right direction.

* For instance, the capacity expansion and dispatch modelling conducted by utilities or system operators will be essential in evaluating the ability and manner in which the energy resources identified in a pathway assessment might be optimally deployed. Subsequent pathway assessments can learn from this focused modelling , incorporating the findings as inputs and assumptions in subsequent iterations of the assessment. In this way, the process of developing and publishing a pathway assessment is iterative—it informs and is informed by the broader landscape of energy modelling.

** Through a jurisdiction review, early versions that align with some of the best practices for pathway assessments could only be found in Quebec and New Brunswick. Ontario has commissioned one from Dunsky and Energy Super Modelers and International Analysts (ESMIA), but it is uncertain whether this will be made public.

Case studies on how pathway assessments are being approached to-date

There is not one single type of model that must be used to conduct a credible pathway assessment. In fact, different jurisdictions have used different combinations of models to achieve the necessary scope.

Washington State

Washington State's Deep Decarbonization modelling used an integrated scenario-based, bottom-up energy model (not optimization-based), with a capacity expansion tool that produces cost-optimal resource portfolios.[13]

New York State

In 2020, New York State commissioned E3 to conduct a strategic analysis of New York's decarbonization opportunities.[14] E3 leveraged a number of different models for this analysis, using their PATHWAYS model to create specific scenarios based on the use of "bottom-up" data for all emissions produced and energy consumed, as well as using E3's RESOLVE model to capture a detailed representation of the electricity sector.[14]

Ontario

In Ontario, the government has commissioned ESMIA and Dunsky Energy + Climate Advisors to work together on their pathway assessment, which leverages Dunsky's expertise to inform scenario design and policy pathways, and makes use of ESMIA's North American Times Energy Model and North American General Equilibrium Model, combining an economy-wide optimization approach that looks at the interaction between thousands of fuels, technologies, and sectors, with an advanced dynamic, macroeconomic model that provides analysis of the impacts on economic growth, public welfare, and employment.[15]

New Brunswick

In New Brunswick, Navius was commissioned to use their gTech-IESD model to conduct the pathway assessment, leveraging a comprehensive representation of all economic activity, energy supply and use, and greenhouse gas emissions in Canada and the U.S. This included simulating New Brunswick as a distinct region, as well as insights into the optimal way of supplying the electricity demand simulated by gTech, capturing sector-specific dynamics.[16]

While none of these pathway assessments fully integrate the six best practices described in this report, they do effectively demonstrate the range of different modelling approaches that could be credibly used.

Comprehensive net-zero energy strategies

Why energy strategies are important

If pathway assessments provide foundational inputs and build a shared understanding of potential pathways, comprehensive energy strategies are the playbook.

A comprehensive energy strategy is typically a non-binding vision document that translates government priorities into actionable guidance for utilities and system-operators, and provides policy direction to ensure informed and aligned decision-making by regulators.[11]

A comprehensive energy strategy is a powerful tool that can help transform a status quo energy system into one that is ready to lead and benefit from the energy transition. Specifically, an energy strategy serves the following purposes:

- **Provides a comprehensive framework for how a jurisdiction can cost-effectively navigate the energy transition**, helping to seize economic opportunities, and ensure energy governance and regulation is fit for purpose.[1]
- **Provides clear and timely guidance to all actors** on the strategic actions the jurisdiction is prioritizing in the short-term. Decarbonization of the energy system is a long-term project, but these plans can help identify the urgent or no-regrets steps that should be taken to begin making progress.
- **Identifies and states the government's vision and objectives** for all actors in the energy sector. Providing this direction is critical to address uncertainty and ensure policy alignment between a government's objectives and the governance, regulation, and policy that guides the development of the grid.

Over the past several years, a growing number of international jurisdictions have developed comprehensive energy strategies that complement their climate plans, including Washington State and Western Australia.[19,20]

Critically, these strategies, while specific, are intended to guide—not substitute—the more detailed work of system planners, regulators, and utilities. Utility and system-operator resource planning processes would be informed

by a government's energy strategy, taking direction from the established priorities, but going into greater detail about how to best achieve the objectives and deliver on the actions assigned to them by the government.

It's also important to acknowledge the significant role and impact that the energy transition has on Indigenous rights and title—and the need for energy strategies to address this directly. The growing importance of clean energy offers a meaningful opportunity to advance economic reconciliation, requiring both proactive and ongoing engagement with Indigenous communities.[21]

In the words of the First Nations Major Project Coalition, "Indigenous support for clean energy infrastructure such as hydro dams and transmission lines through their lands may be the difference between success and failure for the United States and Canada to meet their net zero commitments."[22] Policies like Ontario-based Hydro One's 50-50 equity model with First Nations on new large-scale transmission line projects, or the creation of equity-loan guarantee programs can help support First Nations equity as participation will become increasingly essential.[23,24]

Key elements of a good energy strategy

Energy strategies are not a new tool—but they have been evolving to play a key role in providing a roadmap for how a jurisdiction can navigate the energy transition and action the necessary reforms to achieve a net-zero economy. A review of comprehensive energy strategies published in Canada and abroad revealed a number of best practices.* These include:

1 Explicitly centre the achievement of a net-zero economy by 2050.

Fundamentally, a net-zero energy strategy is just that: an energy strategy that integrates the objective of achieving a net zero economy by 2050 within a plan for the energy system. Failure to center this objective will continue to send mixed signals to energy system and market actors, increasing uncertainty about the choices that should be made. However, while a strategy needs to clearly set out the 2050 net-zero objective, the focus of a strategy should be on the short- and medium-term actions needed to get there.

2 Include a vision, objectives, and concrete action plan.

While energy strategies are typically non-binding and serve as a vision document, they are written in such a way as to translate government priorities into actionable guidance for utilities, including through the introduction of new legislation or regulations where required.

A strategy's vision should communicate the role and importance of clean energy, as well as articulate the desired end-state for the energy system in a jurisdiction, based on the best available information about different pathways. This vision should help connect the dots between a government's broader objectives (climate, affordability, etc.) and the necessary modernization of its energy system.

Objectives help shape the decisions that are made by both government, energy, and market actors. They provide greater certainty for stakeholders by clearly identifying the priorities that government has set, offering guidance on how to balance those priorities and suggesting specific reforms to help chart a path through the energy transition.

Concrete action plans move the strategy beyond words, identifying the most pressing issues, the steps that will be taken to address them, and who is responsible for taking those steps.

Framework of an Energy Strategy:

* International examples include the energy strategies found in the State of Washington, the United Kingdom and the State of Western Australia.

3 Ensure the energy strategy is not a one-off document.

Energy strategies typically establish a process that allows a jurisdiction to evolve their approach as it moves through the energy transition. Whether the strategy outlines a phased approach to development, establishes a strategy for a specific timeframe, or builds in processes for review and update, this certainty is crucial. It allows a jurisdiction to set a long-term vision while still prioritizing the most pressing issues affecting its grid in a timely manner. As technologies mature and costs and demand projections change, the strategy can adapt.

4 Commit to comprehensive and ongoing stakeholder engagement.

Expertise outside of government and from other jurisdictions can help shed light on approaches that have been successful. All Canadians have different experiences with energy—and some, with energy poverty. Ensuring the energy transition isn't something that happens to Canadians—but is something that Canadians embrace—will require ongoing engagement.

Stakeholder engagement is also an important opportunity to align a jurisdiction's industrial strategy with its energy strategy. Globally, the competition for clean investments is fierce, and the availability of clean, cheap, reliable electricity is a key competitive advantage. Industries both new and old will have unique decarbonization pathways that need to be accounted for. By prioritizing ongoing engagement with key industries to help inform their energy strategy, governments can better understand energy decarbonization pathways and use that understanding to inform planning, as well as provide investment certainty on the availability of clean energy.

5 Set out concrete targets for what the strategy seeks to accomplish.

Whether an energy strategy adopts specific performance targets on the deployment of renewables or energy efficiency (like the United Kingdom) or it chooses to identify clear timelines for priority reforms (like Western Australia), the use of targets sharpens the strategy's focus and facilitates accountability.[25,26] These should generally be linked to the specific action plans identified.

6 Integrate planning for different energy systems.

As much as electricity will form the backbone of future energy systems, an energy strategy must consider clean energy in all its forms, as well as the use of fossil fuels through the mid-transition. The most obvious example is the role of natural gas in heating. For both climate and affordability reasons, it is expected that electricity (specifically, energy-efficient electric heat pumps that both heat and cool) will increasingly displace other kinds of space heating.[1] To ensure end-uses like this transition seamlessly and affordably from one energy source to another, energy strategies must coordinate electric and natural gas planning processes.

The same is true for industrial processes where some operations will rely on other forms of clean energy in addition to electricity, whether hydrogen or natural gas with carbon capture and storage.[1] Understanding what is required—and what is optimal—in different industrial pathways is critical to inform energy planning of all types. In short, jurisdictions should be creating energy strategies, not electricity strategies.

Assessing Canadian provinces

In Canada, a growing number of provinces have released some version of a net-zero energy strategy. These strategies all vary in the level of detail they provide and how well they conform to the identified best practices. The table below provides an overview of the current state of energy policies in Canada.

Almost every single one of the provinces that have established energy strategies have done so in the last couple of years, with the majority being published in 2023. To date, Quebec, New Brunswick, and Newfoundland and Labrador have released the most comprehensive energy strategies, aligning with most or all of the best practices identified. While there is still room for improvement, including by adding more specificity in the actions and targets identified, these represent credible starting points. Manitoba, Ontario, and Nova Scotia have established initial energy strategies, but they either fail to meet, or only partially meet, the identified best practices. Prince Edward island and British Columbia are currently in the process of updating or establishing energy strategies, and Alberta and Saskatchewan have no strategy or established process to create one.

Canadian Provinces and Net-zero Energy Strategies

	B.C.	Alb.	Sask.	Man.	Ont.	Que.	N.S.	N.B.	P.E.I.	N.L.
Comprehensive net-zero energy strategy	**No***	**No**	**No**	**Partial**	**Partial**	**Yes**	**Partial**	**Yes**	**Yes****	**Yes**
Explictly centre achievement of net-zero 2050	No	No	No	No	No	Yes	No	Yes	TBD	Yes
Vision, objectives, action plans	No	No	No	Partial	Partial	Yes	Partial	Yes	TBD	Yes
Ongoing renewal process	No	No	No	No	No	Yes	No	Yes	TBD	Yes
Comprehensive stakeholder engagement	No	No	No	Partial	Yes	Yes	No	Yes	TBD	Yes
Use of concrete targets	No	No	No	No	No	Yes	Yes	Yes	TBD	Yes
Integrates planning across energy systems	No	No	No	Partial	Partial	Yes	No	Yes	TBD	Partial

* British Columbia is currently consulting on a “climate-aligned energy framework” which is anticpated to be the first phase in the creation of a comprehensive energy strategy

** Prince Edward Island published a 10-year energy strategy in 2017 and is currently in the process of updating its strategy to reflect changes, including the commitment to be net zero by 2040

Governance and regulatory reform

To provide the resourcing, empowerment, and flexibility that energy system actors will need to meet the new requirements of the energy transition, governments must modernize current governance and regulatory frameworks including the following four priority reforms.

1 Integrating climate and net-zero objectives into the mandates of regulators, system operators, and utilities

Experts across the energy landscape have consistently highlighted the lack of alignment between a government's climate objectives and the policy direction provided to energy system actors as one of the major challenges facing regulators, utilities, and system operators. This misalignment creates uncertainty and negatively impacts their ability to make or approve the types of investments needed to achieve a net-zero-aligned energy system.

Electricity Canada has noted the need for consistent policy direction to empower entities of all sizes to take the necessary action to achieve a net-zero economy.[5] In its *Pathways to Decarbonization* report, Ontario's IESO highlighted that addressing the "uncertainty around the future of carbon and emission targets" was critical in order to guide grid investments, effectively integrate new technologies, and support the decarbonization of other stakeholders.[7] And in the Ontario Electrification and Energy Transition Panel's final report, developing a clean energy economy (in the context of a world moving rapidly to net zero) was referred to as energy planning's "north star."[7,10] Ultimately, aligning climate objectives with other energy objectives will help protect the affordability and reliability of energy by reducing uncertainty and ensuring the necessary investments can be made at the right times.

While a variety of policy tools could be used to communicate the government's climate objectives, many jurisdictions are choosing to embed net-zero objectives into the mandates of regulators, utilities, and system operators. A number of U.S. jurisdictions including Maryland, Colorado, Maine, Massachusetts, Washington, Hawaii, and Washington D.C. have adopted legislation that mandates the consideration of climate change in the regulatory decisions made by energy system actors.[10]

Integrating net-zero objectives into the mandates of regulators, utilities, and system-operators should not replace or override other objectives such as ensuring reliability, affordability, or safety. Rather, achieving a net-zero grid and economy should be added as an additional core objective to be balanced against the others. This direction could be delivered via directives, regulatory changes, or new legislation, as the Canadian Climate Institute recommended in its report, *The Big Switch.*[27]

2 Enabling greater innovation and flexibility within regulators, system operators, and utilities

Dealing with the uncertainty created by the energy transition is one of the primary challenges that regulators, utilities, and system operators face in modernizing their systems and deploying the necessary resources.* Legacy governance and regulatory frameworks are intended to govern a system that grows incrementally over time as electricity demand rises, slowly and cautiously integrating new technologies. However, the urgent need to decarbonize the economy by 2050, coupled with a growing list of new non-emitting technologies, presents a major challenge to this status quo, necessitating new approaches.

While energy strategies and pathway assessments provide policy certainty and insights into different decarbonization pathways, the energy system will also require new tools, regulations, and mandates that permit—and even encourage—greater experimentation and innovation.[28]

For regulators, reforms should seek to clarify the policy objectives they need to consider (i.e. ensuring net zero is being considered as they fulfill their role as an economic regulator). They should also empower regulators to embrace novel approaches in reviewing proposals that are brought forward.*

Where regulators need to embrace novel submissions in review processes, utilities and system-operators should be empowered to advance innovative approaches to deploying the resources and infrastructure necessary to achieve net-zero targets. For instance, Electricity Canada suggests that "flexible regulatory frameworks" could allow for the "proactive submission of utility investment or service proposals which are not bound by prescriptive timing requirements, allowing for multi-year investment plans or targeted requests submitted mid-rate-term."[5] In B.C., BC Hydro has already proposed this type of approach in its 2023 update to the 2021 Integrated Resource Plan where it recommends a new "living" long-term resource plan cycle, which would allow for more regular updates, helping to ensure their planning is matching the potentially faster rate that the energy transition requires.[30]

Reforms that empower regulators, utilities, and system operators to use innovative and flexible approaches to navigate the uncertainties of the energy transition should be advanced in a coordinated and consultative manner, ensuring that the government's objectives are clearly articulated and that utilities, system operators, and their regulators understand and are brought into the new governance framework.

* For example, in a 2023 Clean Energy Canada B.C.-based convening on the deployment of zero-emission medium and heavy-duty vehicles (MHDV), participants noted that the BC Utilities Commission (BCUC) should be empowered to leverage greater flexibility in its rate review processes allowing investments to occur prior to the identification and confirmation of specific customer demand. While still requiring clear rationale and justification for the investments sought, the BCUC would have greater discretion to embrace novel proposals from the utility, allowing the proactive build out of necessary infrastructure.

In Western Australia, technology trials and pilot projects have played a critical role in informing their energy transformation strategy, **with more than 20 trials of new technologies undertaken across hundreds of sites as of 2021**.[29] These trials included testing how distributed energy resources could be aggregated to address grid-scale needs as well as projects that tested stand-alone power systems that combined renewables, batteries, and generators for deployment in remote areas.

3 Coordinating the planning and regulation of different energy systems (i.e. natural gas and electricity)

Most Canadian provinces plan their natural gas and electricity energy systems through separate processes.[8] This presents numerous challenges in ensuring emission reductions can be delivered while simultaneously protecting affordability and managing a cost-effective transition.

Governments must therefore institute reforms that facilitate the coordination of planning and regulation between energy systems—in particular the electricity and gas systems—to avoid stranded assets and manage consumer costs. As highlighted in a March 2023 report by the Building Decarbonization Coalition, without intervention, gas utilities alone are not properly incentivized to provide safe and reliable service at just and reasonable rates over the course of the energy transition.[31]

Certain Canadian jurisdictions have taken initial steps toward coordination. For instance, the main Quebec electric and gas utilities (Hydro Quebec and Enérgir respectively) established a formal partnership in 2021 to better coordinate their systems.[32] In B.C., the regulator attempted to achieve greater integration between BC Hydro and FortisBC by requesting collaboration between the two on the development of "energy scenarios" in 2022.[33]

While jurisdictions across the world are exploring different approaches to modernizing how gas networks are governed and regulated, the reforms ultimately amount to ensuring the natural gas system is no longer planned and regulated separate from the electricity system, and that both are covered by governance and regulatory frameworks that articulate the net-zero objective they must operate within.*

4 Establishing new regulatory and market instruments that facilitate the integration of distributed energy resources and demand-side solutions while enabling greater local energy planning

A final area of mandate reform concerns the treatment of local energy planning and the proliferation of distributed and local demand-side solutions.

One of the most consequential changes of the energy transition is the move from an overwhelmingly centralized energy system with few actors to an increasingly decentralized one as distributed energy resources and other demand side solutions begin to play a larger role—and as electricity demand grows.[28] Both of these trends necessitate a greater focus on local energy planning.

Internationally, multiple jurisdictions have proposed or enacted reforms that extend from expanded mandates for regulators and utilities to the creation of new entities to manage the planning and/or facilitation of local resources. In the U.S., the Department of Energy has released a roadmap to "accelerate the lift-off" of virtual power-plants (VPPs)—essentially, networked DERs acting to address grid-scale demand and provide additional grid services.[34] In the U.K., the independent regulator Ofgem has announced its intention to proceed with the creation of both Regional Energy Strategic Planners (RESPs) to facilitate the planning of local systems and a new Distributed System Operator to coordinate the distribution market.[38] In Western Australia, a new regulatory framework to support DERs was one of the top priorities of the state's original energy transformation strategy.[26]

Canadian provinces need to greatly increase the role of distributed energy resources, demand-side solutions, and local energy planning to help achieve their net-zero targets in a cost-effective and affordable manner. While energy efficiency is a frequent feature of utility resource plans, few jurisdictions have advanced a comprehensive approach to maximizing the role of local and demand-side solutions, despite their often lower relative costs.**

Mandates for regulators, utilities, and system operators could be amended to elevate the importance of these resources, ensuring they are considered alongside more traditional system investments. Provincial governments should also consider more comprehensive reviews, such as the ones highlighted in the U.K. and Australia, to determine whether more substantive regulatory and governance reforms are required to drive the much-needed investments into these resources.

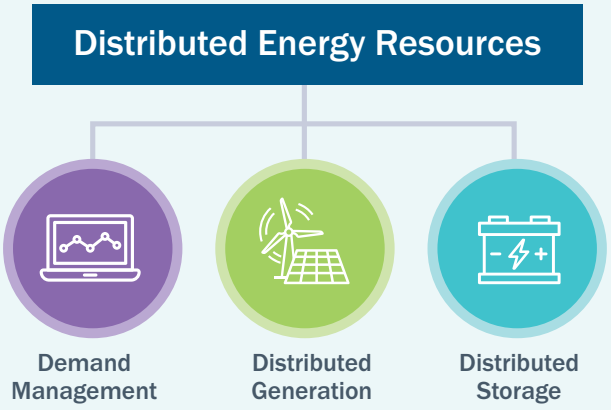
* Given the differences across different systems, a variety of approaches have been taken. In the U.K., a new bottom-up regulatory framework for enabling local heat networks has been established. In Massachusetts, the Department of Public Utilities issued a new order that places major constraints on the expansion of the gas system, ultimately working toward the establishment of a new regulatory structure that aligns the natural gas system with the net-zero objectives of the state.

** Ontario is in the midst of a number of processes aimed at reforming its approach to energy planning, including a OEB/IESO-led effort to increase the integration of DERs, and the government's review of its approach to long term energy planning where the EETP has explicitly referenced a stronger role for local energy planning.

The Cost Savings Potential of DERs

DERs and other demand-side solutions are receiving increased attention due to their potential to balance and support higher levels of variable renewable energy, often at a lower relative cost. In the U.S., the Department of Energy has concluded that **DERs could reduce grid costs by $10 billion per year, while an independent assessment has suggested it could be as much as $35 billion a year**.[34,35]

In Canada, RBC has estimated that DERs integrated into smart homes **could save Ontario ratepayers $500 million annually by 2040**.[36] In fact, an IESO-commissioned DER potential study found that cost-effective DER capacity could meet or exceed all incremental system needs across a range of scenarios .[37] This corresponded to meeting 146-273% of the incremental summer peak and 106-311% of the incremental winter peaks in 2032. Importantly, the achievable potential (which factored in real-world conditions and constraints) was found to be modestly lower, meeting only 39-62% of the expected incremental summer demand and 27-100% of expected incremental winter demand. This discrepancy highlights the need for governance and regulatory reforms to address these issues.



Conclusion

Canadian provinces are at the front lines of the energy transition. How they prepare and the choices they make will have a major impact on whether they are able to navigate it effectively while minimizing costs and seizing opportunities. Nowhere is this more true than in the steps they take—or fail to take—to modernize their energy systems.

As more and more jurisdictions chart a course to net zero, a consistent set of tools is emerging. While it is impossible to completely eliminate the uncertainties that the energy transition presents, provinces that leverage these tools—pathway assessments, comprehensive energy strategies, and governance and regulatory reform—can position themselves for success.

This paper is an early articulation of Clean Energy Canada's thinking on the role these tools can play in achieving the necessary modernization of energy sector planning and oversight. We look forward to working with energy sector stakeholders and contributing to further discussions on how these tools should be designed, and how provinces can best integrate them into their existing energy system structures.

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