Key findings

• We define a clean energy growth economy as one that will sustain our environment, create wealth, and enhance our standard of living. Getting there will require a long-term transformation of all aspects of life in Canada, and a clear and actionable road map to get us there.

• Guided by the UN’s Sustainable Development Goals, we focus on three key themes and a set of strategic goals to measure progress:
  
  - **Economy**—Maximizing Canada’s economic potential and global competitiveness.
  
  - **Environment**—Reducing human-induced environmental impacts and using natural resources responsibly.
  
  - **Society**—Ensuring that Canadians’ standard of living continues to improve.

• We have developed a sustainability framework to track key indicators. An energy-system lens is applied to this framework (i.e., we include the entire energy supply chain), given energy’s ubiquity, its role in GHG emissions levels, and the potential disruptive impacts of climate change.

• These indicators provide an energy-system perspective on sustainability in Canada that can be viewed historically, for the most current period, and for the coming decades.
The basics

A clean energy growth economy will sustain our environment, create wealth, and enhance our standard of living. Taking Canada there requires a long-term transformation that balances the need for environmental protection, economic growth, and social prosperity.

The Conference Board’s Centre for a Clean Energy Growth Economy (CEGE) is using evidence-based research and inclusive dialogue to create a road map of key actions needed for the transition to this sustainable economic model.

But what does a clean energy growth economy look like? How do we track progress moving forward? And, more importantly, how do we move from aspiration to action and implementation in the coming decades?

Those are the key questions addressed by CEGE’s indicator project. This briefing introduces our analytical framework for a clean energy growth economy in Canada. It answers the first question: What is a clean energy growth economy and how do we measure it? The next steps will answer our second (tracking progress) and third (moving from aspiration to action) research questions.

Measuring what matters

Building on the UN’s Sustainable Development Goals

Three interconnected themes establish the parameters for a clean energy growth economy in Canada: the economy, the environment, and society. These are consistent with the United Nations’ Sustainable Development Goals (SDGs) framework, which has been adopted by 193 countries around the world through the 2030 Agenda for Sustainable Development.¹

In response, the Government of Canada has:

- incorporated the SDGs into the Federal Sustainable Development Strategy;
- established an SDG unit within Employment and Social Development Canada to advance the global goals at home and abroad, and;
- created an SDG data hub within Statistics Canada to monitor and report on progress.²

Finally, individual companies in Canada have integrated SDGs into their corporate social responsibility; environmental, social, and governance (ESG); sustainability and similar strategic and reporting initiatives.³ SDGs are also built into

² Government of Canada, “Achieving a Sustainable Future.”
³ See, for example, Barrick Gold Corporation, Sustainability Report 2018; Hydro-Québec, Clean Energy to Power Us All; Nutrien, “Providing Solutions for a Growing World”; Suncor, “UN Sustainable Development Goals”; TD Bank Group, 2018 Environmental, Social and Governance (ESG) Report.
business practices through voluntary and collaborative initiatives such as the Global Compact Network Canada.

We define strategic goals for each theme. These provide direction in the transition to a clean energy growth economy, with achievements indicating success. They are:

- **Economy**: Maximize the long-term economic potential of Canada’s people, regions, and sectors while ensuring that Canadian businesses can thrive in a globally competitive environment.

- **Environment**: Reduce the impacts of human activities on the natural environment and use natural resources in a sustainable and efficient manner.

- **Society**: Ensure that Canadians’ standard of living continues to rise.

To track progress in achieving these strategic goals we identify indicators for each theme. These are analyzed in the context of historical trends, recent changes, and a realistic view of the future.

The initial scope of the analysis is at the national level. But the framework lends itself to being expanded at the regional, sectoral, international, and even firm level in the future.

Given the importance of energy in discussing climate change, ESG, and sustainability issues (both at home and internationally), we apply an energy-system perspective to our framework. That is, we include all energy production, transformation, transportation, and end-use activities.
A sustainability framework to identify interactions

Interactions and dependencies across and within the economy, environment, and society themes can be complex. A simplified sustainability framework shows key relationships across these themes, identifies key actors, and brings attention to the types of indicators that can be used to measure and track the progress in the transition to a clean energy growth economy. (See Exhibit 1.)

Exhibit 1
A sustainability framework is used to define and measure a clean energy growth economy for Canada

In this framework, the natural environment provides the resources essential to people’s survival, such as potable water, clean air, and land for agriculture. Raw resources, such as wood, energy, and minerals, are extracted from the natural environment and transformed into intermediate or finished goods and services.

Beyond resources, ecosystem services also depend on the natural environment. These include recreation, tourism, climate regulation, water filtration, and nutrient cycling. Although these services are well understood to provide multiple and cross-cutting benefits, they aren’t readily quantified in Canada, which limits their inclusion in our framework.

The economy uses natural resources and ecosystem services related to the natural environment, together with human and financial capital from society, to produce goods and services. In turn, the economy compensates people and organizations in monetary terms (mainly via wages and profits), illustrating the circularity of financial flows across actors and themes.

Society’s use of economic outputs and environmental services supports living standards and the quality of life in communities across Canada. In return, because of the relationship among natural resource extraction, production processes, and the final use of goods and services, society’s living standards have a direct impact on the natural environment.

4 Human capital includes knowledge-based contributions, such as education, entrepreneurship, skills, innovation, etc., in addition to manual labour.
The built environment intersects all three themes. Infrastructure, for example, modifies the natural environment, builds the productive capacity of the economy, and enhances the provision of essential services for people.
The built environment intersects all three themes. Infrastructure, for example, modifies the natural environment (e.g., via urbanization), builds the productive capacity of the economy (think power plants, factories, and office buildings, etc.), and enhances the provision of essential services for people (shelter, mobility, education, health care, etc.).

This sustainability framework highlights the need to achieve a long-term balance between fairness, livability, and viability in several ways:

- Creating economic wealth while protecting the environment ensures viability.
- A thriving economy and prosperous society should promote fairness.
- Achieving acceptable standards of living and quality of life while limiting or reducing negative impacts on the environment results in better livability.

Given the interdependencies of flows across themes, achieving these three objectives ensures the strategic goals are met. The result should be a long-term sustainable path toward a clean energy growth economy in Canada.

A focus on energy to measure sustainability

An energy system perspective to our framework is critical. (See Exhibit 2.) Energy is a key component of the built environment and is ubiquitous in all aspects of life in Canada. Energy use is also responsible for the majority of greenhouse gas (GHG) emissions in Canada and globally, contributing to climate change’s potential disruptive impacts across all facets of life.5

We can look at energy from two perspectives. Raw energy resources, such as biomass, natural gas, hydro, and uranium, are extracted from the natural environment as primary energy. These resources are then transformed into useful energy products, such as electricity, marketable natural gas, refined petroleum products, and ethanol and other biofuels as secondary energy.

Energy products are used to provide a multitude of services to society and the economy, including lighting, cooking, space and water heating, transportation, and equipment operation. They are also feedstocks for the production of industrial and consumer products, such as the manufacturing of plastics for our everyday use. All of these energy-derived products are essential to the functioning of the economy, which in turn supports Canadians’ standard of living and quality of life.

The energy system, therefore, includes the entire supply chain for energy-derived products, from extraction to transformation, transportation, and their end-use. At each step of this process, the energy system has impacts on the natural environment—be it the air, land, or water.

Energy-related emissions from the use of fossil fuels accounted for over 80 per cent of GHG emissions in Canada in 2017. Over one-half of such emissions are related to end-users of energy, such as transportation, buildings, and industrial sectors (i.e., energy consumers). The difference is accounted for by energy production, processing, and delivery activities (i.e., energy producers).

Separating energy producers and energy consumers is an important step, as it allows us to identify the key actors who are the main units of analysis within our framework. Using this approach allows for clarity, consistency, simplicity, and comprehensive analysis of the proposed indicators.

The indicators used for tracking progress in moving to a clean energy growth economy in Canada are initially given for the entire economy, which is equivalent to the energy system as a whole. We then focus on providing the indicators for energy producers and consumers. Producers include industries such as coal mining, oil and gas extraction, and the electric and gas utilities. Consumers include all other sectors of the economy. (See Exhibit 3.)

Where possible, a disaggregated level of analysis will also be provided. This can include indicators for individual industries, both energy and non-energy, and for households in the energy consumers’ segment.

---

6 The difference is accounted for by emissions from the agriculture (i.e., crop and animal production), industrial processes and product use (e.g., metal production), and waste (e.g., solid disposal) sectors. See Environment and Climate Change Canada, 2019 National Inventory Report.

7 Arguably, energy producers are also energy users. In fact, they are some of the largest ones. However, for the purposes of identifying different actors in the energy system, this simplified classification is adopted.
Tracking progress can be done only by understanding where we are today and where we need to be tomorrow. The path ahead means monitoring progress and formulating an actionable road map of insights that move us forward.
Putting it all together to track progress

Table 1 presents the suite of evidence-based and quantifiable indicators that we will use to measure Canada’s clean energy growth economy and to track progress in the transition to such an economy.
Table 1
Indicators for measuring Canada’s clean energy growth economy and tracking progress in the transition

<table>
<thead>
<tr>
<th>Theme (and strategic goal)</th>
<th>Relevant United Nations’ Sustainable Development Goals (SDGs)</th>
<th>Sub-theme (ties back to strategic goals)</th>
<th>Indicator</th>
<th>How do we measure it?</th>
<th>Why it matters?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECONOMY</strong></td>
<td></td>
<td>ECONOMY</td>
<td>Economic contribution</td>
<td>Value added</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>Maximize the long-term economic potential of Canada’s peoples, regions, and sectors, while ensuring that businesses can thrive in a globally competitive environment</td>
<td></td>
<td>Competitiveness</td>
<td>Investments in capacity</td>
<td>Non-residential capital stocks and investments</td>
<td>Strategic investments in infrastructure and innovation build the economy’s long-term potential.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Global reach</td>
<td>Includes trade and foreign direct investment</td>
<td>International trade and foreign investment drive Canada’s economic potential as a small and open nation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Growth prospects</td>
<td>Operating environment</td>
<td>Includes profit margins, industrial capacity utilization rates, and labour productivity</td>
<td>Favourable operating conditions encourage stable and sustained economic growth.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Including changes in business entry and exit rates, return on capital employed, and natural resource reserves depletion</td>
<td>Healthy growth prospects attract the resources needed to build the long-term capacity of the economy.</td>
</tr>
<tr>
<td><strong>ENVIRONMENT</strong></td>
<td></td>
<td>ENVIRONMENT</td>
<td>Environmental impacts</td>
<td>Greenhouse gas emissions</td>
<td>GHG emissions</td>
</tr>
<tr>
<td>Reduce the impacts of human activities on the natural environment, and use natural resources in a sustainable and efficient manner</td>
<td></td>
<td></td>
<td>Air pollution</td>
<td>Air pollutant emissions</td>
<td>Atmospheric pollutants have a negative impact on human health and ecosystems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deforestation</td>
<td>Area of deforestation by activity</td>
<td>Deforestation reduces the ability of forests to act as carbon sinks. Deforestation also impacts wildlife habitats, biodiversity, air, soil, and water quality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Natural resource use</td>
<td>Energy use</td>
<td>Primary or secondary energy use</td>
<td>Efficient energy use preserves the non-renewable natural resource base while minimizing waste and environmental impacts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Water use</td>
<td>Water use levels</td>
<td>Efficient water use preserves this essential resource while minimizing waste and environmental impacts.</td>
</tr>
<tr>
<td><strong>SOCIETY</strong></td>
<td></td>
<td>SOCIETY</td>
<td>Opportunity</td>
<td>Employment levels</td>
<td>Employment provides social and health benefits for communities and individuals.</td>
</tr>
<tr>
<td>Ensure Canadians’ standard of living continues to rise</td>
<td></td>
<td></td>
<td>Compensation</td>
<td>Wage levels</td>
<td>Fair compensation boosts workers’ morale, encourages performance, and supports our standard of living.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contribution to society</td>
<td>Taxes paid by sector</td>
<td>Government revenues provide essential programs, services, and infrastructure for all Canadians.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Affordability</td>
<td>Consumer prices by good/service (including energy)</td>
<td>Affordability of basic needs contributes to a higher quality of life.</td>
</tr>
</tbody>
</table>

Sources: The Conference Board of Canada; United Nations.
This table incorporates the definitions, themes, and goals of the analytical framework that views sustainability through an energy-system lens. It highlights the key links to the SDGs framework, identifies how the indicators will be measured, and why they matter when it comes to achieving a clean energy growth economy for Canada.

The path ahead

Tracking progress can be done only by understanding where we are today and where we need to be tomorrow. The path ahead means monitoring progress and formulating an actionable road map of insights that move us forward.

The next step will be to measure all indicators from a historical perspective and at a specific point in time, based on the most recent data available. To do this, we will create a web-based platform and update it as new data become available.

This platform will have a dedicated page for each indicator that includes key information, such as its definition, data sources, importance, and linkage to the SDGs. A short analysis of historical trends, the latest readings, observed changes, and a discussion of key drivers of change—such as economic activity levels, energy use, and the impacts of energy-mix trends on GHG emissions levels—will also be included.

This analysis will raise key questions about the main factors impacting the long-term future trajectory of each indicator and any implications for the transition to a clean energy growth economy. These factors will be addressed through future research that informs the pathway for each indicator.

Where we need to be by 2030 or 2050 is another key piece of measuring progress. Although the strategic goals provide direction for where we need to go, the more specific the targets are, the better we will be able to understand whether we are on or off track.

These long-term targets can be established using a combination of globally agreed-upon measures—for example, the science-based targets included in the Paris Agreement, SDG-specific targets, and those from our expertise. Yet, not all indicators will have specific targets. For some, a general direction from the strategic goals might be the best possible guidance.

Analyzing the historical, current-state, and long-term pathways and targets will allow us to identify gaps and suggest actionable insights required to successfully transition Canada to a clean energy growth economy over the coming decades. Tracking progress and providing actionable insights are the key goals of CEGE’s indicator project.
Appendix A

Methodology
Development of the indicators framework started in the spring of 2018. It was an iterative and comprehensive process that involved extensive engagement, idea exchanges, the gathering of feedback, and the collecting of information from:

- CEGE’s funding members;
- sustainability and subject-matter experts;
- The Conference Board of Canada’s Energy and Environment team;
- other Conference Board colleagues;
- an extensive review of the literature;
- a thorough search of the available data that fit the proposed framework.

CEGE’s members provided funding for a cross-Canada stakeholder-engagement initiative in the fall of 2019 that supported this project—the CEGE Regional Input Tour. The purpose of the CEGE tour was to gather on-the-ground intelligence from key business, government, and civil society leaders from across the country on the region-specific opportunities and challenges of moving to a clean energy growth economy in Canada (with a focus on achieving the strategic goals).

Close to 100 participants attended these events and shared their expertise and viewpoints on this issue. Insights from the tour helped shape the development of the final version of the indicators framework.

In the end, thanks to the extensive and inclusive engagement processes and through comprehensive research, the proposed platform was developed. Most importantly, the selected platform was guided by the principles of clarity, simplicity, relevance, and rigour.
Appendix B

Bibliography


Acknowledgements
This issue briefing was written by Carlos A. Murillo, Senior Research Associate, Energy and Environment. The author thanks Roger Francis, Director, Energy and Environment, and Michael Burt, Executive Director, for acting as reviewers and providing guidance and support throughout the project.

Other members of the Energy and Environment team—including Brett Goodwin, Research Assistant, and Dr. Babatunde Olateju, Senior Research Associate—contributed to the development of the analytical framework. Subject-matter experts present at meetings of The Conference Board of Canada’s Centre for a Clean Energy Growth Economy (CEGE), participants in the CEGE cross-Canada tour, and other Conference Board colleagues also provided key insights into the development of the framework.

Members of the CEGE (which includes some of Canada’s largest energy companies and financial institutions) contributed substantial input over the last couple of years to help develop the indicators platform. CEGE funders also provided the financial support needed to bring this project to fruition.

Any errors or omissions in fact or interpretation contained in this report remain the sole responsibility of The Conference Board of Canada.

Measuring What Matters: An Energy-system Perspective on Sustainability
Carlos A. Murillo

©2020 The Conference Board of Canada
Published in Canada | All rights reserved | Agreement No. 40063028 | *Incorporated as AERIC Inc.
An accessible version of this document for the visually impaired is available upon request.
Accessibility Officer, The Conference Board of Canada Tel.: 613-526-3280 or 1-866-711-2262
E-mail: accessibility@conferenceboard.ca
*The Conference Board of Canada and the torch logo are registered trademarks of The Conference Board, Inc. Forecasts and research often involve numerous assumptions and data sources, and are subject to inherent risks and uncertainties. This information is not intended as specific investment, accounting, legal, or tax advice. The findings and conclusions of this report do not necessarily reflect the views of the external reviewers, advisors, or investors. Any errors or omissions in fact or interpretation remain the sole responsibility of The Conference Board of Canada.
Where insights meet impact