

Net-Zero

Energy System Vision

This document outlines the Net-Zero Advisory Body (NZAB) vision for a net-zero energy system in Canada in 2050. It identifies key goals for Canada as we transform our energy system to respond to climate change.

While this transformation poses some challenges, NZAB sees it as a chance to improve our energy system, directly benefiting all Canadians.

A careful shift to a net-zero energy system can do more than just cut greenhouse gas emissions. Clean energy¹ and other net-zero technologies have the potential to bring many benefits to Canadians.

To capture these benefits, we must define clear goals that will guide:

- **Our actions**
- **Our policies**
- **Our investments**



Here are the
7 energy system goals
we believe Canada
should adopt to maximize
the benefits of this
transformation
for Canadians.



1 / Healthier people, healthier lands, healthier waters

Canadians already feel the effects of climate change on their health, lands and waters. Extreme weather events such as wildfires, floods and heatwaves are becoming more common. A sustainable, net-zero energy system will help Canada meet its greenhouse gas emissions goals. It will also reduce harmful pollutants from our current energy system, which affect human health and the environment. For instance, air pollution from fossil fuel combustion and other human activities is estimated to cause over 15,000 premature deaths each year in Canada². This pollution also harms our lands and waters.



2 / More reliable, resilient and secure energy

Access to reliable energy is difficult for some people residing in rural, remote or Northern communities, including Indigenous Peoples. Climate change causes more wildfires, severe storms and intense heat, which further threatens energy systems. A net-zero energy system can improve reliability, resilience and security. It does this by using a more diverse range of renewable and sustainable domestic energy sources. This system can also be more distributed with more local power generation, like with rooftop solar panels. Additionally, physical interconnections, such as transmission lines, and digital connections, such as smart grid technologies, will better match supply and demand.



3 / Improved energy affordability

Many people in Canada struggle with high energy costs and face energy poverty. This affects an estimated 5.6% and 13% of households across the country^{3,4}. A modern, efficient net-zero energy system requires major investment in electricity infrastructure. However, these upgrades are expected to lower overall energy costs for most households in Canada in the long run⁵. Widespread electrification and increased digitalization will reduce costs for many consumers. Technologies such as electric vehicles and heat pumps are much more efficient than fossil fuel counterparts. Other technological advancements like smart grids⁶, which use digital technologies to better match the supply and demand, will further improve efficiency. This will reduce the need for new generation and grid investment. Alongside these changes, proactive policies are essential to address energy poverty across Canada, including in remote communities.

1. International Energy Agency. 2024. [World Energy Outlook 2024](#). Clean energy includes renewables, modern bioenergy, nuclear, abated fossil fuels, low-emissions hydrogen and hydrogen-based fuels

2. Health Canada. 2021. [Health Impacts of Air Pollution in Canada](#)
3. Natural Resources Canada. 2024. [Energy Fact Book 2024-2025](#)
4. Efficiency Canada. 2025. [Energy Poverty in Canada](#)

5. Transition Accelerator. 2024. [Household Energy Affordability in a Net-Zero Future](#)
6. International Energy Agency. 2025. [Smart Grids](#)



4 / New economic opportunities from investment and jobs in energy projects

The energy sector is crucial to Canada's economy, adding \$279 billion to our GDP⁷. However, the world is changing: the majority of the global population and global GDP are now committed to net-zero targets⁸. We need to take hold of this opportunity to keep energy a strong contributor to our economy. Pursuing net-zero technologies will draw in investment and help us compete globally for export markets. For example, by 2050 Canada's clean energy sector could create 2.2 million jobs and its contribution to GDP could be six times larger in a net-zero scenario. We must prepare our workforce to transition smoothly to these new opportunities⁹.



5 / Reconciliation with and self-determination for Indigenous Peoples

In not seeking informed consent from Indigenous Peoples and ignoring Indigenous rights and knowledge when developing energy projects, Canada has harmed Indigenous Peoples and lands. The transition to a net-zero energy system presents an opportunity to create a new legacy. By respecting Indigenous rights and promoting self-determination¹⁰, energy projects can provide autonomy through independent revenue streams and equity stakes. Strong Indigenous partnerships are key to success in these projects. Recognizing the value of Indigenous involvement has led to many successful collaborations¹¹. In fact, First Nations, Métis, and Inuit Peoples are already driving Canada's energy transition, partnering or benefiting from nearly 20% of the country's electricity-generating infrastructure¹². Almost all that infrastructure is producing renewable energy.



6 / Energy system planning and decision-making that is more collaborative, inclusive¹³ and focused on people

In the past, energy development often hurt communities who were left out of the planning process. The energy transition offers a chance to change this. By involving community members, addressing their concerns and focusing on shared benefits, public support and trust can increase. These benefits include new jobs, capacity building and training, and investment in communities. Landowners also stand to gain, and communities can enjoy lower property taxes thanks to increased tax revenue from energy projects. For example, in 2024, renewable energy projects in Alberta brought in over \$54 million in municipal tax revenue, with some rural communities receiving 30% to 51% of their revenue from these projects¹⁴.



7 / More independence for individuals and businesses to meet their own energy needs

Historically, people had limited ways to engage directly in the energy system. A net-zero energy system, however, is different. It lets individuals produce and store energy, manage their consumption, and interact with the electricity grid. Many Canadians already generate their own energy using solar or wind power, either for personal use or to sell to the grid. Technology plays a key role. Smart meters and appliances help track electricity usage and take advantage of off-peak rates. Options for storing energy and selling it back to the grid, like vehicle-to-grid charging, are also growing.

We hope this document will contribute towards developing a common vision for transforming our energy system.

A net-zero energy vision is needed to shape our actions, policies and investments. As we recommended in our First Annual Report, NZAB believes the federal government should start a collaborative process to develop this vision. Then, it should share this vision with all Canadians.

Benefits

Accelerating our efforts to reduce greenhouse gas emissions can create many benefits to Canadians, including:



Reducing the negative impacts of climate change on human health



The economy



The environment^{15,16,17}



By setting out energy transition goals, we can maximize the benefits for all.

7. Natural Resources Canada. 2024. [Energy Fact Book 2024-2025](#)

8. Net Zero Tracker. 2025. [Data Explorer](#)

9. Clean Energy Canada. 2023. [A Pivotal Moment](#)

10. Indigenous Services Canada. 2024. [Economic Reconciliation Roundtable I: What we heard](#)

11. First Nations Major Projects Coalition. 2023. [The Values Driven Economy Post Conference Report](#)

12. Indigenous Clean Energy. 2022. [Waves of Change: Indigenous clean energy leadership for Canada's clean, electric future](#)

13. World Economic Forum. 2023. [How to create a framework for achieving an inclusive energy transition](#)

14. Calgary Herald. 2024. [Municipal tax dollars from renewable energy projects nearly double](#)

15. Canadian Climate Institute. 2022. [Damage Control: Reducing the costs of climate impacts in Canada](#)

16. Institute for Sustainable Finance. 2021. [Capital Mobilization Plan](#)

17. Government of Canada. 2021. [National Issues Report – Chapter 6: Costs and Benefits of Climate Change Impacts and Adaptation](#)

Features

By 2050, NZAB envisions Canada's energy system achieving net-zero emissions. While specific solutions will vary across Canada according to regional and community circumstances, key energy system features include¹⁸:

Maximizing energy efficiency throughout the system by prioritizing efficiency

Expanding net-zero electricity systems, which will serve as the foundation for decarbonizing other sectors

Electrifying industry, buildings and transportation on a large scale

Reducing fossil fuel use significantly compared to today

Enhancing energy system integration

Using alternative fuels that carry energy to replace fossil fuels where electrification is not feasible or practical

Following the preceding measures to reach net-zero, removing any limited residual emissions in the energy system where direct reductions are not feasible or practical

Features of a net-zero energy system

Over
80% of Canada's greenhouse gas emissions are from its energy system



What is a net-zero energy system?

An energy system consists of all the components related to the production, conversion, delivery and use of energy.

In Canada, it's responsible for over 80% of the country's greenhouse gas emissions. Most of Canada's energy—over 75%—comes from burning fossil fuels which powers activities like the production of oil and gas, generating electricity, moving people and goods, and heating buildings¹⁹.

To achieve net-zero emissions in the energy system, we need to almost completely eliminate greenhouse gas emissions from fossil fuel use.

Any leftover emissions must be offset by human actions to remove emissions from the atmosphere.

18. Clarke et al. 2022. [Intergovernmental Panel on Climate Change – 6th Assessment Report – Working Group III – Chapter 6: Energy Systems](#)

19. Natural Resources Canada. 2024. [Energy Fact Book 2024-2025](#)