

Zeroing in on Emissions

Canada's clean power
pathways – A review



Executive summary

Zeroing in on Emissions: Charting Canada's Clean Power Pathways is the first stop in a three-year initiative we're calling Clean Power Pathways: Fast-tracking Canada's energy transition. The report lays the foundation through an extensive review of global and Canadian decarbonization models and studies. It highlights 10 technically feasible strategies, actions and considerations that a wide range of experts agree will be front and centre in any credible effort to zero out Canada's emissions by the middle of this century, as science on climate change says is required. Together, these strategies are a litmus test for credible climate plans.

Here, we summarize the 10 recommended actions we outline on the pages that follow.

1. ACCELERATE CLEAN POWER

Much of Canada's power is already non-emitting, and there's a strong consensus among researchers that it's possible to accelerate this trend and meet our climate goals. Canada will not decarbonize its energy system, however, unless provinces and utilities aggressively dial down the greenhouse gas emissions associated with electricity generation until they reach zero. Diverse opportunities such as homeowner-generated clean power are appearing. Further, if we are to reach our climate goals, we'll need to clean up our grids and generate a great deal more clean power than we do today.

2. DO MORE WITH LESS ENERGY

Of all potential energy investments, efficiency offers the best return. Every sector of Canada's economy can pursue energy-efficiency measures and reap multiple rewards. Governments generally do so by regulating the energy performance of new buildings, appliances, vehicles and industrial equipment, and by incentivizing retrofits of existing assets. Companies also pursue their own internal targets. At present, Canada wastes a great deal of energy, which points to a large untapped opportunity.

3. ELECTRIFY JUST ABOUT EVERYTHING

Electricity is Canada's cleanest energy source for many provinces, but as of 2016 it only powered about 20 per cent of our energy needs. Studies suggest that by mid-century clean electricity will make up half or more of our energy mix. As grids get cleaner, clean electricity will power a growing share of our economy. It can heat our buildings and power our cars, trucks and buses. Even steel mills and oilsands operations can electrify. Multiple research projects have concluded that electrifying as much as possible will be a pillar of Canada's decarbonization effort.



4. FREE INDUSTRY FROM EMISSIONS

Canada will still need cement, iron, steel, aluminum and chemicals in 2050. And while companies collectively emit a great deal of carbon to produce those commodities, recent research suggests that need not always be the case. Industry can decarbonize its processes while minimizing risk of stranded assets, and while maintaining competitiveness and healthy employment. Solutions will involve a mix of electrification, carbon capture and evolving technologies.

5. SWITCH TO RENEWABLE FUELS

Although batteries and electricity can do a lot of heavy lifting, they are not ideally suited for all of Canada's energy services. The aviation, marine and other heavy transportation sectors, for example, will likely require some combination of biofuels, renewable gas and hydrogen. Reducing renewable electricity costs and expanding supply could make Canada a leader in hydrogen and other zero-carbon fuel production. Identifying, growing and responsibly harvesting the resources needed to produce biofuels challenges us to consider carefully land-base management and species selection. We must also take care to avoid negatively affecting ecosystems and the land we need to grow food.

6. MOBILIZE MONEY

The energy transition will require directing investment flows away from carbon-intensive sectors of the economy toward clean-economy sectors. Much of this investment will shift to the electricity sector where decarbonization will require significant investment. Recent research suggests that the costs associated with decarbonization will be more modest than widely assumed – and confirms that the costs of inaction will be far higher.

7. LEVEL THE PLAYING FIELD

To redirect investment throughout the Canadian economy, government needs to send the right price and policy signals. All credible assessments indicate that Canada will need steadily escalating carbon pricing to drive innovation and clean technology adoption on the path to successfully decarbonize by 2050. The policy works to steadily

“level the playing field” between polluting energy and cleaner energy. It incentivizes efficiency and fuel switching, and drives innovation and investment in the clean energy economy. Other federal, provincial and municipal policies and price signals can help clean the air in congested cities, and improve transit and the energy efficiency of buildings.



8. REIMAGINE OUR COMMUNITIES

Canada’s cities, towns and villages will play a central role in any credible decarbonization effort. Abundant evidence indicates that complete, compact, livable communities are less carbon-intensive than their low-density counterparts. Well-designed communities unlock affordable public transit and active transportation while enhancing quality of life and health. Local governments can access myriad policy tools to lower emissions, such as provincial and municipal building codes and incentives to drive clustered, transit-oriented development. Research suggests that smart city design could reduce Canada’s emissions by 15 per cent or more.

9. FOCUS ON WHAT REALLY MATTERS

Soaring economic growth offers benefits but also carries real costs that are all too easily brushed aside. The necessary high-energy inputs of increasing growth take a toll on people and ecosystems. Canadians can choose to revisit the fundamental metrics that we use to define prosperity, such as GDP, and instead embrace those that measure well-being. In doing so, they will lessen the engineering challenges required to zero out carbon emissions. When we shift our thinking toward outcomes like healthier urban living, more creative solutions like active transportation infrastructure and transit hubs start to arise.

10. BRING EVERYONE ALONG

As Canada zeroes out its emissions, changes in the economy are inevitable. They must be carefully managed. Some sectors and communities will face job losses, while clean tech will be hiring. To ensure the transition does not result in hardships, governments must proactively support vulnerable workers and communities. The clean energy transition can be a driver to create more good jobs, invest in upgrading existing jobs and reduce inequality.

While broad agreement exists among both models and experts that these 10 strategies and actions will be important ingredients to thoughtfully fast-track decarbonization, Canada has yet to land on a consensus on the best ways to move forward.

Canada’s efforts are more likely to succeed if there is a broadly shared vision of the low-carbon, clean future and its myriad health and quality-of-life benefits. We offer this report to shine light on the building blocks of a zero carbon future and the choices that will put the country on that path.