



Canada's Resilient Recovery A Commentary from the Canadian Academy of Engineering

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The current COVID-19 pandemic resembles an earthquake of global dimensions, with enormous impact and aftershocks still being felt and feared. Unlike an earthquake causing physical destruction, the pandemic has stretched and disrupted the sinews of modern life: the ways we interact, earn a living, learn, care for our health and for each other, and function as a society.

While the full damage is not yet known, it is not too early to consider life after the pandemic. The recovery must be resilient and sustainable, thereby leading to better protection and improvements for all citizens, communities, institutions, the economy, and environment. It must also mitigate future risks and address uncertainties, including the effects of climate change, while positioning Canada for new opportunities in a rapidly changing world.

The recovery will add to the enormous costs and debts already incurred by citizens and governments during the pandemic. Success requires commitment and coordinated action by the governmental, industrial, not-for profit, and civil society sectors, leading to clear and readily understood benefits for all Canadians. The recovery cannot be achieved by government investments, regulations, and initiatives alone.

The Canadian Academy of Engineering (CAE) is exploring various means of supporting the recovery and welcomes efforts by others, including the Task Force for a Resilient Recovery (TFRR) which has just released a comprehensive report.¹ It suggests five “Bold Moves”:

1. Invest in climate resilient and energy efficient buildings
2. Jumpstart Canada's production and adoption of zero-emission vehicles
3. Go big on growing Canada's clean energy sectors
4. Invest in the nature that protects and sustains us
5. Grow clean competitiveness and jobs across the Canadian economy

All Moves are dependent on engineering and present major opportunities and challenges for engineers now and in future years.

Goals

More generally, the immediate goal of recovery efforts must be the quick return to a state where Canadians, their companies and institutions can again function properly. An example of an immediate goal is to provide more and safer long-term care facilities for elderly Canadians. This need was laid bare during the pandemic, but it was already well recognized in 2017 when the Conference Board of Canada

¹ https://www.recoverytaskforce.ca/wp-content/uploads/2020/09/TFRR-Final-Report_EN.pdf

concluded that approximately 10,000 new long-term care beds were required per year, up to 2035.² The pandemic showed that the issue is not only more beds, but also beds located in more appropriately designed, staffed, and maintained rooms. The pandemic also demonstrated that public health, hygiene, and the full set of health care supports (ranging from research to practical education) are critically needed to avoid and manage pandemics. It is therefore somewhat surprising that the TFRR report does not include ‘*health*’ as a major component of recovery actions.

However, the report identifies better *buildings* and *vehicles* as key resilience goals. It places strong emphasis on energy efficiency, which is well-aligned with the objective of reducing Canada’s greenhouse gas emissions and achieving net zero by mid-century. The opportunities for efficient building construction (including the use of modular construction technologies) and improving vehicle safety are clear. The infection risks related to buildings and public transport (including trains, planes, and buses) that have high occupancy densities can be addressed through better design and operation.

Energy is and will remain a central issue in Canada’s economy, involving and supporting large numbers of jobs and generating export earnings, which are essential to Canada’s high quality of life. Canada’s energy sector must continue to undergo changes that result in substantially less greenhouse gas emissions from the traditional fossil fuels sector and in the growth of the renewables sector. The TFRR report, like other reports, places great emphasis on transitioning to renewable energy sources and electricity. Large-scale hydro electricity and nuclear power are not emphasized but should remain under active consideration due to their great potential, while recognizing divergent views within Canadian society. The long-term prospect of nuclear fusion should also be kept in focus because of its inherent potential and safety. Canada recently signaled that it will join ITER, the international effort to develop fusion power.

Electrification of Canada’s energy sector requires not only increased generation capacity. It also requires the development and deployment of storage and transmission capacity, especially when reliance on intermittent solar and wind energy is increased. Nation- and continent-wide systems are needed, and have already been outlined in major studies supported by the CAE.^{3,4}

The TFRR makes a strong case for the protection of the natural environment. This goal ultimately sustains life not only in Canada but also, given Canada’s extensive land and sea areas, the health of the entire planet earth. The active participation of all Canadians, but especially the expertise and collaboration of Indigenous peoples, are critical. Protecting and ensuring the sustainability of the natural environment in relation to agricultural, industrial, and recreational uses calls for both a deep understanding of the underlying sciences as well as respect for its values.

The current pandemic also demonstrates the need for private and public sector activities unrelated to health to be viable under rapidly changing circumstances. International competition for Canada’s goods and services providers will grow. However, some aspects of globalization may slow that growth due to increased protectionism and the desire for greater national self-sufficiency. New demands and associated

² https://www.conferenceboard.ca/temp/2c019405-a120-479f-bca9-3f2c1775d109/9228_Meeting%20the%20Demand%20for%20Long-Term%20Care%20Beds_RPT.pdf

³ Canada: Becoming a Sustainable Energy Powerhouse, <https://cae-acg.ca/wp-content/uploads/2014/06/CANADA-July9.pdf> (July 2014)

⁴ Canada: Winning as a Sustainable Energy Superpower, <https://cae-acg.ca/wp-content/uploads/2013/04/02-Volumell-LR.pdf> (May 2012)

opportunities will arise in Canada and abroad for materials, products, and services with greater and more sophisticated knowledge content than their present counterparts.

Canadians must possess the expertise, experience, and commitment to compete in a rapidly changing world. Consequently, broad and sustained investments by government and industry into the not-for-profit sector, which includes universities, colleges, and other educational and research institutions, are critical. This sector is an essential foundation for innovation in general, but innovation is also the key to dedicated recovery actions in health, buildings, transportation, energy, and the natural environment. The TFRR report recognizes these necessities without major elaboration.

Success

Canada, as a trading nation and mid-size power, must align its recovery activities with global realities. This means that Canada must be a winner in the global competition for markets, ideas, and people.

Success in resilient recovery from the current pandemic is predicated on effective collaboration within Canada by the governmental, industrial, not-for-profit, and civil society sectors. Success is also heightened by collaboration with counterparts abroad. Such collaboration should be sought with countries and multi-national organizations that share Canada's values and goals.

Collaboration must be inter- and multi-disciplinary. None of the important recovery challenges are the purview of a single sector, discipline, or profession. All recovery challenges involve the natural and social sciences, humanities, economics, business, and engineering. Imagination, creativity, and commitment to sustainable progress are the overarching and unifying elements.

The Canadian Academy of Engineering, by virtue of its 800 Fellows and their distinguished records in engineering and collaboration, is well-positioned to support Canada's resilient recovery from the current pandemic. Specifically, the CAE would welcome and support the development and implementation of a national recovery strategy. The CAE and its Fellows will work for a recovery that positions Canada as a modern society and economy dedicated to large, measurable near- and long-term increases in sustainability, international competitiveness, employment, and quality of life for all Canadians.

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About the Canadian Academy of Engineering (CAE): The CAE is Canada's national academy of engineering. It consists of over 800 elected Fellows who have made important contributions to engineering in Canada. The mission of the Academy is to demonstrate leadership in the responsible application of engineering knowledge for the benefit of Canadians, provide strategic advice to decision-makers, and contribute to shaping the future of engineering.

The CAE is an independent, self-governing and non-profit organization established in 1987. The CAE works with other senior Canadian and international academies, and is a founding member of the Council of Canadian Academies, along with the Royal Society of Canada and the Canadian Academy of Health Sciences.

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