

# An Energy Primer for Canada: People, Technology and the Economy

Nathalie Pilon

Since the election of a new federal government and the tabling of a budget in March focused on stimulus spending, a national debate is underway about what we need to do on many fronts, whether in transit infrastructure, clean technology for industrial and institutional use, or development of our natural resources. Whether in Alberta or Quebec, British Columbia or Newfoundland, all Canadians want affordable energy, clean, efficient transportation and sustainable communities.

The polarizing discussion on regional disparities and behaviours with regard to climate and the environment does not answer the simple question: What future do we want for our country and its economy based on the resources we have in Canada?

As a Canadian, I believe that to address this question we must focus on three broad sectors: manufacturing, transport and energy.

As someone with more than 20 years of experience in the manufacturing world, I have a special affinity for the first of these and I believe that designing and producing things in this country is not only desirable but essential for our economy to flourish. Manufacturing provides employment, commercial innovation, and importantly, trade deficit reduction. It also has a significant contribution to make towards environmental sustainability. However, the jobs we have long associated with manufacturing are disappearing.

Productivity in manufacturing relies on investment in technology such as automated processes and robotics.

*Managing change has long been the primary challenge of both government and business. But as we live through what has been dubbed the Fourth Industrial Revolution, the one certainty that informs our decision-making is that change isn't what it used to be—technology has both diffused and accelerated it. ABB Canada President Nathalie Pilon provides a snapshot of where manufacturing, transportation and energy are in a changing world today.*



ABB Canada President Nathalie Pilon writes that “Canada has all the energy resources it needs “to build a sustainable and prosperous future for its economy and its people.” ABB Canada photo

Data from the International Federation of Robotics show that between 1993 and 2007 the use of robots in manufacturing raised the annual growth of labor productivity and country GDP by 10 per cent and 16

per cent respectively. It also shows that the countries with the highest penetration of industrial robotics (i.e., Germany and South Korea) also enjoy some of the lowest unemployment rates in the developed world.

At the World Economic Forum earlier this year, ABB CEO Ulrich Spiesshofer addressed the issue of jobs and automation by making a critical distinction:

The purpose of technology is to make a better world. If we use it smartly, we will create work. The problem that we have is that people don't differentiate between jobs and work. There has never been an industrial revolution where the jobs haven't changed. Work will always be there; the jobs are changing.

**W**e are now in the midst of what many have called a fourth industrial revolution, also known as "Industry 4.0." The final word for employment in this new age is that low-skill jobs will be replaced with new higher-skill roles. Robots and automated systems will do the dirty, dangerous and repetitive jobs they are best at, allowing people to focus on the things that they are best at. This is the essence of advanced manufacturing, and it implies an economy-wide adaptation in worker skill sets that Canada must embrace if we are to create a better future sustainably.

Similarly, we must reshape our transportation sector toward one that is powered primarily by electricity. Transportation accounts for 31 per cent of all energy use in Canada and 37 per cent of all GHG emissions. Electric drive is extremely efficient thanks to the fact that electric motors convert around 90 percent of the input energy to traction compared to 40 percent for diesel engines and 30 percent for gasoline. But electrified transport is much more than hybrid cars and metro lines. Think electric propulsion for ships, electric cranes at ports, electric forklifts in warehouses and electric big rigs recharging while their drivers sleep. All of these are feasible today or already in widespread use.

Canada, however, is also the fifth largest producer of oil and gas in the world. Our natural resources sector is an important part of our economy,

**“The grid of the future will be much more complex, with multiple feed-in points from traditional power plants, remote wind farms and rooftop solar systems.”**

and it is likely to remain so for the foreseeable future as the global economy transitions from high-carbon energy sources to lower-carbon alternatives. This evolution speaks to an “all of the above” energy strategy and is recognized in the Quebec Energy Policy, which for example calls for a network of electric vehicle charging stations that also offer hydrogen and natural gas.

The question of energy development and which choices to make in the long run have to take into account not only environment and efficiency but also assumptions on supply and infrastructure. The federal government's New Building Canada Fund and the investments that will be made by provincial and municipal governments for their communities will determine the future of the energy mix.

We are a long way from widespread adoption of electric vehicles and there are supply issues both for EVs and for charging infrastructure. The recent federal budget recognizes this with generous tax incentives allocated to transport systems that permit the furthest travel distances. This pragmatism is essential if we are to execute a smooth transition to a low-carbon transportation sector.

**B**y now it should be obvious that Canada's goals for the economy and the environment are predicated on a fundamental change in our energy supply chain. Whether the end use lies in industrial production, private transportation or residential lighting, we must increase efficiency and productivity at every step in the process while we seek to reduce our overall environmental footprint.

We are facing two key global trends in Canada. One is the shift to renewable energy and a power grid that enables not only the wider use of wind

and solar but that supports technologies like energy storage, demand response and microgrids—all of which can improve sustainability while also increasing reliability.

The grid of the future will be much more complex, with multiple feed-in points from traditional power plants, remote wind farms and rooftop solar systems. New industry players will compete in the wholesale generation market by aggregating real-time reductions in demand from thousands of consumers. The grid itself will become more intelligent, anticipating disturbances and taking action before they occur. Managing this complexity will require a host of new technologies, many of which are already commercially available.

The second big trend lies in automation, where advances in sensor technology, combined with ubiquitous connectivity and an ever-growing capacity to process and store data, are enabling machines to be more and more intelligent. This is the basis for the Internet of Things, which at ABB we see more holistically as including services and people. For example, engineers and service specialists are already able to support remote sites like mines and offshore platforms from offices thousands of miles away through the use of video and real-time data feeds from devices in the field. Applications like this will dramatically reduce the energy required to produce goods and services.

Canada has all the energy resources it needs to build a sustainable and prosperous future for its economy and its people. Getting there will require change in many areas, but from my vantage point within one of the organizations that is driving that change, I am confident we will get there. **P**

*Nathalie Pilon is President of ABB Canada.*