



Energy in Canada @150 and Beyond Disruptor or Disrupted: Canada's Role in the Changing Global Energy Market

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One in a series of papers prepared by Canadian energy sector leaders – at the invitation of the Energy Council of Canada – exploring key aspects of our ongoing national energy story on the occasion of the 150th anniversary of Confederation.

Summary: Elyse Allan describes the volatile, uncertain, complex and ambiguous world in which we live, and how we can go about securing a place for Canadian energy resources within it. This requires the energy sector – with appropriate support from government partners – to become a disruptor, and to speed up the pace of adoption and fully seize the opportunities presented by the digital industrial revolution. This will entail addressing challenges including appropriate carbon pricing design and promotion of energy careers among youth.

Adapting to a VUCA World

Demand for energy continues to increase, driven by growth in global population growth and per capita GDP.¹ This is largely a good news story – it represents populations being lifted out of energy poverty, and gaining access to things we take for granted in Canada such as water treatment, clean cooking fuels, and mobility. But while the total demand for energy increases, how demand is being served – by

¹ McKinsey Insights:
<https://www.mckinseyenergyinsights.com/insights/the-drivers-of-global-energy-demand-growth-to-2050/>

what technologies, where and by whom – is shifting dramatically and rapidly. Start-ups are bringing transformative technologies to market much more quickly – and disrupting longstanding business models just as rapidly. Alongside this, there are escalating consumer and government expectations; people around the world are demanding cleaner, more energy-efficient energy sources at an affordable price. Where do Canadian energy resources fit in this equation?

There is uncertainty about how to respond to this changing global energy market. We are living in what is known as a VUCA world, one that is Volatile, Uncertain, Complex, and Ambiguous. One of the forces driving this is the impact of the digital industrial revolution on industrial operations and business models.

**Our world has become volatile,
uncertain, complex and ambiguous.**

American software engineer Mark Andressen said, “Software is eating the world.” The combination of lower cost sensing technology and faster processing speeds means that information moves faster. To keep pace, we are driven to move faster, communicate faster,



work faster and innovate faster – all of which makes the business climate more Volatile, Uncertain, Complex, and Ambiguous. Digital is revolutionizing every aspect of how energy and resource companies are managing operations, and raising the competitive stakes in the process.

And so the question arises: Will we be the disruptor or will we be disrupted?

For the Canadian energy sector, there can be only one answer. We must be the disruptor, the force driving change, if this sector is to remain internationally competitive and continue to play a lead role in the Canadian economy.

The path leading out of this VUCA world is the very same technology that is disrupting our industries and our traditional business models. The digital industrial revolution is the path to Canadian energy competitiveness in a cost- and carbon-constrained world. We need to invest and grow our in-house digital expertise, and then export that knowledge and expertise to countries that are building their own energy ecosystems.

The digital industrial revolution is the path to energy competitiveness.

It goes without saying that industry and government are partners in this race.

For industry, it is a matter of survival. Our foreign customers are not wedded to their Canadian suppliers. Like all customers, they are looking for security of supply at a fair price, and increasingly they are under pressure from their

own local populations to source energy that is produced sustainably and cost-efficiently.

For government, it is a matter of sustaining and growing well-paying jobs for current and future generations of Canadians while honouring our domestic and global commitments to reduce environmental impacts.

The common element here is digital. Digital is the disruptor, the path to success in a cost- and carbon-constrained world. For Canada to continue to be a place of prosperity, we must lead the digital transformation in our energy sectors.

Going Digital

How does digital impact the energy ecosystem and make it both more sustainable and cost-efficient?

In short: real time data, gathered digitally from every part of your operations allows you to analyze and solve current problems quickly, and to predict future problems and prevent them before they occur. This eliminates downtime, optimizes asset performance and improves overall productivity.

We are already seeing the benefits of digital in action in Canada's oil and gas sector.

For example, in Alberta's *in-situ* oil sands operations, GE's Adaptix software allows operators to be far more precise in their use of steam injection to melt underground bitumen and push it to the surface. This reduces both the use of steam and the natural gas needed to produce it, thereby reducing GHG emissions. The process yields immediate gains from one to six percent in costs and emissions.



Digital solutions like Adaptix will play a significant role in determining the future of this industry.

In the pipeline industry, pipeline integrity is of critical importance. If a leak occurs, speed of detection is one of the most important factors in containment. Current detection systems face challenges such as imprecise sensors and their sub-optimum placement along pipelines, land-based surveys that miss leaks because of the timing of the survey, and numerous false alarms.

GE, in partnership with a company called HiFi Engineering, has developed detection technology that combines fiber-optic cabling with a cloud-based platform to enable virtually instantaneous leak detection – stopping little leaks from becoming big spills. The digital advantage is obvious.

How Government Can Help

Government and industry are partners in making Canada a leader in digital technology. The opportunity that digital offers to improve the competitive position of our energy sector is huge, but how can governments support this transformation?

First, we must focus on skills development. New recruits and the existing workforce need the skills to interpret the data produced by intelligent machines. Industry naturally has a key role in investing in digital training, however, more is needed.

By taking measures to enhance digital skills development at all levels, from kindergarten through post-secondary, governments can help

ensure job seekers are prepared for a radically transformed workplace. Nobody wants to see high-skill, high-wage positions in the burgeoning digital economy remain vacant due to a lack of qualified Canadian applicants.

Governments can also do more to promote career opportunities in the energy sector among young Canadians.

Nobody wants to see high-skill, high-wage positions remain vacant.

There's a bit of irony here. We all know that young, nimble minds are already very comfortable with digital. After all, technology is the ocean they have been swimming in since birth. We also know that the younger generation is very concerned about climate change since it is their future that is at risk. For many, conservation and environmental protection are no longer causes or issues for debate – they are now a way of life.

But they are not flocking to jobs in energy. In truth, they are more likely to be leading the opposition to new infrastructure projects, including renewable energy. This suggests that their perception is rooted in the past rather than the present or future.

That needs to change. The energy industry is not what it was a generation ago. It is now focussed on transitioning to a low-carbon future and on improving access to safe, reliable and clean energy for the populations of developing countries. These are missions that young people would certainly embrace. They're just not connecting them with the energy sector.



Governments can help engage young people in developing the solutions we need to build new, stronger, more sustainable and competitive industries. There are many challenges ahead, and we need the skills, enthusiasm and commitment of younger Canadians to tackle them.

Next is carbon pricing. At GE, we recognize that climate change is real. Mitigating its effects is not an option – it is an imperative.

Carbon pricing will vastly accelerate the rate at which Canadian companies adopt new technology.

In this regard, carbon pricing has proven itself the most efficient policy tool available to governments. It is built on a simple premise: tax the things we don't want, support things we want and need. It is the best way for governments to strike the right balance of being a responsible actor in the fight against climate change, and maintaining our legitimate role as an energy supplier to the world. Carbon pricing will vastly accelerate the rate at which Canadian companies adopt new technology because it changes the fundamental economic equation around risk and reward.

But competitiveness is a legitimate concern for Canadian companies, and returning carbon revenues to the economy is central to that equation. Canada has long struggled with productivity and innovation. Through revenue recycling, governments can incent positive change in these areas and position Canadian companies to be more competitive in the future economy.

Governments can boost productivity by supporting innovation from conception all the way through to adoption. We are doing better at the front end of this equation – Canadian governments are increasingly active investors in technology development. We also see a need for government to look for ways to accelerate the adoption of innovative hardware and software by established companies and by governments themselves. And that means working with start-ups who already have the necessary skills.

I'll go one step further. Be their first customer.

Governments have an enormous opportunity to support the digital industrial revolution through the power of the purse. Adopting value-based procurement that moves away from a 'least-cost' approach enables a broader range of desired outcomes, including the adoption of new and novel technologies. It provides the market pull that is so essential to technology deployment and establishes the proof points that enable widespread adoption.

These strategies can be difficult for government, which is by nature risk-averse. But the pace of digital innovation in today's world demands a rethink of our modus operandi.

Speeding the Pace of Adoption

Think of the digital industrial revolution as a global three-legged race. Canadian governments and business are partnered together, which means that governments need to move at the same speed of business if we are going to place, let alone win.

We need to adopt digital technology faster because digital drives value. The digital



industrial revolution is transforming the energy industry around the world, and Canada needs to be at the forefront of this revolution if we are to remain globally competitive.

Digital solutions are already at hand, however, the rate of digital adoption by industry in Canada is still too slow.

To illustrate the issue, here is a brief quote from the Canadian findings of PriceWaterhouseCoopers' most recent CEO Survey²:

"Most CEOs believe technology will completely reshape their businesses over the next five years. Meanwhile, the speed of technological disruption and its threat to traditional business models seems to be less of an immediate concern for Canadian leaders. Canadian leaders don't view the hiring of people with innovation skills as a top priority."

At GE, we refer to this as receptor capacity. While some organizations are quick to embrace new technology and are ready to manage the problems that sometimes arise with piloting innovation, others want to avoid taking on those risks and are happy to let others be the test pilot.

But in a VUCA world, wait-and-see is a losing strategy. All companies face the threat of Digital Darwinism, AKA "adapt or die".

Canadian governments and Canadian businesses need to improve their receptor capacity. We need to be the digital disruptors, not the disrupted.

Elyse Allan is a passionate champion for Canada's competitiveness, advancing the country's science and technology base and competitive fiscal policy, and an active participant in policy development in a range of fields. Among other recognition, she has been named by *Maclean's* and *Canadian Business* Magazines as one of Canada's most influential business leaders, and is a member of the Order of Canada. The Energy Council of Canada awarded her the Canadian Energy Person of the Year award in 2016. Elyse's GE career began in 1984 and has spanned the US, Canada and several industrial and consumer GE businesses.

² https://www.pwc.com/ca/en/today-s-issues/ceo-agenda/20th-ceo-survey.html?utm_source=global-landing-page&utm_medium=referral&utm_campaign=ceo-survey