



Energy Insights @150 Innovation and Energy Change

By Bob Hanf, Vice Chair, World Energy Council North America Region; and Executive Vice President Stakeholder Relations and Regulatory Affairs, Emera

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: Against a backdrop of accelerating energy-related change, Bob Hanf outlines Emera's evolution over the past century-and-three-quarters, and its current role in helping foster transformation through generation changes, electrification, and various specific projects and initiatives. With local resource availability as a guiding consideration, Emera is helping bring about major GHG emission reductions and dramatic expansion of key transmission infrastructure. A focus on smarter electricity systems and better storage are among Emera's efforts that are helping to bring about customer- and community-supporting energy change, while also fostering a culture of innovation in its operating areas.

shifting to a future where energy choice, control and “always on” reliability are commonplace.

Energy change is happening all around us ... we feel it in the way our customer expectations are shifting.

As exciting and challenging as this change can seem, we believe it's also something that energy companies are well positioned to meet – because change has been a constant in our industry. It has certainly been a constant at Emera, where we have grown and adapted to meet and anticipate the needs of our customers for more than 170 years.

In a Word, Change

If there's a single word that encapsulates what's happening in the energy industry at this point in time, it would have to be “change”.

Energy change is happening all around us, and it's accelerating. We hear it in the growing call for lower-carbon energy. We see it in the technology innovations that are disrupting how we create, share and store energy. And we feel it in the way our customer expectations are

Committed to Customers and Communities

At Emera, our strategy has been to meet the demand for cleaner, affordable energy for over a decade. And our roots in clean energy run much deeper – in some cases, to the earliest days of our utilities. What hasn't changed is our commitment to customers and communities, and how we've sought to use sources of generation that make the most sense for each location we serve.



Emera's history in Nova Scotia dates back to 1840. Today, almost 70 per cent of our business is located outside of Canada with 7,400 employees serving 2.5 million utility customers throughout Canada, the US and in four Caribbean countries.

When we started out, our predecessor Halifax Gas, Light and Water Company delivered coal for the gas street lights of Halifax. Coal and gas were the predominant generation resources in Nova Scotia at the time. Just after the turn of the last century, we added some hydro from our local rivers. We've been investing in renewable energy for a long time.

As customers' lives evolved, natural gas became the dominant fuel following World War II, with electric trolley coaches replacing trams.

Our history in Nova Scotia dates back to 1840, and today almost 70% of our business is located outside of Canada.

Oil emerged as a cheaper fuel than gas as the demand for electricity grew in the 1960s, but in 1973 the OPEC oil crisis hit. Nova Scotia Power had just become a crown corporation at the time, and the government decided to switch from imported oil to cheaper local coal as the primary source of generation. That meant the construction of new coal-fired power plants, mostly in Cape Breton, close to the mines.

Nova Scotia Power was privatized in 1992 and eight years later its holding company was named Emera.

Natural gas saw a re-emergence and, while we were still burning coal, by then most of it came

from the international markets. But with the volatility of fossil fuel markets and a strong government policy focus on renewables, we knew we had to fundamentally transform the way we generated electricity.

That provided the impetus for Emera's strategy to provide clean, affordable energy to our customers. It's a strategy that has worked well for us over the past 12 years and, though it has been tweaked over time, it will carry us to success in the future.

Both government policy and consumer demand set the stage for our strategy¹. While it's inevitable that government mandates will change, customer demand for cleaner energy grows stronger every year.

Our Role in a Transforming Sector

As we look around, transformation in the energy sector is clear and widespread. Emera is playing a role in this shift in the sector in a number of ways. First, through cleaner energy – generating more energy from renewables and from natural gas.

Second, through electrification – by helping our customers shift heating and transportation from higher-carbon fossil fuels to cleaner electricity using heat pumps and electric vehicles. This is happening at a time when the costs of these new technologies are falling rapidly.

And third, through the major projects and initiatives our teams are working on right across our business.

The natural resources available in the markets where we work drive us towards the most efficient and affordable clean solutions for our

¹ Emera Sustainability Report 2016.
www.emera.com/sustainability



customers. At our affiliates in Florida and Barbados, that means the sun. In Nova Scotia, it's the wind and the ocean.

We have made tremendous strides introducing renewable energy onto the grid in Nova Scotia and see great potential for future integration.

Nova Scotia Power has undergone the most rapid transition to renewable energy of any utility in Canada, setting a record 28 per cent of generation from renewable sources in 2016, up from eight per cent in 2007.

The team at NS Power has done that primarily by integrating proportionately more wind onto the system than anywhere else in Canada, with wind capacity representing 30 per cent of the utility's 2,000 MW power system peak.

Nova Scotia is also leading Canada in carbon reduction, with NS Power reducing greenhouse gas emissions by 34 per cent in the past 12 years. Nova Scotia is on track for a 58 per cent reduction by 2030 – almost double the federal target. And NS Power is on track to hit the goal of 40 per cent of electricity coming from clean, renewable sources by 2020.

Looking to the natural resources available locally, hydroelectricity and tidal energy have tremendous potential for us in the Atlantic region.

The Maritime Link is a \$1.6 billion project that will allow an abundance of clean hydro energy to flow from Muskrat Falls in Newfoundland into Nova Scotia and beyond.

The link project is an incredible engineering feat that will connect Newfoundland to the North American grid for the first time in history via 170 km of high voltage direct current cables

under the Cabot Strait. These are the longest subsea cables in North America, entering the ocean at Cape Ray in Newfoundland and making landfall at Point Aconi in Cape Breton, Nova Scotia.

Our proposed Atlantic Link will deliver clean energy from northern Maine and Atlantic Canada directly to southern Massachusetts through a 563-km, 1000-MW subsea high-voltage direct-current cable that would run from southwestern New Brunswick to a landing point in Massachusetts.

If approved, this project will open up an immense market for emissions free energy directly into the Commonwealth and the New England electricity system.

[These two transmission projects add up to what we call the North American Eastern Energy Loop.](#)

These two transmission projects add up to what we call the North American Eastern Energy Loop, creating a regional transmission solution that links together supply and demand. It puts us in a position to export clean energy to New England, potentially enhancing our region's marketability and economic potential, while supplying more renewable energy to the Atlantic region.

As we execute on these massive projects, we're also exploring the potential to harness the immense power of some of the highest tides in the world at the Bay of Fundy between Nova Scotia and New Brunswick.



Emera has partnered with the Irish firm Open Hydro to create Cape Sharp Tidal. The first of two instream tidal demonstration turbines

began producing electricity in November 2016. The data we have gathered will help provide us with the science we are seeking as we explore the potential for tidal energy in the Minas Passage.

[Through affiliates in Maine, Barbados and Nova Scotia, Emera is partnering with world-class leaders like Tesla to introduce the use of battery storage.](#)

The research and development for this tidal project is being done here in Nova Scotia and involves over 300 companies – the vast majority of which are Nova Scotian. We are driving innovation and helping to build a new tidal industry in our region that will generate future economic growth.

We truly believe utilities that enable and facilitate change are the ones that will thrive and emerge as leaders.

Getting Smart on Meters and Storage

We also believe investing in new technologies will make our electricity system smarter and more reliable while empowering our customers. That's why we are exploring such initiatives as smart meters and large-scale electricity storage that will allow us to store intermittent renewable energy so that it can be counted on as a firm source of generation.

Through our affiliates in Maine, Barbados and Nova Scotia, Emera is partnering with world-class leaders like Tesla to introduce the use of battery storage. We're looking at different forms of energy storage including a large-scale battery at a utility substation, a battery system in the basement of a commercial building and, on a smaller residential scale, a storage battery in a customer's garage.

We're also working with partners to introduce more electric vehicle charging stations in Barbados and Nova Scotia while exploring the role of storage in using electric vehicles to support the grid.

And we're bringing these renewable initiatives together with grid intelligence that will result in more reliable service for our customers. Emera companies are collaborating across our operating regions to take advantage of combined purchasing power and to share best practices. Through grid intelligence technology, including Advanced Metering Infrastructure (AMI, or smart meters), customers are gaining more visibility into their energy usage, allowing them to manage consumption and to see firsthand how renewable energy is part of our fuel mix.

The team at Barbados Light & Power is rolling out a four-year AMI deployment, which will play a key role in integrating renewables and balancing energy sources, while responding to changes in peak demand and ensuring reliable supply for customers. The team at Tampa Electric rolled out an initial AMI pilot in April 2016, deploying 2,500 smart meters in Hillsborough County. This was just the first step towards a goal of providing every customer in Tampa Electric's service territory with a smart meter by 2020. A second phase of the pilot is currently underway, as the team works to install



more than 20,000 smart meters in 2017. Nova Scotia Power is also advancing plans to roll-out smart meters to all of its customers, forecasting that over the lifespan of the project, smart meters will reduce costs by approximately \$38 million, helping deliver rate stability to customers.

A Culture of Innovation

I believe companies like Emera have an important role to play in fostering a culture of innovation in the Atlantic region. Innovation is the key to Emera's success as we focus on projects that range from small to massive – each representing our strategy in action as we work to bring about the future of smart energy.

We're a leader in renewable energy innovation in Canada and on the world stage, creating an industry right here in Atlantic Canada through collaborative research partnerships with industry, government and universities.

[We committed \\$10M to Dalhousie University to create the Emera ideaHub incubator and accelerator.](#)

For example, Emera has partnered with New Brunswick Power and the University of New Brunswick to establish the Emera & NB Power Research Centre for Smart Grid Technologies at UNB. Our affiliate Barbados Light and Power is working with the Barbadian government to completely electrify and power the island 100 per cent by renewable energy before 2045. The centre at UNB will attract world-class research and expertise to help create clean energy

solutions for our customers in Barbados which will then be applied at our affiliates.

We have also committed \$10 million to Dalhousie University in Halifax to create the Emera ideaHub – a world class engineering incubator and accelerator space that will provide students and start-ups with mentorship and support to bring ideas for their technology-based products to the market.

The Emera ideaHUB is a perfect fit for us as we constantly explore new ideas and technologies to provide safe, clean affordable energy to our customers.

Investing in innovation like this is not only important for our business, it is important to our community. The ideas that will be accelerated due to initiatives like Emera ideaHUB and the smart grid research centre will help Atlantic Canada launch great companies that will compete in global markets with the best in the world.

I'm proud that we at Emera are helping to lead the way in the rapidly evolving cleaner energy sector.



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Bob Hanf leads strategy and alignment for teams across Emera in the areas of stakeholder and regulatory relations, safety, environment, communications and government relations. Since joining the business in 2002, Bob has held progressively more senior roles within the Emera group of companies, most recently as President and Chief Executive Officer of Nova Scotia Power. Prior to that, Bob served as Chief Legal Officer for Emera in Halifax, Executive Chairman of Light & Power Holdings in Barbados, and President and COO at Bangor Hydro Electric Company in Maine. Bob has been part of the leadership team that has steered

Emera from its origins as a single electrical utility in Nova Scotia to become one of the 20 largest North American publicly traded utilities, and a member of S&P TSX 60.