Canada’s National Hydrogen Strategy

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The global push toward a low-carbon future has galvanized interest in hydrogen and its attendant infrastructure. Hydrogen — the most abundant element in the universe — holds significant promise as an alternate low-carbon energy source in a range of applications and sectors.

A major development in Canada’s embrace of hydrogen’s benefits will be the planned National Hydrogen Strategy, which is expected in the next number of weeks.

In advance of that strategy, it is important to understand that each province has taken a different approach to the development of hydrogen that is reflective of the specific provinces’ resource profiles, energy capacities, and economic and environmental goals.

While every province now openly endorses hydrogen energy as a coming 10-year growth strategy with many of the same (stock) aspirations and goals, there are clear differences in market orientation.

British Columbia: Hydrogen as Transportation

The Province of British Columbia has promoted hydrogen development since the release of the CleanBC policy in 2018 and the more recent comprehensive Hydrogen Study (the Study), where the emphasis is decidedly towards transportation fuels, including:

LCFS: Hydrogen development fits within the B.C. Low-Carbon Fuel Standard, Canada’s first and only lifecycle intensity fuel regime and long-favoured as a model for the federal Clean Fuel Standard.

ZEVs: British Columbia has advanced Zero-Emissions Vehicles requirements to be fully implemented within 20 years, with hydrogen as the default preferred fuel alternative under the scheme. (Canada has been providing incentives for ZEVs and has recently released the *Canadian Net-Zero Emissions Accountability Act*, which would notionally apply to vehicles.)

Fuel Cells: B.C. is a self-described “cradle” of fuel cell technology, and home to Canada’s first retail hydrogen fuelling station, with more planned. It has also committed

funds to Hydrogen BC, a creation of the BC Hydrogen Fuel Cell Association. The province has acknowledged losing ground to developments elsewhere and is desperate to grow fuel cell industries at home, including utility-scale generation as found in California, South Korea and Japan.

A provincial hydrogen strategy remains planned for release this year and will certainly reflect the heavy emphasis that British Columbia places on transportation fuel applications.

Ontario: Hydrogen as Power to Gas

Ontario has just issued an Ontario Hydrogen Economy discussion paper (the Hydrogen Economy) while aspiring to be a "top 10 hydrogen hub in North America."

Arguably, the cornerstone of the Hydrogen Economy is "power to gas," a process which turns the conventional model of natural gas-to-electricity on its head. Through old-fashioned electrolysis, hydrogen can be separated from oxygen, and further consideration of the economics will be required.

In promoting electrolysis, the Hydrogen Economy will likely consider some forms of market intervention to ensure that electrolysis-derived hydrogen can be made financially viable, including:

Discounted Electricity: The government may consider discounted off-peak and surplus energy be made available to generators.

Storage: The province will likely incent electrolysis as a means of energy storage, converting low-carbon sources of energy into hydrogen as a means to preserve and offset peak and excess demand periods. There may well be a provincial push to facilitate changes to municipal by-laws around hydrogen storage and deployment as part of the Hydrogen Economy.

Supplement to Natural Gas Supply: The recent commercial scale demonstration facility at Markham Hydro is specifically cited by the Hydrogen Economy. The 2.5-megawatt facility converts low-carbon electricity from the provincial power grid to hydrogen. Ultimately, the plan is to inject into the natural gas distribution system. This utility-scale facility is heralded as a first of its kind in North America and a model for power-to-gas deployment of hydrogen in Ontario.

Resiliency: Hydrogen is seen as addressing Ontario's long-held concerns over energy resiliency in the event of disruptive events and market shifts that could adversely impact the province's supply. Power-to-gas generation fits within this resiliency strategy.

Alberta: Hydrogen as Blue Natural Gas

Like Ontario, the Province of Alberta also recently released a hydrogen strategy as part of its *Natural Gas Vision and Strategy* (the Vision) in an effort to revitalize its economy. As a large producer of hydrogen for industrial applications already, Alberta's strategy looks to build upon its natural market advantages, including:

CCUS: The province's considerable experience with carbon capture, utilization and storage may allow it to produce considerable quantities of "blue" hydrogen through the sequestration of the resulting carbon in generating hydrogen from natural gas. With CCUS know-how and a renewed demand for low carbon fuels, the timing for hydrogen in Alberta may be right.

Exports: Provincial natural gas production has suffered from the twin ills of depressed prices and high distribution costs. The potential export of a premium value fuel such as hydrogen (in gas or liquefied form) is seen as addressing both, and the Vision anticipates hydrogen distribution networks would develop to serve new export markets.

Diversification: The Vision includes a call-to-arms for the province to expand its offerings relating to natural gas as a means to buffer itself against adverse impacts to its petroleum sector. Blue hydrogen represents one of its diversified products.

Emissions Reductions: Finally, it's notable that the Vision expressly identifies hydrogen development in the province as integral to Canada's overall ability to meet its Paris Accord greenhouse gas emissions reduction targets. It's not difficult to imagine that hydrogen creation will be used to generate emissions reduction credits against conventional energy production emissions.

While the interest in hydrogen is not new in Alberta, targeted support under the National Hydrogen Strategy may finally make viable the province's growth in blue hydrogen as a domestic and export fuel.

Québec: Hydrogen as Distributive Generation

Lastly, in the case of Québec, the province's hydrogen strategy revolves around vertically-integrated Hydro- Québec (HQ), which holds renewable energy generation capacity and distribution rights to both meet provincial demand and supply a number of other Canadian and U.S. markets. Ironically, it may be through HQ's centralized generation and distribution networks that cost-effective localized hydrogen production can be facilitated, including:

Decentralized Hydrogen Production: Unlike the large-scale electrolysis production facilities planned in other parts of Canada, such as B.C.'s Peace Region electrolyser project or Alberta's large scale infrastructure plans, Québec views hydrogen production as essentially distributive and facilitated by HQ's robust electricity distribution networks.

Private Sector-Driven Growth: While the final plans of both the Province of Québec and HQ remain to be finalized, it would appear that heavily discounted electricity may be made available to private sector generators at proposed hydrogen generation points across the province, essentially removing both the province and HQ from the hydrogen market.

Lowest Cost Green Hydrogen: In avoiding substantial infrastructure spending (at this initial stage) and relying upon both the electricity grid and the (hydroelectric-driven) low-cost electricity costs, Québec may be poised to make short-term realizable gains in hydrogen markets, such as fuel cell technologies, before other provinces and states can develop the infrastructure to compete.

In short, Québec's goals for hydrogen may appear similar to the other provinces, but it too has unique market opportunities which the National Hydrogen Strategy needs to accommodate.

BLG's Energy – Power and Energy – Oil & Gas groups are closely monitoring Canada's position in the emerging hydrogen economy, including the National Strategy, and have identified opportunities and challenges in the importance of regional specificity, a holistic approach to hydrogen's role in climate change and cross-sector opportunities.

We will be pleased to provide more information in all of these areas.

By

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