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Carbon capture and hydrogen: a Canadian power couple

We possess well-developed advantages to help underpin growth in the hydrogen industry, such as our water, low-emission electricity, natural gas, CCUS, and extensive energy transportation systems.



When Fatih Birol, the executive director of the International Energy Agency, visited Canada last year, he was asked, “If Canada could only focus on one thing to reduce greenhouse gas emissions, what should it be?” His immediate answer was, “carbon capture use and storage” (CCUS).

This is a strong statement, considering how many different approaches Canada is actively pursuing across a myriad of different industries and options. Also, the clock is ticking on climate change. There is no time to waste on uncertain or suboptimal options.

Given resistance and skepticism toward CCUS from some quarters, why would Birol recommend it for Canada? Perhaps because we are already a leader in the technology.

Originally an enhanced oil-recovery technique, we now use it to reduce emissions from coal-fired electricity generation and petroleum production. Canada is learning by doing and is one of the top five countries, in terms of operational carbon capture and storage projects. As a mature petroleum-producing nation, Canada has a thorough understanding of its subsurface geology and its considerable storage potential, which is necessary for CCUS. We also have sophisticated subsurface rights management regimes and regulatory frameworks.

The possibility for Canada’s oil production to reach net-zero emissions by 2050 is next to impossible without CCUS. But it’s not just about oil. The technology will support the use of natural gas resources to create zero-emitting hydrogen. If Birol was allowed to pick more than one future-forward technology for Canada, hydrogen would have figured

highly as well.

Transportation is Canada's second-largest source of greenhouse gas emissions. This is understandable, given the size of the country and the distances that must be travelled. The electrification of light-duty personal vehicles in Canada promises to compete with conventional vehicles. But large trucks, railways, shipping, and aviation are proving extremely difficult to convert to battery-electric power. These forms of heavier transportation account for the bulk of the country's transportation emissions. Hydrogen offers an answer to this challenge.

Canadian hydrogen is not new; we are the 10th largest producer in the world. But recognizing hydrogen as an important asset in our plans to get to net zero is a recent phenomenon. Just as in CCUS, Canada can be a world leader in this field. We have a technological head start in electrolyzers, which produce hydrogen from water. We are also leaders in fuel cells, which produce electricity from hydrogen to power vehicles.

We possess well-developed advantages to help underpin growth in the hydrogen industry. Our water, low-emission electricity, natural gas, CCUS, and extensive energy transportation systems can be adapted to facilitate moving hydrogen to market. Hydrogen is also unique as an energy carrier in Canada in that it can be produced throughout the country; it is not a regional industry. There is much work to be done for hydrogen to become a more extensive and viable economic alternative to existing energy sources. We are doing it.

Canada has vast quantities of natural gas, both developed and undeveloped. If large-scale CCUS infrastructure were in place, it could conceivably support the production of large quantities of low-emission hydrogen from that source. That in turn could open an entirely new, climate-friendly energy stream. Air Products Ltd. is helping to lead the charge on revolutionizing coordinated thinking between CCUS and hydrogen in Canada. It is investing more than \$1-billion in Alberta's industrial heartland with a project scheduled to come online this year that is projected to capture more than 90 per cent of the emissions from the new hydrogen supply it is looking to provide. By thinking of CCUS and hydrogen together and planning their development in coordination, Canada can lead in providing a world-changing solution.

So, when Birol suggests that Canada focus on CCUS, he is not only talking about removing and storing carbon. He is also talking about building a new, cutting-edge energy system to benefit Canada and the world. If you want to talk about energy, technology, and the environment, all at the same time when visiting Canada, you have to mention CCUS and hydrogen in the same breath. They are a power couple.

Jacob Irving has served as the president and CEO of the Energy Council of Canada since January of 2018. His nearly 20-year career in the Canadian energy industry has been divided almost evenly between the petroleum and electricity sectors. He has spent more than half of this time successfully leading prominent energy industry associations, including the Oil Sands Developers Group and the Canadian Hydropower Association.