**Green hydrogen in Nova Scotia**

*How “green” can hydrogen be and how can it fit into Nova Scotia’s energy future?*

By Jon Tattrie, Climate Story Network

Nova Scotia has announced its green hydrogen action plan, calling it an “alternative clean

energy source” adding that we’re emerging as a region with “ample opportunity” to produce the product – in part because of our potential offshore wind resource.

The government wants to help create a green hydrogen sector in Nova Scotia that “produces local benefits from both domestic and export opportunities.” There currently is no hydrogen-producing industry in the province.

But what exactly is green hydrogen and how could it fit into Nova Scotia’s energy future?

David Neira studies hydrogen in his role as energy coordinator for the Ecology Action Centre (EAC). He says hydrogen is created by running an electrical current through water, which separates the hydrogen from the oxygen in the water molecules. The result is a usable gas with no smell or taste. When combusted, it emits water and heat, but no dangerous carbon dioxide.

**From grey to green**

Neira says the environmental impact doesn’t come from the hydrogen itself, but from how you produce the electricity that produces the hydrogen.

“If it’s coming from renewable energy, it’s green. If it’s from natural gas, it’s blue. If it’s coming from fossil fuels, it’s grey hydrogen,” he says.

Others use the term brown hydrogen to describe burning coal to generate the electricity used to make hydrogen. That’s the dirtiest option to produce it. Nova Scotia says it will use renewable sources such as wind to create the electricity needed. The hydrogen is identical no matter how it’s produced.

Neira says even using renewable sources would come with an environmental cost to Nova Scotians.

“We’re (EAC) talking to some of the communities located where renewable energy projects for production are going to take place. They have some concerns about the environmental impact of these windfarm projects in terms of land use and biodiversity, because these are huge projects.”

**Should it stay or should it go?**

Hydrogen can be used as fuel for certain vehicles or shipped as an export fuel to markets like Germany. It’s also used to make the ammonia found in most agricultural fertilizers – greener hydrogen results in a greener fertilizer.

Neira says if Nova Scotia focuses on the export route, it will have little impact on the province’s goal to decarbonize electricity in the province by 2030. “We’re still depending mainly on coal to produce electricity in Nova Scotia.”

Increasingly though, renewable energy produced locally through land-based and anticipated off-shore wind can be used to help clean the electricity grid in our own backyard. While Nova Scotia has plans to reach 80 per cent renewable energy and to move away from coal by 2030, our grid still includes around 60 per cent of energy generated by the burning of fossil fuels.

The province describes hydrogen as a “flex fuel” that could help provide energy during peak demand hours, or to strengthen the electricity system during a crisis. They also say that green hydrogen will likely be primarily an export product, as “the domestic market alone is too small for private developers to justify the risk and cost of developing offshore wind.”

Exported green hydrogen could be used to help decarbonize hard-to-abate activities around the world such as marine shipping, long-haul trucking, and air transport. This technology is still being developed but could make shipping greener. There is also the possibility that green hydrogen could replace diesel fuel – a potential game-changer for remote communities dependent on diesel for warmth and power.

**Lab-grown power**

Gurpreet Singh Selopal is an assistant professor at Dalhousie University’s Department of Engineering. Much of his work focuses on developing a more direct way to make hydrogen that would leave out any need for wind farms or solar panels, let alone natural gas or coal.

“Hydrogen is one of the cleanest fuels. This is my personal feeling: hydrogen has a huge potential to contribute to our natural future,” he says. “I would say more than 90 per cent of hydrogen is produced [around the world] using fossil fuels. We want to move toward a sustainable solution.”

His team at Dalhousie is researching how “quantum dots,” which are nanocrystals developed in the lab, could use the sun directly to produce hydrogen.

“Ultimately, we are trying to harvest the solar light, and we use that solar light to split the water molecules into hydrogen and oxygen — and we then collect the hydrogen,” he says. “We don’t need any additional electrical energy.”

He estimates they are halfway to their goal and are working toward a usable prototype, though it’s still a way off. He feels that if the province is to build the hydrogen sector, it should be made as cleanly as possible.

Selopal says the resulting clean hydrogen could be used as storable fuel to heat homes, power vehicles, or to produce more electricity, ultimately leading Nova Scotia toward a cleaner energy future.

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*The Climate Story Network is an initiative of Climate Focus, a non-profit organization dedicated to covering stories about community-driven climate solutions.*