Catch a Carbon-Negative Ride: RNG crucial to fulfilling zero-emission transit commitments

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The COVID-19 pandemic has devastated transit agencies' ridership and revenue, and many agencies have minimal budgets left to transition away from fossil fuels. Renewable natural gas (RNG) can play a crucial role in creating a cost-effective path to zero-emissions that accounts for Canada's diverse geography and regional needs.

The drive to eliminate emissions is usually focused on the new technologies of battery electric buses (BEBs) and hydrogen fuel cell electric buses (FCEBs). Both of which are available today. Both of which are complex. Both of which are a necessary part of our climate secure future. Both of which require an entire system overhaul.

However, there is an often overlooked yet easily accessible and simple zero-emission alternative fuel for transit agencies that is also available today—renewable natural gas.

RNG can play a crucial role in drastically reducing conventional transition costs, and is interchangeable with the conventional natural gas used in existing compressed natural gas buses (CNG). RNG can be transported through existing pipeline systems to transit agency facilities using regular gas nomination and scheduling processes.

A new RNG bus can be purchased at almost half the cost of a BEB, with its fuel costing about the same as diesel. Establishing fully-fledged RNG supply chains for fueling will require additional infrastructure investments. Funding to support these incremental costs would enable RNG to join BEBs and FCEBs in the fight against climate change while contributing to employment growth in RNG facility construction, associated financial services, and the manufacturing and sale of CNG buses by Canadian companies.

Research from the United States Environmental Protection Agency and others show that RNG is carbon-negative when produced by capturing and processing methane emitted by organic sources. Although the methane capture technology is behind its carbon dioxide (CO_2) counterpart, there are other organic sources like landfill sites, wastewater treatment plants, food waste, and agricultural and forest operations.

CNG transit vehicles have been available in the marketplace for over a decade. California converged to CNG buses in the late 2000s because it was cheaper and greener than diesel at the time. It's a proven technology, and if the CNG in the fuel line is replaced with RNG supplies, it can now be rendered zero emissions.

Closer to home, we have more than 600 CNG buses on the road, and those can easily convert to zero-emissions if replaced with RNG. In 2021, the City of Hamilton and Enbridge Gas unveiled Ontario's first RNG transit bus just hours after the federal government's announcement to invest $2.75 billion in zero-emission transit.

Serendipitous, to say the least, for a nation looking to explore all options in the drive to zero emissions for public transit and the mobility and transportation sector more generally.

Hamilton's announcement presents a prime example of how transit agencies can help Ottawa achieve its aggressive emission-reduction targets faster by using a more readily available fuel today than in previous years that is relatively easy for transit agencies to procure and deploy.

For instance, Hamilton's inaugural RNG bus will use and divert 450 tonnes of organic landfill waste annually — that's equivalent to 38 garbage trucks — while also displacing CO_2 emissions from 36,000 litres of diesel consumed in a year.

Although the federal government recognizes renewable natural gas as a clean fuel, "zero-emission buses" are narrowly defined as vehicles that have the potential to produce no tailpipe emissions, excluding RNG technologies.

This narrow definition needs to be reconsidered and broadened to enable the full suite of zero-emissions solutions to be implemented, including RNG-fueled vehicles, BEBs, FCEBs and electric low-speed autonomous shuttles for first-km and last-km solutions. These systems require chargers, energy storage devices, green hydrogen (electrolyzed hydrogen) and road-side communications devices that support connectivity and autonomy for shared shuttles. Without this complete suite of powertrain, vehicular, energy and communications solutions in play, we won't win the battle to decarbonize transit effectively, efficiently and in a way that produces better transit, not worse.

With approximately 206 BEBs on Canadian roads today, the federal government has a long way to go to fulfill its target of 5,000 ZEBs over the next five years. Based on where we are today, decarbonization would need to increase by over 250 per cent in a very short period. It's doable, and it should be pursued. But so should all zero-emission solutions.

As we rally to fight the climate crisis, transit will and should play an essential role in our strive to zero-emission transit. There's no one-size-fits-all ZEB option for Canada's diverse transit agencies. There are varying factors (climate, route distances, terrain, duty cycles and passenger capacity) that underscore the importance of allowing communities to make the best fiscal and environmental choices for their region and transit operations by offering diverse ZEB solutions—and this must include RNG.

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Featured image credit: Enbridge Gas Inc. and City of Hamilton.