

Researchers design roadmap for hydrogen supply network

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Walter Mérida Credit: UBC

Transportation is the largest source of greenhouse gas emissions in British Columbia. Researchers at the University of British Columbia have developed a hydrogen supply chain model that can enable the adoption of zero-emission, hydrogen-powered cars—transforming them from a novelty into everyday transportation in just 30 years.

In a new study published this week, UBC researchers provide an analysis of the infrastructure needed to support [hydrogen](#) cars, SUVs and mini vans in British Columbia. They recommend a refuelling infrastructure extending from Prince George in the north to Kamloops and Vancouver in the south and Victoria in the west. Production plants would capture by-product hydrogen from chemical plants or produce it from water electrolysis and steam methane reforming. A network of refuelling stations would be established to serve consumers in major urban centres.

"Hydrogen-powered vehicles are a strong alternative to battery [electric vehicles](#), which don't always comply with fast-refuelling, long-distance travel or cold weather requirements," says lead author Hoda Talebian, a Ph.D. candidate in the department of mechanical engineering at UBC. "We believe we have created the most comprehensive model for hydrogen adoption in a region like B.C., where demand is still low for these types of vehicles."

The researchers, all affiliated with UBC's Clean Energy Research Centre (CERC), analyzed future demand for light-duty hydrogen vehicles and included the potential effects of policy tools like B.C.'s carbon tax and the low carbon fuel standard.



Hoda Talebian Credit: UBC

"Provided B.C. maintains those policies, and assuming enough hydrogen vehicles are available, our model sees hydrogen demand growing significantly every year," said co-author and CERC program manager Omar Herrera.

The researchers note that hydrogen cars like the Toyota Mirai and Hyundai's Nexo are already available in B.C., and a public retail hydrogen station opened in Vancouver last year—Canada's first. By 2020, Greater Vancouver and Victoria are projected to have a network of six stations.

"The momentum for hydrogen vehicles is growing, and B.C. is leading

developments in Canada by providing supports like car sales rebates and incentives for building fuelling stations," said senior study author Walter Mérida, an engineering professor at UBC who studies clean energy technologies and leads the transportation futures research group in the faculty of applied science.

"However, we need a solid refuelling network to truly promote mass adoption. We hope that our framework contributes to its development and to the CleanBC plan, which includes a zero-emission [vehicle](#) mandate by 2040."

"We do see a future where hydrogen can be economically competitive with gasoline, while significantly reducing greenhouse gas emissions," added Mérida. "This study is part of a broad, multidisciplinary effort on the future of transportation. As the energy system becomes smart and decarbonized, hydrogen will become a critical bridge between renewable energy and transportation."

More information: Hoda Talebian et al, Spatial and temporal optimization of hydrogen fuel supply chain for light duty passenger vehicles in British Columbia, *International Journal of Hydrogen Energy* (2019). [DOI: 10.1016/j.ijhydene.2019.07.218](https://doi.org/10.1016/j.ijhydene.2019.07.218)

Provided by University of British Columbia

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