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Case Study on the Role of Fiscal Policy in Hydrogen Development

Lessons Learned

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Pembina Institute and the Canadian Energy Research Institute
Contact Amy Taylor, 403-678-3355, amyt@pembina.org

Project Team:
George Backus, Abha Bhargava, Douglas Bruchet, Matt Horne, Janna Poliakov, Jesse Row, Amy Taylor, Govinda Timilsina, Mark Winfield

1. The time horizon for penetration of the hydrogen technologies included in this modeling exercise is considered long compared to the technologies considered in other NRTEE EFR Case studies (i.e. energy efficient and renewable energy technologies). Given current technology parameters, even over a 30-year period, relatively little penetration of hydrogen technologies occurred. Cost and technological improvements would increase the competitiveness of the hydrogen technologies.

2. Given the long time frame associated with hydrogen technologies, any emission reductions that are achieved as a result of their penetration will also necessarily occur over a long period of time.

3. The penetration of hydrogen technologies does not guarantee that greenhouse gas emission reductions will occur. Consideration of source fuel and energy pathway is key if hydrogen is to be part of a greenhouse gas emission reduction plan. If the intention is to increase hydrogen technology penetration and greenhouse gas emission reductions at the same time, than a focus on low emission hydrogen sources is necessary (e.g. from renewable energy, natural gas reformers, and systems with carbon capture).

4. Cost and technology hurdles are still significant with some technologies and are expected to remain so for the next 10-20 years[1].

5. Given the current cost hurdles associated with hydrogen technologies, emission reductions that are achieved come at a very high cost. If the main objective of fiscal policy is to reduce greenhouse gas emissions in the near term, focusing on other methods of GHG reductions is likely more economic than focusing on hydrogen technologies.

6. It may be most effective to focus EFR policies intended to increase market penetration of hydrogen technologies on technological improvements (R and D, demonstration) and cost reductions. It should be noted that the application of these policies will not necessarily ensure greenhouse gas emission reductions unless the source fuel and pathway for the hydrogen is taken into account in policy design.

7. In the transportation sector it will be necessary to not only concentrate on cost and efficiency improvements in order to increase the penetration of hydrogen technologies, but also the supply and availability of hydrogen fuel and hydrogen related vehicles. Although outside the scope of this analysis, there may be a role for EFR policies targeted at manufacturers and retailers in this regard.

[1] According to the US DOE Hydrogen Posture Plan, the market introduction of personal vehicles that use hydrogen is not expected to occur until after 2020. Hydrogen use in commercial fleets and distributed CHP are on the same time line.

8. The development of hydrogen technologies in Canada is and will be largely influenced by trends in development in other countries such as the United States, Japan and Germany. While such trends were not taken into account in this analysis, it is useful to keep this factor in mind in interpreting the results.

9. From a methodological point of view, the calibration of the model to Canada's Emissions Outlook, An Update, introduces an inherent level of uncertainty into the modeling results. We already know that the fuel prices contained in the CEOU are incorrect. The effect of this error on the model results is uncertain.

10. There are data gaps when it comes to the technology parameters and market availability predictions for hydrogen technologies. For any of the technologies that are not yet commercially available or even in real-world operation, predictions and assumptions need to be made regarding both costs and performance. These assumptions are subjective and often based on best predictions by technology developers and researchers. Thus, there is high uncertainty with these parameters. The modeling results are also highly dependent on the assumptions made regarding when particular technologies will be available in the marketplace and who will have access to supporting services such as refueling infrastructure. There is a wide range of predictions and speculation on when these new technologies will become available.