Identifying pathways to net zero greenhouse gas emissions in PEI

Report prepared for PEI Climate Action Secretariat

SUBMITTED TO

Erin Taylor and Erin Kielly
PEI Climate Action Secretariat

September 9, 2021

SUBMITTED BY

Navius Research Inc.
Box 48300 Bentall
Vancouver BC V7X 1A1

Contact@NaviusResearch.com

About Us

Navius Research Inc. ("Navius") is a private consulting firm in Vancouver. Our consultants specialize in analysing government and corporate policies designed to meet environmental goals, with a focus on energy and greenhouse gas emission policy. They have been active in the energy and climate change field since 2004, and are recognized as some of Canada's leading experts in modeling the environmental and economic impacts of energy and climate policy initiatives. Navius is uniquely qualified to provide insightful and relevant analysis in this field because:

- We have a broad understanding of energy and environmental issues both within and outside of Canada.
- We use unique in-house models of the energy-economy system as principal analysis tools.
- We have a strong network of experts in related fields with whom we work to produce detailed and integrated climate and energy analyses.
- We have gained national and international credibility for producing sound, unbiased analyses for clients from every sector, including all levels of government, industry, labour, the non-profit sector, and academia

Page left blank to facilitate double-side printing.

Summary for policymakers

Understanding the cost of greenhouse gas abatement options is an important step in developing climate policy because it enables decision makers to direct policy efforts towards areas that reduce emissions at the lowest cost. This project aims to inform policy making in PEI by identifying the most cost-effective combination of technologies, fuels and actions that can help the province achieve its greenhouse gas emissions targets.

What are the key insights of this study for policymakers seeking to achieve provincial emissions targets?

PEI will come close to achieving its 2030 greenhouse gas emissions target of 1,249 kt without new policies.

In response to existing provincial and federal policies (but excluding an increase in the carbon price beyond $50/t), emissions in 2030 are 81 kt to 212 kt above PEI's target. This gap could likely be narrowed through relatively modest adjustments to existing policies.

The gap to PEI's 2040 target is large and requires strong policy to overcome.

PEI's emissions start to flatline after 2030 as existing policies run their course. By 2040, emissions are 1,180 kt to 1,384 kt (relative to a target of zero, before accounting for land-use, land-use change and forestry (LULUCF)). The implication is that strong and compulsory policies will be required to close this gap. These policies would require an effective carbon price of over $500 dollars per tonne (i.e., a carbon price of that level or a comparable suite of regulatory policies that achieve the same effect).

The most cost-effective path to net zero in 2040 implies surpassing PEI's 2030 target.

The decline in emissions between the 2030 and 2040 target outpaces the natural retirement of technology stocks. Following this trajectory implies that PEI retire fossil energy-related technologies (e.g. conventional vehicles, propane furnaces) before they reach the end of their lifespan. Avoiding the premature retirement of capital stock, which is expensive, requires ensuring that greater investments in zero carbon technologies are made in the 2020s. The result is surpassing PEI's 2030 target by a couple hundred kilotonnes.

This analysis suggests that policymakers seeking to achieve PEI's greenhouse gas targets focus on:

- Electrifying vehicles, building heating and manufacturing operations. Essentially, electrify everything that can be electrified.
- Boosting the supply of renewable electricity generation through domestic production and/or imports. Between now and 2040, electricity demand increases by 1.9 times under a scenario in which PEI achieves net zero.
- Switching to second generation biofuels or hydrogen in difficult-to-electrify transport modes such as long-haul trucking, marine, and air. This pathway is the least certain and ongoing technology monitoring will be required to determine the most appropriate option for PEI.

Negative emissions technologies can be used to reduce the cost of achieving net zero in the medium-term.

One option to avoid the premature retirement of existing assets is to offset them through a negative emission technology, such as direct air capture, land use and/or forestry sequestration. Such approaches may also be required to offset agricultural emissions. Direct air capture (i.e., removing carbon dioxide from the ambient air) could cost between $125 and $368/t$CO_2$e, less than the cost of eliminating fossil energy use in PEI by 2040 (i.e., above $500/t). An advantage of direct air capture is that it is not location-bound; for example, PEI could pay a direct air capture and storage facility outside of the province to offset emissions.

PEI's economy can continue to grow while reducing emissions to net zero.

The economic impact of achieving net zero ultimately depends on policy choices made in PEI (i.e., policy choice is a strong determinant of cost). Nevertheless, this analysis shows that PEI's economy can thrive while it decarbonizes. Though decarbonization imposes real costs on households and businesses, the provincial economy is 1.6-1.9 times larger in 2040 than today under any scenario in which PEI achieves net zero.

What areas of study warrant more research?

Assessing policy approaches to meet provincial emissions and other objectives.

This analysis identifies the technologies, fuels and actions that could help PEI achieve its climate change mitigation objectives. Yet, it is not an analysis of policy options. For example, vehicle electrification could be brought about through carbon pricing, EV subsidies, ZEV mandates, low carbon fuel standards or emission standards.

Analyzing options to expand electricity (and hydrogen) supply on a more granular level.

The electricity sector is unique in that supply must match demand in every hour of the year. The timing of supply and demand, already important in PEI due to its reliance on wind and imports, will only become more so in an electrified future. Additional analysis can examine the potential for integrating more variable renewables into the grid (e.g. through storage) and the use of surplus electricity to produce hydrogen. Navius' electricity dispatch model IESD is well suited to this task.

The feasibility of reducing agricultural emissions and/or offsetting them with land use change and forestry emissions.

Please note that this analysis focuses on energy-related sectors of the economy.