

RESEARCH PLAN 2020-21

1. ECONOMIC RECOVERY PATHWAYS FOR CANADA'S ENERGY INDUSTRY

Canada's oil, natural gas, electricity, and renewable energy supply sectors have been severely impacted by the COVID-19 pandemic. Many companies may be on the brink of insolvency. What should be done to support their short- medium-term needs to ensure a recovery in those sectors and specific company types? This study will produce a state of the industry from an economic and financial perspective and consider different approaches to recovery. Does recovery mean a one size fits all approach and a one size fits all four energy systems? Support for the energy sectors may be as varied as the size of the companies and what they do within the overall supply sector. Maybe it means international trade support? Incentives? Tax relief? Changes to the regulatory framework? Maybe it means to let the market determine how the recovery should take place and that there should be no government intervention? Does this longer-term active intervention in support of Canada's oil, gas, electricity, and renewable energy sectors support economic growth?

This study will produce an economic and financial status of the oil, natural gas, electricity, and renewable energy industries and consider different approaches to recovery. CERI will assess different support pathways from zero to significant government assistance to determine the costs and benefits of different approaches. The study will consider how support for Canada's economy, either through direct support to citizens or indirect support through energy sector companies impacts on GDP and job creation. Canada's economy. Finally, this study will assess the GHG emissions of various pathways to illuminate how different recovery pathways address Canada's GHG emissions reduction goals.

*Study published September 2020: Part 1 – COVID-19 Impacts
Part 2 – Canadian Crude Oil and Natural Gas*

*Anticipated Publication dates:
Part 3 – October 2020 – Renewable Energy
Part 4 – November 2020 – Electricity*

2. COMPETITIVENESS OF A CIRCULAR PETROCHEMICAL PLASTICS MARKET IN CANADA

This research project will consider the different options available to manage the consumption of single-use plastics from their outright ban on one end of the spectrum to their complete reintegration into the production to consumption system. It will consider the alternatives to single-use plastics and find if those products and uses provide greater or lesser economic and environmental impacts for Canada. Moreover, the project will assess the market potential of new approaches to the management of single-use plastics that Canada can employ in other countries, either through new services or new technologies. It may be that a carefully considered response to single-use plastics in Canada may create a market opportunity for Canadian companies globally and allow

Canada to demonstrate a commitment to action in addressing environmental sustainability. Currently, there remains a great deal of conjecture and speculation on the best economic and environmental approach to managing Canada's plastics waste issue. While the work will focus on single-use plastics, CERI will also consider the full line of plastics products and how those might be part of an overall strategy for an integrated plastics economy.

Anticipated Publication Date: January 2021

3. CLIMATE CHANGE RESILIENCY OF CANADA'S ELECTRICITY SYSTEM

Increased frequency and intensity of storm events are impacting the reliability and cost of Canada's electricity system. Are those impacts mainly focused on transmission and distribution networks? What are the investments required to enhance the reliability of systems under the increased threats from weather disruptions? Reliance on our electricity grid means a higher economic cost if those grids are disrupted. This study will consider the operational requirements for system reliability and the technical and economic solutions to ensure Canada's electricity grids remain dependable. It will consider procedural changes, grid design adjustments, redundancies, and new investments in smart technologies. Overall, maintaining the historical reliability of these electricity systems will require additional investment. What are the retail price and economic implications of ensuring that reliability?

Anticipated Publication Date: February 2021

4. CANADIAN NATURAL GAS MARKET SUPPLY AND DEMAND PATHWAYS OF CHANGE

This project will assess different scenarios for changes in natural gas markets and associated economic impacts on the Canadian economy. Natural gas supply has fundamentally changed in North America. Canadian gas producers across B.C., AB, SK, and N.L., along with governments and other stakeholders, will be provided with a set of scenarios to indicate potential pathways for natural gas supply and demand. The era of low-cost natural gas means that new production needs to be linked to new markets. It also means winners and losers in the development of accessing these markets. LNG is one aspect, as are changes in continental demand from industry, electricity systems and transportation, commercial and residential sectors. Regulations and policies affecting the use of natural gas will be evaluated, as will the competitiveness of natural gas-fired electricity generation in comparison to other generating options. The major question is will natural gas demand increase or decrease continentally, and how that changing market will be divided between U.S. and Canadian suppliers.

Anticipated Publication Date: March 2021

5. LIFE CYCLE PRODUCTION COSTS AND EMISSIONS ANALYSIS OF CANADIAN LNG

This project will assess the full lifecycle analysis (LCA) of the costs and GHG emissions of Canadian LNG projects compared to other LNG projects and coal sources for the production of electricity. CERI will include floating LNG (FLNG) in Canada's Arctic with an integrated natural gas production and transportation network independent of the major North American Infrastructure. The monetization of undeveloped gas reserves in the Mackenzie Delta

in the Northwest Territories (NWT) will be a consideration of the economics of such a project. The comparison of these Arctic region costs to other jurisdictions will determine the competitiveness of those potential investments. The analysis will include the production emissions (methane, CO₂ and indirect emissions from fuel and electricity consumption) to determine the full cost of alternative approaches to generating electricity in China, India, and Japan. Direct energy use will be considered, but the indirect emissions from the use of grid-based electricity will not.

Anticipated Publication Date: May 2021

6. ECONOMIC IMPACTS OF OIL SANDS PRODUCTION IN CANADA AND THE U.S.

As part of an annual update, a forecast of the production of oil sands bitumen and Synthetic Crude Oil will be conducted for 2021- 2041. In addition, to updating the oil sands production costs and production forecast, economic impact analysis will be developed using CERI's Input/Output model for Canadian and U.S. impacts by province and state. GHG emissions will also be forecast as will Canadian and U.S. job impacts. Further, CERI will consider how international demand forecasts could impact Canadian production.

Anticipated Publication Date: May 2021

7. ECONOMIC IMPACTS OF CANADIAN CONVENTIONAL OIL AND GAS PRODUCTION IN CANADA AND THE U.S.

As part of an annual update, a forecast of the production of conventional oil and gas production will be conducted for 2021-2041. This will include onshore and offshore activities as well as emerging oil and gas plays. In addition, to updating the production costs and production forecast, economic impact analysis will be developed using CERI's Input/Output model for Canadian and U.S. impacts. GHG emissions will also be forecast as will Canadian and U.S. job impacts by province and state. Further, CERI will consider how international demand forecasts could impact Canadian production.

Anticipated Publication Date: May 2021

8. ENVIRONMENTAL PERFORMANCE DATA FOR CANADIAN OIL AND GAS FOR USE IN ESG STUDIES

Sustainable finance and reputational risk for investments in the oil and gas sector have generated considerable interest in the need to provide foundational work on the environmental, social, and corporate governance (ESGs). This study will consider environmental performance data that could be used in these ESG frameworks. Data gaps exist in terms of the quality and consistency of the environmental information on oil and gas activities in Canada. As part of the project, CERI will evaluate the methods used to represent this information in some of the frameworks to demonstrate how the same data can change using different methods.

Anticipated Publication Date: June 2021