

2017-2018 Research Plan (November Update)

1. A GUIDE TO ELECTRICITY GENERATION OPTIONS IN CANADA

This project will define the different options available for the delivery of electricity service to consumers in Canada. The analysis will consider the economic cost of providing base load and peak electricity from non-renewable, renewable and nuclear generation. These costs will be compared in isolation and then as they impact the markets of the 10 provinces. The objective of the report is to identify the least cost and lowest emissions option for each province. In addition, the lowest emissions option will also allow for the calculation of the implied carbon price.

Anticipated Completion: January 2018

2. AN ASSESSMENT OF THE SUBSTITUTION OF FOREIGN OIL FOR CANADIAN CRUDE AT THE EASTERN REFINERY MARKET

This project will analyze Eastern Canadian crude oil imports via domestically sourced oil supply and international imports. The scope of this study is to analyze the potential complete or partial substitution of eastern Canadian crude oil imports via domestically-sourced oil supply. The research will provide a cost and emissions comparison based on four potential scenarios of feedstock supply for eastern Canadian refineries, substituting domestic vs. foreign crude in eastern Canadian refinery market.

Anticipated Completion: December 2017

3. ECONOMIC IMPACTS AND MARKET CHALLENGES FOR THE METHANE TO DERIVATIVES PETROCHEMICAL SUB-SECTOR

The Petrochemical sector in Canada has a significant economic impact. Aside from the cost competitiveness issue of the ethane to ethylene sub-sector, industry is considering other aspects including the methane to derivatives groups, such as methanol, fertilizers and other derivatives. The study will focus on technically and commercially feasible methane-derived products – with only technologies at commercial or near-commercial stages considered. This project will determine the economic viability of commercial deployment as well as assess the supply of and demand for methane-derived products with significant market potentials. Non-cost elements which have an influence on economic impacts of the sub-sector will be evaluated and recommendations made based on how other jurisdictions address these issues.

Anticipated Completion: January 2018

4. ECONOMIC AND ENVIRONMENTAL IMPACTS OF TRANSITIONING TO RENEWABLE ELECTRICITY AND CLEANER ELECTRICITY GRID IN WESTERN CANADA BY 2030

This project will consider alternative pathways transforming the electricity grid in the four western provinces: British Columbia, Alberta, Saskatchewan, and Manitoba. The project will build high resolution spatially and temporally explicit interconnected electric power systems of the four provinces. Using the model the project will assess different pathways to achieve deeper emissions reductions, impacts on the system reliability, value of trade, and impacts on electricity rates. The project will also

provide insights into necessary attributes of technologies and system configurations that would facilitate the transition to cleaner electric power systems.

Anticipated Completion: March 2018

5. THE 2020 GLOBAL SULPHUR LIMIT AND ITS IMPACT ON CANADIAN AND GLOBAL MARKETS

International Marine Organization (IMO) has set a global limit for sulphur in fuel oil used on board ships of 0.50% m/m (mass by mass) from current 3.5% starting January 2020. This will significantly reduce the amount of sulphur oxide emanating from ships and should have major health and environmental benefits for the world, particularly for populations living close to ports and coasts. Much tougher rules governing emissions from ships plying international waters soon will force change on the energy industry. This research will evaluate impacts from this regulation on the Canadian crude oil industry.

Anticipated Completion: April 2018

6. COMPETITIVE ANALYSIS OF CANADIAN LNG

This study focuses on examining Western and Eastern Canadian LNG supply costs and competitiveness factors in comparison with two other major producers US Gulf of Mexico and Australia. The study will review key elements of supply costs and competitiveness of projects in abovementioned four locations, including capital costs, operating costs, taxes and royalties including carbon tax regimes, upstream gas prices and transportation to LNG plants. In each location, a representative project will be taken into analysis or a generic one with a similar capacity. The study will also compare a) delivered costs of Western Canadian LNG, US Gulf of Mexico, Australian LNG with LNG prices at a representative Asia import location, and b) delivered costs of Eastern Canadian LNG, US Gulf of Mexico with LNG prices at a representative European and Latin American import location.

Anticipated Completion: March 2018

7. CARBON MANAGEMENT IMPACTS ON ELECTRICITY MARKETS IN CANADA

This project is designed to gain insights into challenges and opportunities carbon management policies impose on the electricity systems in Canada. The objectives of the study include the following: i) how the design of a carbon management policy affects electricity rates and the economy in general; ii) assess the impact on electricity rates for residential, commercial, and industrial customers; iii) assess the impacts of changes in electricity rates on different industrial sectors; iv) assess the value of inter jurisdiction electricity trade resulting from implementation of carbon management policies.

Anticipated Completion: March 2018

8. ECONOMIC IMPACTS OF OIL SANDS PRODUCTION IN CANADA

As part of an annual update, a forecast of oil sands bitumen and SCO production will be conducted for 2017-2037. In addition, to updating the production costs in oil sands and production forecast, economic impact analysis will be developed using CERI's Input/Output model for Canadian impacts. This is (CERI's) twelfth annual oil sands industry update, examining production, supply costs, and constraining factors for oil sands development. Every year CERI published its long-term outlook by scenario for Canadian oil sands production and supply.

Anticipated Completion: March 2018

9. ECONOMIC IMPACTS OF CANADIAN CONVENTIONAL OIL AND GAS SUPPLY IN CANADA

As part of an annual update, this study examines 2017-2037 forecast period for Canada's crude oil and natural gas industries, including updating production forecasts and supply costs. It includes conventional gas, shale gas, tight gas, coalbed methane, as well as conventional, tight and offshore oil

production in Canada. While this study does not include production from oil sands, using CERI's Input/Output model, it will include an economic impact analysis of oil and gas developments in Canada in terms of GDP, labour and tax impacts.

Anticipated Completion: April 2018

Ongoing Research:

1. Maintenance of CERI Models and Programs

Ongoing maintenance and upgrading of CERI computer models and programs

2. Maintenance of CERI Databases

Ongoing maintenance and upgrading of CERI databases

3. Natural Gas Report

Research and updating of CERI's monthly Natural Gas report, the results of which are used in other ongoing projects

4. Oil Report

Research and updating of CERI's monthly Oil report, the results of which are used in other ongoing projects

5. Electricity Report

Research and updating of CERI's Quarterly Electricity report, the results of which are used in other ongoing projects

6. Geopolitics of Energy

Geopolitics of Energy (GOE) is the leading monthly journal on geopolitical developments affecting global energy markets. It provides analysis, information, perspectives and fresh ideas on the political and economic factors affecting energy and their impact on national energy policies, the international environment and prices.