



POTENTIAL FUTURE PROJECTS FOR DISCUSSION PURPOSES

These projects could be considered in future years and are documented to allow for the topics and scope to continue to develop.

A. A competitive assessment of Innovation in the production processes of shale oil and off-shore deep water oil

- Unconventional oil mainly comes from three sources; Shale Oil, Off-shore Deep Water sources and Oil Sands. Building on the study “Economic and Environmental Potentials and Efficiencies of Oil Sands Operations: Processes and Technologies,” this project will assess the economic and technical potential of innovation in shale and offshore crude production to determine the long-term competitiveness of each.

B. Economic and Environmental Impacts of Value Added Uses of Oil and Natural Gas

- Value-added activities for oil and natural gas are limited in Canada compared to other jurisdictions. This project will assess the economic and environmental impacts of different value-added products to the Canadian economy. The focus will be on those provincial economies where oil and gas represent greater than 10% of the economy (Alberta & Newfoundland).

C. Waste to Energy Potential in Canada

- This project will consider the waste of energy potential in Canada. Municipal solid waste and agriculture and forestry residue can be converted into liquid fuels and electricity. The economic and environmental impacts of these processes will be assessed.

D. Perspectives of Canadian Off-shore Oil and Gas Development

- This project will consider the offshore oil and gas reserves in Canada. These areas include the Pacific, Arctic and Atlantic coasts. In some cases, economics is a challenge, other areas have challenging weather conditions to contend with, and still, others are challenged by concern over environmental impacts. This project will provide the current perspective of those potential opportunities and

identify the major challenges of each. It will also consider how other jurisdictions are overcoming those specific challenges to protect the environment while promoting economic development.

E. The State of Tidal Power Opportunities in Canada

- Tidal power can play an important role in electricity generation. This project will assess the economic and environmental impacts of expanded tidal power use.

F. Assessment of Future Electricity Transmission system needs in Canada

- This project will assess economics, land use impacts, and the major electricity transmission system requirements to facilitate reliable and efficient operations of Canadian electric power systems. The study will construct a spatially explicit database of electric power system assets—both existing and planned—and electricity demand centres to assess future transmission needs within Canadian provinces. Using this database, the intents to provide insights into investment needs, social and environmental impacts as well as economic development potential.

G. Economic and Environmental Impacts of Electricity Generation from nuclear reactors

- The use of nuclear power is controversial. From uranium mining to processing through use and storage, stakeholders express concern along the production pathway. This study will assess the new types of reactors as well as the processing cycle to consider the economic and environmental costs and benefits of this electricity generating option.

H. Economic Impacts of Competitive versus regulated electricity markets

- This project will compare the economic benefits and costs of competitive versus regulated generation and transmission markets for electricity. Canada has several models operating that can provide insight into the effectiveness of investment in these different markets. With an increase in investment needed to address transition issues to a cleaner electricity system, decision-makers will be interested in understanding how the different markets minimize cost and maximize benefits.

I. Economic benefits and costs of energy efficiency options in Canada

- This project will assess the economic impacts associated with energy efficiency projects as they relate to system planning requirements for electricity and natural gas generation, transmission and distribution systems. It will review the underlying principles of avoided cost, costing of externalities, free riders and free drivers. These concepts would benefit from an update to how they should be evaluated within the economic tests to screen energy efficiency programs. The

analysis will also compare the cost-effectiveness of energy efficiency investments in producing employment in Canada compared to energy supply and infrastructure investments.

J. Interprovincial trade in Hydroelectricity: Costs and Benefits

- This project will produce a market assessment of the costs and benefits of maximizing the hydroelectricity resources in Canada to support the decarbonization of Canada's energy systems. The report will assess the intra-provincial challenges to those provinces with sufficient hydro resources to move to a 100% hydro system. The second part of the analysis will consider the firm delivery of hydroelectricity to neighbouring provinces which currently have a significant percentage of fossil fuel generation. The review will also consider how load growth can be managed with these hydroelectricity options.

K. Market Designs for Grids with High Amount of Variable Power Generations

- Many Canadian provinces are setting renewable energy adaptation targets as a mechanism to achieve climate policy goals. Traditional electric power systems and markets are designed to operate with dispatchable generating units. Under such configurations, it is not clear whether the investors will see the certainty to invest in any generating source. This project will evaluate the structure and market designs Test of market designs to incentivize investments in an electric power system with high renewable penetration.

L. Lessons Learned in The Implementation of Renewable and Clean Power Options

- This project will consider the programs in Canada, the US and Germany used to promote the investment in renewable and clean power options. An assessment of the economic investment relative to the least expensive alternative will be calculated to determine the implied carbon price of these policies.

M. Development of a social impact assessment model for energy supply and demand investments in Canada

- This research will build on a socio-economic assessment tool developed by Statscan for use with their input-output model. The project will update the model built by StatsCan and specify relationships between supply and demand investment concerning education, skills matching, cultural heritage, health, security, community development and affordability to name a few. The project will demonstrate the utility of the model by producing a social impact assessment of select energy infrastructure projects across the country.

N. Environmental and Economic Analysis of Energy Supply Options for Remote and Northern Communities

- Energy supply in Canada's Remote and Northern Communities is challenging. Territorial governments and some provinces face concerns related to supporting energy requirements for residential, and commercial use and to support industrial activities such as mining. This project assesses grid expansions and local grid options. While connecting to a transmission grid has clear advantages regarding lower cost and reliability in supply, there may be missed opportunities in some cases such as remote communities, cases where significant grid enhancements are needed, etc. Local generation may also have job creation opportunities while connection to the grid does not provide job creation long term. Furthermore, revenues stay in the community, if residents are paying their local utility. This study will conduct an economic analysis of the following case:
 - Connecting a currently off-grid community to a grid system
 - Develop local generation in an off-grid community
 - Disconnecting a currently on-grid community and develop local generation

O. Economic potential and GHG emissions forecast of digital technology options and process efficiency for unconventional oil production

- Building on the research completed in 2015-16 and 2016-17, this paper will detail digital technology and process options that can be used in Oil Sands production to reduce energy use per barrel. The objective is to identify economic options that can be deployed to the sector and how those options may reduce overall emissions. Consideration will also be given to how these technologies can be employed in conventional oil and natural gas production.

P. Cost-Benefit Analysis of Carbon Capture and Storage Options

- Carbon capture and storage is one approach to reducing carbon emissions of oil and natural gas use. This study will consider the economic and environmental impacts of repurposing carbon emissions to other products and services along with storage.

Q. Development of a clean electricity technology market assessment tool

- This project will produce a market assessment tool for clean technologies in Canada. It will provide analysis of financial benchmarking, economic impacts and market demand for technologies associated with climate change policies in the electricity supply and demand sectors.

R. Environmental Regulations of the Oil and Gas Sector in Canada

- Oil and gas production is a major consideration when determining how to combat climate change. It is also an important sector of the economy. This study will consider the environmental regulations recently implemented as well as new

regulations being discussed to assess their impacts on the economy and the environment. This project will review different climate change emissions reductions policies implemented federally and by provincial or territorial jurisdictions. It will consider the cumulative impact of different climate change management policies and how that would affect the competitive position of Canadian oil and gas industry. This study will compare Canadian regulations to the regulations of the US jurisdictions that have a significant oil and gas industry and assess how export-exposed industries might be affected and whether “carbon leakage” should be a consideration.

S. An Economic Impact of Distribution Based Electricity Generation Options in Canada

- This project will consider the issue of distributed generation as it impacts on the operation of electricity grids and investment requirements for electricity distribution systems in Canada. Distributed options such as combined heat and power, self-generation and energy cooperatives will be reviewed to determine how these technologies will impact the cost and reliability of grid operations. Different business models will also be considered including gross and net metering and how those models impact monopoly service providers.

T. The economics of moving to flexible electricity system optimization

- This project will consider the changing nature of Canada’s electricity grids. Traditional optimization has been to control for base load and peak load services. The evolution of the smart grid plus the expanded use of intermittent and distributed resources means a new paradigm is emerging. How might this new paradigm impact the costs of managing the grid and providing reliable service?

U. Net Negative GHG Options for Canadian Energy Systems

- This project will consider the use of net negative GHG activities that can be employed in the energy sector. The Paris Agreement on Climate Change includes the reliance on net negative GHG emissions options as part of a comprehensive approach to achieving the two-degree warming maximum of the accord. Little research has been directed at the costs or benefits of engaging in such activities. This research will detail what current and future options are available that can be employed in any of our oil, gas or electricity supply or demand activities.