



POTENTIAL FUTURE PROJECTS

Updated March 2020

CERI can consider completing these research topics in future years based on stakeholder interest and funding. The topics are documented to allow for the topics and scope to continue to develop. This list is updated quarterly in March, June, September and December.

1. ECONOMIC IMPACTS OF OIL SANDS PRODUCTION IN THE CANADIAN AND US ECONOMIES

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.

2. Economic Impacts of Canadian Conventional Oil and Gas Production in the Canadian and U.S. Economies

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 on-shore and off-shore 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.

3. A COMPETITIVE ASSESSMENT OF INNOVATION IN THE PRODUCTION PROCESSES OF SHALE OIL AND OFF-SHORE DEEPWATER 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 off-shore crude production to determine the long-term competitiveness of each.

4. 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.

5. BIOMASS ENERGY ECONOMICS AND MARKET POTENTIAL IN CANADA

Canada's commitment to the Paris Accord calls for net-zero emissions by 2050. Net emissions do not mean zero emissions. Solutions range from extracting more energy per tonne of GHGs from traditional energy systems to carbon capture and use, to the substitution of zero-emissions or net-zero emissions energy sources. Net-zero emissions can come from biomass energy derived from the agricultural, forest or municipal waste streams or purpose-grown crops. This project will assess biomass as an energy source for solid, liquid, and gaseous fuels and as an energy source for the generation of electricity and thermal energy. It will consider existing and emerging technologies and processes that can be used to produce agricultural crops for the fuel systems and how waste from agriculture and forestry can augment that contribution to meeting Canada's energy demands. It will identify the percentages of each waste stream available to understand the impacts separately on the agricultural and forestry sectors. The energy sector plays a key role in understanding the bioenergy options, production costs, investment requirements and retail price impacts to assist Canada in decarbonizing its oil, gas, and electricity systems.

6. 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.

7. ECONOMIC BENEFITS OF THE RENEWABLE ENERGY INDUSTRY IN CANADA

Renewable energy includes the generation of electricity from renewable sources plus the production of renewable biofuels and methane. Investments in these resources have increased in recent years due to the reduction in production costs and policies to facilitate their introduction in the Canadian economy. These investments contribute to the overall GDP of the country and create employment. This study will determine the contribution this sector will make to the Canadian economy over the next ten years. The study will also determine the net GHG emissions reductions for these renewable resources relative to their traditional energy substitutes.

8. 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.

9. 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.

10. ECONOMIC AND ENVIRONMENTAL IMPACTS OF ELECTRICITY GENERATION FROM SMALL 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.

11. THE EFFECTIVENESS OF ENERGY TECHNOLOGY INNOVATION INVESTMENT AS AN ECONOMIC DEVELOPMENT STRATEGY

Technology Innovation in the Energy Sector is an important priority for industry and governments. In the energy sector, this includes assessments of new technologies to reduce production costs, improve environmental footprints and increase labour productivity. This study will conduct several case studies of industry and government initiatives regarding innovation to determine those program elements that can improve success. What are the performance criteria that should be considered ex-ante and ex-post? How might automation and artificial intelligence applied to energy production, conversion and transportation unlock opportunities to reduce costs and emissions? What are the issues and challenges in the execution of these programs? Does risk avoidance limit Canada's innovation opportunities? With innovation being a key determinant of economic development, does this focus allow for Canada to maximize its investment environment and improve competitiveness with our trading partners? Or are the GDP and jobs benefits greater when support is provided to existing processes and industries?

12. 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.

13. 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.

14. LESSONS LEARNED IN THE IMPLEMENTATION OF RENEWABLE AND CLEAN POWER OPTIONS

This project will consider the programs in Canada, the U.S. and Germany used to promote 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.

15. NATURAL GAS CCS/CCUS – OPPORTUNITIES AND CHALLENGES

The use of natural gas is becoming more significant in Canada's electricity systems and industrial use. This project will consider the point source opportunities for carbon capture and utilization for these sectors. To minimize the carbon footprint and address climate change commitments, industry and the electricity sector need to consider the usage of these mitigation technologies, their economic potential and impacts on electricity pricing and competitiveness.

16. 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.

17. 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.

18. 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 baseload 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?

19. HOW CANADA COMPARES: A SERIES OF ANALYSES COMPARING CANADA TO OTHER COUNTRIES

This project is a multi-year multi-topic comparison of aspects of the economic and environmental performance of Canada's energy supply and demand systems. The work will consider the competitiveness of Canada's energy activities and its regulatory and environmental requirements. Key outcomes will be how Canada compares regarding job creation matching local requirements,

enhancements to GDP, social justice balanced with business needs, indigenous rights, and environmental quality.

20.A RECONCILIATION AND GAP ANALYSIS OF VARIOUS LIFE CYCLE DETERMINATIONS OF KEY ENERGY SYSTEMS

Life cycle analysis is often used to assess the economic and environmental footprint of energy choices. While the concept is well understood, the practice of life cycle analysis varies. This project will evaluate the set of life cycle analyses of key energy system components to determine the commonalities and conflicts between them. The project will note how those differences can be reconciled and the sensitivity to closing those gaps on the overall LCA results.

21. THE COSTS OF ENVIRONMENTAL REMEDIATION OF ENERGY PROJECTS

From orphan wells in western Canada to nuclear waste disposal in central Canada to site remediation across the country, the cost implications of end of life activities is a consideration when looking at the economic benefits of energy projects. This study will assess the economic and regulatory framework regarding remediation activities. Do end of life requirements provide sufficient environmental protection? Are there ways this remediation could be completed more cost-effectively? How might Canada and its provinces coordinate such activities to ensure the most efficient approaches and options are taken?

22. BITUMEN BEYOND COMBUSTION

Canada had the third-largest oil deposits in the world, behind Saudi Arabia and Venezuela, with the majority of resources located in Western Canada in the form of oil sands deposits that are yet to be developed. The production of oil sands bitumen represents only a small share of greenhouse gas (GHG) emissions on a life-cycle basis (LCA), while combustion makes up 70-80 percent of total LCA emissions. What happens if GHG emissions of combusting this resource are something citizens reject? What are the other resource values that reside in this vast reservoir? In this project, CERI will compare the value of traditional uses of oil sands with non-combustion alternatives. What are the non-combustion options? Can the benefit of using bitumen in this manner offset the loss of its more traditional uses?

23. THE DIGITAL OIL AND GAS REVOLUTION

Automation, machine learning and artificial intelligence may transform the way oil and gas are developed and produced. This project will consider the economic and environmental implications of the transition. We will explore the changes in cost, processes and labour used to produce these fossil fuels and see what it means for competitiveness and job creation.

24. WHICH ENERGY TECHNOLOGY INNOVATIONS MAKE SENSE

Investment in new technologies in the energy supply and demand system is increasing. Are these technologies beneficial to the three competing objectives of reduced cost, reduced emissions, or service improvements? This study will catalogue promising technologies that are reaching commercialization to indicate how they might address one or two or all of these objectives. The study will also consider nascent technology development to identify which process areas can benefit from process improvements. Our objective is to show those new technologies that can contribute to the balance between economic growth and environmental stewardship, as well as help Canada maintain its competitiveness in the export market.

25. CONVENTIONAL OIL PRODUCTION: PROCESS AND TECHNOLOGY IMPROVEMENTS

This research will evaluate the emerging processes and technologies that could be used to reduce the production costs and environmental footprint of Canadian conventional oil production. The focus of this analysis will be on on-shore conventional plays and consider commercial or near commercial applications that could be available in the next 5-7 years. How might these new technologies or processes impact the sector? Are there gaps in new developments where there are missed opportunities for improvement? What role does energy efficiency play in achieving improved performance? Does a change in indirect fuel and electricity emissions have a significant impact on the environmental footprint?

26. EMPLOYMENT IMPACTS OF MAJOR ENERGY PROJECTS

Canada's labour market is changing. There are increasing demands on postsecondary institutions to prepare new workers coming into the market. There are also increasing commitments by energy companies to consider co-benefit agreements, local procurement, and internal training requirements. Are there differences in major projects in the oil, gas, and electricity sectors? This study will evaluate the long-term implications on the labour market on the changing nature of work in these high tech and cleantech projects.

27. HANDBOOK OF TECHNOLOGY OPTIONS TO REDUCE PRODUCTION COSTS OR GREENHOUSE GAS EMISSIONS IN THE OIL AND GAS SECTOR

This research will catalogue the recently commercialized and near-commercial technologies for Oil and Gas production that could be considered as companies look to improve their processes. The analysis will provide detailed engineering characteristics of the technologies and where those technologies can be employed in the sector. Cost savings estimates for individual applications and sector activities as a whole will be assessed. Technical challenges will be noted, as well as any regulatory or investment risks.

28. BENCHMARKING OF ENVIRONMENTAL, SOCIAL AND CORPORATE GOVERNANCE INDICATORS FOR CANADA'S OIL AND GAS SECTOR.

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 current and future changes to critical criteria for ESGs. The set of international indicators is varied, although some key elements need to be addressed, including GHG emissions, water use, land-use impacts, local community engagement, co-benefits agreements, job creation, procurement policies, governance practices, accountability, and reporting. This project will rank Canada's ESG performance in its oil gas and electricity supply sectors with several competing ESG frameworks globally. It will include those frameworks in widespread use in the European Union, Japan, China and India as well as the U.S. The study will depend on currently available information for the different ESG indicators and how those data sets are interpreted in the different frameworks. The study will also map the data gaps for Canadian energy companies as they would apply to those frameworks.

29. LEAST COST PATHWAY FOR ELECTRIFICATION

The electrification of energy services is one policy area to reduce GHG emissions in Canada. The cost associated with different service substitutions will vary across the industrial, transportation, residential and commercial sectors. This study will develop a least-cost curve of the key service substitutions of oil and gas-based for electricity-based services. The outcome will be an economic map of which options provide the most cost-effective ways to reduce carbon emissions. The options will be ranked by cost and come from the different industrial sectors, transportation evolution to electric or fuel cell vehicles, and replacement of heating, cooling and hot water services provided by natural gas.

30. FUTURE ENERGY AFFORDABILITY IN CANADA

Reliability, affordability, and sustainability are essential considerations in the evolution of Canada's energy systems. As governments, businesses and the public consider how and where investments are made to enhance the sustainability of these systems, this study will assess the impact on retail energy prices for households, businesses, and communities. These price projections will be evaluated along with energy efficiency investments such that the impacts will be based on not the price per unit of energy but rather the energy bills people and businesses incur. The cost of energy services can then be managed by a combination of affordable prices and higher efficiencies. This information can then be compared to national and regional benchmarks for what is considered "energy poverty" and assess how that cohort of households and businesses may decrease or increase as the net bill impacts change with clean technology investments. Importantly, the study will seek to demonstrate the "shape of the energy poverty curve." If it is steep, that means a small increase in price will not significantly change the percentage of Canadians facing this challenge. If the curve is flat, that means a small increase in price could have a significant impact on Canadians. Either observation can assist governments as they determine energy policies.

31. EMPLOYMENT OPPORTUNITIES OF ENERGY SYSTEMS DECARBONIZATION

The upcoming federal regulation on clean fuel standards will require the fuels-based sector to consider options for lowering the carbon intensity of their products. How will this be done? Will this include a significant role for biomass-based fuels? What are the techno-economic options? If fuel additives are needed, how much investment will be required, and where will that occur? This study will provide an assessment of the economic and employment impacts of the support industries needed to achieve Canada's clean fuel carbon intensity targets. The analysis will show where those investments may be regionally focused and also if there are trade-offs associated with an investment in this sector versus the energy sector generally, forestry and agriculture. New investment deployed in clean technologies is one aspect of a broader industrial strategy for Canada. In addition, the study will consider the work underway to reduce carbon in our energy systems either directly through efficiency or substitution. Net-zero options and carbon capture utilization and storage are ancillary activities that support the lowering of the overall energy system's carbon footprint. The study will provide an assessment of the market potential for these types of services, both domestically and in the export market.

32. ECONOMIC IMPACTS OF LOW CARBON FUELS INVESTMENTS

Canada's clean fuel standard will require the fuels-based sector to consider options for lowering the carbon intensity of their products. How will this be done? Will this include a significant role for biomass-based fuels? What are the techno-economic options? If fuel additives are needed, how much investment will be required, and where will that occur? This study will provide an assessment of the economic and employment impacts of the support industries needed to achieve Canada's clean fuel carbon intensity targets. The analysis will show where those investments may be regionally focused and also if there are trade-offs associated with an investment in this sector versus the energy sector generally, forestry and agriculture.

33. URBAN ENERGY SYSTEMS AND TRANSPORTATION

This project is a continuation of the current review of urban centres and their long-term choices regarding urban density, passenger transportation and freight transportation. Which four cities will be assessed this year? What are the environmental and economic impacts of different transportation technology pathways 1) advanced internal combustion engines, 2) hydrogen-based fuel cells and 3) electric motors? In addition to this assessment, how will the introduction of autonomous vehicles impact urban economies and environmental emissions? Does automation require a specific technology pathway? Are metropolitan centres unique situations calling for different government and business responses?

34. THE FUTURE OF DIESEL

Diesel fuel is an essential aspect of the transportation system in Canada. It is also a vital element for off-grid applications for electricity generation. As the nature of diesel demand changes in Canada, what are the economic consequences for suppliers, refineries, industry, and consumers? What options are there to reduce the carbon intensity of diesel production and use? What techno-economic options exist to substitute away from diesel to reduce GHG emissions? How might the changes in demand for diesel affect Canada's economy and employment opportunities? This study will map out the outlook for diesel based on different economic and environmental market conditions.

35. ECONOMIC IMPACTS OF CANADA'S ENERGY & CLEANTECH SECTOR

Canada has significant expertise in the development of energy supply systems and the management of energy demand. It also has opportunities to promote lower GHG based fuels, electricity generation and innovative technologies. What is the market potential of these opportunities? How might Canada capture some of the developing markets for lower carbon-based energy supplies in the U.S., Asia, and the E.U.? This study will quantify the current economic value of Canada's domestic activities on the economies of other jurisdictions as well as the direct investment opportunities that Canadian companies may capture through the implementation of free trade agreements. Investing in Canada to meet future international demand with lower-carbon energy, clean energy technologies and sustainable development expertise is a growth sector for the country that can both the economy and the environment.

36. ANALYSIS OF HOW CANADIAN OIL IS POSITIONED TO ATTRACT INVESTMENT

The impact of changes in market factors, regulatory requirements, civil society responses and business requirements has resulted in a reduction of foreign direct investment in Canada relative to other oil-producing nations. Or has it? This study will examine the different aspects of foreign direct investment decision criteria to weigh their impact on investing in Canada versus other countries, including the U.S. The analysis will determine the key characteristics affecting these investment decisions through survey information and economic analysis of resource availability, supply chains and skill level of the workforce.

37. BENCHMARKING CANADA TO OTHER JURISDICTIONS IN TERMS OF KEY ECONOMIC INDICATORS – APPROVALS, TAX CHANGES, IRR

This project will compare the competitiveness of oil, gas and electricity systems investments in Canada versus other countries. The study will consider only those economic conditions related to the financial business environment that affect the profitability of energy projects in Canada against other jurisdictions, including the U.S. It will also consider government programs in the different jurisdictions to enhance profitability, and the ability of these types of programs to affect

Canada's ranking of investor attractiveness. For Canada and the U.S., the analysis will disaggregate that ranking by province and territory, with select states.

38. CLEAN ENERGY TECHNOLOGY SOLUTIONS FOR OFF-GRID COMMUNITIES

The 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 will assess 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

39. COMPETITIVENESS OF PIPELINE COMPANIES IN CANADA AND COMPARISON WITH THE UNITED STATES

Oil and gas pipelines are significant long-term investments in energy systems infrastructure. They are also vital assets in creating market access and generating financial value for companies and economic value for provinces and territories. This study will consider the economic conditions associated with these types of investments in Canada and the U.S. It will explore different tolling structures and regulatory requirements related to their construction and operation. Finally, the values of these investments will be linked with how the oil and gas resource values can be enhanced due to market access. This will provide industry and governments with an understanding of the competitive nature of infrastructure investments in Canada and the U.S., and identify scenarios that might change that competitiveness in favour of Canadian projects

40. COMPREHENSIVE GUIDE TO ELECTRICITY GENERATION OPTIONS

Canada's electricity generation mix consists of hydro, gas, oil, coal, nuclear, biomass, wind, solar and tidal sources. Each province's unique mix will vary based on its natural resource availability and accessibility. Canada has various market opportunities to manage its electricity generation fleets by province and territory. How much do the different options cost? How will they integrate into the grids? What is their potential for off-grid deployment? This study will update the rapidly changing costs of different traditional and emerging options. It will seek to define the impacts of dispatchable versus non-dispatchable generation and consider how carbon management policies

can influence that selection. Finally, the project will note the effects of selecting these options based on their GHG and retail price impacts in each province and territory.

41. VIABILITY OF AN ENERGY CORRIDOR IN CANADA

Linear projects for energy supply sectors are an essential part of a functioning market to maintain or grow oil, gas and electricity services. Canada continues to face a debate in this country over the development of pipelines and transmission lines. Is an energy corridor dedicated to the construction and operations of these pipelines and transmission lines, an approach that can be effective in reaching consensus of project approval and within which environmental stewardship can be enhanced? This study will consider the economic and technological viability of this solution. Can pipelines and transmission lines co-exist along these corridors? Can the corridors be appropriately located to serve the needs of oil, gas and electricity market access requirements? How might the higher intensity of use be managed to ensure minimal environmental impacts?

42. MARKET OPPORTUNITIES FOR OFF-SHORE OIL AND GAS IN CANADA (INCLUDE ASSESSMENT OF GHG EMISSIONS AND ASSOCIATED GAS)

Canada's off-shore oil and gas reserves have been developed over the last 20 years. Where is this market going in the future? How much can each of the provinces and the nation expect in terms of economic benefits through GDP contributions, employment and tax receipts? This study will conduct a comprehensive view of the market potential, life cycle environmental footprint and production costs for different off-shore oil and gas reserves off Canada's East Coast. Are there any potential markets for associated gas in some off-shore oil production activities? In addition, the analysis will consider the market access available to off-shore projects as a consideration of the differences in investment opportunities between areas of Canada that do not have market access. It will also incorporate the unique operating conditions in Canada's off-shore that may create challenges associated with off-shore investments in other jurisdictions.

43. MARKET ASSESSMENT OF CARBON UTILIZATION ALTERNATIVES

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.

44. BENEFITS AND COSTS OF A HYDROGEN ECONOMY

Hydrogen based energy systems are being discussed as replacements for fossil fuels for electricity generation, transportation services and space heating. Such an approach would need significant investment in infrastructure to produce and consume the hydrogen. A shorter-term step is the inclusion of hydrogen gas in natural gas streams. Several jurisdictions are considering

this approach and testing the percentage of hydrogen that can be managed in the natural gas systems. In addition, other stakeholders are suggesting the use of both oil and gas as precursors to hydrogen production along with the more conventional approach of water electrolysis. These supply options must be considered in balance for the demand and consumption of hydrogen. If in the mixed stream approach some existing equipment can be used. Can they continue to be used in pure hydrogen streams? How does society deal with the challenge of transporting the hydrogen from production sources to demand sources? This study will develop several hydrogen economy pathways and indicate the costs and benefits both from an economic and emissions perspective.

45. MARKET POTENTIAL FOR NATURAL CARBON SINKS

Canada's commitment to the Paris Accord calls for net-zero emissions by 2050. Net emissions do not mean zero emissions. Rather it means that any emissions are offset by sequestering the carbon either via technological or natural solutions. This project will assess natural carbon sinks, their capacity to absorb carbon, the length of their sequestration and importantly, the costs of ensuring these carbon sinks operate effectively. The energy sector plays a key role in understanding the options and financing solutions for carbon sequestration, to allow for the continued use of fossil fuels in Canada's oil, gas, and electricity systems.