ANNUAL REPORT
2019-2020
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MESSAGE FROM THE BOARD CHAIR</td>
<td>2</td>
</tr>
<tr>
<td>MESSAGE FROM THE PRESIDENT &amp; CEO</td>
<td>5</td>
</tr>
<tr>
<td>RESEARCH</td>
<td>7</td>
</tr>
<tr>
<td>FUNDING AND SUPPORT</td>
<td>20</td>
</tr>
<tr>
<td>MARKETING AND COMMUNICATIONS</td>
<td>22</td>
</tr>
<tr>
<td>ABOUT CERI</td>
<td>26</td>
</tr>
<tr>
<td>FINANCE</td>
<td>29</td>
</tr>
</tbody>
</table>
Last year, I concluded my annual message with anticipation about the final report from the Expert Panel on Sustainable Finance – Mobilizing for Sustainable Growth - a “made in Canada” set of recommendations for how Canada might move toward the integration of environment, social and governance (ESG) factors into economic decision-making processes across business, industry, society and government.

At the same time, CERI was focused on seeking opportunities to contribute to the provision of Canadian-focused energy data and analysis to support this “made in Canada” approach.

Fast forward to today. The momentum is growing for the development and use of tools and analyses that can help Canadians understand and move towards a low carbon economy. And a sense of urgency has developed around addressing climate change issues across industry, government, and society. All of that is commendable. However, there is still a lot to be done and I think that we can all agree on that.

As we know, Canada and the world came to a virtual standstill in March 2020 with the declaration of a global pandemic in the form of COVID-19. The sheer magnitude of the COVID-19 impacts on human health, decreased global energy demand, the broad shutdown of the Canadian (and global) economy, the necessary shift to remote workplace solutions and a myriad of other changes were, until then, unimaginable. In addition, who could have imagined that we would close the border to our largest trading partner?
MESSAGE
FROM THE BOARD CHAIR

How will history portray the COVID-19 pandemic and the global and national responses to the resulting health, societal and economic impacts? Interestingly, it may be that the immense scale of impact necessitated an extreme response; one that may help the world to address multiple global issues. It has been recognized by political, economic, and environmental leaders in numerous countries that if economic recovery is to be meaningful and sustainable, it must focus on “building back better”. If we are successful, history may show that we turned multiple crises into opportunities.

In response to the economic impacts of COVID-19, numerous prominent Canadian thought leaders came together to collaborate and develop ideas and opportunities around themes of “building back better” through “resilient recovery”, based upon key pillars of success including energy efficiency, climate resiliency, clean growth and competitiveness, innovation, equity, education, and job creation. Examples of independent works include:

- Corporate Knights – Building Back Better with a Bold Green Recovery – initiated in April and report issued June 2020 “...outlines a series of investments that the federal government could make to set Canada on a path to a resilient, net-zero economic recovery”. The Building Back Better collaborative group estimates that government investment in the order of $11 billion per year from 2021 – 2030 to leverage private sector investment could lead to a Green Recovery that increases jobs and “setting a course for a Zero Carbon Canada within a generation”.

- The Task Force for a Resilient Recovery – initiated in May 2020 and draft report issued in July 2020 “…to get Canadians back to work while building the clean, prosperous & resilient future we want”. The Task Force called for “five bold moves” to be achieved by the implementation of a set of recommendations for actions that, if undertaken in the next five years, could steer the country towards resilient recovery. The Task Force called for government funding, in the order of ~$55 billion – to leverage private sector investment and move towards resilient recovery. The Task Force also identified “Partners” that could spearhead the implementation of its recommendations to achieve the five bold moves.

These, and provincially driven initiatives, such as the Government of Alberta’s Recovery Plan, the Government of British Columbia’s Stronger BC for Everyone: BC’s Economic Recovery Plan, and, Ontario’s Action Plan for Post-Pandemic Growth and Prosperity, all provide meaningful discussion and frameworks for recovery and growth. These are just a few examples of initiatives underway in the provinces and territories.
MESSAGE FROM THE BOARD CHAIR

However, the challenge is that the devil is always in the details. There is a real imperative for high-quality underlying data and analysis to assist with the implementation of the recommendations from initiatives such as the ones referenced above – to fuel Canada’s economic recovery plans and enable Canada to be competitive on the global stage. Now is the time to drive Canadian data and analyses, which, in turn, can foster a deeper understanding of the impacts, costs, and benefits that different recovery options can provide in the future... from a uniquely Canadian perspective.

The energy sector has a key role to play in Canada’s resilient recovery, much as it has played a role in shaping our economy over the last 200+ years. We must not forget about the rich and deep expertise that we have across our energy sector. This includes electricity, energy efficiency, oil and gas, and renewables. There are some exciting opportunities for the sector on the horizon, such as small modular reactors, energy efficiency, bitumen beyond combustion, the hydrogen economy, and emission reductions in production processes, to name just a few.

Now, more than ever, I am convinced of the need for high-quality, energy sector focused data, research, and analyses. One thing that COVID-19 has certainly taught us is that Canada is different than even our largest trading partner and we need to develop economic recovery strategies unique to our needs, based upon our tools, and our niche... and our own data, research and analysis. That means we need to understand the impacts and outcomes of various recovery pathways and the decisions we make now and into the future.

One of the ways in which this can be facilitated is by further investment in the recently established Canadian Center for Energy Information (CCEI). CERI was proud to have contributed to the development of the framework for the CCEI. With a history of more than 45 years’ of research and analyses experience, nearly 200 publicly available, Canadian-focused energy studies, and carefully maintained Canadian economic models, CERI is uniquely positioned to offer an independent, objective source of high-quality data, research and analyses to the CCEI.

I hope to look back at this message next year and reflect on Canada’s progress towards resilient recovery, and in particular, initiatives and growth within the Canadian energy sector based on made-in-Canada energy data, research and analyses from CCEI, CERI and others.
How times have changed. At the end of March 2020, the close of our fiscal year, Canada was just beginning to learn about the novel coronavirus, COVID-19. The world continues to face the global challenge of the pandemic. Perhaps contrary to world views of the past, today, we must view the world through the lens of our health and the health of those around us. Our work, travel, education, and personal activities have all been impacted. So too has the health of our economic systems.

Canadian energy systems are complex, serve many different needs, and create economic benefits with proportional environmental and social impacts. The current energy debate in Canada is largely focused on greenhouse gas (GHG) emissions from energy production, consumption and exports. When we contemplate how to manage Canada’s GHG emissions, it is important to consider how we might confront emissions issues whilst maintaining the associated economic and social benefits.

In 2019-20, CERI assessed the economics of energy efficiency in industry, the effectiveness of carbon pricing, and value-added options for some of our energy resources. While we produced a host of other research that is later itemized in this report, I wanted to bring the three aforementioned studies forward as examples of the need for a systems approach.
MESSAGE
FROM THE PRESIDENT & CEO

Taking energy efficiency as an example, CERI has shown that there are some competitive advantages to improving energy efficiency for trade-exposed and energy-intensive industries. However, at least one-half of the options are not cost-effective. In some provinces, a decrease in electricity consumption comes with zero or minimal emissions reductions due to the nature of their electricity grids. In these cases, energy efficiency may not necessarily result in a net environmental or economic benefit unless efficiency is viewed in the context of the entire system.

When we consider carbon pricing, the debate often centres around whether to price carbon and, if so, how. When CERI considered how carbon pricing impacts economies, our research found that cap and trade systems are more effective than carbon taxes at reducing emissions; the very point of carbon pricing. Yet, we have seen numerous examples which employ cursory analyses to show net changes in carbon uses within an economy without netting out all the other activities that can affect emissions. Industrial systems change for a variety of reasons. For example, process changes, consumption patterns, new equipment standards, and the list goes on. So, why aren't these other elements removed from the calculation of a carbon pricing impact? Systems are dynamic, so assuming the changes in our economic conditions are the result of one or several policies ignores all the other elements that affect energy use and emissions.

Finally, when we consider value-added products derived from energy commodities, economics are driven by more than their availability. What are the labour costs in the region compared to other jurisdictions? What are the tax implications? What are the logistics to get the valued-added product to the market? In our analysis, we looked at the competitiveness of producing more value-added products from Canada’s natural gas and crude oil. While the development of these resources may be economically competitive with other regions, adjusting the assessment for other system challenges could result in a completely different conclusion.

Systems thinking is important because Canada’s energy systems are intertwined with industrial, commercial, and public sector activities. CERI’s individual studies are pieces of a puzzle. While the full picture can be difficult to see at times, if one fits the pieces together, a better understanding of the interconnectivity of energy systems can be gained. This insight is vital to government, industry, and environmental organizations who can utilize CERI research to make better informed policy and business decisions. If we focus only on the individual pieces of the puzzle, we are likely to create new challenges whilst trying to solve existing ones.
Canadian Energy in a Global Context
Considers the challenges and opportunities of:

- Energy Industry Competitiveness and Foreign Direct Investment in the sector
- Trade and market developments
- GDP and jobs
- GHG accounting and Environmental, Social and Corporate Governance (ESG) criteria
- Carbon offsets and international carbon credits
- Investments and policy implications on trade energy exposed companies
- Canadian clean technology innovation and spin-off effects

Our Evolving Electricity System
Considers the technical, economic and environmental characteristics of:

- Traditional and new generation sources
- Distributed generation and electricity storage
- Substitution toward or away from electricity for energy services
- Impacts on different energy systems due to significant changes in demand
- Implications of carbon management policies and regulations
- Investment in clean technology evolution and their spin-off effects
- Changing business models for regulated electricity companies

Customer Energy Choices
Regardless of the system, customers, large or small, are faced with retail choices. These choices affect affordability and competitiveness. Changing energy systems impact retail prices, energy efficiency, system reliability and environmental impacts. It affects how and where Canadians live and the design of our cities.
STUDY 184 | March 2020
Industrial Competitiveness and Energy Efficiency

STUDY 185 | April 2020
Competitiveness of Canada’s Regulatory Framework for the Oil and Gas Sector

STUDY 186 | April 2020
Ribbons of Steel 2: Ensuring an Economic Future for Petrochemicals and Petroleum Fuels

STUDY 187 | July 2020
Opportunities and Challenges for Distributed Electricity Generation in Canada

STUDY 188 | July 2020
Economic Impacts of Value-added Oil and Gas Products

STUDY 189 | August 2020
The Economic Effectiveness of Different Carbon Pricing Options to Reduce Carbon Dioxide Emissions

STUDY 190 | August 2020
Canadian Crude Oil and Natural Gas Production and Emissions Outlook (2020-2039)

STUDY 191 | August 2020
Canadian Oil Sands Production and Emissions Outlook (2020-2039)

View all of CERI’s studies at www.ceri.ca/studies
William A. Bains

WHAT WE LEARNED FROM OUR 2019-20 RESEARCH

Overview

Energy systems are designed to provide reliable energy services at a reasonable cost. Demand for those services will continue, and increase, and technological improvements will bring new options into our energy markets that allow for improved efficiencies and substitutions.

CERI approaches its research with several themes in mind; Canadian Energy in a Global Context, our Evolving Electricity System and Customer Energy Choices. This year, we added to our understanding of those themes as we worked through different projects.

Considering Canada's energy in a global context, we assessed the long term production for oil and gas. We have seen that a shutdown of the global economy has had a significant impact on oil demand, due to reduced transportation requirements. Yet we note that our study continues to project increased production of Canadian crude. This is due to several factors. The first being that about 50% of oil demand is not within the transportation sector, which indicates that the long-term prospects for oil use will continue, although maybe not at levels above 100 million barrels of oil equivalent. Our assessment of continued growth in oil production in Canada goes to our view of the investment the industry is making in reducing operating costs and emissions. The market will remain, albeit at a lower level, and Canada's oil industry is working to position itself to be more competitive going forward.

In terms of our natural gas prospects, it's all about Liquified Natural Gas (LNG). Canada is part of a largely continental market for gas. With increased competition from the U.S., Canada will go down one of two paths 1) reduced production without significant LNG access to global markets, or 2) entrance into a competitive global market, similar to what we see right now for oil. It's that simple.

In both cases, we note greater competition on the world stage for our fossil fuels. This led us to explore value-added opportunities for oil and gas to diversify Canada's export markets. In our analysis, we demonstrated there are significant opportunities for value creation with the use of natural gas as petrochemical feedstocks. Plastics and industrial chemicals are a reasonable pathway to create additional value. While oil can also be a feedstock for these markets, it is unlikely that oil will be a significant part of the value-added market at this time. CERI is looking to consider further value-added options for oil in terms of carbon fibre, lithium, vanadium and asphalt. Technology improvements need to continue in this area to develop reasonable value-added opportunities.
WHAT WE LEARNED FROM OUR 2019-20 RESEARCH

The opportunities for enhanced value for natural gas right now, and potentially oil in the future, require a robust and efficient logistics system to get Canadian fossil fuel-based products to market. Recognizing this interconnect, CERI assessed the ability of our national rail system to meet these challenges. It should be noted that fossil fuel products are but a few of the many demands our rail network, and two principle rail companies, CN and CP, must manage.

Our assessment indicates room for improvement in our rail network that could benefit the petrochemical and oil production sectors. Coordination amongst all parties who operate, maintain, and grow the capacity of the network, including the all-important "first mile" and "last mile" are vital to a healthy economy. We note that a key challenge to this planning is pipeline market access. Pipeline transport for oil is cheaper and safer than rail. Many stakeholders debate the future of new pipeline projects. However, we have seen the advancement of three pipelines – TransMountain, Keystone XL and the Enbridge Line 3 Replacement Program. If, or when, those come into operation, it will reduce the demand on Canada's rail network, in the all-important western corridor, benefiting other rail shippers and the oil market.

In terms of pipelines and LNG liquefaction facilities, CERI evaluated Canada's regulatory system to assess our competitiveness challenges with the U.S. Our study showed that, for these types of large unique projects, regulatory approvals take upwards of 2 years longer than in the U.S. And that does not include the inevitable legal challenges that occur if a project is approved. That additional time requirement creates challenges for Canada's economy as time is money, and investors in major infrastructure can choose where to invest. Shorter times from approval to completion means a better return. CERI also conducted a comparative analysis of more day-to-day regulatory approvals. From that perspective, Canada and, in particular, various provincial processes, are similar to those in the U.S.

The evolution of the electricity system is dominated by new generation options both at the grid level and distributed generation (DG). Our assessment of distributed generation builds on previous studies dealing with generation economics and electrification. Our analysis shows that distributed generation is over 90% solar photovoltaic (PV). Presently, this option is not economic from a systems perspective but can be from an individual owner's perspective, depending on how owners are compensated. If owners can receive reduced fixed charges and infrastructure costs, they can be profitable. Unfortunately, that means that other consumers on the electricity grid will have to pay for their share of the infrastructure costs.
WHAT WE LEARNED FROM OUR 2019-20 RESEARCH

Costs for PV continue to decline, but infrastructure costs remain. We could find no evidence to indicate that even a 25% penetration of PV in households would change the amount of infrastructure investment required to maintain and grow the electricity grid. This aspect is key as the evidence does not support the general assumption that DG can defer or cancel infrastructure investments. As a network policy, the promotion of DG may create some benefits, but there will continue to be net economic costs for the foreseeable future.

Finally, we considered the energy efficiency impacts on trade-exposed and energy-intensive industries. For the most part, these are focused on reducing natural gas or electricity use. Technical solutions to reduce energy use abound. However, with low costs for natural gas and electricity (in most Canadian jurisdictions), only a percentage of those options are economic. Even so, there are other issues at stake when investing in energy efficiency in the industrial sector, principally, the competitive pricing of the produced products. Some efficiency improvements can translate to a significant reduction in those costs, in the order of 10% or more. However, for the most part, options provide little in the way of a competitiveness strategy for exporters.

Our research during the 2019-2020 year shows the need to understand the detailed consequences of different energy choices. Our systems are complex and isolating individual changes in different energy system components – from changes in oil and gas production, to electricity generation, to consumption by energy-intensive industries – can miss the broader picture. As a country, we continue to need good data and better analysis to challenge our own assumptions and get the best economic value from both existing systems and potential new investments. Good data remains elusive and more investment in Canadian based data is necessary and important.

CERI’s main purpose is to collect and analyze data to allow for a better understanding of Canadian energy systems. We continue to conduct relevant studies regarding these energy systems so that decision-makers in government and industry can consider the ramifications of potential future policies or investments.
WHAT WE LEARNED FROM OUR 2019-20 RESEARCH

Key Insights
In 2019-20, CERI conducted 8 primary research projects. The projects and associated insights are listed below.

1. **Canadian Oil Sands Production Outlook (2020-2039)**
   - The production forecast shows a short-term reduction due to the pandemic's impacts on the economy.
   - Long-term production is forecast to increase to 2039.
   - Emission intensities have improved over the last ten years, based on technology and process innovations. This trend is expected to continue.

2. **Canadian Crude Oil & Natural Gas Production Outlook (2020-2039)**
   - Conventional oil production is impacted in the short-term due to the pandemic; in the medium to longer term, two of three production scenarios show small but permanent production losses.
   - Natural gas production has stayed relatively flat with some impact due to the pandemic; longer term LNG remains a key consideration for production growth.

3. **Ribbons of Steel 2: Ensuring an Economic Future for Petrochemicals and Petroleum Fuels**
   - $Billions in investment needed in Western Canada's rail network to meet future capacity requirements. Construction of additional oil pipelines could alleviate much of this pressure to increase capacity.
   - Rail transportation represented nearly 10% of the total transportation and warehousing sector in 2018 or $8.4 billion in GDP contribution.
   - Collaborative system planning is a key challenge in meeting new capacity requirements.

4. **Competitiveness of Canada's Regulatory Framework for the Oil and Gas Sector**
   - Compared to US regulatory processes, Canada's processes are 13 to 19 months longer on average for major pipelines and LNG liquefaction facilities.
   - For well drilling and other smaller projects, regulatory approvals in Canada are similar to the US.
   - The cost of a delay to a project can be as high as 15% of the overall capital cost in the first year and results in a negative impact to the competitiveness of major Canadian oil and gas projects.

5. **Industrial Competitiveness and Energy Efficiency**
   - Canada's energy intensive and trade exposed industrial sectors can reduce production costs with investment in energy efficiency measures.
   - The pulp and paper and steel making sectors have the largest potential to reduce energy and production costs.
   - At least half the options assessed are not economic from a private sector investment perspective. Third party financial support is needed to implement all the measures identified.
6. **Opportunities and Challenges for Distributed Electricity Generation in Canada**
   - Privately owned distributed generation (DG) investments are cost effective and earn a reasonable return for the investor. This is predicated on proponents being able to avoid all electricity system charges.
   - Except in unique circumstances, there are no net public economic benefits of even high levels of DG penetration.
   - Over 90% of DG systems in Canada are solar photovoltaic (PV).

7. **The Economic Effectiveness of Different Carbon Pricing Options to Reduce Carbon Dioxide Emissions**
   - Emissions trading frameworks are more effective than carbon taxes at reducing economy wide carbon emissions.
   - For the sample of case studies assess in the study, carbon taxes were shown to contribute to economic growth but failed to meet the objective of reducing emissions.
   - Both carbon tax and emissions trade systems have a great capacity to reduce GHG emissions; however, a level at which they are utilized is not adequate for significant change towards low-carbon economies. Strengthening and adding new carbon policies and actions, especially those that can deal with carbon leakage, is needed.

8. **Economic Impacts of Value-Added Oil and Gas Products**
   - There are opportunities to create value-added products for natural gas in Canada. These are petrochemical products, mainly methanol and ammonia.
   - There are no clear pathways to create additional value from crude oil. There are also no medium-term technology innovations that would change this perspective.

COVID-19 recovery will be a key consideration for CERI in 2020-21. The pandemic has devastated the Canadian and global economies, highlighting weaknesses in the global economic system which negatively impact societal well being. While short term measures put in place to “keep the lights on” will provide some relief, once through the crisis, Canada must resume our important discussions that address both environmental stewardship and aspirations for economic prosperity. CERI's long-term analyses will continue to provide critical information for industry, government, and other energy stakeholders as they determine the path(s) forward.
Ganesh Doluweera  
*Director, Research*

**Peer reviewed publications:**


**Other contributions:**

- **Teaching at the University of Calgary:**
  SEDV 603 – Energy Systems II (Renewable Energy), Spring 2019 (May – June)  
  ENEE 575 – Alternative Energy Systems, Winter 2020 (Jan – April)

- **Speaker - Webinar organized by the ASEAN Center for Energy:** "Waste to Energy: Solving the waste problem in ASEAN Megacities", March 20, 2020

- **Contributions to IEA/NEA Report:** The International Energy Agency (IEA) and the Nuclear Energy Agency (NEA) under the auspices of the OECD are currently preparing the next edition of the Projected Costs of Generating Electricity. Dr. Ganesh Doluweera, CERI's Director of Research, is a member of the international group of experts who provides methodological insights to assist the report's development. Through a series of workshops, the expert group reviewed the standard and alternative methods to estimate the cost of electricity generation and emerging issues in the electricity generation sector. CERI also coordinated the Canadian data collection for the report. The report is to be published in the Fall of 2020 by the IEA.

- **Workshop on Economic Impact Analysis:** CREATE-IISC [https://createiisc.com/]: In July 2020, CERI offered a two-day workshop on tools and methods for economic analysis of energy systems for a group of graduate students and postdoctoral associates associated with the University of Calgary’s “Integrated infrastructure for Sustainable Cities” program. CERI is a collaborator of the CREATE-IISC, and the workshop was offered as CERI’s contribution to the program.
Hamid Rahmanifard

*Research Engineer*

**Publications and Contributions:**

- “Wavelet Modelling Approach for Reservoir Model Classification”, SPE Europec featured at 82nd EAGE Conference and Exhibition, Amsterdam, Netherland (December 2020)
- “Multivariate Time Series Modelling Approach for Production Forecasting in Unconventional Resources”, SPE Annual Technical Conference and Exhibition, Houston, Texas (October 2020)
- “Well Performance Prediction in Montney Formation Using Machine Learning Approaches”, 2020 Unconventional Resources Technology Conference Austin, Texas (July 2020)
- Hamid has been awarded Natural Sciences and Engineering Research Council (NSERC) grant for three years starting in 2020.

Anna Vypovska

*Environmental Researcher*

- As a professional Biologist (P.Biol.), and a full member of the Alberta Society of Professional Biologists since 2014, Anna participated in the annual ASPB Conference in November 2019.
- Member-in-Large at the Briar Hill School Council since September 2017.
- Executive Secretary of the School Council at the Calgary Ukrainian Saturday School (Calgary’s only community school that has more than 70 students studying Ukrainian)

Nurul Hossein

*Economic Researcher*

**Publications:**

Toufigh Bararpour

Research Engineer

Publications:


Patent:


Voluntary activity:

- Vice President in Chemical & Petroleum Engineering Grads’ Association (CPEGA), an internal organization built to provide help and support for all graduate students (MEng, MSc, PhD) in Chemical & Petroleum Engineering Department of the University of Calgary. Its goal is to improve the overall quality of the educational experience of the graduate students while they are members of the Chemical and Petroleum Engineering Department.
Allan Fogwill, President and CEO, Canadian Energy Research Institute

The Asia Pacific Energy Research Centre (APERC) was established in July 1996 in Tokyo, pursuant to the Action Agenda adopted by the Asia-Pacific Economic Cooperation (APEC) Economic Leaders at the Osaka Summit in November 1995.

The primary objective of APERC is to foster the understanding of global, regional and domestic energy demand and supply trends, energy infrastructure development, energy regulatory reform, and related policy issues in view of regional prosperity. APERC advocates rational energy policy formulation and enhances capacity building in energy research in the region, following APEC’s Non-binding Energy Policy Principles for furthering energy security, economic growth, and environmental quality in an effort to implement its mission and vision.

Allan is a member of the Advisory Board, a group representing major research institutions located in the APEC region which facilitates cooperative research. Its primary role is to give professional advice regarding APERC research with respect to methodologies, approaches, databases, information sources, and the relevant experts to be involved.

The purpose of the Canadian Centre for Energy Information (CCEI) is to provide a convenient one-stop shop for information on Canada’s energy future. The CCEI will present energy information in a way that is easy for a wide range of data users to understand. It will integrate data from federal, provincial and territorial sources across Canada. Allan sits on the CCEI Board of Directors.

Lisa Rollins, Vice President, External Relations, Canadian Energy Research Institute

The vision of the Society of Petroleum Engineers Canadian Educational Foundation (SPECEF) is to be the premier charitable organization supporting the energy industry education in Canada. The mission is to support and promote individuals and programs to advance energy industry education in Canada. Lisa sits on the SPECEF Board of Directors.
Dinara is an industry supervisor for two students enrolled in the University of Calgary’s Master of Science in Sustainable Energy Development (SEDV), an interdisciplinary graduate program providing a balanced education related to energy and environmental management. A combined offering through the School of Public Policy, Haskayne School of Business, Schulich School of Engineering, School of Architecture, Planning, and Landscape, and the Faculty of Law, SEDV is an unprecedented program designed for professionals and students who are seeking a broad-based and comprehensive education in sustainable energy.

Dinara Millington is a mentor with Bow Valley College for the Corporate Readiness Training Program (CRTP), a full-time program for internationally educated professionals (IEPs) who are looking to start their career in Canada. It provides learners with the skills to find a job and the business communication skills needed to excel.

Dinara is a member of the PetroLMI Advisory Committee that is conducting a new project “Exploring the Skills and Competencies in Demand in Alberta’s Petrochemicals and Refining Sectors”. Together with external Committee members, PetroLMI is reviewing the existing 140 occupational profiles to add relevant competencies, training and activities for the sectors and create 15 new profiles of occupations in demand. The project wraps up in summer 2021.
**STUDY 192A** | September 2020

**STUDY 192B** | September 2020
Economic Recovery Pathways for Canada's Energy Industry: Part 2 - Canadian Crude Oil and Natural Gas

**STUDY 192C** | October 2020
Economic Recovery Pathways for Canada's Energy Industry: Part 3 - The Potential for Renewable Energy to Stimulate the Economy

**STUDY 192D** | November 2020
Economic Recovery Pathways for Canada's Energy Industry: Part 4 - Electricity

**STUDY 193** | January 2021
Competitiveness of a Circular Petrochemical Plastics Market in Canada

**STUDY 194** | February 2021
Climate Change Resiliency of Canada's Electricity System

**STUDY 195** | March 2021
Canadian Natural Gas Market Supply and Demand Pathways of Change

**STUDY 196** | May 2021
Life Cycle Production Costs and Emissions Analysis of Canadian LNG

**STUDY 197** | May 2021
Economic Impacts of Oil Sands Production in Canada and the U.S.

**STUDY 198** | May 2021
Economic Impacts of Canadian Conventional Oil and Gas Production in Canada and the U.S.

**STUDY 199** | June 2021
Environmental Performance Data for Canadian Oil and Gas for use in ESG Studies
The Canadian Energy Research Institute is a registered charitable organization qualified to issue official donation receipts required to claim donation tax credits.

Donations are applied directly to research costs. Funds help to improve the quality of energy information available to Canadians by allowing the Institute to develop its research team.

In a country weighed down by opposing views on critical energy issues, CERI research enriches conversations by providing fact-based studies which serve as legitimate, trustworthy sources of information.

Organizations which fund CERI recognize the value an independent source of Canadian energy information provides. The Institute is dedicated to producing unbiased, transparent analyses that aid decision-makers in business, government, academia and the public.

**CERI research is made possible thanks to our three generous core funders (right).**

The Institute also receives support from:

- Alberta's Industrial Heartland Association
- Canadian Energy Pipeline Association (CEPA)
- Canadian First Research Excellence Fund (CFREF)
- Chemistry Industry Association of Canada (CIAC)
- Ivey Foundation
- Government of British Columbia
- Government of Saskatchewan
- S.M. Blair Family Foundation
- Alberta Energy Regulator
- Bow Valley College
- CEPA Foundation
- JWN Energy
- Northern Alberta Institute of Technology (NAIT)
- Petroleum Services Association of Canada

CERI is not influenced by funding or sponsorship bias, which refers to the tendency of a scientific study to support the interests of the study's financial sponsor. All research conducted by the Institute, and the core studies produced, are independent of funding influence.
CERI continues to strengthen its critical relationships with various stakeholders. Since the Institute's inception, the University of Calgary has been a long-term vital supporter of the organization.

CERI is engaged with the University of Calgary in the following ways:

**Master of Science in Sustainable Energy Development (SEDV)**
The University of Calgary's Master of Science in Sustainable Energy Development (SEDV) MSc is an interdisciplinary graduate program providing a balanced education related to energy and environmental management. A combined offering through the Haskayne School of Business, Schulich School of Engineering, School of Architecture, Planning and Landscape, and the Faculty of Law, SEDV is an unprecedented program designed for professionals and students who are seeking a broad-based and comprehensive education in sustainable energy.

During the 2019-2020 year, CERI supervised four students from the program, acting as an external supervisor.

**Office of the Vice-President, Research, and the Global Research Initiative (GRI)**
The GRI aims to build sustainable, long-term partnerships with industry and government through investment in research to bring new knowledge to the market. The GRI enables scholars and students to work together with partners outside of academia on solutions to big challenges facing the global energy industry.

To meet its objective, the University of Calgary's GRI continues to engage with CERI by supporting graduate student positions to join the multidisciplinary team at CERI. During the 2019-2020-year, five post-doctorate positions at CERI were funded.

**Natural Sciences and Engineering Research Council (NSERC) Collaborative Research and Training Experience (CREATE) Integrated Infrastructure for Sustainable Cities**
CERI taught a three-day course on economic modelling tools and methods for CREATE graduate students and postdoctoral fellows in the summer of 2019. The students were part of the “NSERC-CREATE Integrated Infrastructure for Sustainable Cities” group at the University's Schulich School of Engineering.
CERI Energy Quarterly is the Institute’s new newsletter, created in response to feedback received from our annual Stakeholder Satisfaction Survey in which respondents frequently mentioned their interest in receiving a regular newsletter from CERI.

"I like the idea of a newsletter. It would remind me on a busy day that I should be checking the website and balancing my information with your research."

- Stakeholder Satisfaction Survey Respondent (2018-2019)

First released in fall 2019, the newsletter is published on a quarterly basis (January, April, July, October). Readers can look forward to content including the latest research, upcoming events, commodity updates, media coverage and more.
CERI conducts an annual stakeholder satisfaction survey to solicit feedback from its network regarding their general level of satisfaction with the Institute and, specifically, to provide information and feedback about their role in the energy sector, how they use CERI research, additional research topics and products of interest and whether they believe CERI research is independent, objective and relevant.

This survey was conducted from May 1 - 22, 2020 via email using Survey Monkey software. 3,916 individuals received the survey with 123 responses received.

CERI received an overall rating of 77% satisfaction with 88% of respondents highly likely or likely to recommend CERI research.

How likely would you be to recommend CERI research as a source of information which can help to improve energy literacy and fluency?

- Highly likely: 40%
- Likely: 48%
- Unsure: 9%
- Unlikely: 2%
- Highly unlikely: 1%
CERI IN THE MEDIA

CERI works with our media partners to provide data and observations regarding today’s most important energy issues. This is just a sample of media coverage including CERI during 2019-20.

CALGARY HERALD

Varcoe: Replacing coal with gas will open new ‘window of opportunity’ for Canada’s LNG sector

Chris Varcoe • Calgary Herald
November 28, 2019 • 4 minute read

A study last year by the Canadian Energy Research Institute (CERI) found western Canadian LNG has an overall cost advantage to land product in Asia, compared to building new export facilities in the U.S.

“The availability of credible and comprehensive information is important if citizens, organizations and governments are to make wise decisions. Such information is lacking in Canada regarding our energy supply and demand options,” CERI said.

DINARA MILLINGTON, VP OF RESEARCH, CANADIAN ENERGY RESEARCH INSTITUTE

Without new pipelines, crude-by-rail demand will double: CERI

Work Continues On Improving Canada’s Energy Information System

By Paul Wells
Tuesday, August 6, 2019, 8:23 AM MDT

“The electrification pathway has some unanswered questions

By ALLAN FOGWILL DEC 2, 2019

Railways will need to invest $5B to keep up with shipping demand, says CERI

Canadian Energy Research Institute says cargo, including oil, will ramp up over 5 years

CERI received 686 editorial mentions in the 2019-20 year. The global potential reach was more than 530 million.
Breakfast Overview Series
CERI’s Breakfast Overview events review the findings of each study. Our host venue partners are typically academic institutes which provide the added value of networking with students and faculty over a hot breakfast. Members of the research team are available following the presentation to discuss methodology and results.

CERI Petrochemical Conference
Hosted each year in Kananaskis, this continues to be a highly anticipated event for both participants and exhibitors to enjoy golf, networking and unrivaled technical content. We have seen an increase in delegate attendance year-over-year, as well as high interest in speaker participation.

CERI Webinars
For those in our network not able to join us in person at our Breakfast Overview events, our research findings are shared online. Webinars include a 30-40 minute presentation with a discussion period immediately following.

Executive Briefings
The Institute's network is extensive and ongoing consultation with key influencers and decision-makers ensures that CERI has its finger on the pulse of short, mid and long-term energy issues. Executive overviews are available for energy staff, clients and other stakeholders and can be tailored to meet the specific needs of organizations.
Ms. Corinne Boone  
Board Chair  
Climate and Sustainable Innovation (CSI)

Mr. Terry Abel  
Executive Vice President  
Canadian Association of Petroleum Producers

Mr. Mike Cleland (Past Chair)  
Senior Fellow of the University of Ottawa’s Positive Energy Project, QUEST (Quality Urban Energy Systems of Tomorrow) Board Member and Past President and CEO of the Canadian Gas Association

Mr. Kendall Dilling  
Vice President, Environment and Regulatory Cenovus Energy Inc.

Mr. Michael W. Ekelund  
Assistant Deputy Minister  
Resource Revenue and Operations Division  
Alberta Department of Energy

Mr. Allan Fogwill  
President and CEO  
Canadian Energy Research Institute

Dr. Ian Gates  
Professor, Associate Dean (Innovation) and UCalgary GRI Lead  
Dept. of Chemical & Petroleum Engineering  
Schulich School of Engineering  
University of Calgary

Mr. Eric Sanscartier  
Director, Energy and Economics Analysis Division  
Natural Resources Canada

Ms. Marika Hare  
Consultant

Mr. Kevin Heffernan  
Consultant and Past President of the Canadian Society for Unconventional Resources
RESEARCH ADVISORY COMMITTEE

Mr. James D. Brown P.Eng.
Fellow
CERI

Mr. Richard Carlson
Director, Energy Policy and Energy Exchange
Pollution Probe

Ms. Julie Girvan
Independent

Mr. Jim Hughes
Consultant

Mr. Bruce Lourie
President
Ivey Foundation

Mr. Garret Matteotti
Director, Business Development
Alberta Industrial Heartland Association

Mr. Paul-Emile McNab
Director, Business Development and
Strategic Initiatives
Canadian Council for Aboriginal Business

Mr. Mark Pinney
Manager, Natural Gas and Transportation
Canadian Association of Petroleum Producers

Dr. Shahrzad Rahbar
President
Industrial Gas Users Association

Ms. Yasmin Rahemtulla
Director, Economic Research
Alberta Energy

Mr. Eric Sancartier
Director, Energy and Economic Analysis Division
Natural Resources Canada
CERI TEAM

Ms. Dinara Millington
Vice President, Research

Mr. Ganesh Doluweera
Director, Research

Mr. Evar Umeozor
Senior Researcher

Mr. Sochi Iwuoha
Senior Researcher

Mr. Andrei Romaniuk
Senior Researcher

Mr. Hamid Rahmanifard
Research Engineer

Ms. Purnima Somathilake
Data Engineer

Mr. Nurul Hossain
Economic Researcher

Mr. Victor Gallardo
Economist

Ms. Anna Vypovska
Environmental Researcher

Mr. Mohammad Ahmadi
Research Engineer

Mr. Eranda Bartholameuz
Research Engineer

Mr. Hossein Hosseini
Researcher

Ms. Madie Zamzadeh
Researcher

Mr. Juan Arteaga
Research Assistant

Mr. Iman Erfan
Research Assistant

Tosin Adayemo
Research Assistant

Mr. James D. Brown P.Eng.
Fellow

Mr. Robert M. Cutler
Fellow

Mr. Larry Kaufmann
Fellow

Mr. Allan Fogwill
President and CEO

Ms. Kathy Altenhoven
Manager, Finance and Administration

Ms. Carol Williams
Office Coordinator

Ms. Lisa Rollins
Vice President, Marketing and Communications

Ms. Kelsey Marklund
Marketing and Communications Advisor

Ms. Megan Murphy
Marketing and Communications Coordinator

Ms. Capri Gardener
Marketing and Communications Coordinator
## CANADIAN ENERGY RESEARCH INSTITUTE

Financial Highlights for the Year Ended March 31, 2020

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2019</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Assets</strong></td>
<td>$2,268,214</td>
<td>$2,632,297</td>
<td>$2,752,734</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td>($1,358,068)</td>
<td>($1,562,025)</td>
<td>($1,603,262)</td>
</tr>
<tr>
<td><strong>Net Capital</strong></td>
<td>$910,146</td>
<td>$1,070,272</td>
<td>$1,149,472</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td>$2,044,584</td>
<td>$1,796,128</td>
<td>$1,819,657</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td>($2,204,710)</td>
<td>($1,875,328)</td>
<td>($1,907,083)</td>
</tr>
<tr>
<td><strong>Net Operating (deficit)</strong></td>
<td>($160,126)</td>
<td>($79,200)</td>
<td>($87,426)</td>
</tr>
</tbody>
</table>