

# IVEY ENERGY POLICY AND MANAGEMENT CENTRE



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# DIRECTOR'S MESSAGE

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**GUY HOLBURN**, DIRECTOR | Ivey Energy Policy and Management Centre, Ivey Business School | Professor and Suncor Chair in Energy Policy

**2017 MARKED THE FIVE-YEAR ANNIVERSARY** of the Ivey Energy Policy and Management Centre, and I am pleased to reflect on the Centre's various accomplishments over this short period of time. Some simple statistics give an indication of the scale of the Centre's contributions to thought leadership and public discourse on energy issues in Canada: 44 events organized in London, Toronto, Ottawa, and Calgary, involving more than 4,000 participants; 37 policy briefs, op-eds, and academic publications; 19 student interns and research assistants; \$2 million received in private sector donations, and \$2.1 million in faculty research grants from government. We are continuing this trajectory of outreach and research activity, gradually building our position as a unique source of independent, fact-based insights on energy sector development.

Centre faculty and fellows are frequently in demand to speak at industry events and academic conferences, to provide expert opinions to news media, and to advise government panels and departments. Just in 2017, the Centre was invited by the federal government to offer input to the NEB Modernization Panel, and by Ontario's Ministry of Energy to assess electricity generation costs. In both cases, our policy analyses helped to inform policy recommendations and decisions.

2017 saw some new initiatives at the Centre: motivated by current policy reforms in electricity markets in several provinces, the Centre sponsored the inaugural Canadian Electricity Markets

and Policy Workshop for researchers and analysts from across Canada and the U.S., held at the Ivey Business School. Frank Wolak, Professor at Stanford University and one of the world's top experts on electricity market design, gave the keynote address, a highlight of the workshop. The Centre also organized its first conference in Calgary, joint with Haskayne Business School, featuring Richard Dicerni, Adjunct Professor at Ivey, Professor Michael Greenstone, University of Chicago, and Steve Williams, CEO and President of Suncor. We were delighted with the capacity audience of 250 participants who engaged in a thoughtful conversation about the future of hydrocarbons and policies for balancing economic, social, and environmental goals.

I am thankful for the tremendous efforts of the whole Ivey Energy Policy and Management Centre team – faculty and staff, student interns, executive fellows, and advisory board members – all of whom are integral to the Centre's achievements during this and the last five years.

I am also especially grateful for the continued support of our donors – ATCO, OMERS, Power Workers' Union, Suncor Energy Foundation, TransCanada Corporation, and Union Gas – who have enabled the Centre to grow and extend its impact. The Centre has ambitious plans to build on its past successes, and we look forward to working with all our partners in the years ahead.

# RESEARCH

## ENERGY CENTRE POLICY BRIEFS ANALYSIS AND INSIGHT INTO ENERGY ISSUES

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### **RISKS AND COSTS OF REGULATORY PERMIT APPLICATIONS IN CANADA'S PIPELINE SECTOR**

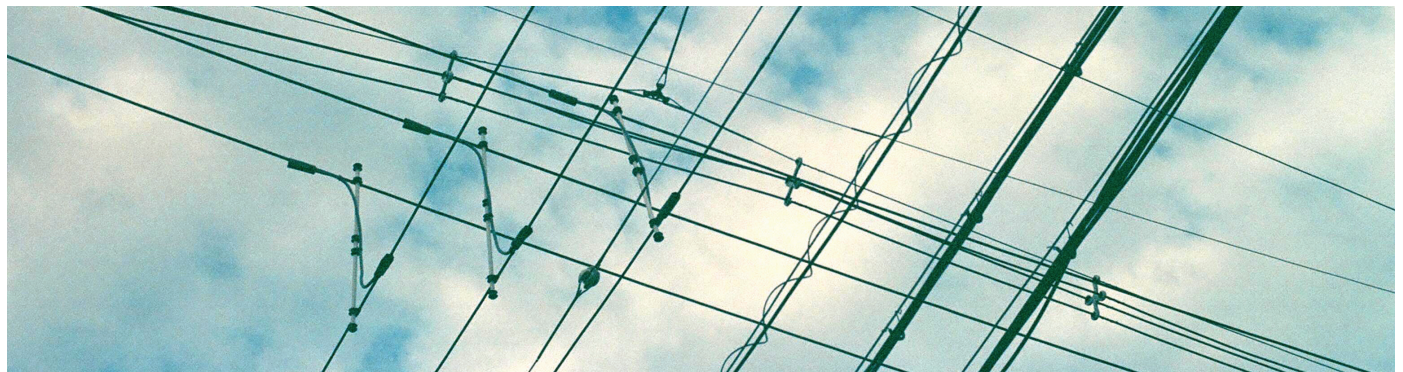
This report assesses the costs and risks associated with applying for regulatory approval of major pipeline projects in Canada. A challenge for major pipeline investment is that the sunk costs of regulatory applications and project development are significant and viewed as having increased substantially over the last decade. Firms often invest hundreds of millions of dollars in order to apply for NEB review and then government approval of large scale projects - none of which is recoverable should the project be denied. At the same time, industry perceives that the risks of denial by the government have increased given the politicization of major pipeline projects. The simple arithmetic of increased risk and high sunk costs yields lower expected financial returns for major pipeline projects, a deterrent to investment. The report examines the potential benefit of structural reform to the approvals architecture: a two-stage approval process that sequences government determination of the public interest before NEB technical review of the project could reduce costs and risks for project developers, improving the investment climate for infrastructure projects.



## **THE ECONOMIC COST OF ELECTRICITY GENERATION IN ONTARIO**

This Policy Brief brings an economic perspective to the analysis of electricity generation costs and prices in Ontario. Generation accounts for approximately two-thirds of Ontario's total electricity system costs, making consumers' electricity bills particularly sensitive to changes in generation policies and the cost of ensuring that sufficient generation capacity is available to meet demand. In Ontario, the wholesale price of electricity generation has declined since 2006, yet regulated rates for household consumers have almost doubled, creating some confusion over the reasons why bills have increased. The report provides an economic cost analysis of the generation component of electricity bills, which can reconcile these seemingly contradictory trends.

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## **BACKGROUND ON GENERATION CAPACITY MARKETS**

Generation capacity markets have the potential to more efficiently procure future generation for Ontario's electricity market. Cost savings in a capacity market are achieved in two ways. First, competition between generators lowers the cost of procuring capacity through competitive bidding pressures. Second, entry and technology risks are borne by investors and generators instead of by consumers and taxpayers. This Policy Brief serves as a background on generation capacity markets, beginning with a description of key attributes and functioning of capacity markets. It then provides a discussion of the anticipated financial benefits of implementing a capacity market in Ontario as well as an overview of the experience of capacity markets in other jurisdictions. Finally, some important caveats and key messages are discussed in considering the implementation of capacity markets.



# THE PARIS AGREEMENT ON CLIMATE CHANGE: AN OVERVIEW AND IMPLICATIONS FOR CANADA

This Policy Brief provides an overview of the Paris Agreement on Climate Change, a legally binding international treaty that is programmed to grow stronger over time, requiring countries to regularly revise domestic policy plans and adopt more stringent emission reduction targets. Virtually all countries have joined the treaty: 189 countries accounting for 98 per cent of global GHG emissions have enacted climate legislation to comply with the Paris Agreement. A growing pattern of government policies and business practices are converging toward low-carbon development, particularly in Europe and Asia. Policies on renewable energy, energy efficiency and carbon pricing will likely deepen due to treaty implementation. National and global implementation may have moderate short-term consequences and notable long-term impacts on the Canadian economy and society. Future developments related to the Paris Agreement warrant sustained attention from corporate and government decision-makers.

IVEY ENERGY POLICY AND MANAGEMENT CENTRE

## BY THE NUMBERS, 2012-2017

**\$2.1 million**

Donations

**19** Student internships granted

**44**

Events

**20**

Student scholarships awarded

**2,850**

Newsletter subscribers

**\$2.0** MILLION

Grants and awards

**4,200**

Attendees at events

**37** Publications

# ACADEMIC PUBLICATIONS

## “NEW VEHICLE FEEBATES”

**Nicholas Rivers and Brandon Schaufele, *Canadian Journal of Economics*, February 2017**

Governments around the world have considered ‘feebate’ policies – combinations of fees and rebates – to combat greenhouse gas emissions from cars. This paper is among the first to empirically evaluate the impact of a long-standing Canadian feebate policy on vehicle sales and fleet emissions.

## “THE ROLE OF GOVERNANCE SYSTEMS AND RULES IN WIND ENERGY DEVELOPMENT: EVIDENCE FROM MINNESOTA AND TEXAS.”

**Adam R. Fremeth and Alfred A. Marcus. *Business and Politics*, October 2016**

Drawing on the ideas of J.Q. Wilson and E. Ostrom, the authors compare options for overcoming barriers to investment in wind energy in two U.S. states.

## “CORPORATE POLITICAL STRATEGY IN CONTESTED REGULATORY ENVIRONMENTS.”

**Adam R. Fremeth, Guy L.F. Holburn and Richard G. Vanden Bergh. *Strategy Science*, December 2016**

This paper examines how firms invest in building relationships with elected politicians in response to opposition from organized stakeholders who participate in regulatory agency policy-making processes.

## “PRIVACY PRESERVING PREDICTIVE ANALYTICS WITH SMART METERS”

**Biruk Habtemariam, Andriy Miransky, Ali Miri, Saeed Samet and Matt Davison, 2016 IEEE International Congress on Big Data.**

This paper examines how smart meter data analysis provides key insights about energy demand and usage patterns for efficient operation of power generation and distribution companies.

# FACULTY RESEARCH GRANTS AND AWARDS

## Adam Fremeth

- Social Sciences and Humanities Research Council grant, \$132,666, Principal Investigator, 2014-2018
- Social Sciences and Humanities Research Council grant, \$68,100, Principal Investigator, 2011-2014
- Carbon Management Canada grant, \$442,140, Principal Investigator, 2011-2014

## Margaret Loudermilk

- Mathematics of Information Technology and Complex Systems grant, \$30,000, Principal Investigator, 2016-2017
- Social Sciences and Humanities Research Council grant, \$2,000, Principal Investigator, 2016-2017

## Matt Davison

- NSERC Discovery grant, \$235,000, Principal Investigator, 2015-2019

## Horia Hangan

- Infrastructure Operational Fund CFI and ORF, \$3,635,891, Principal Investigator, 2014-2019
- NSERC CRD grant, \$540,000, Principal Investigator, 2015-2018
- NSERC Discovery grant, \$110,000, Collaborator, 2012-2017

## Guy Holburn

- Ontario Ministry of Energy, \$50,000, Principal Investigator, 2017-2018
- Natural Resources Canada grant, \$30,000, Principal Investigator, 2015-2016
- Social Sciences and Humanities Research Council grant, \$62,000, Principal Investigator, 2010-2013
- Hydro One University of Western Ontario Research grant, \$150,000, Principal Investigator, 2010-2012

## Brandon Schaufele

- Sustainable Prosperity Research grant, \$13,200, Principal Investigator, 2013
- University of Ottawa CUT grant, \$6,863, Principal Investigator, 2012-2013
- Pacific Institute for Climate Science, \$10,000, Co-Principal Investigator, 2012-2014
- Environment Canada Economics and Policy Research Network, \$500,000, Collaborator, 2012-2017
- CIGI-INET Research grant, \$198,000, Collaborator, 2012-2014

# TEACHING

## NEW IVEY CASE STUDIES



### Environmental Defense Fund and the Leveraged Buyout of TXU Energy

This case study looks at one of the largest leveraged buyouts in history - Kohlberg Kravis Roberts and Texas Pacific Group's acquisition of TXU Energy, one of the major electric utilities in the United States with a significant portfolio of coal-fired generation capacity. The case takes the perspective of Environmental Defense Fund, an environmental NGO, that was approached by KKR and TPG to lend its support for the deal during the regulatory review process. EDF needed to ensure that any agreement with KKR and TPG balanced the organization's core objectives and satisfied the needs and expectations of its stakeholders, members, and donors. The novel deal was heralded as a potential formula for addressing future environmental and social problems, but execution would be mired in challenges.



### TransCanada's Energy East Pipeline: Managing Aboriginal Relations in the Energy Sector

Following the announcement of TransCanada's Energy East pipeline project, the company sought ways to establish and manage relationships with 150 Aboriginal communities along the proposed route across Canada, particularly in the province of New Brunswick where new pipeline would be constructed. Following Supreme Court rulings that have reinforced the "duty to consult and accommodate," Aboriginal groups have a powerful voice in the development of energy infrastructure, creating new requirements for companies wishing to expand into areas subject to Aboriginal title and treaty claims.



### Suncor Energy: Navigating Climate Policy Risk in Alberta

This case study examines the decisions facing Steve Williams, President and CEO of Suncor Energy, as the province of Alberta was beginning a far-reaching shift in its regulation of greenhouse gas emissions in 2015 under a recently elected New Democratic Party government. The oil sector's position was complicated by the combination of a significant deterioration of oil prices and environmental group opposition to new pipelines required for accessing new markets. Williams needed to consider how to balance the interests of multiple stakeholders, including customers, employees, governments, civil society, and shareholders. Suncor adopted a proactive stance and worked with the government to support an ambitious carbon pricing policy that addressed both business and environmental concerns.

## OTHER RECENT IVEY CASE STUDIES WITH AN ENERGY FOCUS

- **ALTAGAS LTD.: FOREST KERR HYDROELECTRIC PROJECT** | AltaGas, an energy company based in Calgary, Alberta, collaborated with the Canadian federal government, British Columbia's provincial government, and a First Nations group to reach an agreement for constructing a large hydroelectric project in a remote location in northern British Columbia.
- **BLACK FRIDAY FOR THE OIL MARKETS** | A New York hedge fund formulates financial option trading strategies based on anticipated OPEC decisions to cut oil production in 2014 and 2015. The case discusses the geopolitical factors that influence oil supply, inventory, and prices, and analyzes options markets, trading strategies, and price sensitivities to oil price shocks.
- **ERIE THAMES POWERLINES: THE HYBRID TRUCK DECISION** | Erie Thames Powerlines, an electricity distributor in southwestern Ontario, needed to determine the suitability of acquiring hybrid trucks as opposed to conventional diesel utility trucks.





## ↑ LEARNINGS AND LEGACY: TRANSCANADA'S KEystone XL PIPELINE



OCTOBER 19, 2017

Dennis McConaghy, Ivey Executive-in-Residence, gave a keynote lecture to over 350 Ivey HBA students on TransCanada's Keystone XL pipeline, reflecting on challenges, successes, and lessons learned.



## ↑ NAVIGATING CLIMATE POLICY



DECEMBER 1, 2016

Gord Lambert, Ivey Executive-in-Residence, discussed with Ivey students the oil and gas sector's approach to climate change policy and support for carbon pricing in Alberta.



## ↑ MANAGING ABORIGINAL RELATIONS IN THE ENERGY SECTOR



NOVEMBER 24, 2016

Bill Gallagher, lawyer and author of *Resource Rulers*, discussed the evolving relationship between Aboriginal groups and natural resource companies in Professor Adam Fremeth's Managing Energy and the Natural Environment class.



## ↑ ADDRESSING SOCIETAL AND ENVIRONMENTAL NEEDS IN INDUSTRY



JANUARY 23, 2017

Gary Bunio, General Manager, Strategic Technology Development at Suncor Energy, addressed Ivey students in Professor Diane-Laure Arjalies' Corporations and Society class.

# INTERNS GAIN FIRST-HAND KNOWLEDGE OF ENERGY ISSUES

Energy Centre interns gain first-hand knowledge of the issues and challenges facing the energy sector through working with Centre faculty on research projects.

## UP-CLOSE WITH

### KARTIK RAO, PHD CANDIDATE IN BUSINESS, ECONOMICS AND PUBLIC POLICY



“Working with the Ivey Energy Centre, I have been examining the effect of Ontario’s 2009 Green Energy Act, and the determinants of community acceptance or resistance to wind energy. I have found the opportunity to work on a recent and important policy issue, and its impact on various stakeholders, relevant to my research interests. The research project allowed me to work alongside expert faculty members as well as industry leaders from the energy sector. Such collaborations have significantly benefitted my understanding of the energy sector and the nuances of policy formulation. The research project also required me to work on new empirical methods, which have been valuable additions to my repertoire of analytical skills.”

### ■ JOSEPH ARYA

Joseph is a recent graduate of Ivey’s Honors Business Administration program. His research with the Energy Centre involved analyzing capacity market structures and regulatory costs involved with pipeline project development. Joseph is now an Investment Banking Analyst for Scotiabank.

### ■ ANDREW SMITH

Andrew is a recent graduate of Ivey’s Honors Business Administration program. He examined electricity capacity markets in different jurisdictions, and researched renewable portfolio standards in the United States.

### ■ JACK SWADRON

Jack’s experience in the Corporations and Society course at the Ivey Business School led him to develop a greater interest in energy policy. His work with the Energy Centre involved exploring the governance of local electricity distribution companies in Ontario. Jack is now an Investment Banking Analyst for TD Securities.





**Suncor Energy  
Emerging Leaders  
Award Recipients**  
Alexandre Rice-Hoyt,  
Ryan Stasiuk, Joshua  
Reding, Ryan Alizadeh

# SUNCOR AWARD RECOGNIZES IVEY'S RISING STARS

The Suncor Energy Foundation has established the Suncor Energy Emerging Leaders Awards, honouring selected first-year HBA students who demonstrate excellent academic achievement, strong leadership, and a keen interest in the energy sector.

The award provides these students with financial support, mentorship from faculty in the Centre and the opportunity to combine energy sector knowledge with business education to help them become leaders in the industry.

## RYAN ALIZADEH

**Program:** Dual HBA/ Engineering

**Area of Interest:** Nuclear and Renewable Energy

**Fun Fact:** This summer I went skydiving, and I have played rugby since I was 12 years old.

## JOSHUA REDING

**Program:** Dual HBA/Engineering

**Area of Interest:** Energy Sector and Renewable Energy Resources

**Fun Fact:** I love to cook almost everything.

## ALEXANDRE RICE-HOYT

**Program:** HBA

**Area of Interest:** Oil and Gas Equity Research

**Fun Fact:** This past summer I worked for RS Energy Group, an equity research firm concentrated on the oil and gas industry.

## RYAN STASIUK

**Program:** HBA


**Area of Interest:** Renewable Energy and Social Impact

**Fun Fact:** I completed an Olympic triathlon in May 2017.

# OUTREACH



## THE GLOBAL ENERGY CHALLENGE: WHAT IS THE FUTURE OF FOSSIL FUELS?

 September 13, 2017


The Ivey Energy Policy and Management Centre and Haskayne School of Business co-hosted a special keynote lecture and panel discussion in Calgary, featuring Professor Michael Greenstone, University of Chicago and Director of the Energy Policy Institute of Chicago; Richard Dicerni, Adjunct Professor, Ivey Business School, and Steve Williams, President and CEO, Suncor Energy.

Greenstone noted that economic growth and development depends on access to low cost, reliable energy sources, and that the future growth of countries such as China and India will propel demand for hydrocarbons for many years. The challenge for governments, corporations, and society as a whole is to find ways to mitigate the negative effects of hydrocarbon consumption on climate change and local air pollution.

According to Greenstone, "There's no magic bullet here... The Paris Agreement is a step in the right direction. And government policies that are market-based – carbon pricing and cap-and-trade – are the most efficient way to drive innovation and achieve global climate goals from an economic perspective. Government investment in R&D can also sometimes be effective. Canada appears to be a leader in climate policy."




## CANADIAN RESOURCE AND ENVIRONMENTAL ECONOMICS CONFERENCE 2017

 September 30-October 1, 2017

The 27th Annual Canadian Resource and Environmental Economics Conference featuring keynote speaker, Professor Frank Wolak, from Stanford University was held at the Ivey Business School in London, Ontario.



## CANADIAN ELECTRICITY MARKETS AND POLICY WORKSHOP

 September 29, 2017

Ivey Energy Centre faculty organized and hosted the first workshop on Canadian Electricity Markets and Policy, attended by researchers from Canada and the U.S. Topics ranged from consumer behaviour to strategic firm conduct and environmental policy.

## ANNUAL CCRE ENERGY LEADERS ROUNDTABLE



April 5-7, 2017

The Centre supported the fifth Annual Energy Leaders Roundtable, organized by the Council for Clean and Reliable Energy. Fifty energy sector leaders from across Canada attended the two-day retreat in Orangeville, Ontario, with keynote speeches by Elizabeth May, Leader of the Green Party of Canada; Anthony Haines, President and CEO, Toronto Hydro Corporation; and Greg Lyle, President, Innovative Research Group.



### VALUING STAKEHOLDER GOVERNANCE



January 13, 2017

Sinzianna Dorobantu, Assistant Professor of Management and Organizations at NYU Stern, presented her research on community benefit agreements between First Nations and firms in Canada's mining sector.



### WIND POWER AND SOCIAL ACCEPTANCE: KEY ISSUES FOR COMMUNITY CONSIDERATION



December 1, 2016

Stephen Bird, Associate Professor of Political Science at Clarkson University, and Fulbright Visiting Research Chair in Governance and Public Administration at the University of Ottawa, shared his perspective on key issues surrounding wind power and social acceptance.



### THE GLOBAL ENERGY OUTLOOK



October 6, 2016

Steve Carlisle, President and Managing Director, General Motors Canada, discussed the future of transportation technologies in the auto sector, at an event hosted by the Ivey Energy Policy and Management Centre in Toronto. Michael Greenstone, Milton Friedman Professor in Economics, University of Chicago, presented his research on energy policies that address economic, environmental and social goals.

## MEDIA MENTIONS

With growing activity and scale, the Centre has received significant media coverage of its research and outreach activities. Centre faculty shared their insights with news outlets such as CBC, Business News Network, Maclean's, The Globe and Mail, and CTV News.

**KEEP UP WITH ALL OF THE NEWS AT [IVEY.CA/ENERGYCENTRE/NEWS](http://IVEY.CA/ENERGYCENTRE/NEWS)**

### THE GLOBE AND MAIL

#### The Globe and Mail

**Brandon Schaufele | June 20, 2017**

Cold facts take the heat out of Ontario's electricity debate

#### The Globe and Mail

**Guy Holburn, Adam Fremeth, Margaret Loudermilk, Brandon Schaufele**

**February 27, 2017**

A formula for smoothing rising Ontario hydro bills

### CTV NEWS

#### CTV News

**Margaret Loudermilk**  
**March 2, 2017**

Andrea Horwath reacts to Wynne's commitment to lowering hydro bills

### MACLEAN'S

#### Maclean's

**Dennis McConaghy**  
**February 15, 2017**

It's time for clarity on Canada's climate and energy policy

### BNN BUSINESS NEWS NETWORK

#### Business News Network

**Gord Lambert**  
**January 17, 2017**

Alberta playing offence on climate initiatives

### CBC

#### CBC

**Dennis McConaghy**  
**December 20, 2016**

The card Canada never played to get Keystone XL approved

# IVEY ENERGY POLICY AND MANAGEMENT CENTRE FACULTY AND STAFF

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## **GUY HOLBURN** DIRECTOR

Guy Holburn is the Suncor Chair in Energy Policy and Professor of Business, Economics and Public Policy at the Ivey Business School. His area of expertise is in the intersection of business strategy and public policy, particularly as applied to strategy and policy issues in the energy and utilities sectors. He is currently leading a multi-year research program on the regulation of the energy sector in Canada. Holburn received his MA and PhD from the University of California, Berkeley, and his BA Hons. (First Class) from Cambridge University. He is a member of the Council for Clean and Reliable Energy and a Director of London Hydro.

## **ADAM FREMETH** IVEY ENERGY CONSORTIUM FELLOWSHIP

Adam Fremeth was awarded the inaugural three-year Ivey Energy Consortium Fellowship in 2013 and is Associate Professor of Business, Economics and Public Policy at the Ivey Business School. He completed his doctorate at the Carlson School of Management at the University of Minnesota. He holds an HBA from Ivey and an MA in International Affairs from Carleton University. His research focuses on the intersection of firm strategy and public policy-making.

## **BRANDON SCHAUFELE** IVEY ENERGY CONSORTIUM FELLOWSHIP

Brandon Schaufele was awarded a three-year Ivey Energy Consortium Fellowship in 2015. He is Assistant Professor in Business, Economics and Public Policy at the Ivey Business School. Prior to his arrival in 2014, Schaufele was an Assistant Professor in the Department of Economics at the University of Ottawa, as well as the Research Director of the University of Ottawa's Institute of the Environment. Schaufele's research focuses on the links between firms, governments and civil society with special emphasis on energy and environmental policy.

## **MATT DAVISON** RESEARCH FELLOW

Matt Davison is a Professor jointly appointed to the departments of Applied Mathematics and Statistical & Actuarial Sciences at Western University. Davison holds the Canada Research Chair in Quantitative Finance and leads the nationwide Modelling Trading and Risk in the Market project for the MITACS Network of Centres of Excellence. Much of his research is on energy markets and finance, and lies at the intersection of industrial mathematics, operational research, and engineering.

## **RICHARD DICERNI** RESEARCH FELLOW

Richard Dicerni is an Adjunct Research Professor at the Ivey Business School. He began a career with the federal government in 1969 and has held a number of executive positions in the federal and provincial public service, including Deputy Minister of Industry Canada from 2006 to 2012 and Deputy Minister of Alberta Executive Council from 2014 to 2016.

## **HORIA HANGAN** RESEARCH FELLOW

Horia Hangan is a Professor in the Faculty of Engineering at Western University and the founding Director of the Wind Engineering, Energy and Environment (WindEEE) Research Institute. His research focuses on the simulation and impact of high intensity winds, wind energy and wind environmental impacts.

## **GORD LAMBERT** SUNCOR SUSTAINABILITY EXECUTIVE-IN-RESIDENCE

Gord Lambert is the former Executive Advisor for Sustainability and Innovation at Suncor Energy. Previously, he was Vice President of Sustainable Development. Prior to assuming that role in 1997, Lambert spent two years as Director of Sustainable Development for TransAlta Corporation and 15 years with a major Canadian integrated oil and gas company. In 2017, he was appointed as a Director of the Alberta Energy Regulator.

## **PAIGE MASTALERZ** COORDINATOR

Paige Mastalerz coordinates operations and outreach for the Ivey Energy Policy and Management Centre. She is also Project Coordinator for the Lawrence National Centre for Policy and Management at the Ivey Business School. She holds a BA from Western University in French.

## **DENNIS MCCONAGHY** VISITING FELLOW

Dennis McConaghy is the former Executive Vice-President of Corporate Development at TransCanada. Previously, he was Executive Vice-President of Pipeline Strategy and Development. He joined TransCanada in 1998, and has held senior positions in Corporate Strategy & Development, Midstream/Divestments, and Business Development. He has more than 25 years experience in oil and gas. In 2014, he was appointed Visiting Fellow for both the Ivey Energy Policy and Management Centre and Ivey's Lawrence National Centre for Policy and Management.

## **RAJIV VARMA** RESEARCH FELLOW

Rajiv K. Varma is an Associate Professor and Hydro One Chair in Power Systems Engineering in the Electrical and Computer Engineering Department at Western University. Varma is the project lead in a recently awarded \$6-million research grant from Ontario Centre of Excellence for a photovoltaic solar power integration.



# IVEY ENERGY POLICY AND MANAGEMENT CENTRE ADVISORY BOARD

<b>ERIC AXFORD</b>	Executive Vice-President, Business Services, Suncor Energy
<b>STEVE BAKER</b>	President, Union Gas Limited
<b>PAUL BOOTHE</b>	Former Professor and Director, Lawrence National Centre for Policy and Management, Ivey Business School
<b>JAN CARR</b>	Strategic Advisor, Gowlings and Hatch; Former CEO, Ontario Power Authority
<b>STEVE CLARK</b>	Senior Vice-President, Strategy and Corporate Development, TransCanada
<b>RICHARD DICERNI</b>	Former Deputy Minister of Alberta Executive Council
<b>GUY HOLBURN</b>	Director, Ivey Energy Policy and Management Centre, Ivey Business School
<b>GORDON LAMBERT</b>	Executive-in-Residence, Ivey Energy Policy and Management Centre, Ivey Business School
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<b>WAYNE STENSBY</b>	Managing Director, Electricity, ATCO
<b>MEL HYATT</b>	President, Power Workers' Union
<b>MARK VANDENBOSCH</b>	Acting Dean, Ivey Business School

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