Technology Innovation & Policy Forum 2018

Unlocking Energy Innovation for a 'Low Cost-Low Carbon' Economy

Council for Clean & Reliable Energy — transforming the way we think about power

WISE — Waterloo Institute for Sustainable Energy

University of Waterloo

November 7, 2018
University of Waterloo
Federation Hall

Conference Program

8:00 am **Registration & Continental Breakfast**

9:00 am **Welcome**
Glen Wright, Chairman, Council for Clean & Reliable Energy (CCRE)
Karen Taylor, Vice Chair, Council for Clean & Reliable Energy (CCRE)

9:15 am **Keynote Speaker**
Yung Wu, CEO, MaRS Discovery District

How Canada Can Become a Global Innovation Powerhouse

9:45 am **Panel 1: Promise and Perils of Technology Disruption**

Emergence of decentralized energy systems has the potential to create enormous new economic value for the customer. The technology disruption also threatens the existing structure of energy production and delivery. The panel will discuss whether the threat is real and implications for the future evolution of the industry.

Moderator: **Jatin Nathwani**, Professor and Executive Director, Waterloo Institute for Sustainable Energy (WISE); Member, CCRE
Panelists: **Dr. Ingrid Ott,** Expert Member, Merkel Commission on Research and Innovation, Professor and Chair, Economic Policy at Karlsruhe Institute of Technology (Germany)
Raymond Tracey, CEO, Essex Power
Dr. Catherine Rosenberg, Tier 1 Canada Research Chair in the Future Internet and CISCO Research Chair in 5G Systems, Professor, Electrical and Computer Engineering, University of Waterloo
Joshua Wong, CEO, Opus One Solutions

Q&A Session: 45 minutes

11:15 am **Break**

11:30 am **Innovation Showcase Feature and Technology Developers Presentations**

Moderator: **Ron Clark**, Partner, Aird & Berlis LLP
Presenters: **Elizabeth Monoian** and **Robert Ferry**, The Land Art Generator Initiative
Adrian Conrad, COO, The Cora Group
John Adams, Managing Director, Natural Gas Innovation Fund, Canadian Gas Association
Julie Morin, Intelligent Cloud Business, IOT Global Black Belt SSP, Microsoft Canada
Alif Gilani, Head of Engineering, Energy Management Division, Siemens Canada
Ian Gallagher, General Manager, Collaboration, CISCO Canada

12:30 am **Lunch, Innovation Showcase, Networking & Industry-Academic Collaboration**

1:15 pm **Optional Lab Tours** (for Pre-registered Guests)
Laboratory 1: Centre for Advanced Photovoltaic Devices and Systems (CAPDS)
Laboratory 2: Giga-to-Nanoelectronics Centre
Laboratory 3: Non-Destructive Testing Centre

2:30 pm **Panel 2: Financing Business Models: The Good, the Bad and the Ugly**

Financing innovation is almost always an issue. This highly experienced panel will discuss alternative approaches to financing and the advantages and pitfalls which need to be considered. The panel will also consider successes and failures with alternative business models and the role of government in fostering innovation.

Moderator: **David McFadden**, Counsel, Gowling WLG (Canada) LLP; Member, CCRE
Panelists: **Dr. Tom Corr**, President and CEO, Ontario Centres of Excellence
Jeffrey Steiner, President & Executive Director, Angels Investor Ontario
Steve Muzzo, President and CEO, OZZ Electric and Cricket Energy

Q&A Session: 45 minutes

4:00 pm **Closing Remarks**
Karen Taylor, Vice Chair, CCRE

Reception, Innovation Showcase, Networking & Industry-Academic Collaboration

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KEYNOTE SPEAKER

Yung Wu

Chief Executive Officer, MaRS Discovery District

Yung Wu is a pioneering entrepreneur and serial investor. Under Wu's leadership, MaRS will continue to advance prosperity through entrepreneurial achievement. Previously, Wu was chair of NFQ Ventures, an early-stage investment firm based in Toronto. He has a track record of founding, scaling and actively backing several groundbreaking startups, including: Castek Software, an insurance software vendor that was sold to a division of Oracle in 2007; Fuse Powered, a mobile analytics and big data firm that was purchased by Upsight in 2016; and Antibe Therapeutics, a biotech company developing medicines to treat pain and inflammation. Wu has been recognized as one of Canada's "Top 40 under 40" leaders and for leading one of the country's "50 Best Managed Private Companies."

John Q. Adams

In his role as Managing Director of the Natural Gas Innovation Fund, John is responsible for raising capital from industry investors, manages the fund's investment process, governance and accountability, and implementing the fund's investment strategy for natural gas priorities to raise capital from its industry investors; manages the fund's portfolio activities including technology scouting and deal review, technical and business evaluation, due diligence and evaluation, project management, corporate performance and entrepreneurial support; and ultimately responsible for all day-to-day management decisions including human resources, risk management, accounting and auditing, investment and fund management and performance.

John brings 25 years of experience in the cleantech energy sector with his current position at NGIF and previous positions at Sustainable Development Technology Canada (SDTC) - with a range of increasingly senior positions including Director, Applications/ Funding Advisory, Director, Stakeholder Relations, Vice President Industry, and Executive Director raising $40M in partnership agreements, leading national funding competitions, created a national Virtual Incubator, and reviewed over 1000 cleantech ideas and proposals; and at Mitsui & Co. (Canada) Ltd. With positions in infrastructure business and international trade.

John has a Bachelor of Science (B.Sc.) Environmental Science and Environmental Management from University of Toronto.

Ron W. Clark

Ron is a Partner at the law firm Aird & Berlis LLP. He loves the challenge of operating a practice at the intersection of corporate/commercial, energy and municipal law. Having advised numerous clients through the historical and institutional development of the energy market in Ontario, Ron brings extensive experience and perspective to guiding his energy clients through both the immediate and anticipated steps of a transaction. In addition, with a deep interest in the intersection of law and public policy, Ron enjoys meeting the unique challenges of his clients with respect to the constant evolution of the energy market.

Ron's corporate/commercial practice includes advising corporations, financial institutions, municipalities and individuals on commercial agreements, asset and share purchase transactions, mergers and acquisitions, private placements and secured lending transactions. The energy side of his practice involves counselling stakeholder groups, retailers, distributors and generators on legislative and policy matters relating to electricity markets.

Ron has been retained in connection with power procurement arrangements, development of generation and cogeneration facilities and the Ontario government's clean energy supply and renewable energy supply RFPs and contracts. He has also been involved in electricity restructuring in Iraq, Saudi Arabia, Ghana, Albania, Macedonia and the Regional Southeast European market. Additionally, Ron chaired the Ontario Energy Association's Task Force on Ontario's proposed electricity legislation.

Ron has a background in public international law and previously served as a diplomat with the Canadian Department of Foreign Affairs and International Trade, with postings in Ottawa and Brussels.

Adrian Conrad

Adrian is the Chief Operating Officer of The Cora Group. Adrian Conrad's business and financial acumen coupled with project management knowledge makes Adrian a discerning commercial developer and a natural partner at The Cora Group. He is passionate about preserving our environment for future generations and a strong proponent of LEED and sustainable development. Adrian has extensive experience in commercial development and leasing for small and large tenant needs, and over his career, has raised more than $200 million in capital financing, developed or repositioned more than $250 million of real estate, and overseen the leasing more than 2 million square feet of office space within Waterloo Region. He continues to spearhead the creation of premiere, sustainable Class A office spaces tailored to the needs of tech firms. Cora Group's portfolio of sustainable properties, located within David Johnson Research + TecTechnology Park in Waterloo's IdeaQuarter, are among the Region's most prestigious Class A office locations.

Dr. Tom Corr

As President and CEO of Ontario Centres of Excellence, Dr. Tom Corr brings more than 30 years of entrepreneurial experience in the IT and venture capital sectors. As a technology business owner with a distinguished academic background, Dr. Corr is a leader in bridging the worlds of entrepreneurship and academia.

Prior to joining OCE in 2010, Dr. Corr was the CEO of the Accelerator Centre (AC) at the Waterloo Research and Technology Park and Associate Vice-President of Commercialization at the University of Waterloo (UW) and Director of Commercialization - IT & Communications at the University of Toronto. Dr. Corr's career also includes leadership roles in the IT sector including positions as Managing Partner at Catalyst Partnership; founder and CEO of Momentum Systems; founder and CEO of Applied Development Corp., and President of Canadian Data Processing Corp.

He holds a Doctor of Business Administration degree from Henley Management College/Brunel University in England, an MBA from the University of Toronto, and the ICD.D designation by the Institute of Corporate Directors. Dr. Corr serves on the boards of C-FER Technologies (Chair), the Southern Ontario Smart Computing Innovation Platform, and Ontario Genomics.

Ontario Centres of Excellence is a non-profit organization that drives the commercialization of cutting-edge Ontario-based research across key markets sector to build the province's innovation economy and secure its global competitiveness. OCE currently manages more than 930 research, commercialization and talent projects that will bring innovation to the marketplace and foster the training and development of future innovators, entrepreneurs and business leaders.

Robert Ferry and Elizabeth Monoian

Robert and Elizabeth are the Founding Co-Directors of the Land Art Generator (LAGI). They conceptualized LAGI in the Fall of 2008 and the project was strongly founded by theSspring of 2009.

In addition to developing and managing the LAGI design competitions, Ferry and Monoian have developed an array of unique STEAM materials that are widely used globally, including the Field Guide to Renewable Energy Technologies, Art+Energy Camps, Art+Energy Flash Cards, a 13-step STEAM Toolkit, information graphics, publications, and more. LAGI is the recipient of multiple National Endowment for the Arts grants and has been awarded the J.M.K. Innovation Prize, a program of the J.M. Kaplan Fund.

Through LAGI Elizabeth and Robert have published, exhibited, and presented globally on the aesthetics of renewable energy and the role of art in providing solutions to climate change.

Ian Gallagher

Ian Gallagher is the general manager, collaboration for Cisco Canada. He leads a national team of collaboration product specialists responsible for working with Cisco partners and customers to create and execute business

impacting collaboration strategy and architecture.

Since joining Cisco as a systems engineer in 2000, Gallagher has held a number of roles in both sales and engineering. Most recently, he served as a systems engineering manager for collaboration. Before becoming a consulting systems engineer for collaboration in 2006, Gallagher worked as a global systems engineer for the Toronto Dominion Bank and was involved in the early deployments of IP telephony at TD Bank, Royal Bank of Canada and several other key Canadian collaboration customers.

Prior to joining Cisco, Gallagher worked as a senior network architect for Symcor Services where he helped consolidate the cheque processing and print operations of three large Canadian banks. Gallagher holds a bachelor's degree in computer science from York University.

Alif Gilani

Alif Gilani is the Head of Engineering of Siemens Canada's Energy Management Division and the Head of Operations & Project Management for the Digital Grid Systems Segment.

Mr. Gilani is responsible for all engineering, innovation and development of Energy Management activities in Canada. He reports directly to the head of the Energy Management Division and works with various business unit heads as well as heads of key support functions of sales, strategy, business excellence and communication within the division.

Prior to his current roles, Mr. Gilani was the Technical Lead Manager for the Energy Automation Division in the Lower Gulf Region Arab Emirates, Bahrain, Qatar, Oman & Yemen. Mr. Gilani has over 12+ years of experience in the areas of protection, control and substation automation and has executed a multitude of projects with varying complexity in a number of countries leading multinational and multicultural teams. In addition to this, Mr. Gilani leads the research and development team within Siemens Canada's Digital Grid Systems segment on the prototyping of a low cost microgrid controller system. He heads all Microgrid projects within Siemens Canada from a project management, base design development, configuration and testing perspective.

He is a professional engineer and holds a P.Eng from PEO and APEGS and serves as a member and contributes to IEEE, CIGRE and the National Electricity Roundtable (NER).

Mr. Gilani received a Bachelor of Science (B.Sc) Degree in Electrical Engineering from Queens University in Kingston, Ontario, Canada in 2001 and a Masters of Engineering (M.Eng) Degree in Engineering Management from the University of Ottawa in Ottawa, Ontario, Canada in 2003.

David J. McFadden, Q.C.

David McFadden is Counsel at Gowling WLG having served previously on the firm's Executive Committee and Board of Trustees. He has acted for corporations, municipalities and utilities involved in the generation, distribution, transmission, marketing and financing of energy.

David is the Chair of the Board of Director of Toronto Hydro Corporation, 407 International Inc., and PCI Geomatics Inc. He serves as a member of the Board of Directors of Cricket Energy Holdings Inc.

David is a past Chair of the Board of Directors of the Ontario Energy Association (OEA) and continues to serve on the OEA's Board. He serves as Vice Chair of the Energy Transformation Network of the IESO and is a member of the Advisory Board of the MaRS Advanced Energy Centre and the Council for Clean and Reliable Energy.

David is the Chair of the board of Governors of the Mackenzie Institute and is on the Board of Governors of York University where he chairs the Board's Governance and Human Resources Committee. He previously served as Chair of the Toronto Board of Trade and continues to serve as a member of the Board's Audit Committee.

David was the Chair of the Board of the Ontario Centres of Excellence Inc. (2004-2010) and in that position led the creation of the Centre of Excellence for Energy which has supported energy innovation across Ontario. David has also served as Chair of the Stakeholder's Alliance for Electricity Competition and Customer Choice, was a member of the Canada-US Electric System Working Group which investigated the massive blackout in August 2003, co-led an investigation team into the 2006 nationwide blackout in Jamaica, was a Member of the Ontario Ministry of Energy's Electricity Conservation and supply Task Force (2003-2004), and served on the Ontario Distribution Sector review Panel (2012).

David was named the Leader of the Year by the Ontario Energy Association in 2013.

Julie Morin

Julie Morin is part of the Microsoft Internet of Things Global Black Belt Team tasked with helping public and private sector customers accelerate their digital business transformation through the Internet of Things.

She brings experience in driving technology initiatives with Canadian organizations by finding innovative solutions to address high value digital transformation projects. Julie is in line with the industry's fast changing requirements for enterprises looking for guidance with the Internet of Things, predictive analytics, machine learning and data strategy while ensuring compliance, and security as a forefront.

Steve Muzzo

Mr. Muzzo is the Founder and Chief Executive Officer of Ozz Electric, OZZ Clean Energy's largest shareholder, and a strategically active board member. Established in 1991, OZZ Electric is a full service Electrical and Data Com company with over 900 electricians servicing the ICI and Multi-Residential markets in Ontario, Alberta and Newfoundland. He also co-founded OZZ Comfort Solutions and Trilliant Inc. Trilliant provides intelligent network solutions and software to utilities around the world for advanced metering, demand response, and smart grid management.

Jatin Nathwani

Professor Nathwani is the founding Executive Director, Waterloo Institute for Sustainable Energy (WISE) and holds the prestigious Ontario Research Chair in Public Policy for Sustainable Energy at the University of Waterloo.

WISE brings together the expertise of 100+ faculty members to develop and implement large-scale multi-disciplinary research projects in collaboration with business, industry, governments and civil society groups. The vision of the Institute is simple: clean energy, accessible and affordable for all.

His current focus is on implementing a global change initiative: he is the Co-Director, with Professor Joachim Knebel (Karlsruhe Institute of Technology, Germany), of the consortium 'Affordable Energy for Humanity (AE4H): A Global Change Initiative' that comprises 130+ leading energy access researchers and practitioners from 30 institutions and 16 countries.

Prior to his appointment at the University in 2007, Professor Nathwani worked in a leadership capacity in the Canadian energy sector over a 30-year period. He brings a unique combination of academic perspectives with extensive experience in the business sector that includes corporate planning and strategy, energy sector policy developments, power system planning, environmental and regulatory affairs and research program management.

Professor Nathwani serves on several Boards at the provincial and national levels and has appeared frequently in the media (print, TV, radio) and has over 100 publications related to energy and risk management, including seven books.

Professor Nathwani holds a PhD in Engineering from the University of Toronto and is a Registered Professional Engineer in the Province of Ontario.

Dr. Ingrid Ott

Ingrid Ott heads the institute of Economic Policy at Karlsruhe Institute of Technology where she administers education and training in various disciplines including endogenous growth theory, spatial economics, economic policy, innovation theory & policy, methods in economic dynamics, and quantitative methods in economics. She is a full professor at KIT with strong research expertise in innovation and growth theory, cutting-edge technologies and regional development. Under her supervision, her research team has developed formal theoretical models and applied these models by means of simulations and empirical analyses to concrete economic problems successfully deriving policy recommendations.

Prof. Ott was a member of the Expert Commission for Research and Innovation that advises the federal government (Germany) on research, technology and innovation policy issues, and identifies progress and options for action each year. She is also a member of the founding committee of the Institute of Technology Futures (ITZ) and member of the board of directors of the Centre for European Economic Research (ZEW) in Mannheim. She has also served as the head of research division New Technologies and Regional Innovation Systems at the Hamburg Institute of International Economics (HWWI).

Dr. Catherine Rosenberg

Catherine Rosenberg is a Professor in Electrical and Computer Engineering at the University of Waterloo since 2004. Since June 2010, she holds the Canada Research Chair in the Future Internet. She was elected an IEEE Fellow for contributions to resource management in wireless and satellite networks on 2011 and was elected a Fellow of the Canadian Academy of Engineering in 2013. In April 2018, she became the Cisco Research Chair in 5G Systems.

Additionally, Professor Rosenberg was on the Scientific Advisory Board of the Orange Group (France-Telecom) from 2007 to mid-2015. She became its president from January 2013 to mid-2015. She also became the president of the Scientific Advisory Board of the French IRT (Research and Technology Institute) BCOM on multimedia and networking in 2014.

Her research expertise lies in wireless networks, multimedia, traffic engineering and energy systems. Her work in wireless networks includes 5G, IoT, and generally resource management. Professor Rosenberg's multimedia research encompasses CDN, peer-to-peer, and real-time streaming. Her research in traffic engineering focuses on quality of service, network optimization and game theory and pricing. Prof. Rosenberg's research in energy systems includes smart

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grid design, storage modeling, renewable integration, and data analysis.

Jeffrey Steiner

Jeffrey Steiner is a Toronto lawyer and business leader involved in the media, real estate, and mining sectors. He founded New Franchise Media Inc., which develops film & TV projects based upon the bestselling novels of Jeffrey Archer.

In his role from 2002-2009 as President & CEO of the Toronto Economic Development Corporation (TEDCO), he developed the new Toronto headquarters for Corus Entertainment Inc. - a 500,000 square foot LEED-Gold green building on Toronto's waterfront.

Mr. Steiner is a member of the Board of Directors of Canada's official export-import bank Export Development Canada (EDC). He previously served on the Board of Directors of the Ontario Centres of Excellence (OCE Inc.), which oversees government investment in the commercialization of university R&D through industry collaboration and venture capital.

His previous experience includes serving in the federal government as Chief of Staff to the Minister of Indian Affairs & Northern Development, and at the Department of National Defence.

Karen Taylor

Karen Taylor has over 25 years of related financial and energy experience. She was a top ranked equity analyst for 16 years covering the pipeline, energy utility, and power generation sectors in Canada and the United States. She also served as Executive Advisor to the Chair of the Ontario Energy Board and was a Member of the Ontario Energy Board, giving her a deep understanding of rate regulation. Karen has a Bachelor of Commerce with a major in finance with distinction from the University of Alberta, an MBA with honours from the Richard Ivey School of Business, is a CFA Charter Holder, and has the ICD.D designation from the Institute of Corporate Directors.

Raymond Tracey

Ray is responsible for the development and integration of Essex Power Corporation and its three subsidiaries into successful businesses: Essex Powerlines, Essex Power Services and Essex Energy. Ray plays a key role in ensuring that corporate systems and business processes comply with the deregulated processes such as wholesale and retail settlements, electronic business transactions and unbundled billing.

Ray serves as the Chair on the board of directors of the Electricity Distributors Association (EDA) for the 2015-2016 terms. Ray holds a Bachelor of Applied Science in Electrical Engineering from the University of Windsor, and registered with the Association of Professional Engineers of Ontario in 1988. Ray has 30 years of proven experience in engineering, planning, market settlement, business integration and innovation.

Joshua Wong

Joshua Wong is President and CEO of Opus One Solutions, a software engineering and solutions company empowering the decentralized energy economy in improving grid reliability, utilization and efficiency, as well as unlocking grid potential for 100 percent clean energy.

Prior to Opus One, Joshua was the Director of Engineering at eCAMION Inc., a leading provider of battery storage system solutions. In this role, he leads the development of integrated solutions for on-grid, off-grid, and mobile applications. Prior to eCAMION, Joshua was the smart grid and grid solutions lead at Toronto Hydro Electric System Limited, the electric utility for the city of Toronto, where he led the policy, strategy, business and engineering development of Toronto's smart grid infrastructure, including a 25-year smart grid roadmap. Furthermore, he spearheaded the Smart Community initiative, effectively introducing and delivering a portfolio of smart grid demonstrations including distribution automation, smart metering, advanced sensing, electric vehicle charging and energy storage initiatives.

Joshua specializes in driving practical innovations and navigating complex whitespaces in the smart energy sector, applying integrative and systemic thinking to deliver immediate results. He is a licensed Professional Engineer in the province of Ontario. He received his Bachelor of Applied Science in electrical engineering from the University of Toronto, Masters of Electric Power Engineering from the University of Waterloo and completed executive programs from Harvard Business School, MIT Sloan and IMD Business School.

Glen Wright

Glen Wright is the Chairman of the Council for Clean and Reliable Energy, a federally incorporated non-profit volunteer organization that provides a platform for open dialogue and solutions-oriented approach to the challenges of the energy sector. He is the former Chairman of Hydro One Inc. and Waterloo North Hydro.

Mr. Wright is currently the Chairman of LeanCor LLC and LeanCor Canada Inc., a global supply chain company that offers a unique combination of training and education, hands-on consulting and outsourced logistics services.

Mr. Wright has served as the Chair of the Ontario's Workplace Safety and Insurance Board, and was a Member of the Commission for Environmental Cooperation, part of the North American Free Trade Agreement, where he served as the Chair of the of the Joint Public Advisory Committee.

Glen's private sector career has focused primarily on the insurance and actuary fields. He has served on the Board of a wide range of corporations in the insurance, environmental, technology and manufacturing sectors and participated in a variety of charitable and not-for-profit Boards including the Canadian Broadcasting Corporation and Wilfrid Laurier University. Early on in his career he served as a Member of Waterloo City Council and Waterloo Regional Council and has acted as a senior advisor to several federal and provincial leaders.

Lab Tours: 1:15 – 2:15 pm

LAB 1: Centre for Advanced Photovoltaic Devices and Systems (CAPDS)

Promotes cutting-edge research and development that spans the spectrum of photovoltaic (PV) technology. The 14,000 square-foot facility includes infrastructure for synthesizing semiconductor base materials; developing nanotechnologies for PV; designing and fabricating advanced PV devises and systems modules; and, testing and characterizing PV materials, devices and systems.

LAB 2: Giga-to-Nanoelectronics (G2N) Centre

G2N is a unique facility at the University of Waterloo and Canada, offering a wide range of capabilities for processing electronic materials and devices. Established in 2005, the Centre is a hands-on facility providing users training and access to run their own research. This facility consists of groups within the University of Waterloo and external partners that make up the interdisciplinary research that spans nano-materials to large-area electronics. In addition to facilitating academic research programs, G2N also provides the capability to develop and prototype novel and emerging technologies for commercial applications.

LAB 3: Non-Destructive Testing Centre

Around the world, cities are facing a major challenge: What to do about aging infrastructure such as bridges, water mains, roads, and electrical transmission lines. How can engineers know if they have years of life left in them or are on the verge of collapse? University of Waterloo research teams are developing innovative techniques to help distinguish the good from the bad in materials ranging from concrete to wood - without manually taking the system apart.

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