

Technology Innovation & Policy Forum 2017

Disruptive Innovation over the Wires: Business Models for Success



November 9, 2017
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)
Jatin Nathwani, Executive Director, Waterloo Institute for Sustainable Energy (WISE); Member CCRE
- 9:15 am **Keynote Speaker**
Pamela Jones, Director of Transmission and Distribution Policy, Canadian Electricity Association

Innovation Mechanisms

- 9:45 am **Panel 1: Is Technology Disruption Driven by Economics?**

The large cost declines in several parts of the energy supply chain – batteries, LEDs, solar and wind, sensors, devices and computational power – is the context that will determine new business models and relationships between the utility, the customer and new service providers. The panel will discuss financial and regulatory implications likely to emerge for the electric utilities.

Moderator: **Jatin Nathwani**, Executive Director, WISE; Member, CCRE

Panelists: **Paul Grod**, President & CEO, Rodan Energy Solutions
Ingo Mauser, dr-Ing, Research Associate, Applied Informatics (AIFB), Karlsruhe Institute of Technology (KIT), Germany
Malcolm McCulloch, Professor and Head, Energy and Power Group, Department of Engineering Science, University of Oxford, United Kingdom
Neetika Sathe, Director, Emerging Technologies, Alectra Energy Solutions Inc.

Q&A Session: 45 minutes

- 11:15 am **Break**

- 11:30 pm **Technology Developers Presentations**
David Teichroeb, Business Development, Emerging Technologies, Enbridge Inc.
Paul Pauze, Vice President, Business Development and Sales, Innovus Power Inc.
Julie Morin, Internet of Things, Global Black Belt Team, Microsoft Canada
Alif Gilani, Head of Engineering, Energy Management Division, Siemens Canada
- 12:30 am **Lunch, Innovation Showcase & Networking**
- 1:30 pm **Optional Lab Tour** (for Pre-registered Guests)
Centre for Advanced Photovoltaic Devices
- 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: **Ron Dizy**, Managing Director, MaRS Cleantech, Advanced Energy Centre
Colin Kelleher, CEO, Kelleher Group
Michael Nobrega, Chair of the Board, Ontario Centres of Excellence, former President and CEO, OMERS

Q&A Session: 45 minutes

- 4:00 pm **Closing Remarks**
David McFadden, Counsel, Gowling WLG (Canada) LLP; Member, CCRE

Reception, Innovation Showcase, Networking & Industry-Academic Collaboration

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KEYNOTE SPEAKER



Pamela Jones

Pamela Jones is the Director of Transmission and Distribution Policy at the Canadian Electricity Association. She is a seasoned

policy and government relations professional with a proven track record of securing favorable regulatory outcomes and influencing stakeholders and building consensus. With over twenty years of experience working in policy development for public and private entities in Canadian telecommunications, broadcasting and electricity, Pamela is known for her ability to promote and defend the long term strategic interests of her employers and clients.

Trained as a paralegal and as a mediator/facilitator, Pamela holds a graduate diploma from Carleton University in Conflict Studies and bachelor degrees in Political Science and Communications from the University of Ottawa. Prior to completing these university degrees, Pamela graduated top of her class from the Ontario Business College as a Law Clerk/Paralegal. She is currently working on a Masters of Law (LLM) in Energy and Infrastructure Law.

In between securing these university level educational pursuits, Pamela layered in executive education with certificates in financial

literacy, governance, and teaching. Over the course of her career, Pamela has further been recognized by the Women in Communications and Technology with the Jeanne Sauvé Fellowship Award for policy professionals, was awarded a relocation (Montreal to Ottawa) by TELUS Communications Inc. and given a President's Commendation Award by Hydro Ottawa.

Pamela's career highlights include providing expert testimony in front of national and provincial regulators such as the CRTC and OEB and being part of regulatory teams that introduced the telecommunications ombudsman and the national do not call list as well as regulatory teams that introduced local and long-distance competition in the telecommunications industry. Pamela also counts among her achievements being part of a senior management team that negotiated the approval of a five-year infrastructure funding agreement for electricity distribution worth nearly a billion dollars.

Ron Dizi

Ron is the Managing Director of the Advanced Energy Centre at the MaRS Discovery District. The Advanced Energy Centre (AEC) collaborates with a diverse set of partners to foster the adoption of innovative energy technologies in Ontario and Canada, and leverage those successes and experiences into international markets. Under Ron's leadership, the Centre is convening energy players in a unique way. At the AEC, Ron and his team provide a forum in which energy players can speak openly, think deeply, ask the hard questions and co-create innovative solutions to complex, system-wide challenges. In doing so, the Centre is helping energy systems become more cost effective, reliable and resilient to change and opportunity.

Ron was previously the President and CEO of ENBALA Power Networks, a smart grid technology company that offers grid optimization services to utilities and system operators to increase the overall efficiency and reliability of the power system.

Ron is viewed as a thought-leader on innovation opportunities that lie within the evolution of the modern power system. Based on his well-respected perspective on the smart grid, he was recruited to the executive committee of the board for the Ontario Energy Association and the Association for Demand Response and Smart Grid. He was also elected chair of the Corporate Partners Committee of the Ontario Smart Grid Forum.

Ron's entire career has been focused on bringing new technologies to evolving markets, including spending nearly ten years as a venture capitalist (both as a direct investor and as a pension fund manager), co-founding a company specializing in artificial intelligence and gathering experience in major consulting firms. Ron holds a degree in Industrial Engineering from the University of Toronto.

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.

Paul Grod

Paul Grod is President & CEO of Rodan Energy. Prior to co-founding Rodan Energy, Paul was a corporate and investment banker with CIBC World Markets and later practiced corporate finance and M&A law with Gowling Lafleur Henderson LLP, one of Canada's largest national law firms.

Paul has grown Rodan Energy into a leading energy services company to many of North America's top power producers, utilities and energy users. Rodan has earned a number of awards under Paul's leadership, including Ontario Energy Association's Emerging Company of the Year, and Canada's Top 100 SME employers for three consecutive years.

Some of Paul's distinctions include the Queen Elizabeth II Diamond Jubilee medal, the 25th Anniversary of Ukraine's Independence Medal from the President of Ukraine, and Embassy/Hill Times Magazine ranking him as one of the Top 100 influencing Canada's Global Future. He has served on a number of electricity market stakeholder and advisory panels, and is currently a member of the CEO Roundtable for the IESO's Market Renewal Program.

Paul actively volunteers his time with various charities and community organizations. He is currently the National President of the Ukrainian Canadian Congress and Vice President of the Ukrainian World Congress. Paul is member of the Law Society of Upper Canada and holds a Bachelor of Political Science degree, a Bachelor of Laws degree and a Master of Business Administration degree.

Colin Kelleher

Colin Kelleher is the CEO of the Kelleher Group specializing in angel investing in early-stage technology start-ups. Current deals that he is involved in include investments in the areas of UAV technology, digital agriculture, e-retailing,

energy informatics and analytics, medical devices and digital content optimization. Prior deals he has been involved with include energy optimization technology, water technology, 3D mapping and asset management modelling software for municipalities and utilities.

For the past six years, Colin sat on the Board of Directors of the Ontario Centres of Excellence (OCE), a not-for-profit government funded organization that generates economic benefits for the economy by driving the successful commercialization of discoveries and technologies. OCE also incubates and invests in start-up companies emerging out of industrially relevant R&D being developed in Canadian universities. As part of the director role, Colin chaired the OCE strategic planning committee in 2013 and 2014, setting the five-year plan for the strategic direction for the organization. He also sat on the four sector advisory boards that influence the direction of the organization which included advanced manufacturing, ICT and digital media, energy and environment and advanced health technologies.

Colin has been a regular guest lecturer at the University of Waterloo faculty of architecture and the University of Toronto's planning program on real estate cost/risk dynamics. Colin is a graduate of the executive program at Singularity University where he received the Singularity Prototype Challenge Award for his presentation on the buildings of the future.

Ingo Mauser

Ingo Mauser finished his studies in 2012 and holds a German Diploma in Business Administration and Engineering (Diplom-Wirtschaftsingenieur) from the Karlsruhe Institute of Technology.

From 2012 until 2016, he worked as a Research Scientist at the FZI Research Center for Information Technology. In 2016, he became a Research Associate at the Institute AIFB of the Karlsruhe Institute of Technology (KIT) and received his PhD degree in 2017.

His research focuses on the development of information and communication technologies for intelligent buildings, energy management, and the future smart grid as well as on heuristic optimization.

Malcolm McCulloch

Malcolm McCulloch is Professor and head, Energy and Power Group, Department of Engineering Science at the University of Oxford.

His interests are in the areas related to the domestic energy sector, development of user centric demand side management technologies, useful information to enable behaviour change. Previous work led the spin-out Intelligent Sustainable Energy, of which Malcolm is both a founder and non-executive director. This has merged to form Navetas Energy Management.

In the transport sector, research is ongoing in developing power trains for electric vehicles. A successful project was that of the Morgan LifeCar - the first ever Hydrogen sports car. This project led to the development of high-efficiency low-weight motors using new materials

- the yokeless and segmented armature motor. This has resulted in the Oxford spin-out company Oxford Yasa Motors, of which Malcolm is a founder. He is extending the work of ICERT to create an Integrated Transport Network for Oxford.

In renewable generation, novel lightweight low speed direct coupled generators are being developed along with a transverse axis tidal turbine, leading to the spinout of Kepler Energy, of which Malcolm is also a founder and non-executive director.

In energy for development, he is developing technologies that leverage advanced intelligence to provide cost effective and nano and micro grid solutions that provide a scalable pathway to distributed electrification.

Malcolm McCulloch was Co-Director of the Institute for Carbon and Energy Reduction in Transport, a member of the Oxford Martin School from 2008-2013.

David 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 Directors 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. and is a member of the Advisory Board of Forum Vostro Energy Services Inc.

David is the immediate past Chair of the Board of Directors of the Ontario Energy Association and continues to serve on the OEA's Board. He serves on the Advisory Board of the MaRS Advanced Energy Centre, the Smart Grid Forum of the Independent Electricity System Operator and the Council for Clean and Reliable Energy.

David is on the Board of Governors of York University and 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.

Michael Nobrega

Michael Nobrega became Chair of the Board of Directors of the Ontario Centres of Excellence (OCE) in October 2012. He has been a member of the OCE Board since 2007.

Mr. Nobrega is the former President and Chief Executive Officer of the Ontario Municipal Employees Retirement System (OMERS), a position he held since 2007. OMERS is one of Canada's largest pension plans, with more than \$50 billion in assets. It provides retirement benefits to 372,000 members on behalf of over 900 local government employers across Ontario.

Mr. Nobrega is a veteran financial and investment executive with more than 30 years' experience. Before his appointment as President and CEO of OMERS, Mr. Nobrega was the President and Chief Executive Officer of Borealis Infrastructure Management Inc., an investment entity which originated and structured infrastructure investments. Prior to Borealis, Mr. Nobrega was a partner at a major international accounting firm.

Mr. Nobrega holds an Honours BA from the University of Toronto, where he received the Arbor Award for outstanding community service. He also holds a chartered accountancy designation from the Institute for Chartered Accountants of Ontario and the Canadian Institute for Chartered Accountants. In 2009 Mr. Nobrega was named a Fellow of the Institute of Chartered Accountants of Ontario - the highest designation the Institute confers and which recognizes outstanding career achievements as well as excellence in service to the community and profession.

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.

Professor Nathwani is also the Co-Director, with Prof. Joachim Knebel (Karlsruhe Institute of Technology, Germany), of the consortium 'Affordable Energy for Humanity (AE4H): A Global Change Initiative' comprising 150 energy access thought leaders, researchers and practitioners from 50 institutions in 22 countries. The overarching vision of AE4H is to drive the scientific, technological and social innovations required for a cleaner, low carbon energy system

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that also meets the challenge of universal energy access.

Energy research at WISE spans the full range of renewable energy technologies, energy storage, smart energy networks, sustainable mobility and ICT for micro-power and off grid access. WISE brings together the expertise of over 120 faculty members, drawing its strength from Departments in all the faculties at the University of Waterloo to develop and implement large-scale multi-disciplinary research projects in collaboration with business, industry, governments and civil society groups.

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, integration of environmental sustainability within power system planning, regulatory affairs and research program management.

Professor Nathwani serves on several advisory Boards at the provincial and national levels and has appeared frequently in the media (print, TV, radio).

Professor Nathwani has over 110 publications related to energy and risk management, including seven books and is a Registered Professional Engineer (PEO) in the Province of Ontario, Canada.

Paul Pauze

Paul Pauze is the Vice President of Business Development and Sales for Innovus Power Inc., a North American company who has developed the first commercial, primary power variable speed generator (VSG). The breakthrough technology improves the efficiency of prime power generation and is engine and fuel agnostic. Innovus enabled generators are ideally suited for microgrids, hybrid renewable systems, and primary power grid support. The Innovus generation technology optimizes efficiency by allowing the generator's engine to operate at optimal speeds for any load and maintains microgrid stability at any renewable penetration by producing power through a back to back converter platform. Innovus eliminates the need for storage to provide grid stability for high penetration renewables, therefore significantly lowering the levelized cost of energy, and with a storage-friendly platform allows for the future addition of storage as costs decrease.

WISE recently completed a follow-up study to the two WWF reports, called "Feasibility Studies of Variable Speed Generators for Canadian Arctic Communities," where Innovus' technology resulted in a significantly lower cost of energy and emissions for all community studies compared to the battery based synchronous

generation systems in the WWF reports.

Prior to joining Innovus in 2016, Paul was the founder and President of SunRise Power Corp. a leading Ontario solar manufacturer and engineering firm from 2009-2015 specializing in commercial rooftop solar PV systems. SunRise was Ontario's first-string inverter manufacturer and delivered the provinces first commercial rooftop racking systems.

Before joining the renewable industry, Paul spent many years in manufacturing with General Electric in Peterborough Ontario, in a number of rolls from Engineering Manager, Lean Leader to Plant Manager.

Paul has been a professional engineer for 20+ years, and a member of the Ontario Society of Professional Engineers holding a Bachelor of Science in Electro-Mechanical Engineering from Queens University where Paul started his career in renewables as Electrical Manager of the Solar Vehicle program leading the team to a top 5 at SunRayce 95.

Neetika Sathe

Neetika Sathe is Director, Emerging Technologies at Alectra Energy Solutions. Her role in the organization is to identify, analyze and develop leading-edge innovative technologies and business opportunities. Prior to joining Alectra, Neetika was the Chief Marketing Manager at Nissan Canada responsible for the launch of the Nissan LEAF in Canada.

She serves on the board of several industry associations such as SmartGrid Canada and Electric Mobility Canada, including Chairing the Board of NSERC Energy Storage Technology (NEST) Network. Neetika was recognized by Energy Storage North America with the 2016 Champion Award for her leadership and exceptional achievement in advancing energy storage technology.

Neetika has a Masters degree in Physics from Panjab University, followed by an MBA from McMaster University.

David Teichroeb

David Teichroeb oversees business development in emerging technologies at Enbridge Inc. He has over 20 years of experience in the natural gas and power generation sectors. He is responsible for evaluating and developing new business investments involving emergent

technologies. This includes distributed generation, fuel cells, energy recovery to power, hydrogen, electricity energy storage and other renewable technologies.

Before joining Enbridge in 1993, David worked in the diesel power generation industry. He provided engineering and technical services to a varied customer base that included Canada Steam Ship Lines, the Canadian Coast Guard, and John Deere.

David graduated from Niagara College, mechanical engineering technology, and he is a graduate of the Institute of Gas Technology in Chicago, IL, as a Chartered Industrial Gas Consultant. He serves as a Board of Director, and Vice Chairman, for the Canadian Hydrogen and Fuel Cells Association.

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 a 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 a number of federal and provincial leaders.

University of Waterloo Lab Tour: 1:30 – 2:00 pm

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 devices and systems modules; and, testing and characterizing PV materials, devices and systems.

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