# Dave Arkell | ENERGY MANAGEMENT AND SOLUTIONS

President & CEO, 360 Energy

#### BACKGROUND

- Deliver measurable results and continuous improvement of energy performance for clients through supply management & energy efficiency systems that manage carbon emissions, reduce business risk, and remain resilient in changing times.
- Specialize in cross functional organizational training of best practices to optimize procurement, data management & reporting, and energy usage.
- Work extensively with the greenhouse & manufacturing sectors and are acutely aware of the immediate need to modify energy capacity to expand operations without delay.

### **ENERGY MODELLING QUESTIONS**

- How will a national modelling platform enable enhanced customer choice?
- How will we capture the diverse opportunities and challenges that customers will face when attempting to model energy systems of the future?
- How will energy modelling account for changing market pricing?

Canadian Energy Modelling Initiative Central Region Workshop 2019







# Lucas Semple, P.Eng., M.A.Sc. | INDUSTRIAL PROSUMER

**General Manager, Under Sun Acres Inc.** 

#### BACKGROUND

- Manage a leading 24 acre bell pepper production facility in Leamington, Ontario.
- Do our own transient energy modelling and frequently partner with Universities and research facilities on science and energy projects.
- Electricity, Natural Gas and Water usage. Monitoring of numerous facets of the greenhouse microclimate
- Currently installing 13 MW of combined heat and power engines for peaking power on the Ontario electricity grid.
- Expansion to 48 acres of growing area in 2020

- What Canadian Open Source Tools are available to assist prosumers like me?
- How will my interests and needs be captured by a national energy modeling platform?
- How can we ensure modelling that is being done will be beneficial to end-users?
- What can be done to improve dissemination of modelling information so both academia and industry can benefit?







# David Foord | Faculty of Engineering

Assistant Professor, Emera and NB Power Research Centre, University of New Brunswick

#### BACKGROUND

- Teaches and researches on energy system technological innovation, low-carbon energy transition and social change.
- Directs a research on project on how utilities, nonprofits and governments are introducing new greenhouse gas emission counting systems for pubic engagement in low-carbon energy transitions.
- Member of an interdisciplinary research centre that conducts research for power utilities on smart grids, including NB Power, NS Power, Barbados Light & Power and Grand Bahamas Power.

- What new engineering tools are needed to model and analyze electric power systems for resource planning and impact evaluation at the generation, transmission, and distribution levels?
- What new models are needed to understand EV user behaviour in electric power systems?
- Do power system cost-of-service (regulated rate-ofreturn) models provide the appropriate structures and incentives for vertically integrated utilities?





## David Foord | Faculty of Engineering

Assistant Professor, Emera and NB Power Research Centre, University of New Brunswick

- How can we use modelling to explore the links between consumer adoption of greenhouse gas counting systems and low-carbon energy system transitions?
- What can modeling offer for real-time analysis of distributed energy resources data for determining the available load and reliability, and for post-processing analytics to identify long-term trends and effects?
- For virtual power plants, what new modelling approaches are required for forecasting the aggregated control of distributed energy resources?



# Ismael Cissé | ECONOMIST AND MODELER

Transition énergétique Québec

#### BACKGROUND

- Produces energy demand and GHG emissions forecasts for Quebec.
- Estimates the impacts of energy efficiency and GHG mitigation policies.
- Guides policies decision-making, especially for targets selection and evaluates the ability to reach them.
- Review and improve/develop modelling tools (Master Plan).

### **ENERGY MODELLING QUESTIONS**

- Energy data availability and modelling capacities, what solutions?
- What is the best modelling strategy for the industry sector that can reflect the decision-making process about the energy mix?
- How and to what extent can land use planning policies be incorporated into energy and GHG modelling?





# David Shipley | ENERGY SECTOR MODELER

Senior Consultant, Posterity Group

#### BACKGROUND

- Started out writing hour-by-hour models of solar DHW systems in FORTRAN!
- 10 years as lead modeler for a team that did almost all the conservation potential studies for Canadian energy utilities: 17 studies from BC to NL to YT
- Developer of new software, integrating all that modeling expertise and running 1000 times as fast as our old Excel models – I'm back to writing code!

- What is the range of customer energy requirements my utility might have to supply over the next 20 years?
- How can we combine alternative fuels and efficiency measures to meet our GHG targets in our province?
- What demand management measures can delay expanding energy infrastructure in this town for the least expense?







# Hossam Gaber | ENERGY MODELER

Professor, Founder IEEE Smart Energy Grid Engineering Conference Series, Ontario Tech University



Canadian Energy Modelling Initiative Central Region Workshop 2019

- How will a national platform support collaboration and protect IP of individual researchers?
- How do you to estimate best penetration ratios of different energy technologies and what factors contribute to the decision making?
- Since the availability of the renewable sources are not continuous, can only electric energy storage (battery) fulfill the electricity demand at remote area? If 'YES', then how?



# Francesco Ciari | TRANSPORTATION MODELING

Assistant Professor, Polytéchnique Montréal

#### BACKGROUND

- Agent-based modeling of transportation.
- Focus on innovative transportation modes (shared mobility, vehicles automation, electrification).

#### **ENERGY RELATED QUESTIONS**

- What is the energy impact of new transportation systems?
- What is the impact of vehicles electrification on the electric grid?
- What transportation system would allow minimizing energy consumption while maintaining (or improving) the current LOS?
- What individual behavioral changes would allow minimizing energy consumption in transportation?



# Nick MacMackin | ENERGY SYSTEMS RESEARCHER & MODELER

Master's Student, Environmental Energy Institute, University of Windsor

#### BACKGROUND

- A dynamic, parametric electricity demand curve model which facilitates investigation of a range of what-if scenarios.
- Uses representative sector and technology load curves to with adjusted magnitudes and shapes based on scenario parameters.
- Includes adjustable parameters such as growth rates, consumer behaviors, climate change, and technology penetration rates (EV, PV, energy storage, etc.).
- Working on third version of the model, using a progressively determinant approach to incorporate more factors and detail.

#### **ENERGY MODELLING QUESTIONS**

- What are the potential impacts of technology development and penetration trends on daily electricity demand?
- What implications do the shifting demands have for current and future energy systems?
- What opportunities exist and how can we leverage them to support a sustainable energy economy?
- What challenges exist? How can we mitigate them and make robust plans under high uncertainty?







# Christina Hoicka | ENERGY SYSTEMS RESEARCHER & MODELER

Assistant Professor, Social Exergy & Energy Lab, York University

#### BACKGROUND

- How can we accelerate the diffusion of low-carbon innovations for a 1.5C mitigation target while managing consequential risks, solutions, governance, and equity?
- Interdisciplinary analysis to study participation of communities in a low-carbon energy transition.
  - Energy democracy: renewable energy (RE) communities/clusters, community energy
  - Energy justice: gender diversity, Indigenous energy, energy poverty
  - Diffusion of innovations and socio-technical transitions analysis;

- How can we use modelling to explore the links and critical gaps between adoption of innovations in energy services and sustainability transitions in Ontario's energy sector?
- Technical and socio-technical analysis is increasingly local focused on optimization and governance roles, respectively.
- Where do demand centres and/or communities overlap, or not, with RE resources, electric vehicle, demand-side energy innovations uptake?
- How might the introduction of new sociotechnical innovations configurations affect evolution of the grid?







## Matt Davison | QUANT ENERGY FINANCE & RISK MANAGEMENT

Professor of Applied Math and Statistical & Actuarial Science and Dean of Science, Western University

#### BACKGROUND

- Uses mathematical modelling techniques developed for banking and finance to determine how to value and optimally operate energy infrastructure in the face of price, environmental, and regulatory uncertainties.
- Projects include hydro dams (uncertain price, inflow), natural gas storage (price), wind turbines (regulation, price, component failure, technology), carbon markets (regulations, price), ethanol (prices, regulation, market impact of production, oil storage "tanker trade" impact of forward markets, global adjustment demand modelling.
- 2006-2016 Canada Research Chair (Tier 2); completed large project on value of environmental forecasts for Environment Canada; Co-Director of Fields-CQAM Financial Analytics Lab.

- How can wind producers make best decisions in face of commodity price uncertainty, technology price uncertainty, regulatory, and component failure uncertainty?
- Uncertainty?
  How do the price responses of system participants to influence market dynamics (world oil market, US ethanol market, Ontario global adjustment)?
- In a big data analytics world, what is the value of improved forecasts? (environment, component failure)
- How can regulations be designed to incorporate the response of market participants to them?







# Vicki Gagnon | SYSTEM OPERATOR

Manager of Conservation Programs, IESO

### BACKGROUND

- Manage public sector participation across all conservation programming at IESO.
- Co-Chair of the Agriculture Sub Working Group at IESO since 2007.
- Recently published sector-specific energy profiles and efficiency opportunities:
  - Municipal Energy Profile (2017)
  - Water/Wastewater treatment sector (2018)
  - Greenhouse Energy Profile (2019)

## **ENERGY MODELLING QUESTIONS**

- How will a national modeling platform transcend the interconnections from system operator to local distribution company to consumer?
  - Performance-based efficiency programs
  - Achievable potential regional issues
  - Planning
- How can national modelling tools be used to better predict the need and location of new generation, storage, and/or transmission?
  - Efficient Load Growth E-bus, Greenhouse
- How will my interests and needs be captured by a national energy modeling platform? Consistency across local and regional levels







## Joerg Wittenbrinck

Senior Policy Advisor, Ontario Ministry of Energy, Northern Development and Mines

#### BACKGROUND

- Climate Resilience
- Emerging Trends
- Energy Systems Integration
- Decarbonization Pathways

Disclaimer:

 Here to present my own views, based on emerging trends work, not to represent the views of the Ministry or the Government of Ontario more generally

## **CONSIDERATIONS FOR ENERGY MODELLING**

Two points to start:

- We need energy models for both teleological and exploratory purposes.
- We never start the system from scratch.

Wishlist:

- 1. Accurate: Model how things (will) matter
  - True capabilities of all resources, including digitized DERs, renewables and conventional resources – and how they interact
  - Demand-side paradigm shift: from "generation follows load" to "load follows generation"
- 2. <u>Comprehensive and Open</u>: Model dynamic and systemic transformations
  - Energy Systems Integration
  - Acknowledge (technological, social, economic, policy, climatic) uncertainty

#### to comprehensive value stacking







# Alec Warzin | LOCAL DISTRIBUTION COMPANY

Senior Network Management Officer - Operating Planning - Distribution, Hydro One

#### BACKGROUND

- Coordinate load transfers and customer interruptions to support Capital and Maintenance activities
- Performs Generation Assessments to provide curtailed outputs during load transfers.
- Review all documentation prior to connection of new Distributed Generation to address any operating impact
- Provide Distributed Operating insight to policy and procedure groups

### **ENERGY MODELLING QUESTIONS**

- How will LDCs be consulted to map the growing shift to distributed energy resources?
- How will LDCs and Transmitters be expected to coordinate their activities?
- How will a national modeling platform capture the strong regional differences that exist between provinces and even individual LDCs?







# JJ Davis | MARKET PARTICIPANT (GENERATION)

### BACKGROUND

- Manage 200 MW of wind generation in Ontario and 23 MW of Hydro in British Columbia.
- Active member and vocal contributor in Canadian Wind Energy Association and IESO working groups.
- Kruger is a progressive, engaged energy company. Frequently driving energy research collaborations with Universities and other agencies.
- Kruger Energy is focused on renewables development acquisition and operations across Canada, on-grid and off-grid

### **ENERGY MODELLING QUESTIONS**

- How will the various renewable energy sectors be consulted during the construction of a national energy modelling platform?
- How will some of wind's emerging roles (e.g.in an ancillary service market) be mapped into a national modelling platform?
- How granular will a national energy modeling platform get? Will it focus on transmission level, distribution or finer?
- How high will the targets be for renewable integration and transmitting energy across regions?





