

NSERC Energy Storage Technology Network

Virtual Technical Conference

June 16 & 17, 2020

 #NESTNet

Welcome

Welcome to the fifth and final annual NSERC Energy Storage Technology Network (NESTNet) Technical Conference. Although we cannot be together in person this year, we would like to offer our sincere thanks for joining us remotely from across Canada and around the world.

As we move towards cleaner energy systems, demand for innovative energy storage solutions is rising. NESTNet brings together leaders from the academic community, industry, utilities and government. Over the next two days, we will provide them with a stage to present their findings, showcase their innovations, exchange ideas and share their outlooks for the future.

As the network wraps up, we would like to gratefully acknowledge your invaluable contributions to the network over the past five years.

ryerson.ca/nestnet

Ryerson
University

Centre for
Urban Energy



Sessions 1, 2 & 3: <https://ryerson.zoom.us/j/896588327>

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- 9:00 a.m. ET** **Welcome and opening remarks**
Bala Venkatesh, Ryerson University
- 9:05** **Virtual group photo**
- 9:10** **Theme 1: Energy storage technologies**
F. Handan Tezel, University of Ottawa
- 9:20** **Project 1.1: Hybrid multi-level grid-scale battery thermal management system**
Mina Rouhani on behalf of Majid Bahrami, Simon Fraser University
- 9:40** **Project 1.2: Fabrication, modelling, design and testing of flywheels for grid-scale storage**
Marc Secanell Gallart, University of Alberta
- 10:00** **Project 1.3: Design and testing of an innovative energy accumulator for underwater CAES**
Mehdi Ebrahimi on behalf of Rupp Cariveau, University of Windsor
- 10:20** **Project 1.4: Thermal energy storage in adsorbent beds for space heating and cooling applications**
Curtis Strong on behalf of F. Handan Tezel, University of Ottawa
- 10:40** **Project 1.5: Hybrid energy storage system designs**
Ayman Elkasrawy on behalf of Bala Venkatesh, Ryerson University
- 11:00** **Lunch break**
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- 12:00 p.m.** **Theme 2: Power electronics converters**
Liuchen Chang, University of New Brunswick
- 12:10** **Project 2.1: Modular architecture and functionality of energy storage power converters**
Liuchen Chang, University of New Brunswick
- 12:30** **Project 2.2: Digital control systems of power converters for energy storage**
Vijay Sood, Ontario Tech University
- 12:50** **Project 2.3: Coordinated operation of multiple storage units and technologies**
Reza Iravani, University of Toronto
- 1:10** **Project 2.4: SCADA interface for energy storage systems**
Tariq Iqbal, Memorial University
- 1:30** **Project 2.5: Control systems for second-life batteries for grid-scale energy storage**
Lukas Swan, Dalhousie University
- 1:50** **Break**
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- 2:00** **Theme 3: Power systems integration**
Claudio Cañizares, University of Waterloo
- 2:10** **Project 3.1 Optimal planning for energy storage facilities in transmission systems**
Hamid Zareipour, University of Calgary
- 2:30** **Project 3.3: Energy storage device protection**
Saleh Saleh, University of New Brunswick
- 2:50** **Project 3.4: Integration of storage for improving power quality of smart distribution systems**
Magdy Salama, University of Waterloo
- 3:10** **Project 3.5: Operation and control of power systems with energy storage systems**
Matheus Zambroni de Souza on behalf of Claudio Cañizares, University of Waterloo
- 3:30** **Project 3.6: Reliability modelling and assessment of power systems with energy storage systems**
Rajesh Karki, University of Saskatchewan

Agenda - Day 1

Tuesday, June 16, 2020 (continued)

- 3:50 **Break**
- 4:00 **Presentation: Energy storage in Brazil**
Antonio Zambroni de Souza, Universidade Federal de Itajubá
- 4:30 **Closing remarks**
Bala Venkatesh, Ryerson University

Agenda - Day 2

Wednesday, June 17, 2020

Session 4: <https://ryerson.zoom.us/j/333801653>

- 9:00 a.m. ET **Theme 4: Economics and policy**
Miguel Anjos, University of Edinburgh and Polytechnique Montréal
- 9:10 **Project 4.1: Development of life cycle net energy ratio of energy storage technologies**
Md. Mustafizur Rahman on behalf of Amit Kumar, University of Alberta
- 9:30 **Project 4.2: Modelling electricity market prices considering large-scale storage penetration**
Valérie Provost on behalf of Miguel Anjos, Polytechnique Montréal
- 9:50 **Project 4.3: Provision of ancillary services by energy storage systems**
Hisham Alharbi on behalf of Kankar Bhattacharya, University of Waterloo
- 10:10 **Break**
- 10:20 **Project 4.4: Optimal brokerage models for the grid integration of energy storage**
Elizaveta Kuznetsova on behalf of Miguel Anjos, Polytechnique Montréal
- 10:40 **Project 4.5: Towards federal and provincial energy storage policy frameworks for Canada**
Mark Winfield, York University
- 11:00 **Project 4.6: Social acceptance of energy storage systems**
Ian Rowlands, University of Waterloo
- 11:20 **Break**

Session 5: <https://ryerson.zoom.us/j/97505647276>

- 11:30 **Theme leaders' panel discussion: Lessons learned**
F. Handan Tezel, Liuchen Chang, Claudio Cañizares, Miguel Anjos, Ian Rowlands, Jennifer MacInnis
Moderated by Bala Venkatesh, Ryerson University
- 12:30 p.m. **Lunch break**

Session 6: <https://ryerson.zoom.us/j/94439678442>

- 1:30–2:30 **CSA Standard C22.3 #9: Interconnection of distributed energy resources to the grid**
Gary Thompson, Toronto Hydro and Brian McMillan, McMillan Distribution Engineering and Consulting
Introduced by Bala Venkatesh, Ryerson University
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- 3:00–4:30 **Board of directors meeting**
A private Zoom link will be provided to all board members

Theme 1: Energy storage technologies

Theme leader: Dr. F. Handan Tezel, University of Ottawa

In this theme, research is focused on batteries (thermal management systems and innovative housing designs), flywheels (designs and modelling), compressed air energy storage (CAES; enhanced underwater designs and operation), thermal storage (materials and system designs), and hybrid energy storage models.

Theme 2: Power electronics converters

Theme leader: Dr. Liuchen Chang, University of New Brunswick

Research in this theme focuses on power electronic converters, including modular converters, digital controllers, supervisory controllers, supervisory control and data acquisition (SCADA) systems, and power electronics for repurposed electric vehicle batteries.

Theme 3: Power systems integration

Theme leader: Dr. Claudio Cañizares, University of Waterloo

Research in this theme will enable the seamless integration of energy storage into power systems by developing planning tools, operational tools, protection systems, power quality mitigation solutions, and reliability benchmarks.

Theme 4: Economics and policy

Theme leader: Dr. Miguel Anjos, University of Edinburgh and Polytechnique Montréal

This theme investigates and provides solutions for techno-economic challenges in the successful integration of energy storage into power systems. In addition, it examines policy, regulatory and social challenges faced by storage solutions to enable successful uptake by utilities and societies.



Connection problems?

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