

NSERC Energy Storage Technology Network

TECHNICAL CONFERENCE

June 18 & 19, 2019
Centre for Urban Innovation
Ryerson University

 #NESTNet

Welcome

It is with great excitement that we welcome you to Toronto for the fourth annual NSERC Energy Storage Technology Network (NESTNet) Technical Conference. We would like to offer our sincere thanks to you for joining us today and gratefully acknowledge the support from our partners, without whom this event would not have been possible.

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 are happy to be providing them with a stage to discuss the progress made so far and to share their outlooks for the future.

ryerson.ca/nestnet

**Ryerson
University**

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Urban Energy



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CRSNG**

8:30 a.m. ET	Breakfast and registration Level 1 (Atrium)
9:00	Welcome and opening remarks Level 1 (Atrium) Bala Venkatesh, Ryerson University
9:15	Group photos Level 1 (Atrium)
9:45	Theme 1 overview: Energy storage technologies Level 3 (CUI 317) Bala Venkatesh on behalf of F. Handan Tezel, University of Ottawa
10:15	Project 1.1: Hybrid multi-level grid-scale battery thermal management system Sepher Fourashani on behalf of Majid Bahrami, Simon Fraser University
10:30	Project 1.2: Fabrication, mathematical modelling, design and testing of flywheels for grid-scale energy storage Marc Secanell, University of Alberta
10:45	Project 1.3: Design and testing of an innovative energy accumulator for underwater CAES Mehdi Ebrahimi on behalf of Rupp Carriveau, University of Windsor
11:00	Project 1.4: Thermal energy storage in adsorbent beds for space heating and cooling applications Ye Hua on behalf of F. Handan Tezel, University of Ottawa
11:15	Project 1.5: Hybrid energy storage system designs Barbara Rosado on behalf of Bala Venkatesh, Ryerson University
11:30	Lunch Level 2 (CUI 219)
12:30 p.m.	Theme 2 overview: Power electronics converters Level 3 (CUI 317) Bala Venkatesh on behalf of Liuchen Chang, University of New Brunswick
1:00	Project 2.1: Modular architecture and functionality of energy storage power converters Shuang Xu on behalf of Liuchen Chang, University of New Brunswick
1:15	Project 2.2: Digital control systems of power converters for energy storage Vijay Sood, Ontario Tech University
1:30	Project 2.3: Coordinated operation of multiple storage units and technologies Mostafa Mahfouz on behalf of Reza Iravani, University of Toronto
1:45	Project 2.4: SCADA interface for energy storage systems Tariq Iqbal, Memorial University
2:00	Project 2.5: Control systems for second-life batteries for grid-scale energy storage Lukas Swan, Dalhousie University
2:15	Break and networking Level 2 (CUI 219)
2:30	Theme 3 overview: Power systems integration Level 3 (CUI 317) Claudio Cañizares, University of Waterloo
3:00	Project 3.1: Optimal planning for energy storage facilities in transmission systems Miguel Anjos on behalf of Hamid Zareipour, University of Calgary
3:15	Project 3.3: Energy storage device protection Christian Richard on behalf of Saleh Saleh, University of New Brunswick
3:30	Break and networking Level 2 (CUI 219)
3:45	Project 3.4: Integration of energy storage for improving power quality of smart distribution systems Magdy Salama, University of Waterloo
4:00	Project 3.5: Operation and control of power systems with energy storage systems Behnam Tamimi on behalf of Claudio Cañizares, University of Waterloo
4:15	Project 3.6: Reliability modeling and assessment of power systems with energy storage systems Prasanna Piya on behalf of Rajesh Karki, University of Saskatchewan

Agenda - Day 1

Tuesday, June 18, 2019 (continued)

4:30	Project 3.7: Capacity markets for energy storage - design and implementation Amr Adel on behalf of Bala Venkatesh, Ryerson University
4:45–5:45	Poster session Level 2 (CUI 219)
6:00–8:00	Dinner and awards Level 3 (CUI 317) Winners of the energy storage design challenge and award for best poster to be announced

Agenda - Day 2

Wednesday, June 19, 2019

8:30 a.m. ET	Breakfast and registration Level 1 (Atrium)
9:00	Welcome and opening remarks Level 3 (CUI 317) Miguel Anjos, University of Edinburgh and Polytechnique Montréal
9:15	Theme 4 overview: Economics and policy Miguel Anjos, University of Edinburgh and Polytechnique Montréal
9:45	Project 4.1: Development of life cycle net energy ratio of energy storage technologies Mustafizur Rahman on behalf of Amit Kumar, University of Alberta
10:00	Project 4.2: Modelling electricity market prices considering large-scale energy storage penetration Elizaveta Kuznetsova on behalf of Miguel Anjos, Polytechnique Montréal
10:15	Project 4.3: Provision of ancillary services by energy storage systems Kankar Bhattacharya, University of Waterloo
10:30	Project 4.4: Optimal brokerage models for the grid integration of energy storage Juan Gómez-Herrera on behalf of Miguel Anjos, Polytechnique Montréal
10:45	Break and networking Level 2 (CUI 219)
11:00	Project 4.5: Towards federal and provincial energy storage policy frameworks for Canada Level 3 (CUI 317) Mark Winfield, York University
11:15	Project 4.6: Social acceptance of energy storage systems Ian Rowlands, University of Waterloo
11:30	Presentation: Commercialization update Marcelo Sarkis, Prima IP
11:45	Presentation: Internationalization update Ian Rowlands, University of Waterloo
12:00 p.m.	Presentation: Public perceptions of grid-scale energy storage technologies in the UK and Canada Chris Jones, University of Surrey
12:15	Presentation: Sustainable Energy for the Advancement of Society – a new Brazilian R&D centre Walmir Freitas, University of Campinas
12:30	Closing remarks Miguel Anjos, University of Edinburgh and Polytechnique Montréal
12:45–2:00	Lunch Level 2 (CUI 219)
3:00–5:00	Board of directors meeting Level 2 (CUI 219)
6:00–8:00	Dinner Board of directors and research steering committee 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 modeling), 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.



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