

NSERC Energy Storage Technology Network

Technical Conference

June 21–22, 2017

Tecumseh Auditorium,
Oakham House, 63 Gould St.

 #NESTNet

Welcome

It is with great excitement that we welcome you to Toronto for the second 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.

8:30 am ET	Breakfast and registration
9:20	Welcome and opening remarks Bala Venkatesh, Academic Director, Centre for Urban Energy at Ryerson University
9:30	Theme 1: Energy storage technologies F. Handan Tezel, University of Ottawa
10:00	Project 1.1: Hybrid multi-level grid-scale battery thermal management system Seyyed Mahdi Nemati Mehr on behalf of Majid Bahrami, Simon Fraser University
10:15	Project 1.2: Fabrication, mathematical modelling, design and testing of flywheels for grid-scale energy storage Pierre Mertiny, University of Alberta
10:30	Break and networking (refreshments served in SCC-115 Courtyard) Poster session in Tecumseh Auditorium
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 F. Handan Tezel, University of Ottawa
11:15	Project 1.5: Hybrid energy storage system designs Kamran Masteri on behalf of Bala Venkatesh, Ryerson University
11:30	Project 1.6: Design of pole-top energy storage Mohamed Awadallah on behalf of Bala Venkatesh, Ryerson University
11:45	Lunch (served in SCC-115 Courtyard)
12:45 pm	Theme 2: Power electronics converters Liuchen Chang, University of New Brunswick
1:15	Project 2.1: Modular architecture and functionality of energy storage power converters Liuchen Chang, University of New Brunswick
1:30	Project 2.2: Digital control systems of power converters for energy storage Vijay Sood, University of Ontario Institute of Technology
1:45	Project 2.3: Coordinated operation of multiple storage units and technologies Reza Iravani, University of Toronto
2:00	Project 2.4: SCADA interface for energy storage systems Tariq Iqbal, Memorial University
2:15	Project 2.5: Control systems for second-life batteries for grid-scale energy storage Lukas Swan, Dalhousie University
2:30	Break and networking
2:45	Theme 3: Power systems integration Bala Venkatesh, Ryerson University
3:15	Project 3.1: Optimal planning for energy storage facilities in transmission systems Juan Arteaga on behalf of Hamid Zareipour, University of Calgary
3:30	Project 3.2: Optimal planning for energy storage in distribution systems considering feeder investment model Bala Venkatesh, Ryerson University
3:45	Project 3.3 Energy storage device protection Saleh Saleh, University of New Brunswick
4:00	Break and networking
4:15	Project 3.4: Integration of energy storage for improving power quality of smart distribution systems Magdy Salama, University of Waterloo

Agenda - Day 1

Wednesday, June 21, 2017

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| 4:30 | Project 3.5: Operation and control of power systems with energy storage systems
Mariano Arriaga on behalf of Claudio Cañizares, University of Waterloo |
| 4:45 | Project 3.6: Reliability modeling and assessment of power systems with energy storage systems
Rajesh Karki, University of Saskatchewan |
| 5:00–5:15 | Project 3.7: Capacity markets for energy storage - design and Implementation
Bhanu Opathella on behalf of Bala Venkatesh, Ryerson University |
| 7:00–9:00 | Dinner at the Alumni Lounge, Mattamy Athletic Centre, 50 Carlton St.
Open to all presenters, project leaders and committee members |

Agenda - Day 2

Thursday, June 22, 2017

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| 8:30 am ET | Breakfast and registration |
| 9:20 | Welcome and opening remarks
Bala Venkatesh, Academic Director, Centre for Urban Energy at Ryerson University |
| 9:30 | Theme 4: Economics and policy
Miguel Anjos, École Polytechnique de Montréal |
| 10:00 | Project 4.1: Development of life cycle net energy ratio of energy storage technologies
Sahil Kapila on behalf of Amit Kumar, University of Alberta |
| 10:15 | Project 4.2: Modelling electricity market prices considering large-scale energy storage penetration
Miguel Anjos, École Polytechnique de Montréal |
| 10:30 | Project 4.3: Provision of ancillary services by energy storage systems
Kankar Bhattacharya, University of Waterloo |
| 10:45 | Break and networking (refreshments served in SCC-115 Courtyard) |
| 11:00 | Project 4.4: Optimal brokerage models for the grid integration of energy storage
Miguel Anjos, École Polytechnique de Montréal |
| 11:15 | Project 4.5: Towards federal and provincial energy storage policy frameworks for Canada
Mark Winfield, York University |
| 11:30 | Project 4.6: Social acceptance of energy storage systems
Ian Rowlands, University of Waterloo |
| 11:45 | Keynote: A brief introduction to the University of Sheffield's Centre for Doctoral Training in Energy Storage and its Applications
Christopher Jones, Acting Director |
| 12:15–1:15 pm | Lunch (served in SCC-115 Courtyard) |
| 2:00 | Research Steering Committee meeting
Room ENG-358, George Vari Engineering and Computing Centre, 245 Church St. |
| 2:45 | Break |
| 3:00–5:00 | Board of Directors meeting
Room ENG-358, George Vari Engineering and Computing Centre, 245 Church St. |
| 6:15–8:15 | Dinner at Scaddabush, 382 Yonge St.
Presentation by Jennifer MacInnis, Chair of the Commercialization and Outreach Committee
Open to all NESTNet 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, École Polytechnique de 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.