



Centre for Urban Energy  
*Energizing the Future*

**2014  
ANNUAL  
REPORT**

— Faculty of Engineering  
and Architectural Science

RYERSON  
UNIVERSITY



“ I was pleased to have the opportunity to tour the Centre for Urban Energy in 2014 and to see some of the exciting innovations and technologies being produced by the centre’s world-class researchers alongside industry partners. The energy sector is a key component of the Canadian economy, which is why it is a priority sector under Canada’s Global Markets Action Plan, the government’s blueprint for creating jobs and opportunities for all Canadians. Ensuring that Canada remains competitive on a global scale requires the kind of innovation, expertise and training that I witnessed first-hand at CUE. ”

The Honourable Ed Fast, Minister of International Trade,  
Government of Canada

## TABLE OF CONTENTS

**04**

Thank You to Our Partners

**15**

Research Highlights

**05**

Message from Our  
Academic Director

**18**

IESO Research Fellows

**06**

Message from Our  
Executive Director

**19**

Student Research Awards

**07**

Progress

**20**

Certificate in Energy Management  
and Innovation

**08**

By the Numbers

**21**

iCUE

**09**

Advisory Council

**23**

Outreach

**10**

People

**24**

Global Reach

**11**

Research Focus

**25**

Internships

**14**

Schneider Electric  
Smart Grid Laboratory





“ In five short years, CUE has become an important world centre for urban energy and, with strong and continuing support from the energy sector, has developed a reputation for entrepreneurship, job creation and innovation. To me, the ‘energy’ in ‘Centre for Urban Energy’ comes as much from the people as the ingenious ideas they pursue; and I am proud to recognize CUE’s extraordinary leadership in transforming our approach to urban energy and building our culture of sustainability. ”

— Sheldon Levy, President, Ryerson University

# THANK YOU TO OUR PARTNERS

## Founding Sponsors



## Sponsors



## Collaborators



# MESSAGE FROM OUR ACADEMIC DIRECTOR



**Bala Venkatesh**

Professor, Electrical and  
Computer Engineering

Academic Director

From our downtown location in Toronto, one of North America's fastest growing cities, Ryerson's Centre for Urban Energy (CUE) is able to witness the challenges and opportunities of rapid urbanization up-close. How does such growth affect the environment, our communities and particularly, our electricity infrastructure?

Recently, dramatic events challenged Ontario's energy system. In late 2013, an ice storm left more than 600,000 electricity customers across the province without power. In 2014, the last coal plant fired. Add in an aging workforce and infrastructure and it's not hard to understand why this sector is in flux. In 2010, with support from Hydro One, the former Ontario Power Authority (now the IESO) and Toronto Hydro, CUE was founded to focus on energy companies' challenges – from generator to consumer. Our research aims to build an efficient, resilient and technologically advanced grid for the future.

CUE's 63 researchers, students and staff accrued many accomplishments in 2014. Of 42 research projects, several came to fruition. Partnering with Pollution Probe, we predicted future electric car use. With Temporal Power, we deployed new flywheel storage technology. With Hydro One, we increased the operational life of solar panels. With Toronto Hydro, we laid the groundwork for large-scale batteries, transforming the potential of clean energy. Finally, we collaborated with the Ministry of Energy and PowerStream on the groundbreaking Schneider Electric Smart Grid Lab (for more details, see page 14).

Beyond technology, effective growth requires a skilled workforce. CUE prides itself on giving Ryerson students wide-ranging industry-driven learning and training opportunities. Besides our popular postgraduate Certificate in Energy Management and Innovation, we're developing a master's program. Additionally, almost 100 students have come through the centre via internships and student research awards – with many now employed in the energy sector.

Have a problem to solve? CUE is full of bright minds and innovative ideas. We can help.

A handwritten signature in black ink, appearing to read 'Bala Venkatesh'. The signature is written in a cursive style and is positioned above a horizontal line.

# MESSAGE FROM OUR EXECUTIVE DIRECTOR



**Dan McGillivray**  
Toronto Hydro  
Distinguished Fellow  
Executive Director

The energy sector has reached a tipping point – rapid advances in energy technologies threaten to alter the way we produce, distribute and consume energy. CUE aims to help our partners and students prepare for this future.

In 2014, we reflected on lessons learned from Ontario's 2013 ice storm. Stakeholders and electricity professionals from across greater Toronto gathered at CUE to share experiences and identify priorities. We recognized opportunities for research and education in the areas of vegetation management, communications and energy literacy.

On the innovation front, the Innovation Centre for Urban Energy (iCUE) continues to encourage young energy entrepreneurs. Since November 2012, we have received 39 applications and accepted 14 member companies into the lab, representing 33 new jobs. Nine companies are developing businesses and five are “graduating”. We also stay in touch with grads like Laura Miller whose company DanTeb Enterprises is thriving.

On the education front, we made great strides last year, offering a 12-week summer school for energy startups and MBA students. Some of the student ideas developed then have blossomed into award-winning enterprises, such as 2ND LOT.

And we took a course on the road. With Sean Conway, Hydro One Distinguished Research Fellow at CUE, we prepared and delivered a professional development course on energy technology and politics at the former Ontario Power Authority (now the Independent Electricity System Operator). We've been asked to offer it again next year.

Finally, we developed a graduate course on energy innovation for the 2015 winter term via Ryerson's Environmental Applied Science and Management program. At every class, energy sector experts will share professional experience with students.

By following Ryerson's motto – *Mente et Artificio* – and putting mind and skill into action, CUE's students and partners can succeed as we move into the future.

A handwritten signature in black ink that reads "Dan".





## PROGRESS

### 2010

Ryerson University opens CUE with the support of three founding sponsors: Hydro One, the former Ontario Power Authority (now the IESO) and Toronto Hydro

### 2011

CUE establishes a partnership with Anna University in Chennai, India to develop a joint centre for research and collaboration in urban energy

### 2012

CUE develops a postgraduate Certificate Program in Energy Management and Innovation and launches the iCUE, an incubator and accelerator for energy-focused startups

### 2013

The Ontario Ministry of Energy and Schneider Electric announce funding to build a smart grid laboratory at CUE, the first of its kind in a university setting anywhere in Canada

### 2014

CUE releases a major report on cities' response to extreme weather and commences a program of research in conjunction with the community-owned electricity distribution company PowerStream

## ABOUT US

The Centre for Urban Energy (CUE) at Ryerson University is an academic-industry partnership that is exploring and developing sustainable solutions to urban energy challenges such as the advancement of smart grid technologies, energy policy and regulatory issues, storage, electric vehicles, net-zero homes and renewables.

## VISION

To be a world-class research and innovation centre dedicated to solving urban energy challenges.

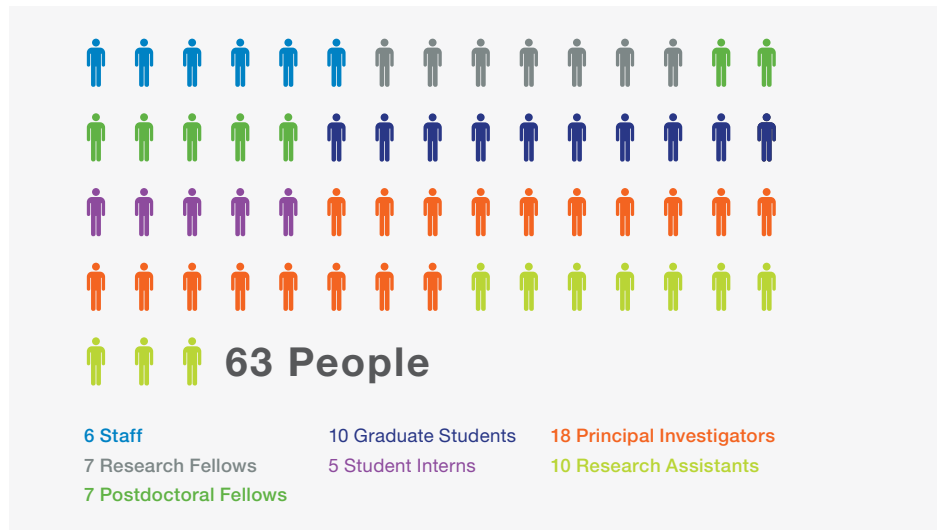
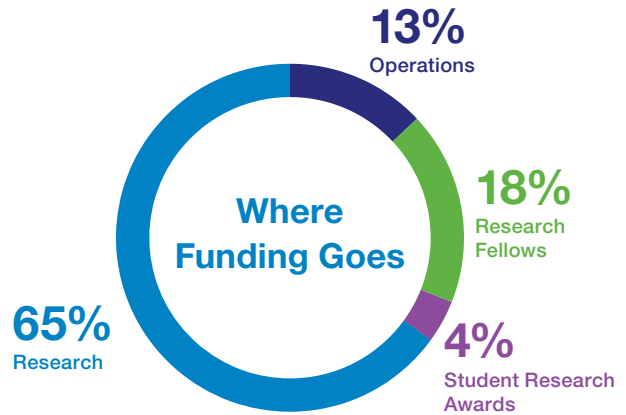
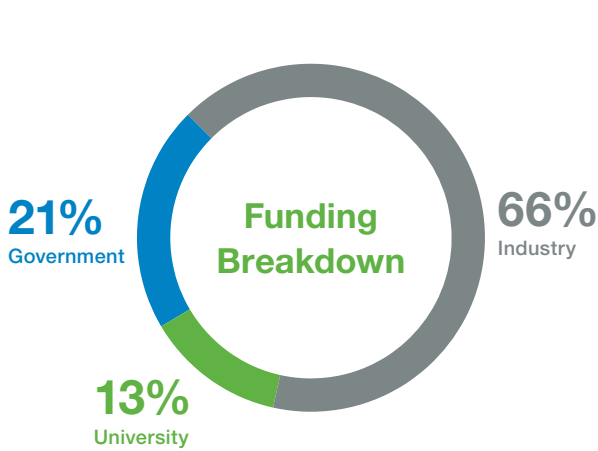
## MISSION

- Build academic, public and private sector partnerships
- Conduct research, development and demonstration, leading to commercialization
- Create the next generation of energy entrepreneurs
- Encourage multidisciplinary and collaborative approaches
- Provide scholarship and learning opportunities



# BY THE NUMBERS

## \$20.2 Million Funding



## 15 iCUE Enterprises



## Priorities



# ADVISORY COUNCIL



Chair  
**Mohamed Lachemi**  
Provost and Vice-President  
Academic  
Ryerson University



Co-Chair  
**David Curtis**  
Director, Asset Management  
Hydro One



**Tom Chapman**  
Manager, Economics and  
Policy  
IESO (formerly the Ontario  
Power Authority)



**Thomas Duever**  
Dean  
Faculty of Engineering and  
Architectural Science  
Ryerson University



**Léonce Fraser**  
Vice-President, Projects  
Execution Centre  
Schneider Electric



**Andrew Pride**  
Former Vice-President,  
Conservation  
Ontario Power Authority  
(now the IESO)



**Dino Priore**  
Executive Vice-President,  
Engineering and Construction  
Toronto Hydro



**Martin Rovers**  
Director of Energy Services  
PowerStream



**Bala Venkatesh**  
Academic Director  
Centre for Urban Energy  
Ryerson University



**Kim Warren**  
Vice-President, Market and  
System Operations and  
Chief Operating Officer  
IESO

# PEOPLE

## Principal Investigators

Mohammed Abdoli-Eramaki  
Liping Fang  
Xavier Fernando  
Alan Fung  
Mark Gorgolewski  
Ling Guan

Yifeng He  
Farrokh Janabi-Sharifi  
Yunwei Li  
Vojislav Mišić  
Kaamraan Raahemifar  
Magdy Salama

Vijay Sood  
Rajiv K. Varma  
Phil Walsh  
Bin Wu  
David Xu  
Amirnaser Yazdani

## Research Fellows

Omid Alizadeh  
Mohamed Awadallah  
Hydro One Visiting Research Fellow  
Sean Conway  
Hydro One Distinguished Research Fellow  
Daniel Cheng  
Reza Ghaffari  
IESO Visiting Research Fellow

Shivkumar Iyer  
Srinivas Karanki  
Santhi Karthikeyan  
Jessie Ma  
IESO Distinguished Research Fellow  
Paul Murphy  
Hydro One Distinguished Research Fellow  
Bhanu Opathella

Pratap Revuru  
Honorary Fellow  
Birenda N. Singh  
IESO Distinguished Research Fellow  
Venkata Yaramasu  
Peng Yu  
Ryan Zade  
Visiting Research Fellow

## Entrepreneur-in-Residence

Marzio Pozzuoli

## Administration

Bala Venkatesh  
Academic Director  
Dan McGillivray  
Toronto Hydro Distinguished Fellow and Executive Director

Denis Arseneault  
Administrative Coordinator

Diane Chong  
Departmental Assistant

Karen Ho-Cespedes  
Project Manager

Matthew Kerry  
Marketing and Communications Manager

Adnan Syed  
Project Manager

Kathy Zheng Couto  
Lab Engineer

## Student Interns

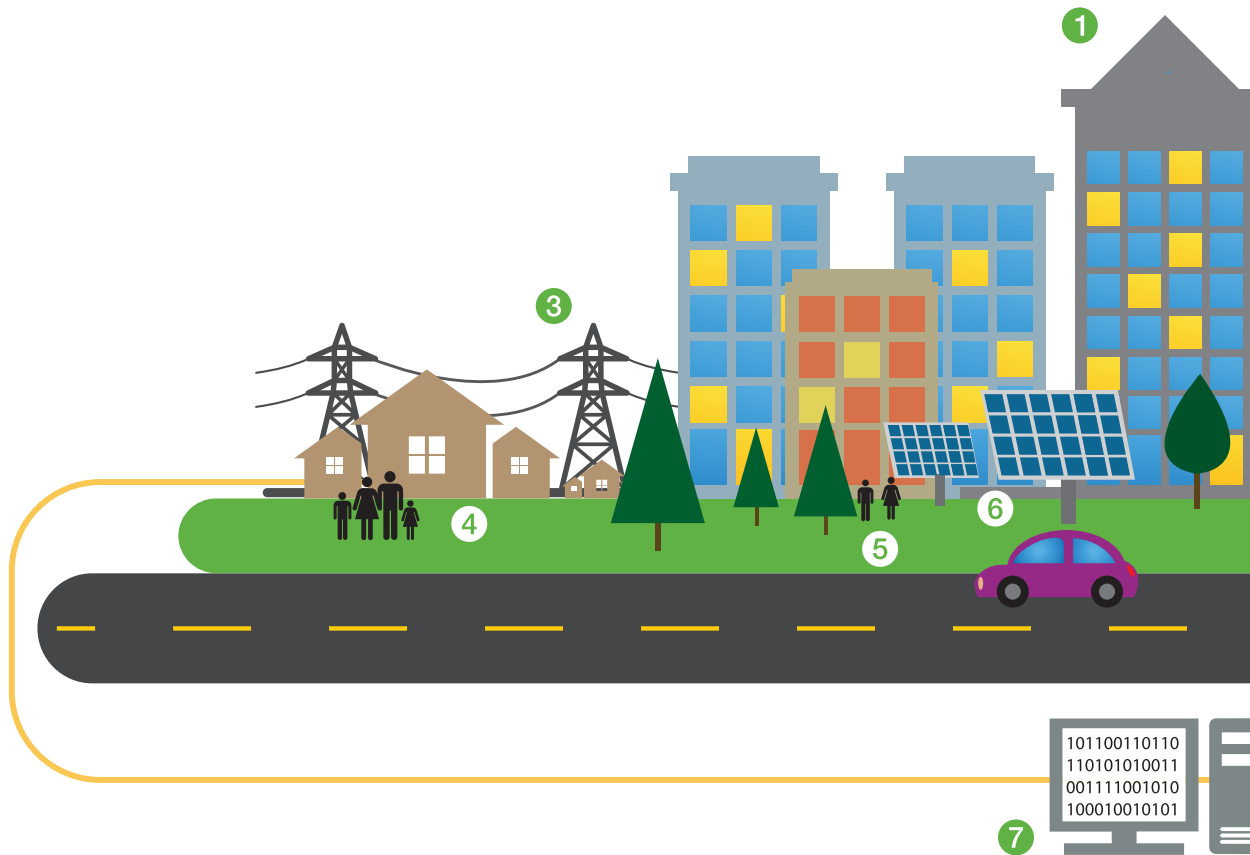
Ryan Austin  
Aditi Bandyopadhyay  
Cornel Campbell  
Noman Fazal  
Deborah Hernandez

Asfandyar Khan  
Sarah Marchionda  
Linh Nguyen  
Calvin Pedro  
Hao Quan

Marina Rizk  
Ali Siddiqui  
Lyubka Totina  
Thubarakan Sothilingam



# RESEARCH FOCUS



## 1 Efficiency and Conservation

Reducing the carbon footprint at Hydro One ✓

Time-of-use customer analysis ✓

Building performance assessment using occupant questionnaires and energy data

IESO fellows and student research awards (*Learn more on pages 18 and 19*)

Enbridge energy assessment

## 2 Electric Vehicles

Electrical impact on transformer station components due to electric vehicles ✓

Plug-in hybrid electric vehicle charging station for urban energy systems

Design and development of faster chargers and charging stations

Chargers, stations, power converter interfaces and power sharing ✓

Wireless performance monitoring of plug-in electric vehicles

## 3 Generation and Transmission

Anti-islanding detection for multiple inverters in a distribution grid

Transmission supply diversification challenges in Toronto ✓

## 4 Net-Zero Homes

Development of residential HVAC and air-conditioning demand management and control system

## 5 Policy

Shoulder injuries among Toronto Hydro workers – from evaluation to control (*See research highlights on page 17*)

Customer interruption costs meta study

## 6 Renewables

Impact of solar panels on transformer station components ✓

Intelligent wind algorithms ✓

Control and interface for an urban clean-energy microgrid ✓

Smart management and control of short-circuit currents to increase connectivity of renewable sources in Ontario (*See research highlights on page 16*)



Performance and benefits of urban micro-wind turbines

Urban solar farms

NSERC Wind Energy Strategic Network ✓

Microgrids and their control and operation

Protection management of feeders with renewables

### 7 Smart Grid

Zone energy management and optimization systems

Secure and reliable data communications ✓

Smart power grids – modelling, planning and control design

Development of urban electric systems

Information processing and communication technology for secure smart grid

Schneider Electric Smart Grid Laboratory *(Learn more on page 14)*

PowerStream Greenwood transformer station demonstration

*(See research highlights on page 15)*

### 8 Storage

System integration of large-scale energy storage using lithium batteries

Temporal Power flywheel – electrical impact and transformer storage

Temporal Power flywheel – energy on time ✓

Electrovaya battery commissioning and installation

Urban bulk energy storage systems

Lithium-ion battery demonstration

Energy storage working group workshop ✓

Third-party monitoring of the Electrovaya battery

Pole-top energy storage system

Aggregation of energy storage solutions

NSERC Energy Storage Discovery Grant

✓ = Completed



“ Harnessing smart grid technologies in a way that benefits the broader electricity system and the consumer is a key focus of the Ontario Smart Grid Forum. The Forum has been advocating for open standards and an integrated testing facility in order to advance innovation. This new lab represents an important step toward achieving this common aim by bringing together Ontario’s researchers, solution providers and utility companies. ”

— Bruce Campbell, President and CEO, IESO  
and Chair, Ontario Smart Grid Forum





## SCHNEIDER ELECTRIC SMART GRID LABORATORY

We all want a modern, efficient and resilient electricity system that brings value to customers. Smart grid technologies enable local distribution companies (LDCs) to better detect and restore outages, improve planning and operations, integrate more renewables and electric vehicles, as well as give customers tools to manage their energy bills and reduce greenhouse gas emissions through conservation.

With support from Schneider Electric and the Ontario Ministry of Energy, CUE has built Canada's first university-based smart grid laboratory. The Schneider Electric Smart Grid Laboratory is a dedicated facility for collaborative industrial research. It will serve as a "sandbox" for Ontario institutions and the electrical industry to develop, demonstrate and discover products, solutions, ideas and algorithms. It will also provide a training platform for the next generation of smart grid engineers, scientists, planners and operators.

The state-of-the-art facility can physically and electrically represent a substation and feeders of any LDC. It houses all protection schemes, breakers, transformers, supervisory control and data acquisition (SCADA) and advanced distribution management system (ADMS) solutions. Users are able to readily plug in renewables, smart loads, energy storage and much more, as well as utilize the advanced metering infrastructure (AMI) to study their interactions under different scenarios in real time.

To learn more, please contact:

**Bala Venkatesh**  
Academic Director  
Centre for Urban Energy

416-979-5000 x2974  
[smartgridlab@ryerson.ca](mailto:smartgridlab@ryerson.ca)

*The Schneider Electric Smart Grid Laboratory was sponsored by the Ontario Ministry of Energy and funded in part through the Ontario Smart Grid Fund.*



## RESEARCH HIGHLIGHTS

### Leading the development of new smart grid technologies

PowerStream is the first utility to benefit from the incredible capabilities of the Schneider Electric Smart Grid Laboratory. From its Greenwood transformer station in Vaughan, Ont., the utility is working with CUE researchers to create a physical replica of three feeders. This replica includes overhead wires and underground cables, transformers, loads and generators, plus protection and control features on the feeders. The new laboratory allows PowerStream to test its system in different scenarios and implement new technologies at a fraction of the cost of real-world testing – and without customer service disruptions.

#### What problem is being solved?

PowerStream can:

- Test system operation under different contingencies to assess potential impact on its system and customers.
- Find solutions to challenges such as reverse flows on feeders.
- Understand the role of electricity storage devices in reducing line losses and increasing the capacity for renewable energy sources.
- Optimize equipment capacity.
- Tackle customer energy costs through leading-edge Volt/VAR power controls.

#### Practical applications:

- Benefit PowerStream customers by increasing overall resilience and efficiency of the system.
- Integrate more renewable energy sources.
- Reduce customer load and energy consumption.
- Learn where to locate energy storage facilities.

#### Project Sponsor:



#### Name of Project:

PowerStream Greenwood transformer station demonstration

#### Timeline:

August 2014 – April 2015

#### Research Focus:

Smart Grid

#### Principal Investigator:

Bala Venkatesh

#### Research Team:

Peng Yu, Bob Singh, Bhanu Opathella, Kathy Zheng Couto



## RESEARCH HIGHLIGHTS

### Plugging solar energy into the Ontario grid

The environmental, economic and political case for renewable energy is compelling. Solar panels have become attractive to many Ontarians due to the Feed-in Tariff (FIT) and microFIT programs launched by Ontario's Ministry of Energy in 2009. Yet many applications are being denied or delayed due to limited short-circuit capacity at various transformer stations. This is a serious concern for Hydro One, the provincial government and clean energy advocates such as the Canadian Solar Industries Association. This project aims to provide smart, pioneering, innovative and comprehensive solutions to effectively control and reduce short circuits.

#### What problem is being solved?

- Overcome technical obstacles and allow renewable energy to become commonplace.
- Manage short-circuit currents and thereby avoid damage to valuable system components such as circuit breakers and transformers.
- Prevent any major system reconfigurations.
- Improve effectiveness of conventional and novel fault-current limiting devices.

#### Practical applications:

- Increase the number of renewable sources connected to Ontario's transmission and distribution systems.
- Provide Hydro One with a novel framework to optimize location, design and size of fault-current limiting devices.
- Implement the framework into Hydro One's transmission area on 115kV lines.

#### Project Sponsor:



#### Name of Project:

Smart management and control of short-circuit currents to increase connectivity of renewable sources in Ontario

#### Timeline:

August 2013 – May 2016

#### Research Focus:

Renewables

#### Principal Investigator:

Bala Venkatesh, Amirnaser Yazdani

#### Research Team:

Peng Yu, Omid Alizadeh





## RESEARCH HIGHLIGHTS

### Protecting Toronto Hydro workers from shoulder injuries

Work-related shoulder pain is a health and safety challenge in many workplaces, especially where jobs require strenuous physical exertion. At Toronto Hydro, due to overhead work and heavy loads, work-related shoulder and lower-back injuries are a high risk. Due to physical requirements of their trade and environmental conditions, certified power cable and certified power line workers in particular, frequently fall in the high-risk category for shoulder pain. CUE researchers are working with Toronto Hydro to identify causal factors and develop an injury prevention tool to significantly improve workplace health and safety.

#### What problem is being solved?

- Prevent shoulder and lower-back injuries in this unique and highly specialized workplace environment.
- Understand the biomechanical load demands on shoulders associated with this work.
- Recognize factors contributing to shoulder pain and create mitigating engineering controls and policies.
- Identify tasks and sub-tasks with higher risk of musculoskeletal injuries.

#### Practical applications:

- Introduce effective, safe and ergonomic controls.
- Develop an innovative and novel tool to help workers handle chamber lids that weigh more than 200 pounds.
- Provide safer access to underground chambers and overhead cables.
- Increase productivity and reduce lost time and injury claims.

#### Project Sponsor:



#### Name of Project:

Shoulder injuries among Toronto Hydro workers – from evaluation to control

#### Timeline:

June 2013 – August 2015

#### Research Focus:

Policy

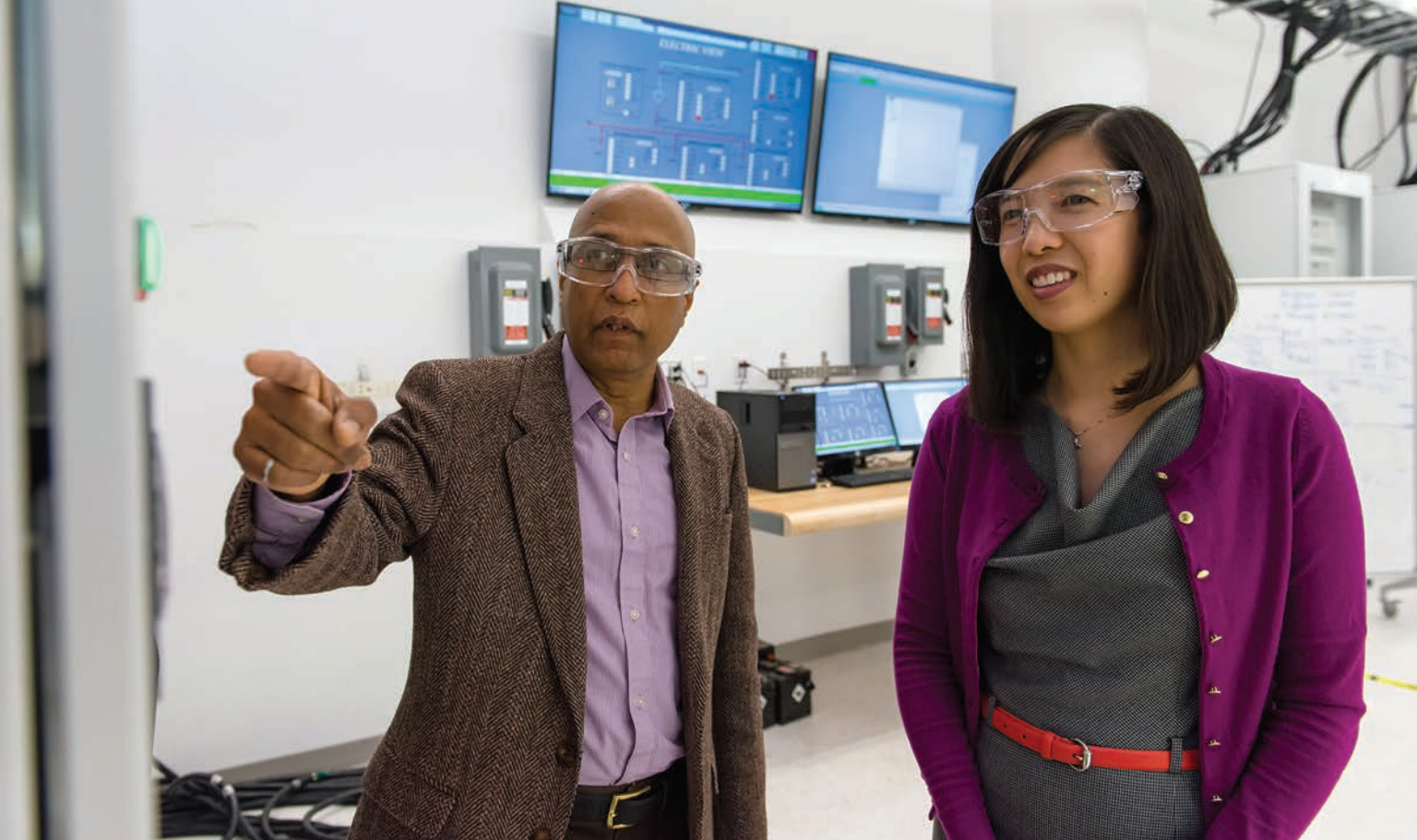
#### Principal Investigator:

Mohammad Abdoli-Eramaki

#### Research Team:

Cale Templeton, Tolga Tugrul, Negar Ashtari, Zainab Mirza, Yass Sotoudenia

© A registered trademark of Toronto Hydro Corporation used under licence. "Toronto Hydro" means Toronto Hydro-Electric System Limited.



## IESO RESEARCH FELLOWS

The Independent Electricity System Operator (IESO) is helping CUE fulfill its mandate to explore and develop solutions to urban energy challenges.

One of the three founding sponsors of CUE, the IESO has provided our centre with funding through its Conservation Fund for three full-time IESO Research Fellows to conduct original research on the challenges facing Ontario's electricity sector over the next three years.

- Bob Singh (Distinguished Research Fellow), previously a manager at Hydro One, will explore the integration of urban and energy planning.
- Jessie Ma (Distinguished Research Fellow), previously a business development advisor at Hydro One, will investigate the integrated delivery of electricity, gas and water conservation.
- Reza Ghaffari (Visiting Research Fellow), who was awarded a PhD from Ryerson in September 2014, will conduct research on energy storage technologies.

"It is a great opportunity for me to further my research on energy storage in such a supportive and rigorous environment as CUE," says Reza.

Jessie says the fellowship offers her the opportunity to combine her academic background in engineering and public administration with her experience in the electricity sector: "My passion is in using energy to build healthier and happier communities."

Bob says he wants to use his decades of experience at utilities to explore ways in which the distribution system can respond to an "unprecedented level of change on all fronts" and hopes to find "pragmatic and cost-effective solutions."

The fellows will be supported in their research by our IESO Student Research Assistantship Awards recipients.

# STUDENT RESEARCH AWARDS

CUE's student research awards recognize graduate and undergraduate students from a variety of programs who have shown excellence in an energy-related research project. Projects serve as an excellent experiential learning tool, with students given the opportunity to solve real-world challenges faced by our industry sponsors. Students must identify a problem, carry out design and testing, and demonstrate results.

Award ceremonies take place twice a year and are made possible by our generous sponsors: Hydro One, the IESO and Toronto Hydro.

## Toronto Hydro Student Research Awards 2013

Presented in December 2014

Student	Program	Project
Abdul Afram	Mechanical and Industrial Engineering	Efficiency and Conservation
Runa Das	Architectural Science	Policy
Elham Gholamhosseini	Mechanical and Industrial Engineering	Electric Vehicles
Anahita Jami	Business Management	Renewables
Sebastián Rivera Iunnissi	Electrical and Computer Engineering	Electric Vehicles

## Hydro One Capstone Research Awards

Presented in April 2015 to teams of fourth-year students from the Department of Electrical and Computer Engineering

Students	Project
Lisandro Lopez, Jigar Patel, Ravi Patel	Net-Zero Homes
Zehra Firas, Jun He, Junhua Zhang	Net-Zero Homes
Ahalya Mathanrai, Rumanan Muthalikkuddy, Daniel Nowocien	Storage
Husni Haji Hassen, Daniel Marques, Arash Moghimi	Renewables
Priyesh Bhavsar, Harranesh Puvanendran, Baljit Rehal	Net-Zero Homes
Roman Dzikh, Monika Karandikar, Nikola Tripic	Net-Zero Homes
Zhifang Cao, Reynold Salazar, Mingming Zhu	Efficiency and Conservation
Stanley Balshin, Michael Nagiub, Harout Simonian	Storage
Michael Foe, Kevin Soo, Priya Verma	Renewables
Hassan Ahmed, Usman Bhutta, Akber Khan	Efficiency and Conservation
Mohamad Makkiyah, Milad Mikha, Thanh Nguyen	Generation and Transmission
Thang Loac, Jermy Varghese, John Koshy	Generation and Transmission
Armin Omid, Alex Pezeshki, Mohammadreza Sepehri Nazar	Storage
Mehak Saini, Hridhipratim Debnath, Daniaal Ali	Net-Zero Homes
Ross De Souza, Ayman Omar, Yohan Tewelde	Generation and Transmission
Mark Sumagang, Deliph Vijeyendrakumar, Sagar Dharamshi	Net-Zero Homes
Alexander Andreev, Daniel Chung, Azizeh Rezaie	Net-Zero Homes

## IESO Research Assistantship Awards

Presented in April 2015

Student	Program	Project
Abdul Afram	Mechanical and Industrial Engineering	Net-Zero Homes
Craig Brown	Architectural Science	Efficiency and Conservation
Apparao Dekka	Mechanical and Industrial Engineering	Storage
Pallavi Roy	Business Management	Renewables
Thierry Spiess	Electrical and Computer Engineering	Renewables
Danilo Yu	Electrical and Computer Engineering	Efficiency and Conservation



# CERTIFICATE IN ENERGY MANAGEMENT AND INNOVATION

In the energy sector, for every two workers that retire, there is only one replacement. This is not sustainable, particularly in a rapidly growing sector. Our postgraduate certificate program provides adult learners with an opportunity to acquire the knowledge and expertise they need to contribute effectively to energy management, conservation, sustainability and public policy governing this regulated sector – and also to energy innovation, entrepreneurship, and the challenges and opportunities in developing new energy technologies and business enterprises.

Our program was developed in cooperation with the G. Raymond Chang School of Continuing Education and is available in-class, online and in the workplace via our customized executive course.

## FAQs

### Who should register?

Individuals seeking to expand their expertise, change or advance their careers in the energy sector and complete professional development requirements for management and leadership roles.

### What are the admission requirements?

Mature student status and evidence of relevant college or university level coursework, or mature student status together with relevant industrial or professional experience.

### What are the certificate requirements?

The successful completion of six courses with a cumulative grade point average of 2.00 or higher.

### What are the required courses?

- CKEI 100 – Energy Innovation and Entrepreneurship
- CKEI 110 – Energy Conservation: Emerging Trends
- CKEI 120 – Energy and the Public Policy Debate in Canada
- CKEI 130 – An Introduction to Smart Grid

### What are the electives?

Students must select a total of two electives:

- CKEI 140 – Current Topics in Energy Management and Innovation
- CECN 510 – Environmental Economics
- CKES 190 – Renewable Energy and Green Technology
- CKPM 202 – Fundamentals of Project Management
- CKSS 100 – Fundamentals in Sustainability I

### When can I enroll?

A selection of courses is available throughout the year. Fall term runs from September to December. Winter term runs from January to April. Spring/Summer term classes are offered between May and August.

To learn more or enroll now, please visit  
[ryerson.ca/ce/energy](http://ryerson.ca/ce/energy)

THE CHANG SCHOOL

RYERSON UNIVERSITY  
CONTINUING EDUCATION

# iCUE

The Innovation Centre for Urban Energy is another example of Ryerson’s unique experiential “zone learning” model. The iCUE is an incubator and accelerator focused on urban energy. Instead of a co-op model where students work for someone else, the iCUE provides them with opportunities for collaboration and gives them the support and mentorship they need to start their own companies. The goal is to help students turn their ideas into viable commercial products, services and technologies for the energy sector – and provide environmental, social and economic value to Canadian society.

Since forming in November 2012, the iCUE has worked with 15 startups, representing 33 jobs. Here’s an update on what some of our current and graduated enterprises accomplished in the past 12 months:

 **2NDLOT** Employees: 

**Progress report from co-founder Matthew Tokarik:** “For architects and building owners designing small-to-medium energy efficient buildings, 2ND LOT provides energy and sustainability consulting in a collaborative manner from concept to compliance – unlike traditional engineers who join the project late and work in isolation. Whole-building energy modelling software is used in an integrated manner with architects’ normal workflow to quantify energy savings to confidently inform design decisions, or as a tool to assess the costs and benefits of retrofit strategies.”

**2014 milestones:** Generated initial revenue from pilot projects; received Norman Esch Engineering Innovation and Entrepreneurship Award.

 **energysavers** Employees: 

**Progress report from general manager M. Ryan Manchee:** “EnergySavers provides energy renovations to the residential market at no initial cost to a homeowner. We facilitate the financial and contracting services that guarantee a project is paid for entirely out of the energy cost savings realized after a renovation. The financing system is being taken up by many municipalities in Ontario, expanding our serviceable area, and market opportunity.”

**2014 milestones:** Nominated by the Ontario Centres of Excellence for the David McFadden Energy Entrepreneur Challenge which also helped the startup to secure letters of support from private investors for seed capital.

**GRID RESOURCES** Employees: 

**Progress report from principal Andrew Clare:** “Grid Resources is working on software that allows users to easily see exactly how much they can save by installing a net-metered solar system. The new customer-focused software solution will model the value proposition of solar to building owners, showing them the exact savings and return on investment through an easy, simple and fast web interface.”

**2014 milestones:** Ryerson Engineering student Diana Ospina won a Norman Esch Engineering Innovation and Entrepreneurship Stage 1 Award to conduct market research on Grid Resources’ software solution.

**My Green Neighbour** Employees: 

**Progress report from founder Bianca Sayan:** “My Green Neighbour develops and ‘white-labels’ apps to help users conserve energy. I received external interest from the Government of Ontario, MaRS and Ontario utilities in 2014.”

**2014 milestones:** My Green Neighbour’s products placed in the Energy Apps for Ontario Challenge and were considered for the first round of the “Green Button” tools for Ontario utilities.

The iCUE is open to anyone with a unique idea. Prospective energy entrepreneurs should contact Dan McGillivray at [dan.mcgillivray@ryerson.ca](mailto:dan.mcgillivray@ryerson.ca)



Employees:

**Progress report from communications advisor Brian Millar:** "Plug'n Drive is a non-profit organization committed to accelerating the adoption of electric cars to maximize their environmental and economic benefits. Since 2011, Plug'n Drive has established itself as a leader in the electric car space, a trusted source of unbiased information on electric cars, charging stations and the electricity sector."

**2014 milestones:** Reached over 14,000 individuals and provided over 1,400 test drives at over 45 events and tradeshow across Ontario. Partnered with WWF to create Canada's first comprehensive guide for installing charging stations in condominiums and apartment buildings. Assisted a number of companies with the installation of public electric vehicle (EV) charging stations including: Bruce Power, the Electrical Safety Authority, Ontario Power Generation and Tim Hortons. Launched the EV Owner's Club of Canada and the EV Canadian Dealer Awards.

## Screaming Power

Employees:

**Progress report from Gary Michor, CEO:** "Screaming Power is a company focused on bringing mobility and data connectivity to the energy industry. For over a year, Screaming Power has worked with subject matter experts and energy utilities to create a set of mobile templates and extraction tools that are 'game changing' for the entire industry. The goal is to create an extensible, user-friendly platform that utilities can easily and cost-effectively utilize."

**2014 milestones:** Completed research and development as well as marketing and sales initiatives for the rollout of the first solution in the first quarter 2015.



Employees:

**Progress report from CEO Kamran Masteri Farahani:** "Measurement of the duration of views, number of views etc. is the kind of thing generally associated with online media rather than out-of-home advertising, so being able to track that information is very valuable to clients. At Smartto we have found a new and exciting advertising platform which collects real-time data and also catches consumers off-guard and creates a 'surprise' function."

**2014 milestones:** Creating the first prototype and installing it at the iCUE.

## TAP THE GRID

Employees:

**Progress report from principal Gabriel Lazdins:** "Tap the Grid is a replacement for temporary portable generators and allows customers to remove the generator and power the activities directly from the grid. It is a complete self-serve solution requiring no connect or disconnect support from an operator or LDC."

**2014 milestones:** Working on prototype and attracting municipal operators/partners.



Employees:

**Progress report from founder Scott Sniedzins:** "Truly Local Farms is an urban farming company looking to #IncreaseTheGood in people's lives. Our major focus is to try and lower everyone's global footprint and we feel urban farming is the way to make this change. We do this in two ways; first we empower people to grow their own food inside and out all year round with the help of local farmers; second (for people that don't have the space) we deliver living mature herbs and healthy snacks to people's condos."

**2014 milestones:** Truly Local transformed a women's shelter into a complete urban homestead, developed its own indoor micro-farm in Toronto and set up several urban farms in condos and restaurants around the GTA.

Other iCUE enterprises: **Indee; Heliolytics; DanTeb Enterprises; Rigel Scientific Research; En-Tire Savings; Power Cost Monitor**

# OUTREACH

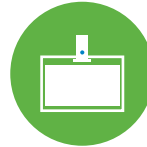
CUE played a part in well over 100 events in 2014, working alongside numerous academic, public and private sector organizations to provide opportunities for inspiration, collaboration, education and networking. CUE events are unique in that they gather everyone from CEOs, senior executives and government ministers to researchers and, of course, Ryerson students. The events help foster new and lasting relationships between industry and the energy workforce of tomorrow.



1 Industry Roundtables



2 Student Award Ceremonies



8 Events and Conferences



11 Technical Workshops



2 Open Houses



31 Tours



36 Speaking Engagements



26 Student Information Sessions

## Highlights of CUE's 2014 event calendar:

### January

Ryerson student information session on engineering and entrepreneurship

### February

Industry roundtable focused on extreme weather and its impact

### March

Kickoff of a series of technical workshops tackling asset renewal

### April

iCUE company Plug'n Drive hosts seminar on electric vehicles and condos

### May

CUE participates in Ontario Centres of Excellence's Discovery conference

### June

University of Campinas professor Walmir Freitas delivers a talk on Brazil's smart grid

### July

50 co-op students spend the day at CUE as part of an IESO field trip

### August

RuggedCom founder Marzio Pozzuoli shares his story with budding energy entrepreneurs

### September

On a day of worldwide climate action, CUE takes part in the People's Climate Forum

### October

The future of local distribution companies is the focus of a CUE-sponsored conference

### November

Many CUE speakers at the 2014 Association of Power Producers of Ontario conference

### December

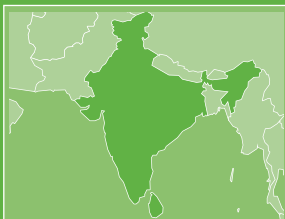
The *Energy Meets Big Data* breakfast panel features experts from IBM and Cisco Systems





## GLOBAL REACH

Striving to become a global leader has always been at the heart of CUE's vision. To this end, in 2014 we continued to cultivate partnerships with leading technical institutions and prominent industry partners and collaborated with the brightest and best researchers from around the world. Highlights included:



### India

CUE continued its partnership with Anna University in Chennai, India by welcoming three students from the university's Power Engineering and Management master's program. Anusree Thattiyot, Meera Arigi and Priyadharshini Natarajan were each awarded \$5,000 scholarships. Supervised by Bala Venkatesh, they conducted research at CUE in the summer of 2014.



### Germany

CUE partnered with the Waterloo Institute for Sustainable Energy to welcome eminent scientist and researcher Professor Joachim Knebel from Karlsruhe Institute of Technology for a sold-out talk on Germany's energy transition: a world-leading move towards renewable energy and hyper-efficiency known as the *Energiewende*.



### Southeast Asia

CUE hosted its largest foreign delegation yet in June 2014. Attendees included Ed Fast, Canada's Minister of International Trade, along with delegates from the Association of Southeast Asian Nations. These included ministers, government officials and business representatives from 10 different countries: Brunei, Myanmar, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam.



### Brazil

As part of the Science without Borders (SwB) program, eight Brazilian interns from the Federal Technological University of Paraná and the University of São Paulo were placed with iCUE startups during the summer. SwB encourages Brazilian students to study internationally in the subjects of science, technology, engineering and mathematics.



## INTERNSHIPS

CUE offers numerous internship opportunities to Ryerson students from a variety of programs and many students have gone on to work in the energy sector. More than 40 interns have worked at CUE since its inception and we're extremely proud of their achievements since leaving CUE. Here are stories of two such interns, Haris Saleem and Sarah Marchionda.

Haris, a civil engineering student at Ryerson, completed a four-month stint with the water resources department at Ontario Power Generation (OPG) after finishing his second year of studies at Ryerson. In the summer of 2014, he worked with the City of Toronto's water department. That fall, Haris returned to OPG in their dams and structures department in Niagara Falls, Ont. to complete another internship.

"The CUE internship was invaluable because it sharpened my understanding of the many connections between university education and employment possibilities," he says. "What I was learning in my engineering courses started to take on greater meaning and relevance as I worked my way through the internship. I should also stress how valuable I found the collaboration and the mentorship offered at CUE. And I have to think that the experience helped me obtain an internship with OPG because I had firsthand knowledge of Ontario's energy sector."

Sarah attended McGill University pursuing a bachelor of commerce degree. While at McGill, she developed an interest in urban energy issues and came to Ryerson in 2012 to pursue a postgraduate degree in urban and regional planning. Sarah now works with Quality Urban Energy Systems of Tomorrow (QUEST) on a number of projects related to planning and energy policy.

"I applied to CUE because I thought it would be an excellent complement to my area of study," she says. "I was interested in energy policy issues – things like conservation, smart grid, renewable energy and electric cars – and wanted to enrich my knowledge base and develop skills that would prepare me for my career. Honestly, my experience as a CUE intern far exceeded my expectations. CUE not only provided me with an opportunity to research topics that I was interested in, but I also received a highly unique mentorship experience.

"The practical nature of the CUE student internships, has had – and will continue to have – lasting benefits for me and my career. My experience at CUE introduced me to many current issues facing the energy sector, particularly as they relate to land-use planning, and allowed me to find a niche that I am very passionate about.

"Probably the most valuable take-away from my experience at CUE was the opportunity it provided for me to meet important members of the energy sector. I was able to attend panel discussions, roundtables, workshops and other industry events through which I built a strong professional network. I had the chance to meet and share ideas with many interesting people in the energy sector – from student researchers, to founders of startup companies to senior energy sector executives."





PLUGNDRIVE.CA



Stay up-to-date with CUE activities in 2015:

Sign up for our monthly email newsletter at [ryerson.ca/cue](http://ryerson.ca/cue)



**Centre for Urban Energy**  
*Energizing the Future*

**Location**

147 Dalhousie Street  
 Toronto, ON M5B 2R2

**Mailing Address**

350 Victoria Street  
 Toronto, ON M5B 2K3

**More Information**

416-979-5000 x2974  
 cueinfo@ryerson.ca



/CentreForUrbanEnergy



@RyersonCUE

[ryerson.ca/cue](http://ryerson.ca/cue)

**Paper Performance:**

This report was printed using 610 lbs of Rolland Enviro100 Print 100% post-consumer paper.  
 By choosing environmentally friendly paper, we have achieved the following savings:

					
<b>5 trees</b>	<b>18,934 L of water</b> 54 days of water consumption	<b>232 kg of waste</b> 5 waste containers	<b>763 kg CO2</b> 5,101 km driven	<b>5 GJ</b> 21,041 60W light bulbs for one hour	<b>1 kg NOX</b> emissions of one truck during 3 days



**zerofootprint™**



Printer is ISO 14001 certified.

**RYERSON UNIVERSITY**