



UNIVERSITY **POLITEHNICA** OF BUCHAREST

## Bucharest 2018

# Symposium on Microgrids

---

Bucharest, 2-6 September 2018



<http://microgrid-symposiums.org>

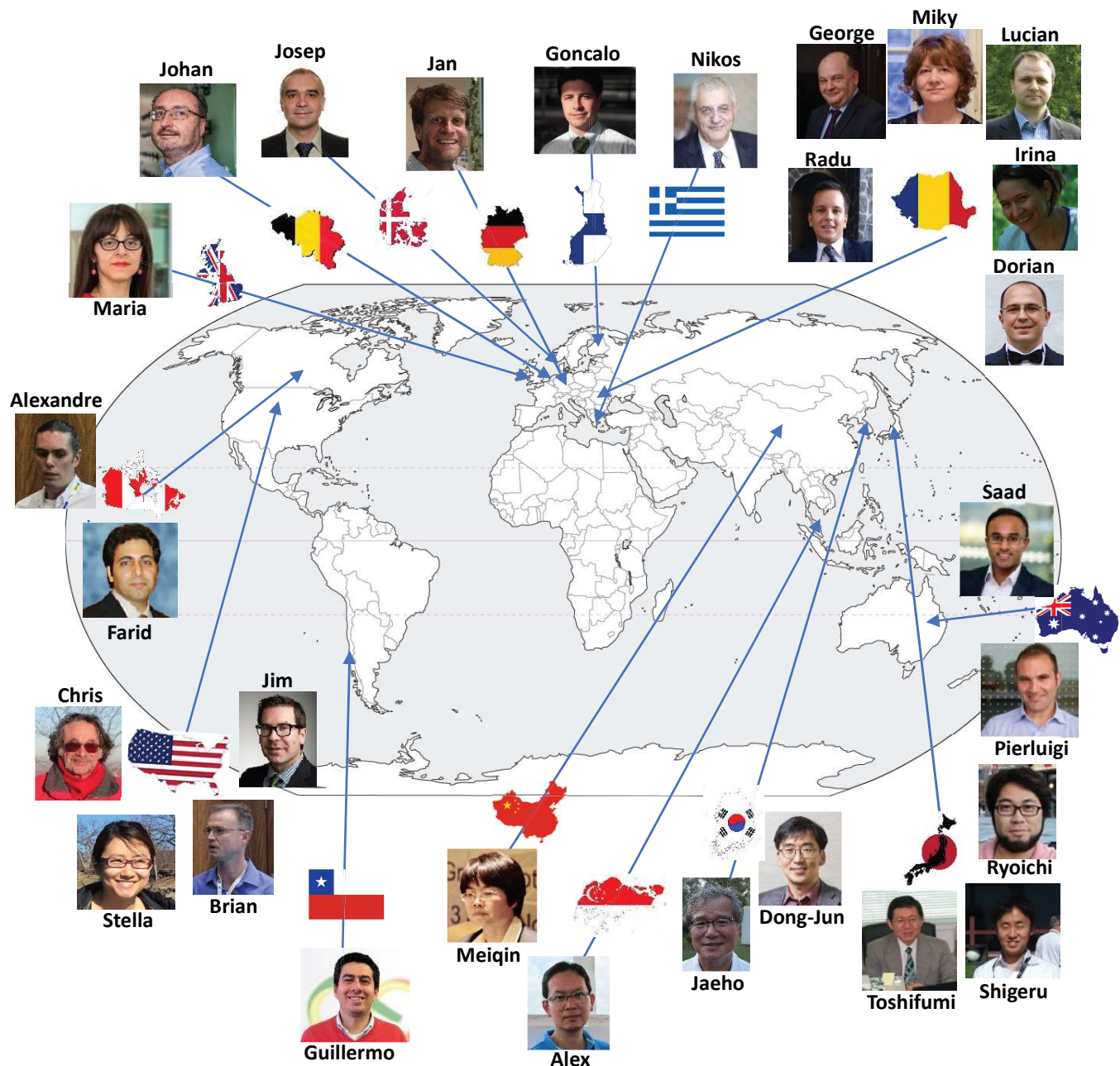
[www.upb.ro](http://www.upb.ro)

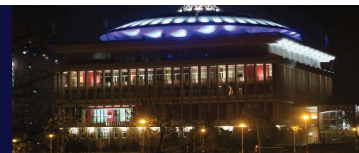


# BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

2 - 6 September 2018





## International Microgrid Symposium Steering Committee

### Leadership

<b>Nikos Hatziargyriou (Steering Committee Chair)</b>	NTUA & HEDNO
<b>Mihaela Albu (Bucharest Symposium Co-Chair)</b>	University Politehnica of Bucharest
<b>Maria Brucoli (Bucharest Symposium Co-Chair)</b>	EdF Energy R&D
<b>Ryoichi Hara (Prior Steering Committee Chair)</b>	Hokkaido University
<b>Pierluigi Mancarella (Prior Symposium Co-Chair)</b>	University of Melbourne
<b>Saad Sayeef (Prior Symposium Co-Chair)</b>	CSIRO

### Europe, Middle East & Africa

<b>Mihaela Albu (Europe Lead)</b>	University Politehnica of Bucharest
<b>Nikos Hatziargyriou</b>	NTUA & HEDNO
<b>Johan Driesen</b>	K.U. Leuven
<b>Maria Brucoli</b>	EdF Energy R&D
<b>Josep Guerrero</b>	Aalborg University
<b>Goncalo Mendes</b>	Lappeenranta University of Technology
<b>Jan von Appen</b>	Fraunhofer IEE

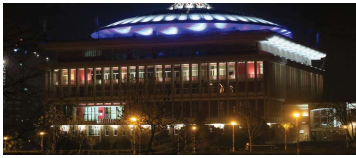
### The Americas

<b>Jim Cale (Americas Lead)</b>	Colorado State University
<b>Farid Katiraei</b>	Quanta Tech.
<b>Chris Marnay</b>	Berkeley Lab & MgDoM
<b>Guillermo Jimenez</b>	University of Chile
<b>Alexandre Prieur</b>	NRCan
<b>Brian Miller</b>	NREL
<b>Dave Turcotte (Acting Member)</b>	NRCan

### Asia & Oceania

<b>Dong-Jun Won (Acting Asia Lead)</b>	Inha University
<b>Jaeho Choi</b>	Chungbuk National University
<b>Shigeru Bando</b>	CRIEPI
<b>Saad Sayeef</b>	CSIRO
<b>Meiqin Mao</b>	Hefei University of Technology
<b>Alex Chong</b>	A*STAR
<b>Ryoichi Hara</b>	Hokkaido University
<b>Toshifumi Ise</b>	Osaka University
<b>Pierluigi Mancarella</b>	University of Melbourne





## BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

2 - 6 September 2018

The organizing committee would like to thank the following sponsors of the Bucharest 2018 Symposium on Microgrids for their generous contribution.



### DO YOU WORK WITH MICROGRIDS AND NEED A SOLUTION FOR:

- Understanding how renewable generation affect grid stability
- Verifying and improving microgrid network models
- Measuring and understanding the complex and dynamic power flows in distribution and microgrids
- Measuring cable impedances for precise fault locations
- Detecting remote rehearsals of cyber-attacks on substations

Then you need the microPMU which provides measurements with millidegree accuracy and micro-second resolution for your microgrid applications

To learn more, please visit:

[www.powerstandards.com/microPMU](http://www.powerstandards.com/microPMU)



RTDS Technologies Inc., the exclusive supplier of the RTDS® Simulator, has been the world standard of real time digital power system simulation for over 20 years.

More than 350 organizations use the RTDS Simulator worldwide, with over 1500 units in service. Electric power utilities, equipment manufacturers, research institutes, and universities in 43 countries around the world use the Simulator for power system studies and closed loop testing of protection and control equipment.

RTDS Technologies is constantly updating the Simulator's capabilities to reflect the changing technologies of the power industry. Today, the RTDS Simulator has been used for microgrid and DER simulation and testing, cyber security analysis and assessment, power-hardware-in-the-loop studies, MMC-based schemes, wide area protection using phasor measurement units, and much more.

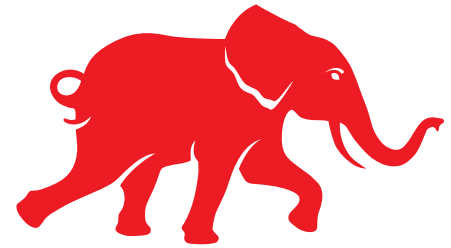
Learn more about the RTDS Simulator at [www.rtds.com](http://www.rtds.com)



The organizing committee would like to thank the following sponsors of the Bucharest 2018 Symposium on Microgrids for their generous contribution.

Typhoon HIL Inc. is the market and technology leader in the rapidly-growing field of ultra-high-fidelity controller-Hardware-in-the-Loop (C-HIL) simulation for power electronics, microgrids, and distribution networks. We provide industry-proven, vertically integrated test solutions along with highest-quality customer support. The company was founded in 2008 and since then has been creating products distinguished by the ultimate ease of use, unrivaled performance, leading-edge technology, and affordability.

Designed with love, from ground up, Typhoon HIL tools offer a unique user experience, free of third party software and hardware complexities. As a result, Typhoon HIL Control Center with all the libraries installs with a single click, models compile in seconds, digital inputs are sampled with a 20 ns resolution, and real-time simulation runs with a time step as low as 500 ns on all Typhoon HIL products. To learn more, please visit [www.typhoon-hil.com](http://www.typhoon-hil.com)



## Typhoon HIL



# SIEMENS

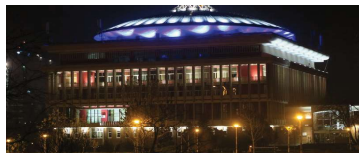
*Ingenuity for life*



THE POWER OF KNOWLEDGE

# RONEXPRIM

WE DELIVER PERFORMANCE



# BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

2 - 6 September 2018

## Agenda for the BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

### Sunday 02 September– Pre-Symposium Activities

UPB Rectorat Building, Hall AN

14:30-19:00 Registration opens

16:00-17:00 Tour UPB labs

17:00-19:00 Welcome Reception

### Monday 03 September – Morning Session

UPB Rectorat Building AN010

09:00-09:05 Mihaela Albu (University Politehnica of Bucharest) & Maria Brucoli (EDF Energy R&D), Symposium Co-Chairs  
**Welcome to Bucharest**

09:05-09:20 Anton Anton (Minister of Energy, Romania) & Ioan Dumitrache (General Secretary of Romanian Academy)  
**Official Opening of the Bucharest 2018 Symposium on Microgrids**

09:20-09:30 Nikos Hatziargyriou (NTUA & HEDNO), International Steering Com. Chair  
**The Microgrid Symposium Tradition**

### 09:30-11:00 EUROPE Session 1

**Chairs:** Diana Strauss-Mincu (DERlab eV & Fraunhofer IEE) & Samuli Honkapuro (Lappeenranta University of Technology)

09:30-09:50 Nikos Hatziargyriou (NTUA & HEDNO)  
**The Future of Microgrids in the 2050 ETIP-SNET Vision**

09:50-10:00 Discussion

10:00-10:20 Christian Dumbs (ENEDIS)  
**Embedded Microgrids Within the InterFlex Project**

10:20-10:30 Discussion

10:30-10:50 Josep Guerrero (University of Aalborg)  
**Maritime Microgrids**

10:50-11:00 Discussion

11:00-11:30 Coffee Break

### 11:30-12:30 EUROPE Session 2

**Chairs:** Goran Strbac (Imperial College) & Jan Von Appen (Fraunhofer IEE)

11:30-11:50 Goncalo Mendes (Lappeenranta University of Technology)  
**LUT Developments on Microgrids-related Research**

11:50-12:00 Discussion

12:00-12:20 Enrico De Tuglie (Politecnico di Bari)  
**The Prince Lab Microgrid Test Bed**

12:20-12:30 Discussion

12:30-13:30 Lunch

# BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

2 - 6 September 2018



## Monday 03 September – Afternoon Session

UPB Rectorat Building AN010

### 13:30-15:30 THE AMERICAS Session

**Chairs: James Cale (Colorado State University) &  
Farid Katiraei (Quanta Technology)**

13:30-13:50 Farid Katiraei (Quanta Technologies) – Canada  
Goncalo Cardoso (Berkeley Lab) – United States  
Felipe Valencia (University of Chile) - Central and South America  
**Overview of Microgrids in The Americas**

13:50-14:00 *Discussion*

14:00-14:20 Mohammad Shahidehpour (IIT, Chicago)  
**Transactive Energy in Networked Microgrids**

14:20-14:30 *Discussion*

14:30-14:50 Alex McEachern (Power Standards Lab)  
**The Future of Stability Measurements on Microgrids**

14:50-15:00 *Discussion*

15:00-15:20 Anurag Srivastava (Washington State University)  
**Measuring and Enabling Resiliency in Microgrids**

15:20-15:30 *Discussion*

15:30-15:45 **Group Photo Shoot**

15:45-16:00 **Short Break**

### 16:00-17:30 PANEL Session : Local Energy Communities

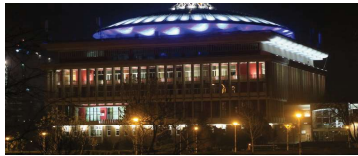
**Chairs: Chris Marnay (Berkeley Lab & MgDoM) & Hiroshi Asano (CRIEPI)**

16:00-17:30 Hirohisa Aki (University of Tsukuba)  
Mahesh Bhav (NTPC Bus. School)  
Maria Brucoli (EdF Energy R&D)  
Hyeyoon Jeong (KDN)  
Pierluigi Mancarella (University of Melbourne)  
Mihai Sanduleac (UPB)  
Mohammad Shahidehpour (IIT, Chicago)  
Ioannis Vlachos (NTUA)  
Nan Zhou (Berkeley Lab)

17:30-18:00 **Move to Hotels**

19:30-22:30 **Symposium Dinner**

**“Hanu' lui Manuc” Restaurant (Bucharest Old Town)**



# BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

2 - 6 September 2018

## Tuesday 04 September – Morning Session

UPB Rectorat Building AN010

**09:30-10:30 POSTER Introduction Session**

**Chairs: Maria Brucoli (EdF Energy R&D) & Shigeru Bando (CRIEPI)**

09:30-10:30 Each poster presenter gives a 3 min teaser

10:30-11:30 **Coffee break and poster viewing**

**11:30-12:30 PANEL session: Emerging Microgrid Technologies**

**Chairs: Mohammad Shahidehpour (IIT, Chicago) & Lucian Toma (UPB)**

11:30-12:30  
 Petru Ruset (Siemens Romania)  
 Arunprasanth Sakthivel (RTDS)  
 Martti Ylikoski (Nokia)  
 Andreas Eberhard (PSL)  
 Paul Roege (Typhoon HIL)  
 Tilo Buehler (ABB)  
 Jason Qin (Microgrid Lab)  
 Luis Manuel Alves (EDP Distribution)

12:30-13:30 **Lunch**

## Tuesday 04 September – Afternoon Session

UPB Rectorat Building AN010

**13:30-15:30 ASIA Session**

**Chairs: Saad Sayeef (CSIRO) & Alex Chong (A\*STAR)**

13:30-13:50 Pierluigi Mancarella (University of Melbourne) &  
 Meiqin Mao (Hefei University of Technology)

**Overview of Microgrids in Asia**

13:50-14:00 *Discussion*

14:00-14:20 Zhaoxia Xiao (Tianjin Polytechnic University)

**Coordination Control of Shipboard Microgrids**

14:20-14:30 *Discussion*

14:30-14:50 Markson Tang (Daily Life)

**Off-grid Microgrid Projects in Southeast Asia**

14:50-15:00 *Discussion*

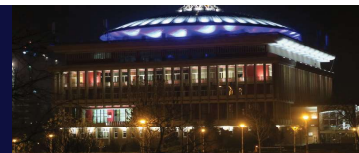
15:00-15:20 Hak-Man Kim (Incheon National University)

**Resilient Hybrid Technology for High-Value Microgrids (RHYTHM)**

15:20-15:30 *Discussion*

15:30-16:00 **Break**





## 16:00-18:00 REMOTE Session

**Chairs: Xavier Vallve (TTA) & Ryoichi Hara (Hokkaido University)**

16:00-16:15 Dongjun Won (Inha University)

**DC Island Microgrid in Korea**

16:15-16:20 Discussion

16:20-16:35 Saikat Chakrabarti (Indian Institute of Technology, Kanpur)

**Development of a Smart Microgrid R&D Platform in the Indian Context**

16:35-16:40 Discussion

16:40-16:55 Michael Ross (Yukon College) & Farid Katiraei (Quanta Technology)

**Practical Considerations for Remote Microgrid Design and EMS**

16:55-17:00 Discussion

17:00-17:15 Arnaud Henin (Gommyr)

**Solar-Battery Microgrids vs. Solar Home Systems**

17:15-17:20 Discussion

17:20-17:35 Chun-Der Chang (CHEM)

**Penghu Dongjiyu Microgrid Enhancement**

17:35-17:40 Discussion

17:40-17:55 Heleno Sanches (ECREEE)

**Hybrid Microgrids in Cabo Verde**

17:55-18:00 Discussion

## 18:00-18:30 Closing Session

### Back-Up Speakers

*Suitable for session: Asia*

Hirohisa Aki (University of Tsukuba)

**Higashi Matsushima Resilient Community**

*Suitable for session: Europe*

Mihai Sanduleac (UPB)

**Enabling Microgrids by Rhizomes of the EU Nobelgrid project**

Maria Brucoli (EdF R&D)

**CommUNITY: Brixton Commercial Non-Wires Microgrid**

Jan von Appen (Fraunhofer IEE)

**New Approaches for Energy Management and Grid Integration for DER**

*Suitable for session: The Americas*

Chris Lute (NREL)

**Microgrid Projects in Central America**

Chris Marnay (Berkeley Lab)

**DC Distribution in Buildings**

*Suitable for session: Remote*

Kostas Latoufis (NTUA)

**Hybrid PV/Wind Minigrids for Rural Community Energy Projects**



# BUCHAREST 2018 SYMPOSIUM ON MICROGRIDS

University Politehnica of Bucharest

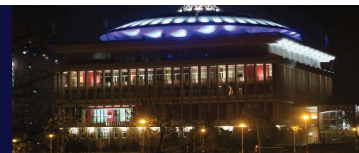
2 - 6 September 2018

## Wednesday 5 September – Symposium Technical Tour

08:20	Bus departure from UPB (river gate)
08:50	Bus departure from Unirii Square (Metropoliei Hill)
12:15	Arrival in Constanta
12:15-13:15	Lunch
16:00	Arrival in Tulcea
19:00	Dinner

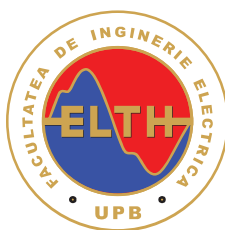
## Thursday 6 September – Symposium Technical Tour

08:00	Departure from Tulcea for the smart metering infrastructure visit (Delta boat trip)
13:10-14:30	Lunch
17:30	Bus departure from Tulcea
21:00	Arrival in Bucharest



## Local Organizing Committee

<b>Mihaela Albu (Chair)</b>	University Politehnica of Bucharest
<b>Maria Brucoli</b>	EdF Energy Research
<b>Goncalo Mendes</b>	Lappeenranta University of Technology
<b>Lucian Toma</b>	University Politehnica of Bucharest
<b>Stella Wang</b>	KAYAK
<b>Radu Plamanescu</b>	University Politehnica of Bucharest
<b>George Darie</b>	University Politehnica of Bucharest
<b>Irina Ciornei</b>	University Politehnica of Bucharest
<b>Cornel Chira</b>	University Politehnica of Bucharest
<b>Dorian-Octavian Sidea</b>	University Politehnica of Bucharest



# Bucharest 2018 Symposium on Microgrids

<http://microgrid-symposiums.org>



UNIVERSITY **POLITEHNICA** OF BUCHAREST