

# Energy, Cities, and the Control of Complex Systems

May 12-14, 2014 – Erice, Sicily – Italy

## Sunday, May 11

9:00 – 18:00 Registration

19:45 Dinner

## Monday, May 12

9:00 – 9:30 Opening Remarks (Co-chair Robert Schock)

9:30 – 10:00 Aristides Patrinos  
*Introduction – The Promise of Urban Science*

10:00 – 10:30 Arnulf Grübler  
*An Assessment of Urban Energy Systems*

10:30 – 10:45 Discussion

10:45 – 11:15 Coffee Break

11:15 – 11:45 Kurt Yeager  
*The Microgrid Revolution*

11:45 – 12:15 Adilson E. Motter  
*Stability and Control of Synchronization in Power-Grid Networks*

12:15 – 12:30 Discussion

12:30 – 14:30 Lunch

14:30 – 15:00 Santo Fortunato  
*Complex Networks: The Importance of Structure*

15:00 – 15:30 Guido Caldarelli  
*Self-healing Networks: Redundancy and Structure*

15:30 – 15:45 Discussion

15:45 – 16:15 Coffee Break

16:15 – 16:45 Moshe Ben-Akiva  
*Future Urban Mobility: Tools and Solutions*

16:45 – 17:15 Marc Barthelemy  
*Modelling Mobility Patterns and Scaling in Cities*

17:15 – 17:45 Ennio Cascetta  
*Urban Mobility Systems: Complexity, Models and Eco-rational Choices*

17:45 – 18:00 Discussion

19:45 Dinner

## Tuesday, May 13

- 9:00 – 9:30 Anna Nagurney  
*Sustainable Supply Chain Networks for Sustainable Cities*
- 9:30 – 10:00 Steve Dorey  
*Energy and Urban Innovation in Toronto*
- 10:00 – 10:15 Discussion
- 10:15 – 10:45 Coffee Break
- 10:45 – 11:15 Sean Cornelius  
*Controlling Cascades in Complex Networks*
- 11:15 – 11:45 Ekehard Schöll  
*Control of Complex Network Dynamics: Spontaneous Symmetry-breaking, Coherence-incoherence Transitions, and Chimera Death*
- 11:45 – 12:15 Jie Sun  
*Identification and Scheduling of Interventions to Control Network Crises*
- 12:15 – 12:30 Discussion
- 12:30 – 14:30 Lunch
- 14:30 – 15:00 P. K. Agarwal  
*Enhancing Power Grid Reliability through Synchrophasor Measurements*
- 15:00 – 15:30 Yoshiaki Shibata  
*Residential Distributed Energy Systems*
- 15:30 – 15:45 Discussion
- 15:45 – 16:15 Coffee Break
- 16:15 – 16:45 Henrik Madsen  
*Intelligent Energy Systems Integration in Cities*
- 16:45 – 17:15 Hemendra Agrawal  
*Development of Smart Grid/Cities in the Indian Sub-Continent: Issues and Challenges*
- 17:15 – 17:45 Dirk Witthaut  
*Stability, Decentralization and Braess' Paradox in Oscillator Models for Power Grid Operation*
- 17:45 – 18:00 Discussion
- 19:45 Dinner

## Wednesday, May 14

- 9:30 – 10:00 Kimberly Gray  
*Coupling Cycles of Energy, Water and Land Use to Reinvent the Urban Landscape*
- 10:00 – 10:30 Hyejin Youn  
*Cities: Emergence of Order*
- 10:30 – 10:45 Discussion
- 10:45 – 11:15 Coffee Break
- 11:15 – 11:45 Francesco Calabrese  
*Understanding Urban Dynamics from Digital Traces*
- 11:45 – 12:15 Matei Georgescu  
*Shaping the Cities of Tomorrow: Integrating Local Adaptation within an Environmental and Energy Framework*
- 12:15 – 12:30 Discussion
- 12:30 – 14:30 Lunch
- 14:30 – 14:40 Energy Rapporteur (Schock)
- 14:40 – 14:50 Cities Rapporteur (Dorey)
- 14:50 – 15:00 Complex Systems Rapporteur (Motter)
- 15:00 – 16:00 Roundtable (Ben-Akiva, Gray, Grübler, Nagurney, Yeager)  
*Potential Applications and Priorities*  
*Limitations of Existing Approaches*  
*Priorities for Research, Development and Demonstration*  
*Tools for City Managers*  
*Next Steps*
- 16:00 – 16:15 Closing Remarks (Co-chairs)
- 19:45 Farewell Dinner

## Invited Participants

- P. K. Agarwal, Power System Operation Corporation Ltd., India
- Hemendra Agrawal, Power Grid Corporation of India Ltd., India
- Marc Barthelemy, Institut de Physique Théorique, France
- Moshe Ben-Akiva, Massachusetts Institute of Technology, USA
- Francesco Calabrese, IBM Research, Ireland
- Guido Caldarelli, IMT Alti Studi Lucca, Italy
- Ennio Cascetta, Università degli Studi di Napoli Federico II, Italy
- Sean Cornelius, Northeastern University, USA
- Steve Dorey, Waterloo Institute for Sustainable Energy, Canada
- Santo Fortunato, Aalto University, Finland
- Matei Georgescu, Arizona State University, USA
- Kimberly Gray, Northwestern University, USA
- Arnulf Grübler, International Institute for Applied Systems Analysis, Austria
- Henrik Madsen, Technical University of Denmark, Denmark
- Anna Nagurney, University of Massachusetts, USA
- Aristides Patrinos, Center for Urban Science and Progress, USA
- Eckehard Schöll, Technische Universität Berlin, Germany
- Yoshiaki Shibata, Institute of Energy Economics, Japan
- Jie Sun, Clarkson University, USA
- Dirk Witthaut, Max Planck Institute for Dynamics and Self-Organization, Germany
- Kurt Yeager, Galvin Electricity Initiative, USA
- Hyejin Youn, University of Oxford, United Kingdom

## Co-Chairs

- Adilson E. Motter, Northwestern University, USA, [motter@northwestern.edu](mailto:motter@northwestern.edu)
- Robert Schock\*, Center for Global Security Research, USA, [bob@bontekoe.net](mailto:bob@bontekoe.net)

\* Energy Permanent Monitoring Panel Co-Chair, World Federation of Scientists, Switzerland