# Energy Systems Integration in smart buildings, communities and microgrids

## The University of Melbourne, Melbourne, Australia
## 21st-22nd March 2017

Matthei room, University House, 1 Professors' Road, The University of Melbourne
https://maps.unimelb.edu.au/parkville/building/112

*Organised by **The University of Melbourne** and the*
***International Institute for Energy Systems Integration (iiESI)***

## Workshop background

Decrease in cost of distributed renewable energy sources (e.g., PV) and energy storage and the ubiquitous penetration of ICT technologies are rapidly changing the power and energy system landscape. Furthermore, the rise of the smart grid control-oriented philosophy as opposed to the "conventional" asset-based one to facilitate development of a low carbon energy system is creating new opportunities for end-users to play a more active role in system and market operations. In this context, concepts such as smart buildings, smart districts, community based energy systems, and microgrids are rapidly developing throughout the world and represent a perfect example of Energy Systems Integration (ESI) as an evolving paradigm for future energy systems and exciting emerging research area. More specifically, ESI can be appreciated here from manifold perspectives, for example integration of multiple energy vectors in a multi-energy system context (e.g., electricity, heat, cooling, gas, etc.), integration of energy and ICT technologies, integration of "distributed" and "centralised" power and energy systems, integration of consumers and producers, and so forth. In the light of the above, the aim of this workshop, organised in collaboration between the Melbourne Energy Institute at the University of Melbourne and the International Institute for Energy Systems Integration, is to present and discuss some of latest developments, challenges and opportunities in the ESI area with focus on applications in buildings, districts communities, and microgrids.

# Agenda

## *Day 1*

The first day will involve presentations and discussions on technical (morning) and socio-economic (afternoon) aspects of smart buildings, districts, communities and microgrids.

8.30 – 9.00 Registration, Tea & Coffee

9.00 – 9.15 Welcome and opening – Pierluigi Mancarella, The University of Melbourne

9.15 – 9.30 Workshop objectives - Mark O'Malley, University College Dublin, Ireland

*AM Session: Technical aspects*
Chair: Mark O'Malley, University College Dublin, Ireland
The first morning session will cover technical aspects associated to energy systems integration at the level of smart buildings, districts, communities and microgrids.

9.30 – 10.00 "Probabilistic energy forecasting for smart grids and buildings" - Rob Hyndman, Monash University, Melbourne, Australia

10.00 – 10.30 "Technical, financial and environmental analysis of a small scale, grid connected, hybrid power plant" - Michael Brear, The University of Melbourne

10.30 – 11.00 "Integrating PV and storage in communities: distribution network challenges and smart grid solutions" – Nando Ochoa, The University of Melbourne

11.00 – 11.30 Coffee Break

11.30 – 12.30 *Discussion*: "What are the technical gaps and challenges in understanding and modelling for ESI in districts, communities and microgrids? What are the key technologies to be considered? What are the potential benefits? What's the role of data (for instance from smart meters)?"

12.30 – 13.30 Lunch Break

*PM Session: Socio-economic aspects*
Chair: William D'haesleer, KU Leuven, Belgium
The afternoon session will cover techno-economic and social aspects associated to energy systems integration at the level of smart buildings, districts, communities and microgrids.

13.30 – 14.00 "Integrating community energy into the Australian National Electricity Market"– Iain Macgill, University of New South Wales, Australia

14.00 - 14.30 "Socio-economic aspects of community energy systems" – Reihanna Mohideen, The University of Melbourne

14.30 - 15.00 “Integrating minigrids into communities: socioeconomic and technical considerations from real-world case studies”– Justin Harding, Ausnet Services, Australia

15.00 - 15.15 – Coffee break

15.15 – 16.00 *Discussion*: “What are the socio-economic, commercial and regulatory barriers to develop ESI-based districts, communities and microgrids? What is the role of consumers? What is the role of energy policy and regulation?”

16.00 – 16.15 *Summary and lessons learned from day 1* – Pierluigi Mancarella, The University of Melbourne

## *Day 2*

The second day will provide further insights into energy systems integration in distributed energy systems but from the perspective of the whole system (AM). Then, general discussions will be carried out before summarizing the workshop achievements and next steps.

*Whole System-level aspects*
Chair: Pierluigi Mancarella, The University of Melbourne
The morning session will cover whole system-level aspects associated with energy systems integration at the level of smart buildings, districts, communities and microgrids.

9.00 – 9.30 "Integrated modeling of active demand response with electro-thermal systems" – William D'haeseleer, KU Leuven, Belgium

9.30 – 10.00 "Planning and operating integrated energy systems" - Mark O'Malley, University College Dublin, Ireland

10.00 – 10.30 "Flexibility and system services from distributed multi-energy systems: a techno-economic assessment" – Pierluigi Mancarella, The University of Melbourne

10.30 – 11.00 Coffee break

11.00 – 12.00 *Discussion*: "What are the whole system level benefits from integrating distributed and centralised energy systems? How about integrating different energy vectors? What are the challenges? Are they technical, economic or what?"

12.00 – 13.00 Lunch

*PM session: Final discussions and workshop closing*

13.00 – 14.00 *Final discussion with relevance to Australia, and next steps* - Chair: Mark O'Malley, UCD, Ireland
The final group discussion will be centred on consolidating and summarizing the learning from the workshop, with focus on the Australian situation and recent economic and security events. The discussion will also bridge towards next steps.

14.00 – 14.15 *Workshop closing remarks* – Pierluigi Mancarella, The University of Melbourne