



IEEE Italy PES Italy Chapter Distinguished Lecture program

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Politecnico di Milano, Edificio 24, piano terra, aula Alpha, Via Camillo Golgi, 40

What, where and who?

Virtual power plants, energy communities and microgrids

Distributed Energy Resources (DER) are becoming widespread in most countries worldwide. In particular, at the household level rooftop solar photovoltaics and battery energy storage systems, and soon electric vehicles too, are poised to play an essential role towards power system decarbonisation and more consumer-centric markets. Local energy systems with shared assets such as community storage are also emerging as important options of interest. Key ongoing debates now refer to how different DER technologies and schemes should be fully integrated into power and energy system and market operation.

In this IEEE Power and Energy Society Distinguished Lecture we will present fundamental techno-economic aspects of key aggregation approaches that could enable large-scale deployment of DER, namely, virtual power plants, energy communities, and microgrids. More specifically, we will discuss the key features of these different aggregation models (“what”), under which conditions each of them should/could be considered (“where”), and potential technical and commercial opportunities and challenges for different stakeholders involved with DER development, e.g., aggregators, energy managers, distribution system operators, and so forth (“who”). Several case studies from a number of recent projects in Australia, UK, Europe, Malaysia and Chile will be used to exemplify the concepts presented.



Pierluigi Mancarella is the Chair Professor of Electrical Power Systems at The University of Melbourne, Australia, and Professor of Smart Energy Systems at The University of Manchester, UK.

He received his MSc (2002) and PhD (2006) degrees from the Politecnico di Torino, Italy, worked as a post-doc at Imperial College London, UK, and held visiting positions in the US (NREL), France (Ecole Centrale de Lille), Chile (University of Chile), and China (Tsinghua University). Pierluigi’s research interests include techno-economic modelling of low-carbon grids, multi-energy systems, energy system planning under uncertainty, and reliability and resilience of future networks.

He has been involved in/led more than 80 research projects worldwide and actively engaged with energy policy in the UK, Europe and Australia, and is author of several books and of over 400 research publications and reports.

Pierluigi is a Fellow of the IEEE; an IEEE Power and Energy Society Distinguished Lecturer; an Editor of the IEEE Transactions on Power Systems and the IEEE Transactions on Energy Markets, Policy and Regulation; the Convenor of the Cigre C6/C2.34 Working Group on “Flexibility provision from distributed energy resources”; and the inaugural Chair of the Working Group on Energy of the IEEE European Public Policy Initiative.

Pierluigi was awarded the 2017 veski Innovation Fellowship by the Victorian Government for his “FlexCity” project on multi-energy urban virtual power plants, and an international Newton Prize 2018 for his UK-Chile Newton-Picarte project on power system resilience. He also led the Melbourne Energy Institute’s work “Power system security assessment of the future National Electricity Market” for the Australian Chief Scientist’s “Finkel Review”.

Pierluigi is currently working closely with the Australian Energy Market Operator (AEMO) and the Australian Energy Market Commission (AEMC) and a number of other industry stakeholders in the development of distributed energy marketplaces and new power system security and resilience services.

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