



Workshop on Smart Grid Technologies and Implications for Inclusive Development in Sri Lanka

3-4 April 2018 • Galle, Sri Lanka

The University of Melbourne as a *Prosumer*: The Parkville Virtual Power Plant

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.

Pierluigi Mancarella

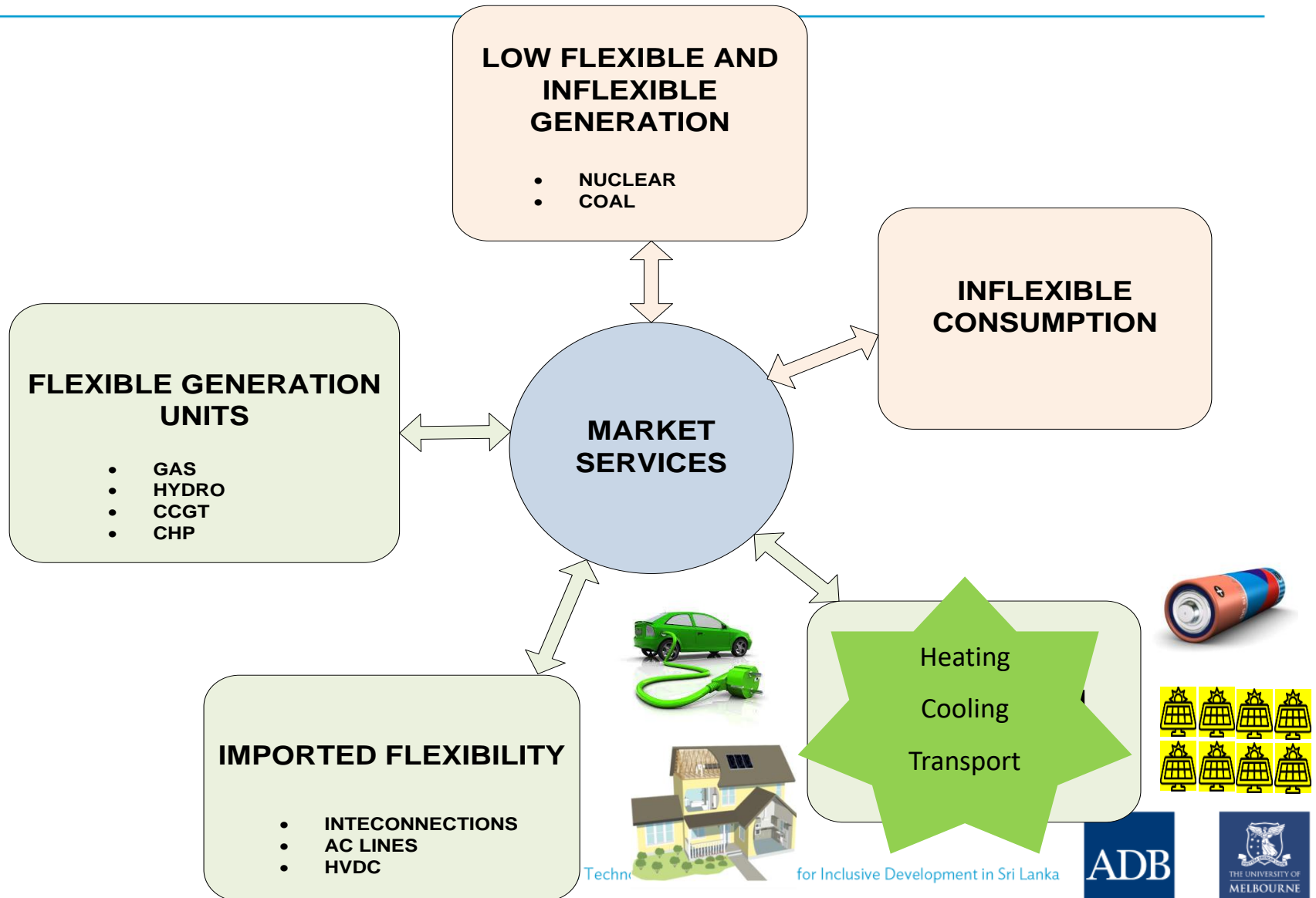
Chair of Electrical Power Systems

The University of Melbourne

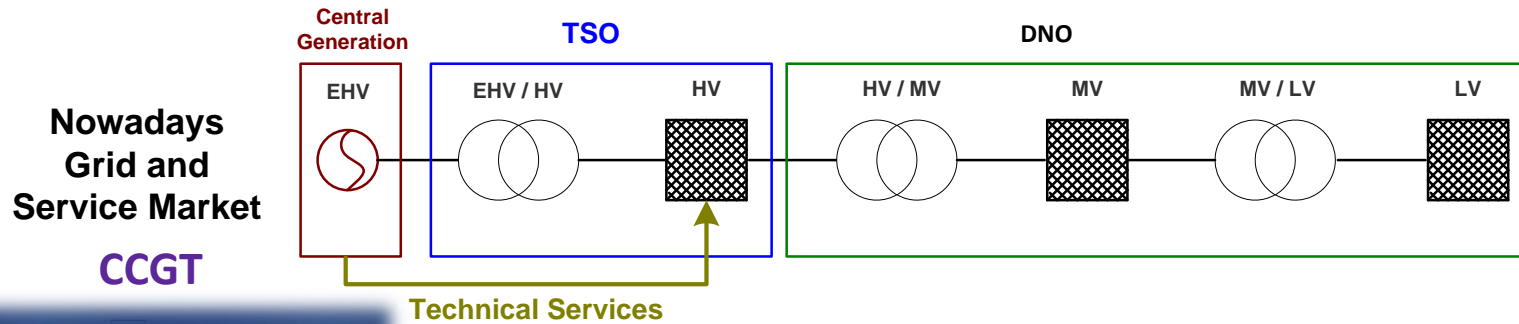
pierluigi.mancarella@unimelb.edu.au



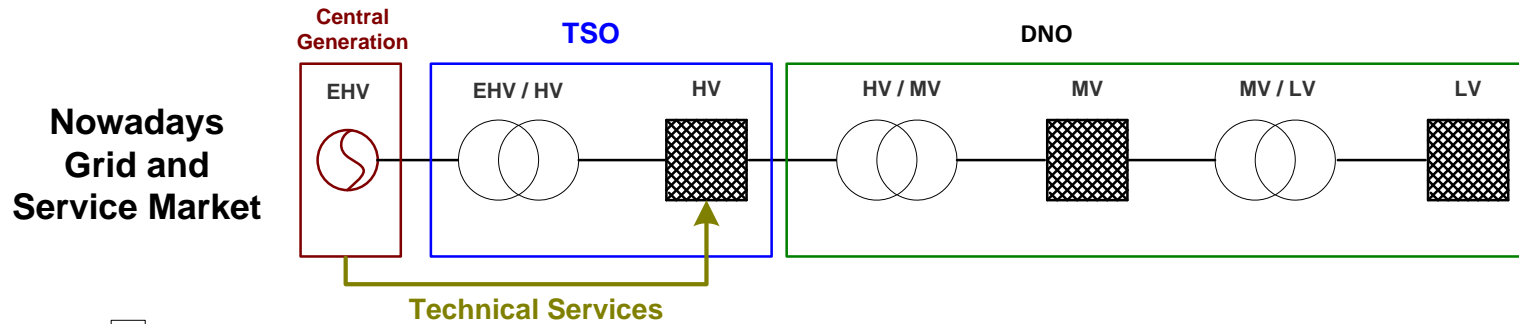
Prosumers and reliability



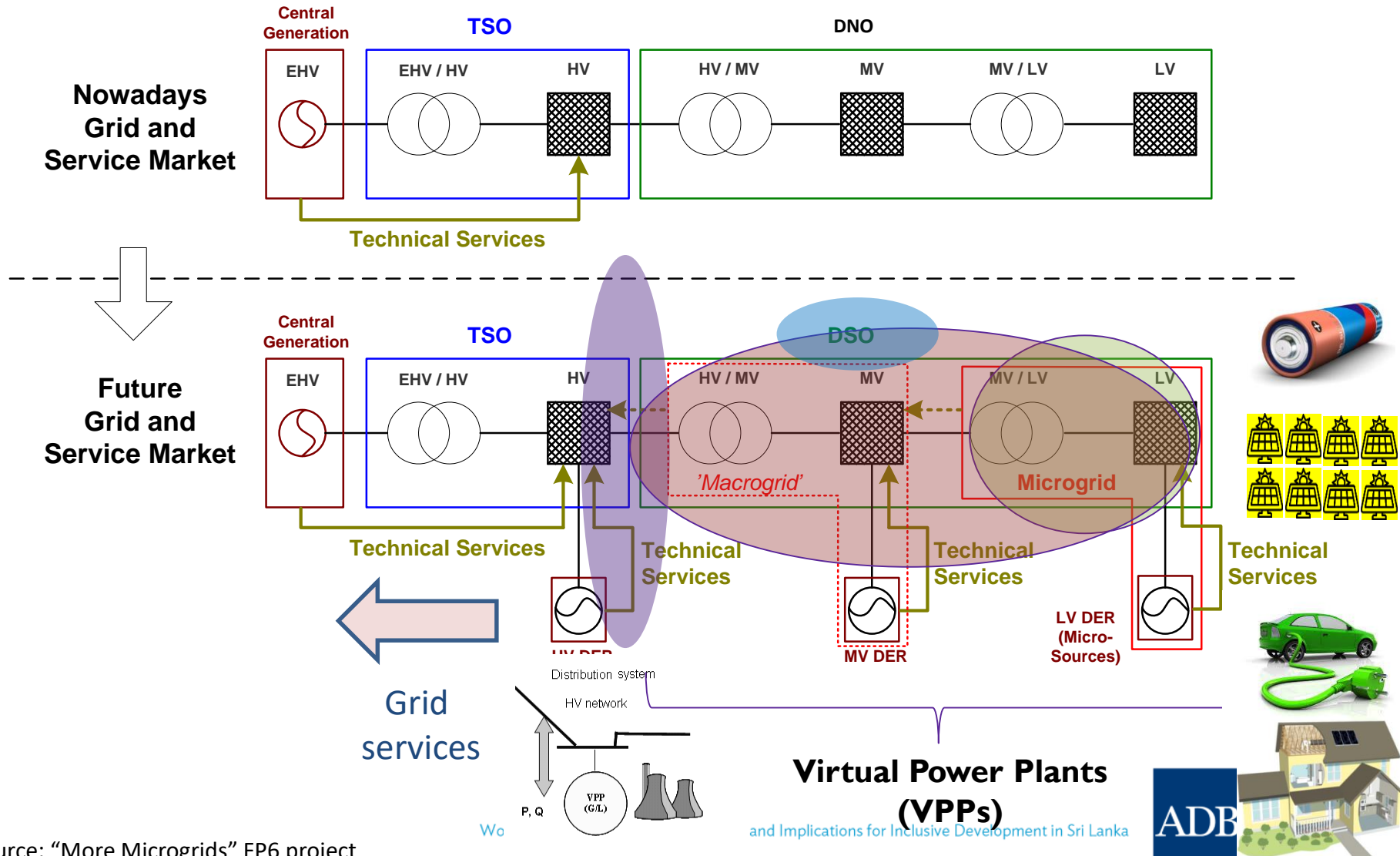
From current system architectures...



... to future system architectures



... to future system architectures

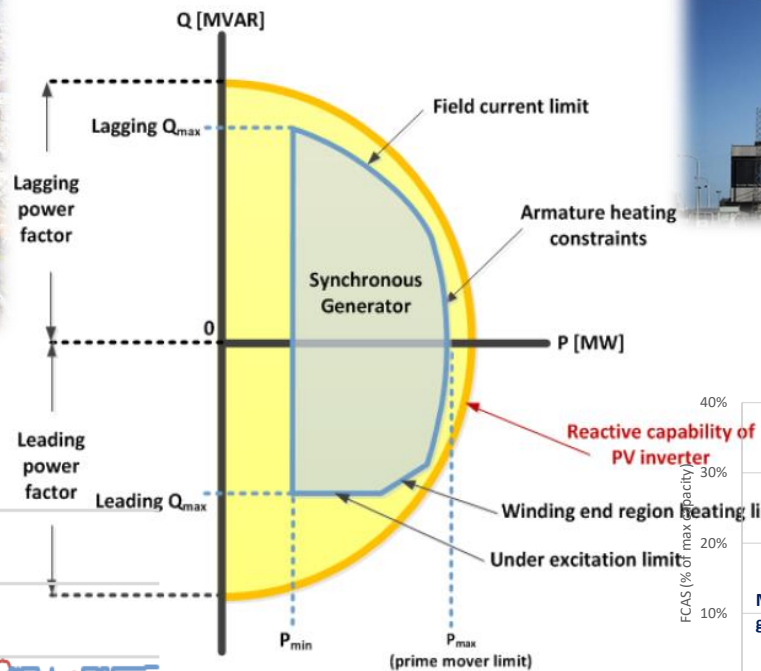
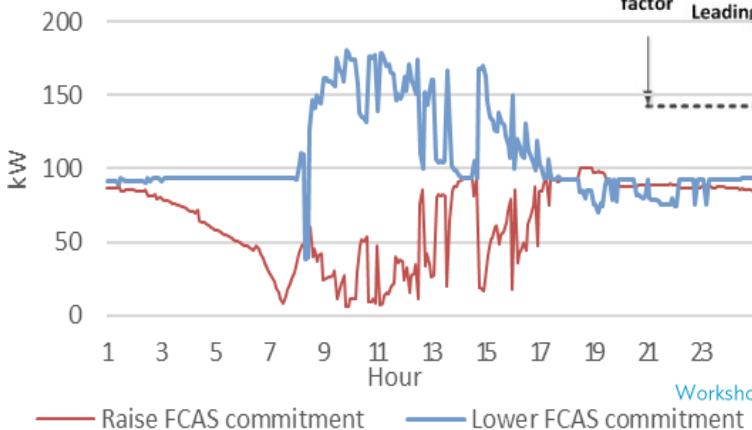


The UoM VPP

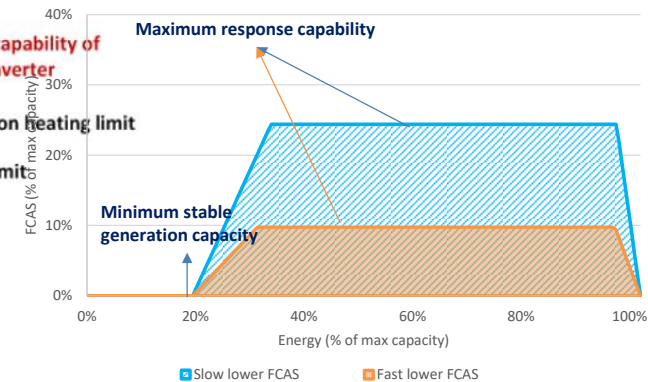
UoM VPP



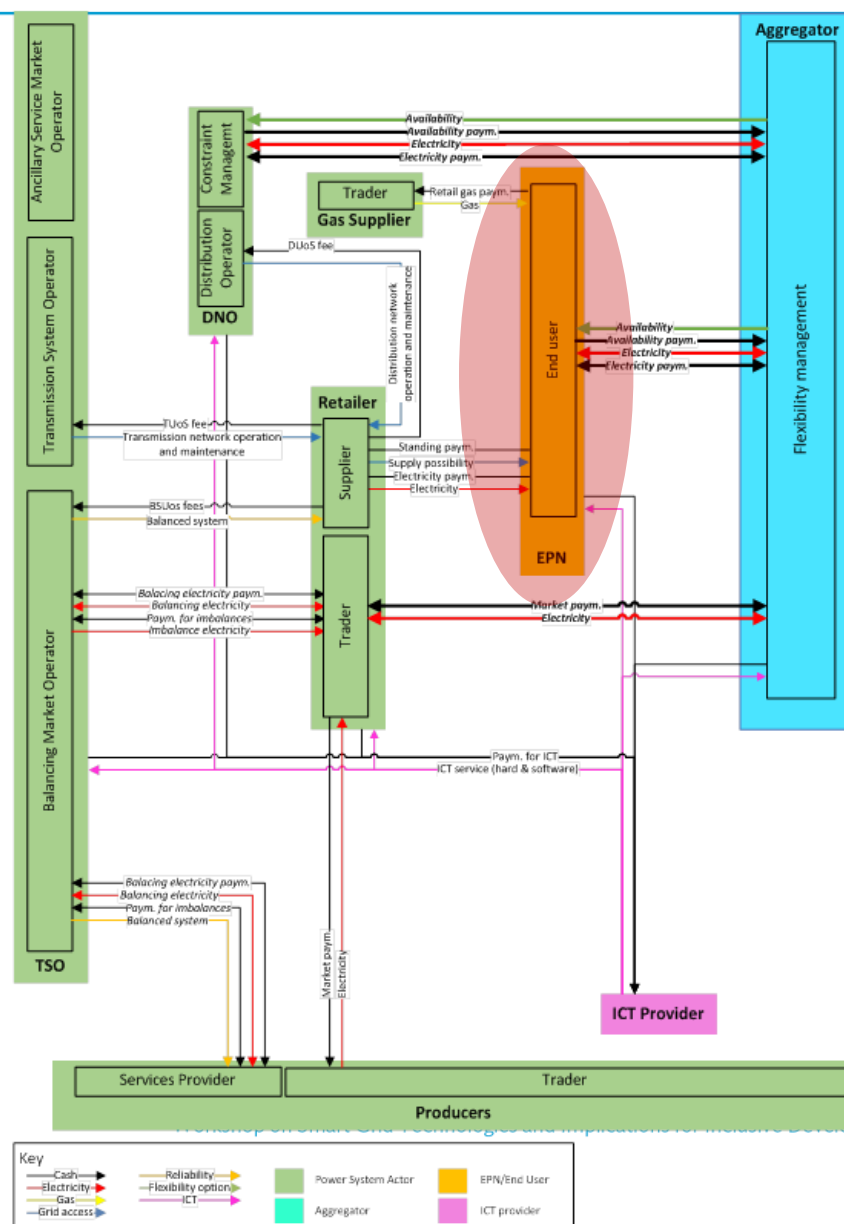
FFR capability example



CCGT



Prosumers, affordability and business case

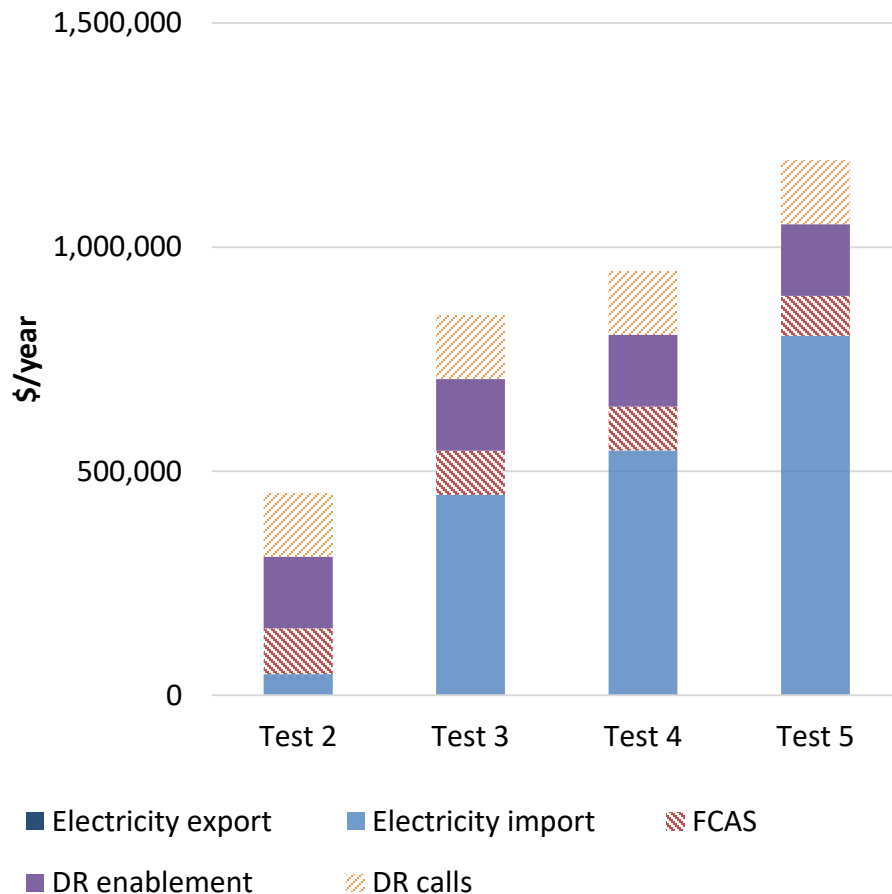


Distributed energy at edge of the value chain: Challenges & Opportunities

A. Monti, D. Persch, K. Ellis, K. Kouramas, and P. Mancarella (eds.), "Energy positive neighborhoods and smart energy districts: methods, tools and experiences from the field", Elsevier, September 2016

Annual savings: preliminary results

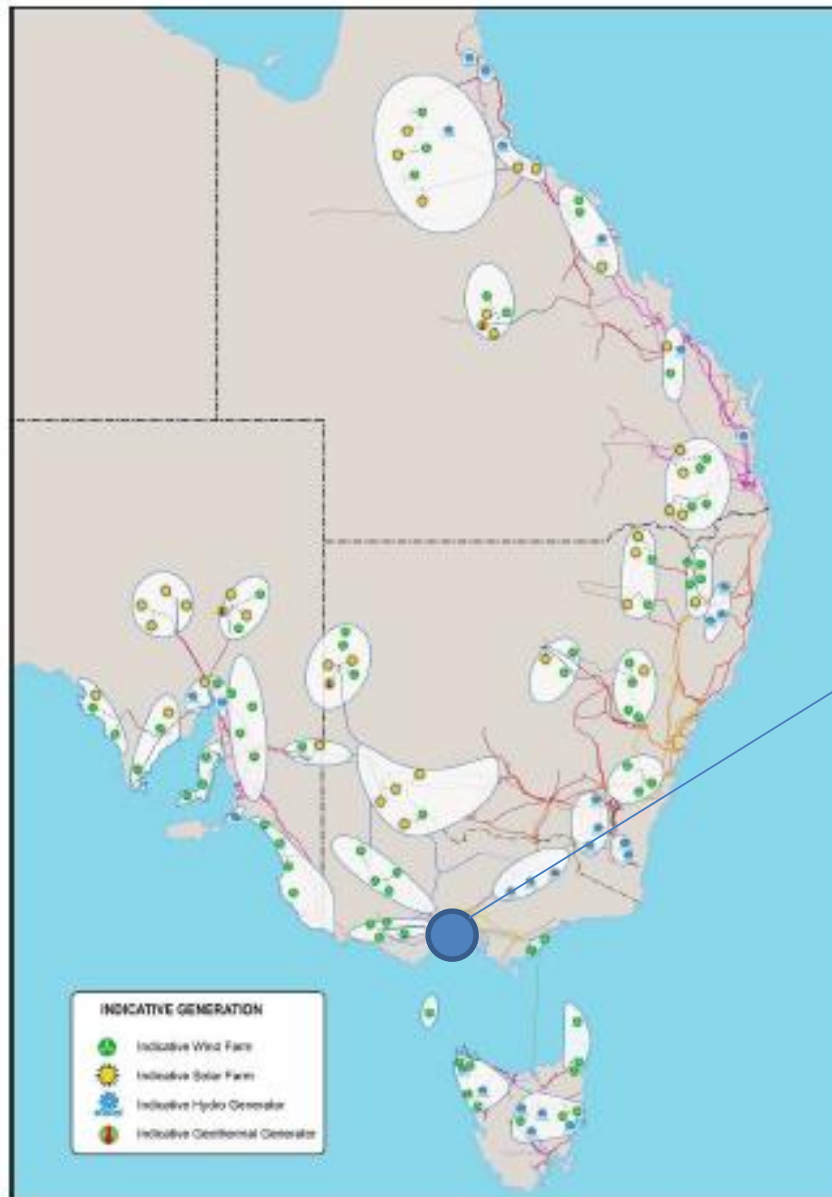
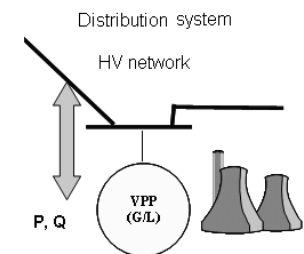
Savings in operation cost, compared to BaU



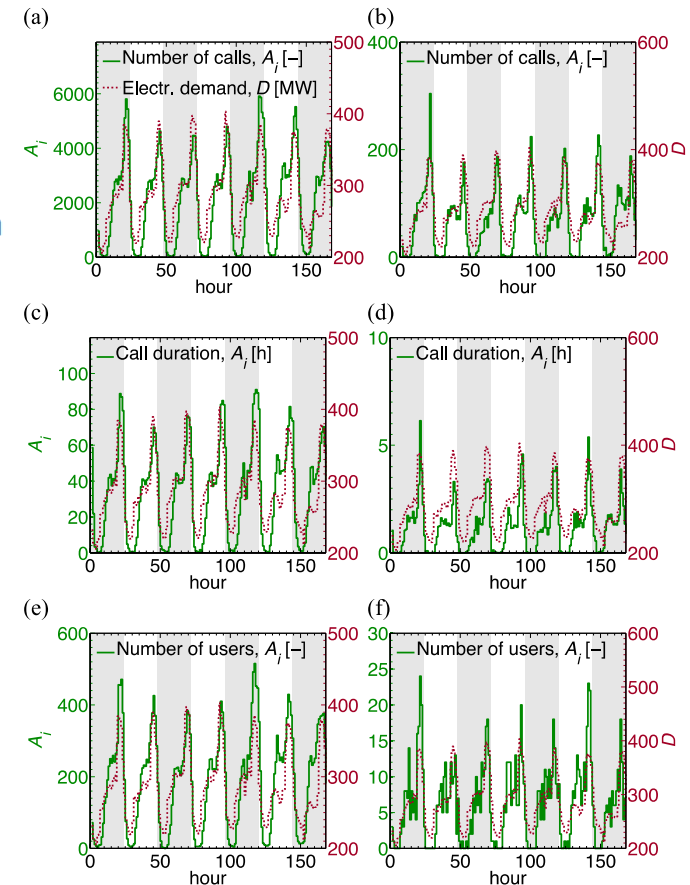
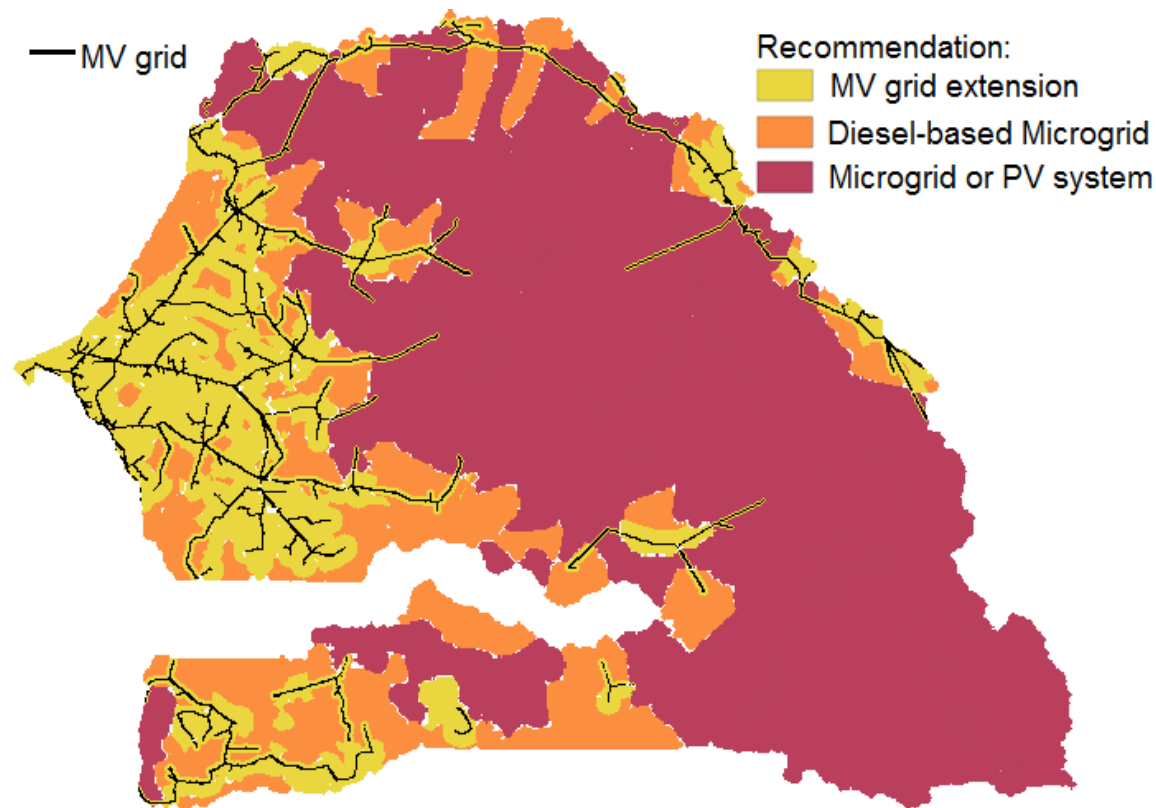
- **Economic benefits of VPP**
 - participating in FCAS and DR services
 - Participating in FCAS and DR markets brings up to some **400 k\$/year** of cost savings, which account for some **5%** of the total operation cost
- The VPP operation potential economic benefits are the **same or similar** order of magnitude of energy reduction savings, at a fraction of the investment cost though

Next

The true **Smart City**: Melbourne as a VPP



Are these concepts applicable and scalable to developing countries?



E.A. Martinez-Cesena, P. Mancarella and M. Schapfler, Using mobile phone data for electrification planning, D4D Competition, MIT Media Lab, April 2015, Double Award Paper

Dakar

Rural area

Final remarks

- Enter the **Prosumer**!
- Scalable concept to truly replace conventional power plants for the provision of reliability
- **Virtual Power Plant** concepts for communities and cities
- Making a **City** truly **Smart**!
- Allow deployment of low carbon technologies (**decarbonisation**), development of new business cases (**affordability**), and contributes to system operation (**reliability**)
- **Prosumer-centric pursuing of the solution to the energy trilemma**



Workshop on Smart Grid Technologies and Implications for
Inclusive Development in Sri Lanka

3-4 April 2018 • Galle, Sri Lanka

The University of Melbourne as a *Prosumer*: The Parkville Virtual Power Plant

Pierluigi Mancarella

Chair of Electrical Power Systems

The University of Melbourne

pierluigi.mancarella@unimelb.edu.au

