

EXECUTIVE SUMMARY

Session 4 – Distributed Energy Resources and Active Demand Integration

SUMMARY

126 papers were accepted for presentation in Session 4 and of these 20 were presented in the main oral presentation sessions and 12 were presented in Research and Innovation Forum (RIF) sessions. Three Round Table sessions featured 15 industry experts and a lively discussion chaired by the Session 4 Rapporteurs.

This session highlighted the continued development of active distribution networks and new technologies required to deliver low smarter distribution systems capable of supporting the adoption of low carbon technologies by consumers. All the main aspects of developing low carbon networks were covered by the papers including such items as distributed renewable energy generation, energy storage and demand/customer response.

A general trend was observed that there are now a greater number of real world demonstrations of novel approaches to integrate distributed energy resources with distribution networks, although there is still much research work ongoing.

Session 4 was as popular as ever, with paper and presentation standards high. Poster sessions continue to be a useful way for 'mass dissemination' of results.

MAIN SESSION 4 - BLOCK 1

Active Demand Integration

Oral Session Block 1 benefited from presentations on the optimal integration of renewable energy sources by limiting peak generation, presenting results for different energy allocation strategies that allow to increase renewable penetration with rare generation peak shaving. Papers also covered residential demand management and distribution grid impact assessment, presenting the results of a model that incorporates weather forecasts as an input for demand forecast, incorporating the potential flexibility associated with the different consumption patterns. Another topic was price-based control of flexible loads for distribution network management, analysing the potential for some appliances to be responsive to price signals provided by the market, and the impact on the aggregated load profile associated with having a large number of appliances responding automatically to the same price signals. Finally several papers shared details on the experimental validation of residential consumer responsiveness to dynamic time-of-use pricing, analysing the response of a population to price signals.

MAIN SESSION 4 - BLOCK 2

Planning and Studies

This block included papers from Portugal, Spain, France and Germany. The topics covered many areas including the integration of micro generation, control of battery storage, simulation techniques for ancillary services and studies into replicability potentials.

MAIN SESSION 4 - BLOCK 3

Innovative Technologies and Solutions

Oral Session Block 3 on Technology benefitted from presentations on energy storage services and addressed the issues of concurrent, complementary and conflicting value streams for energy storage with techniques to address this. The topic of DER/DG hosting capacity headroom calculation and publication was presented with a clear conclusion from an audience vote that this is neither mandated nor obliged in many countries (US and UK being exceptions noted).

MAIN SESSION 4 - BLOCK 4***Smart Grid Demonstrators***

The papers presented in this block were of an exceptionally high standard. The combination of some highly technical research, coupled with information on major demonstration projects was well received. Of particular interest to delegates were the large EU funded projects. In particular the NICE grid results generated several questions, as did research on the relatively small requirement for low voltage network regulation in Austria.

Overall this block showcased results from some of the largest smart grid trials in the world. Projects from the UK, Austria, France and Italy were presented. Unfortunately the planned presentation by colleagues from South Korea was not possible due to travel issues.

ROUND TABLE 07***Implementation and Rollout of Innovative Distributed Energy Resources Grid Integration Solutions***

Round Table 07 ('Implementation and Roll-out of Innovative DER Grid Integration Solutions') had excellent contributions from EDSO, WPD, SAG and DNV GL with lively discussion based on the implementation and roll-out examples presented. Interesting topics for discussion noted the general lack of pace of smart roll-out across Europe with necessary regulatory reform, commercial models for smart solutions, business cases to appropriately capture smart grid solution value, European codes, and technical standards to enable a faster roll out pace.

ROUND TABLE 09***Testing Methods and Considerations for Smarter Network Equipment – ICT, control, operation***

Round Table 09 was well attended with the speakers sharing knowledge on the importance of testing and new specialisms required in an age of ICT enabled grids. The questions showed the level of interest in the topic and a potential requirement for further research and standards development in this field.

ROUND TABLE 11***The Use of Energy Storage to Alleviate Distribution Network Constraints***

Round Table 11 ("The use of Energy Storage to alleviate distribution network constraints" had excellent contributions from EPRI (Mark McGranaghan), Imperial College (Prof Richard Green), IST (Prof Mesquita e Sousa), UKPN (Nick Heyward) and Philip Hiersemenzel (Younicos). It provided an overview regarding several issues associated with the current state-of-the-art regarding storage:

- The use of storage on the USA (integrated vision that included market outlook, technology, applications and RD&D challenges);
- Strategic assessment of the role and value on energy storage systems and the long-run impact of storage on prices and capacity. The view was that in 2020 the ;
- Presentation on an alternative storage technology (supercapacitors, eventually associated with battery systems);
- Two grid-scale storage projects already on operation (Leighton Buzzard from UKPN, with a 6 MW, 10 MWh Li-ion battery and WEMAG's 5 MW, 5 MWh Li-ion battery. The latter was Europe's first commercial battery plant).

The round table was very well participated, with several questions posed to the speakers. Some of the questions addressed some issues related with the regulatory framework, associated with the principle that DSOs might own storage for grid management purposes, but are subject to rules of not participating in energy markets (as buyers or sellers). This issue still has to be clarified by the relevant NRAs.

RESEARCH & INNOVATION FORUM SESSION 4***DER & Active Demand Integration***

The shorter RIF session at CIRED 2015 still allowed twelve authors to briefly present the conclusions of their research. All the participants conveyed clear messages in the short duration allocated enabling some time for further audience questions as part of four mini-panels. The RIF session included papers for all four blocks allowing a wide variety of papers to be covered.

POSTER TOURS

Four poster tours were organised with a high number of interactive presentations of posters in each of the four blocks of Session 4. Each tour ran twice to allow delegates to meet as many authors as possible.

The topics covered in the tours were as wide as the set of papers in Session 4 and there was therefore good discussion by the 15-20 delegates on each tour.

CONCLUSIONS

Session 4 continues to provoke much interest and stimulate conversations between conference attendees and authors. Main sessions, round tables and poster tours were very well attended by delegates. The breadth of topics covered is wide, including all relevant DER technologies such as Distributed Generation, Electric Vehicles and Heat Pumps. The conference programme included the presentation of papers across a broad spectrum of engineering specialisms ranging from EHV power system studies through to consumer behavioural analysis.

The 2015 programme included more reports on demonstration and deployment projects than previous events, in addition to research and development papers. This is evidence that a move to more innovative and technology based solutions for power system networks will eventually become the norm.

The quality of papers submitted to Session 4 was exceptionally high with many more authors requesting presentations than could be accommodated in the time available. However the conference session managed to provide an insight into the excellent work from around the globe.

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