



SC C6 Meeting in Paris

Palais des Congres, Place Maillot, room 253 level: 2

August 25, 2010, Wednesday

Chaired by Nikos Hatziargyriou

Agenda (draft)

Morning session: 9.00 – 13.00

1. Introduction of new members

2. Report from the TC meetings (by the SC Chairman)

- TC AG_Network of the future

3. SC C6 2009 Award

4. Status of existing WGs and TFs (by the relevant Convenor)

- **TF C6.04.02** 'Computational Tools and Techniques for Analysis, Design and Validation of Distributed Generation Systems' (Conv. Kai Strunz), presentation of final report; discussion on publication and of further actions
- **WG C6.05** 'Technical and Economic impact of DG on Transmission and Generation' (Conv. Goran Strbac), presentation of final report; discussion on publication and of further actions
- **WG C6.08** 'Integration of large share of fluctuating generation' (Conv. Harald Weber), presentation of final report; discussion on publication and of further actions
- **WG C6.09** 'DEMAND SIDE RESPONSE' (Conv. Alex Baitch), presentation of final report; discussion on publication
- **WG C6.11** 'Development and operation of active distribution networks' (Conv. Christian D'Adamo), presentation of final report; discussion on publication and of further actions
- **JWG C3.05/C6.14** 'ENVIRONMENTAL IMPACT OF DISPERSED GENERATION' (Liaison member E. Lakervi), presentation of present status; discussion on expected progress
- **WG C6.15** 'Electric Energy Storage Systems' (Conv. Zbigniew A. Styczynski), presentation of final report; discussion of publication and of further actions
- **WG C6.16** 'Technologies employed in rural electrification' (Conv. Trevor Gaunt), presentation of present status; discussion on expected progress
- **JWG C1/C2/C6.18** 'Coping with limits for very high penetrations of renewable energy' (Liaison member Wil Kling), discussion on expected progress
- **WG C6.19** 'Planning and optimization methods for active distribution systems' (Conv. F. Pilo), presentation of present status; discussion on expected progress



- **WG C6.20** 'Integration of electric vehicles in electric power systems' (Conv. J. Lopes), presentation of present status; discussion on expected progress
- **WG C6.21** 'Smart Metering – state of the art, regulation, standards and future requirements' (Conv. Eduardo Navarro), presentation of present status; discussion on expected progress
- **WG C6.22** 'Microgrids Evolution Roadmap' (Conv. Chris Marnay), presentation of present status; discussion on expected progress
- **AG C6.01** (Conv. Nikos Hatziargyriou), presentation of present status, strategy
- **AG C6.12** (Conv. Trevor Gaunt), presentation of tutorial organisation plan
- **AG C6.17** (Conv. Adriaan Zomers), presentation of activities on rural electrification
- **AG C6.23** (Conv. Alex Baitch), presentation of creation of terminology

Afternoon session: 14.00 – 17.00

5. Further activities. Proposal for new WGs

- Technical Committee project on Smart Distribution

6. 2012 Paris General Session

- Preferential subjects for the 2010 Conference

7. 2011 SC meeting

8. Liaison with other associations: CIRED, IEEE

9. SC website: news from the Secretary and comments from members and WG/TF Convenors

10. Any other business

Projector and Windows 2000 PC will be available for Power Point presentations.



DISCUSSION MEETING

Group C6

(Distribution Systems and Dispersed
Generation)

Tuesday 24th August 2010

SUMMARY

Chairman: Nikos Hatziaargyriou (Greece)

Secretary: Christine Schwaegerl (Germany)

Special Reporters:

Wil L. Kling (Preferential Subject 1: Planning and Operation)

Mark McGranaghan (Preferential Subject 2: Demand Side Integration)

Joseph Mutale (Preferential Subject 3: Rural and remote areas)

Preferential Subject 1: Planning and Operation

The morning session with 23 prepared presentations was structured with three subtopics to discuss important issues that were identified in the paper contributions for this session:

- a) Regulation, Reliability, Power System Evolution, Ancillary Services
- b) Distribution Automation, ICT Structure, Standards
- c) Active Distribution Networks, Voltage Control, Microgrid Operation

Firstly, it was discussed what is necessary to monitor of distributed energy resources (DER) and why this is required. Major goals of active distribution networks were given as well as an overview about the main ancillary services which can be provided by DER and responsive loads especially for voltage support, frequency regulation and wind power variation. An example of angle measurements to be used to control the distribution network was presented.

The customer willingness to support smart grid features was discussed with positive examples and energy savings up to 10%.



The IT framework for simulating the operation of distribution networks was detailed. An overview of a data warehouse developed in Germany based on CIM (Common Information Model) and using the Unified Modelling concept according to IEC standards was presented. An intelligent Home system for data handling and appliances control was shown.

Information was provided on test systems for new distribution network design and operations.

Finally voltage control in distribution networks with large amounts of DG was discussed. It was shown that reactive control has preference above active control for several reasons although in cable networks the effectiveness of reactive controls is less efficient. More research is needed for integrated voltage control of distribution networks.

Preferential Subject 2: Demand Side Integration

The session was structured with three subtopics to discuss important issues that were identified in the paper contributions for this session:

- a) The potential for demand side resources from residential and commercial segments
- b) Pricing as a basis for Demand-Side Integration
- c) Communication and information architecture and technologies for Demand Side Integration

Seven questions were developed as a basis for discussion under these headings. Important discussions based on 19 prepared contributions during the session are summarized below.

Important conclusions from these discussions are:

1. The potential for demand side resources is very significant. For instance, Mr. Stoetzer quoted a study performed by the German Energy Association VDE indicating that there is almost 18 GW of DSM available in Germany from heating and heat storage alone.
2. Electric vehicles (EV) are a particular resource that has a significant potential impact. Mr. Lombardi described that the estimated EV penetration in Germany is 2 million vehicles by 2020. Many challenges exist in terms of the infrastructure and interfaces to integrate this resource.
3. There are many demonstration projects under way that will help advance the technologies and the standards for demand side integration. Important updates were provided from the ADDRESS project (Mrs. Belhomme), the Smart Grid/Smart House project (Mrs. Lioliou), the EPRI Smart Grid Demonstration Initiative (Mr. McGranaghan/Mrs. Chuang), Web2Energy project (Mr. Fenn), and the OPEN meter project (Mr. Mauri). This is only a small subset of the hundreds of important demonstrations that need to be coordinated to maximize the value from the efforts.
4. The Common Information Model (CIM) provides a foundation for integration at the utility enterprise level (Mr. Lambert). Part 9 provides a first draft of the information



interface for advanced metering systems. The next steps of interfacing inside facilities will likely take advantage of existing protocols like BACNet (Mr. Koshio).

5. Many different approaches for pricing systems for demand response were described (Mrs. Chuang). Designing the pricing approach is a challenge for the regulator and utilities. Demonstrations like the ones in Ireland and in Chicago will help with understanding of customer behaviour to different pricing systems.
6. Advanced metering will play an important role in demand side integration but most discussions described the need for an energy interface device for the home or small business, such as the Energy Butler in the Web2Energy project (Mr. Buchholz) and the Energy Box in the ADDRESS project. Mr. McGranaghan described a project at EPRI to develop a physical connector interface that can be used with smart appliances or the energy interface to allow flexible implementation of communications technologies and protocols without impacting expensive assets that have long life times.
7. Standards are a critical requirement to create interoperable systems that will support ongoing developments in technologies and systems. This is the focus of the NIST SGIP in the USA (coordinating with international groups) and is a primary focus throughout the world.

Preferential Subject 3: New concepts and technologies for electrification of remote and rural areas

The session was structured with three subtopics to discuss important issues that were identified in the paper contributions for this session:

- a) Opportunities offered by micro grids
- b) Rural electrification experiences and connection to the grid
- c) Rural electrification organisation experiences

The session commenced with a keynote address by Mr. Zomers who discussed the importance of rural electrification and set out the key issues, challenges as well as opportunities in this area. The overview provided a sound basis for the discussions. Seven questions were developed as a basis for discussion under the above subtopics. The main points noted during the discussion are summarized below.

Opportunities offered by Microgrids

1. The main points discussed focused on the benefits of Microgrids as well as control algorithms that can enhance their operation. It emerged that it is not easy to justify the benefits of Microgrids and much depends on local circumstances. However the concept of Microgrids is particularly suited to rural areas with weak connections to the grid.



2. The studies carried out in Spain revealed that in order to achieve a smooth transition from grid connected to stand alone operation, the microgrid load must not be more than plus or minus 10% of the available synchronised generation within the microgrid.

Rural electrification experiences and connection to the grid

3. Power from high voltage power lines can be extracted using low cost technologies such as Auxiliary Services Voltage Transformer (ASVT) and electromagnetic induction. The loss performance of the ASVT was reported to be marginally higher than that of ordinary power transformers. The low cost of such schemes however justified their application. Voltage regulation is poor when the distances from the power line to the load are long.
4. The power obtained by an electromagnetic induction system can be scaled by varying the length of the collection device. The limiting factors are fundamentally economic and can be improved by standardization of components.

Rural electrification organisation experiences

5. In answer to the question of regarding the practical steps that should be taken to encourage world Governments to adopt a more holistic approach to rural development on a sustainable basis, it was pointed out that various recent reports have already suggested rethinking rural development strategies. It was also suggested that collective action of World Governments together with the international community is required. The important and politically difficult question of which organization will take the lead however remains.
6. On the question of feed-in tariffs, it was suggested that these tariffs for both grid connected and off-grid systems are feasible in developing countries but the following prerequisites must be fulfilled:
 - There must be an effective regulatory framework and legislation
 - An appropriate feed-in tariff scheme must be formulated and implemented properly
 - There must also be adequate administrative capability as well as infrastructure
 - There must strong political support which is consistent and transparent and finally
 - Financial guarantees must made available