

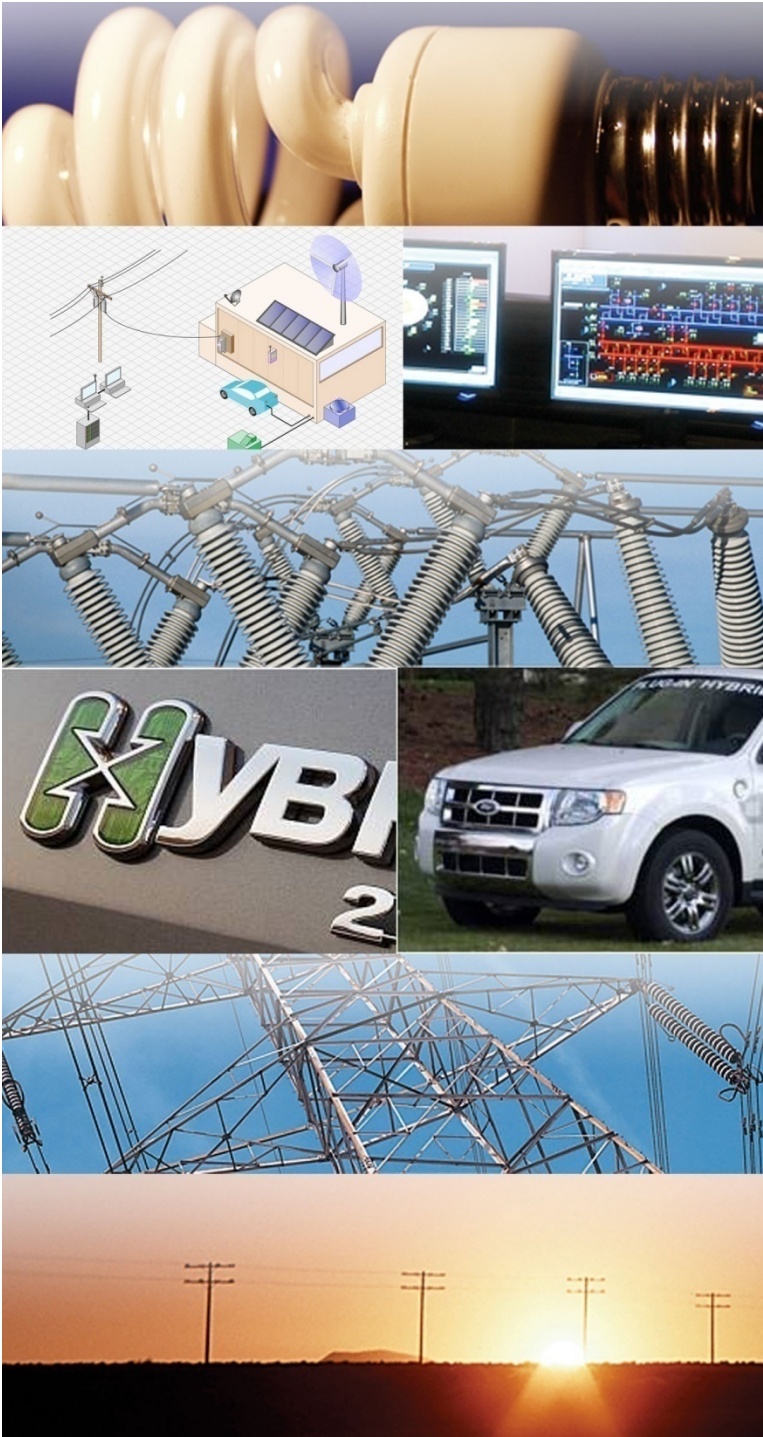


## Overview of CIGRÉ C6 Activities

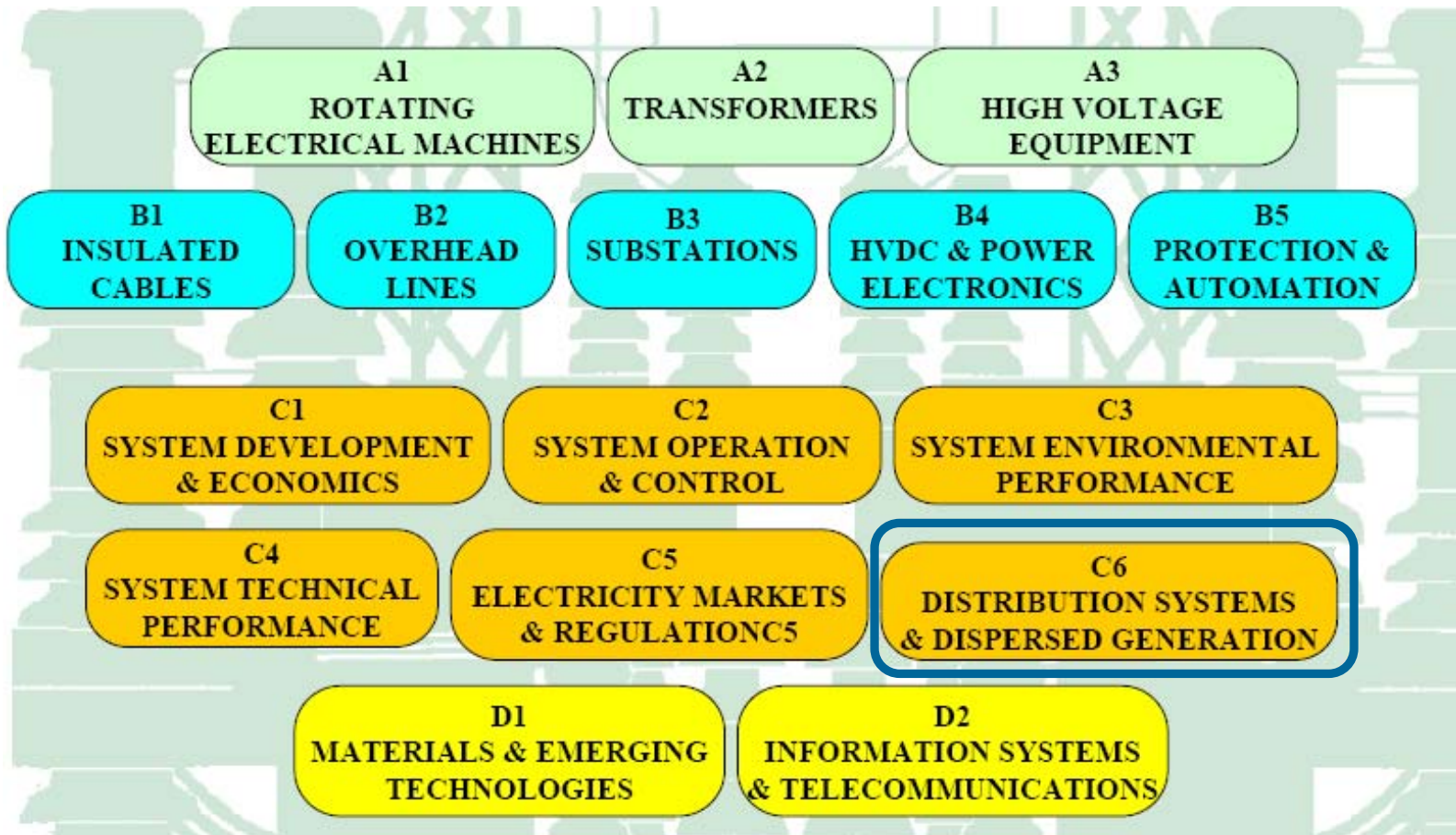
*Fourth International Conference on Integration of  
Renewables and Distributed Energy Resources  
post-Conference Workshop*

*Albuquerque, NM, USA  
December 10, 2010*

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# CIGRÉ study committees (SC)



## C6 Activity Plan (2009)

**Chairman: Nikos Hatziargyriou (Greece)**

**Secretary: Christine Schwaegerl (Germany)**

- to study the connection and the integration of dispersed generators, including related devices such as storage, electronic base interfaces and systems; to adopt the concept of Dispersed Energy Resources (DER)
- to study the application of the DG concept as a part of the medium long term evolution of distribution systems, i.e. creation of active distribution networks able to contribute to the improvement of the overall performances of electric power systems.
- to examine the opportunity to extend the SC activity to study the evolution of distribution networks including subjects that are not strictly related to the application of DG concept.
- to continue to study the subject of rural electrification.

# C6 Completed Activities

Type	Number	Title	Name of Convenor	Created	Disbanded
WG	C6.04	Connection and protection practices for dispersed generation	N. Hatziargyriou (Greece)	2003	2006
TF	C6.04.02	Computational tools and techniques for analysis, design and validation of distributed generation systems (1)	K. Strunz (Germany)	2003	2009
WG	C6.05	Technical and economic impact of DG on transmission and generation systems (1)	G. Strbac (UK)	2003	2009
WG	C6.08	Integration of a large share of fluctuating power (1)	H. Weber (Germany)	2004	2009
WG	C6.09	Demand side response (1)	A. Baitch (Australia)	2004	2009
WG	C6.10	Technical and commercial standardisation of DER/microgrids components (1)	J. M. Oyarzabal (Spain)	2006	2009
WG	C6.11	Development and operation of active distribution networks	C. D'adamo (Italy)	2006	2009
WG	C6.13	Rural Electrification (2)	G. Dagbjartsson (Switzerland)	2006	2008
JWG	C6.14/C3.05	Environmental impact of dispersed generation	T. Smolka (Germany)	2006	2009
WG	C6.15	Electric Energy Storage Systems	Z. A. Styczynski (Germany)	2007	2009

## C6 Working Groups - Active

- **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 C6.16** '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

## C6 Working Groups - Active

- **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

# C6 Advisory Groups

- **AG C6.01** STRATEGY AND ADVISORY GROUP
  - (Conv. Nikos Hatziargyriou), presentation of present status, strategy
- **AG C6.12** TUTORIAL ADVISORY GROUP
  - (Conv. Trevor Gaunt), presentation of tutorial organisation plan
- **AG C6.17** RURAL ELECTRIFICATION ADVISORY GROUP
  - (Conv. Adriaan Zomers), presentation of activities on rural electrification
- **AG C6.23** TERMINOLOGY ADVISORY GROUP
  - (Conv. Alex Baitch), presentation of creation of terminology

## C6.11 – Development and operation of active distribution networks – Christian D’Adamo (ENEL)

- Provide a **shared definition** of “Active Network”
- Assess the actual **status of implementation** worldwide
- Assess the **network and generators requirements** for the integration of DG and DER
- Identify the **enabling technologies**
- Identify **limits/barriers**

## C6.11 Key findings – survey effort

- A **general consensus on the definition and main features** of ADN has been reached
- The actual **level of implementation is quite low** (e.g. many small-scale pilot installations but yet no system approach)
- **Operational procedures of ADN are insufficient** for the system integration of DER and DG
- **Standardization and investment incentives are key** to success
- **Lack of incentives** for DSO

## C6.11 Draft Report Completed

- Introduction
- Definition and Survey Results
- Current Status of AND Development
- Recommendations for the Transition to more Active Distribution Networks
- Conclusions and Summary

## C6.19 Planning and optimization methods for active distribution systems (Fabrizio Pila)

- Survey on the state of the art on planning for active distribution systems
- Requirements of planning methodologies (a questionnaire will be sent to distribution companies and universities)
- Identification of short, medium, and long term models for active distribution planning (e.g., technical models, economic and market models)
- Reliability models of active distribution systems
- Algorithms for active distribution system expansion/upgrade planning suitable to different scenarios and regulatory frameworks. Methods and tools allow optimal DES (distributed energy storage) and DG sizing and siting as well design and integration of microgrids and multi-microgrids

## C6.19 Task Forces

- TF1 – Survey (Khalil El Bakari)
- TF2 – Network Planning (Chad Abbey)
- TF3 – Active Network Planning (Nando Ochoa, Wolfgang Hribernik)
- TF4 – Reliability of Active Networks (Mark McGranaghan)
- TF5 – Demand Side Integration (Johan Driessen)

# C6.20 Integration of electric vehicles in electric power systems - Joao Pecas Lopes

- To identify the impacts of a massive integration of EVs in the future transmission and distribution electricity grids.
- To identify potential smart control approaches to be adopted by system operators. Recommendations on potential standardization of technologies (network interface, metering, communication etc.) will be developed.
- To address the impacts on generation and grid infrastructures planning, evaluating at the same time the required/deferred investments due to the simultaneous presence of intermittent RES and EV in the grid;
- To identify the most appropriate ways to include EV into electricity markets, including an evaluation of how smart metering should take the presence of EV into account;
- To collect practical experience from utilities, pilot projects and studies on the impact of integrating EV into the grid.
- To collect information on standardization efforts for EV charging systems and interfaces.
- To identify the required study models and analytical tools needed to evaluate the impact of large scale EV

## **C6.21 Smart Metering – state of the art, regulation, standards and future requirements (Eduardo Navarro)**

- Meeting in August 2010 for initial discussion

## C6.22 Microgrids evolution roadmap (Chris Marnay)

1. Definition – What is it?
    - *GROUP ACTIVITY*
  2. Benefits – Why do we want/need it?
    - *GEZA JOOS LEAD*
  3. Technology – How do we build and operate it?
    - *REZA IRAVANI LEAD*
  4. Business Cases – Being attractive to participants and investors?  
& Regulation – Can it fit into the current regulatory regime?
    - *JOHAN DRIESEN LEAD*
  5. Deployment Roadmap – Where do we want/need to go?
    - *GROUP ACTIVITY?*
- annex: Demonstration Projects – Can we compile a catalogue?  
– *CHAD ABBEY LEAD*

# CIGRE Symposium – Bologna 2011



## Call for Papers

*The electric power system of the future*  
*- Integrating supergrids and microgrids*  
*International Symposium*  
Bologna (Italy); 13-15 September 2011

Organized by CIGRE Technical Committee  
and the Italian CIGRE National Committee

### CONFERENCE VENUE

Bologna is located in the North of Italy and is the capital of the region Emilia Romagna. Its University is more than 900 years old and, in the 18<sup>th</sup> Century, hosted the work of Luigi Galvani, one of the founders of modern electrotechnical studies. The city has a peculiar medieval architecture and many historical buildings which make its visit interesting.



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### BACKGROUND and SCOPE

The Power System of the Future will see a mix of conventional generation and renewable generation, which may be dispersed and embedded in local networks - microgrids - or produced in large farms. It will include strong grids - supergrids - wheeling the power from bulk generation and interconnecting local power systems, so as to compensate the temporal and geographical fluctuation of the generation and loads.

The Symposium will:

- Address technical issues related to future network architecture, planning, control and operation...
- Introduce the most promising technologies enabling the evolution of SmartGrids, including ICT,
- Discuss market and regulatory issues,
- Present best practice and practical examples of pilot installations.

### PARTICIPANTS

The Symposium is aimed at transmission, distribution and system operators, market operators, regulators, suppliers, traders and universities.

### PROGRAM

The Symposium will be held over 3 days:

- An Opening Panel with invited speakers will discuss the future of the Power Systems
- Discussion sessions will follow during which authors will present their papers and will then participate in a general discussion.

The Symposium will take place in connection with the Annual meeting of SC C6 - "Distribution Systems and Dispersed Generation" - and its Working Groups, with time slots planned for Tutorials.