



21, rue d'Artois, F-75008 PARIS, FRANCE
Tel: +33 1 53 89 12 90
Fax: +33 1 53 89 12 99
<http://www.cigre.org/>

Comité d'études C4 / Study Committee C4

Analyse Technique des Réseaux / System Technical Performance

Chairman:
Prof. Carlo Alberto Nucci
University of Bologna
Department of Electrical Engineering
Viale Risorgimento, 2
40136 Bologna BO
ITALY
Tel: +39 051 209.3479
Fax: +39 051 209.3470
Email: carloalberto.nucci@unibo.it

Secretary:
Dr. Pouyan Pourbeik
Electric Power Research Institute
942 Corridor Park Blvd.
Knoxville
TN 37932
USA
Tel: +1 919 794 7204
Fax: +1 919 794 7204
Email: pouyan@ieee.org

STRATEGIC PLAN FOR 2010 TO 2016 REVISED VERSION – APRIL 2011

APRIL 7, 2011

1. INTRODUCTION

1.1 Purpose

The purpose of the strategic plan is to describe mid- to long-term objectives and goals of SC C4. It is intended to be a living document, enabling the planning and organisation of future activities.

1.2 Time Horizon

The time horizon of the strategic plan is seven years (2010-2016), with a review scheduled in a few years, if the need arises or at the request of the Technical Committee. *The detailed action plan, however, covers a shorter period of four years.*

1.3 Relationship to the CIGRE Strategic Plan and other Study Committees

The CIGRE Technical Committee has prepared a Strategic Plan, which has been adopted by the CIGRE Administrative Council and that is the basis for the preparation of the various Study Committees Strategic Plans. In this respect, Study Committee C4 is requested to carry out or to take part in studies dealing with methods and tools for analysis of power systems performance, with particular attention to the study of the transmission and distribution system as a whole, to the solutions for maintaining security of supply, to the consolidation of unbiased technical information useful to assist decision makers and stakeholders, to the analysis of the system implications of new generation technologies. Study Committee C4 cooperates with other Study Committees in joint working groups where joint participation is beneficial and/or where areas of responsibility meet.

1.4 Approval

The CIGRE SC C4 Strategic Plan was approved on April ..., 2011.

2. Goals

2.1 Mission Statement for SC C4

To facilitate and promote the progress of engineering and the international exchange of information and knowledge in the field of System Technical Performance. To add value to this information and knowledge by means of synthesizing state-of-the-art practices and developing recommendations.

2.2 Scope for SC C4

SC C4 deals with methods and tools for analysis related to power systems, with particular reference to dynamic and transient conditions and to the interaction between the power system and its apparatus/sub-systems, between the power system and external causes of stress and between the power system

and other installations. Specific issues related to the design and manufacturing of components and apparatus are not in the scopes of SC C4, as well as those specifically related to planning and operation and control, apart from those cases in which component/apparatus/subsystem behaviour depends on, or significantly interacts with, the performance of the nearby power system. The areas on which the activity is carried out are: Power Quality, Electromagnetic Compatibility/Electromagnetic Interference (EMC/EMI), Insulation co-ordination, Lightning, Advanced Tools for the analysis of power system performance, Power systems dynamic performance models and analysis. The above points certainly relate also to the emerging Smart Grids technology, with particular emphasis concerning Power Quality and Advanced Tools for the analysis of power system transients and dynamic performance.

For each of the six areas above mentioned, the topics of interest include, but are not limited to, the following points:

- **Power Quality:** Benchmarking of PQ performance; Compatibility levels and Indices; Measuring and monitoring; Correlation between lightning and voltage dips; Emissions from disturbing installations (e.g. HVDC, SVC, arc furnaces); Immunity of installations.
- **Electromagnetic Compatibility (EMC):** EM vulnerability; EMC in vicinity of power systems; Requirements and solutions for HV substations and generating stations; Health effects related to low frequency EMF are excluded.
- **Insulation co-ordination:** Critical review of existing practice; UHV systems; HVDC systems; Interaction between system and transformers, with reference to transformer energization studies; Resonance and ferroresonance; interaction between long AC cables and the system; influence of system conditions and characteristics on CBs operation, such as TRVs; Insulator pollution influence on the system performance.
- **Lightning:** Critical review parameter statistics; Attachment process; Lightning performance of distribution and transmission lines with reference to the application of line arresters; Low Voltage lines protection; Protection of wind generators; lightning location systems data application.
- **Advanced Tools for the analysis of power system performance:** Numerical EM analysis for surge propagation studies; Numerical techniques for the computation from steady-state to very fast front transients; modelling unsymmetrical conditions of power systems.
- **Power systems dynamic performance models and analysis:** Power balancing assessments; Influence of power converters and HVDC transmission on system security and AC network performances; Methods for modelling and aggregation of loads in active power networks;

Performance issues related to the application of long HVAC cables; dynamic interaction between generation and transmission equipment.

2.3 Strategic intent

The strategic intent of SC C4 is to initiate and coordinate technical activities related to the above six fields related to power system performance. This will be achieved through maximising the potential of the links that exist with external organisations, such as CIGRE, IEC, Eurelectric and IEEE, as well as through internal coordination with the other CIGRE Study Committees. A key focus for the next eight-year period is on the technical challenges related to what is nowadays generally called 'smart grid', with no distinction between transmission and distribution level.

In organising the SC C4 activities and workforce, it is important to recognise the following key features of its scope:

- It brings together all activities related to the system "technical" performance under one study committee, thus providing for the coordination and integration of these activities.
- The study of the phenomena considered requires a high degree of specialist knowledge and experience related to characteristics and performance of individual components as well as the integrated power system.

The SC C4 strategy to fulfil its mission and scope is expected to be accomplished by focusing on the following main targets:

1. interaction with other committees and organisations;
2. dissemination of the technical achievements;
3. meaningful interaction with target groups;
4. promoting electrical power engineering education (EPEE).

For the first two bullets the relevant AGs have been established (see Appendix). Concerning points nr. 3 and 4, some elements are given in what follows.

2.4 Interaction with Target Groups and meeting their needs

The following is a preliminary list of Target Groups identified by SC-C4:

- Technical Groups: equipment suppliers, consultants, grid planners
- Operations: system operators, distributors, asset managers
- Science and Public Groups: universities, research institutes
- International Technical Organizations: CIGRE, IEEE, IEC
- Other stakeholders: regulators, distributors, consumers

One of the main strategic thrusts of SC C4 is to identify the needs of the target groups, develop useful technical information, and promote trends beneficial to them.

2.5 Promotion of EPEE Activities

A key priority for SC C4 will be to promote power engineering education and research as a means of facilitating progress in engineering and advancing knowledge in the field of System Technical Performance. Active participation of universities and students in SC C4 activities will be encouraged. Technical assistance and support will be provided for developing good power engineering courses. Industry/university collaborative research in the fields of interest to SC C4 will be promoted.

3. Contribution to CIGRE Master Plan 2006-2011

The strategic plan for SC C4 takes into consideration the CIGRE Master Plan 2006-2011, which sets out four major objectives. These are listed below highlighting the contribution from SC C4:

Objective 1: Increase CIGRE's value to members and society

Endorsement of the worldwide focus of CIGRE is an important aspect of the SC C4 strategic plan: this is expected to result in the desired increase of CIGRE value to members and society. The interchange of technical knowledge and information between stakeholders and organizations in different parts of the world will be promoted by SC C4, as done in the past.

Objective 2: Fully engage all stakeholders in the electricity enterprise

SC C4 is one of the most adequate committees to promote engagements of all stakeholders of the electricity enterprise, in view of its 'system' connotation. 'Ad-hoc' symposia and colloquia will be one of the major way for such an accomplishment.

Objective 3: Increase the recognition of CIGRE

Among its roles CIGRE has the fundamental mission of providing the technical-scientific basis for the development of new standards. SC C4 has a consolidated tradition of cooperation with international organizations, such as IEC, CIRED, CENELEC, IEEE, ITU-T, EURELECTRIC, and UIE, which is expected to keep increasing the recognition of CIGRE.

Objective 4: Strengthen support and cooperation between National Committees and Central Offices

All members of SC C4 will be warmly encouraged to act also in this respect, as well as in the recruitment of new members.

Objective 5: Strengthen support and cooperation among Study Committees dealing with power systems performance issues

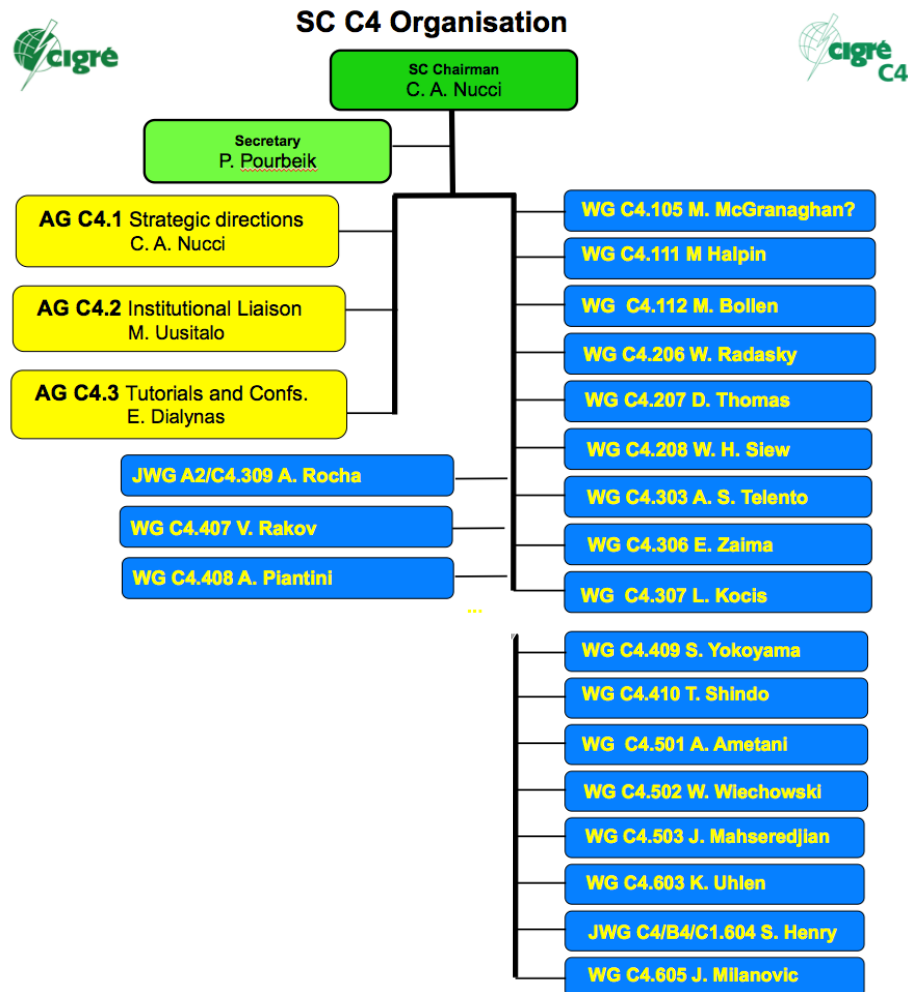
All members of SC C4 will be warmly encouraged to act also in this respect

4. STUDY COMMITTEE STRUCTURE AND MANAGEMENT

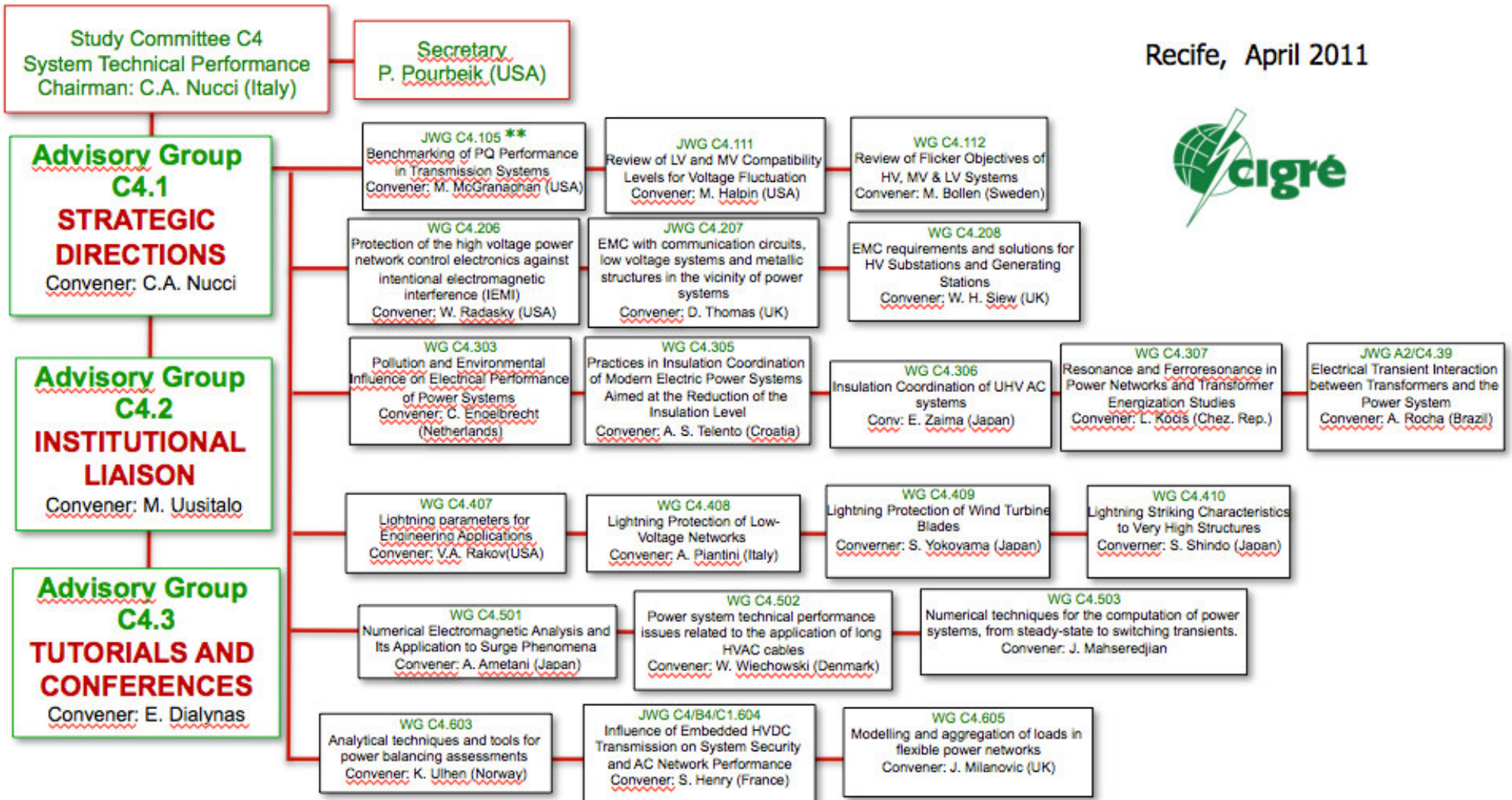
4.1. General

At present the Study Committee C4 consists of a Chairman, a Secretary, 24 Regular Members and 15 Observer Members representing 40 countries. Among the 40 constituent members, 17 are from Research Organizations and Universities, 17 from Utilities, and 7 from Regulators, Manufacturers or other entities.

The present overall organisation of SC C4, including the Advisory Groups, Working Groups, is illustrated in the following Figure. The structure of SC C4 will be periodically reviewed and modified as necessary as the technical problems it has to address change or the needs of the stakeholders change.



Recife, April 2011



4.2. Management

The following Advisory Groups have been set up to assist in the planning and steering of SC C4 activities:

- AG C4.1 Strategic directions
- AG C4.2 Institutional Liaisons
- AG C4.3 Tutorials and Conferences

The AGs are mostly composed of SC members, and each member of the SC should belong to at least one AG. AG meetings are however open to WG members and to experts invited by the AG convener.

Details of the AGs are reported in the Appendix.

Appendix

STRATEGIC PLANS FOR SC C4 ADVISORY GROUPS

A.1 Strategic directions (AG C4.1)

AG C4.1 has the role to

- Assist the Chairman in coordinating the SC activities; facilitate the interaction among AGs and WGs and promote active participation of experts in WGs
- Monitor the interests and requirements of CIGRE stakeholders and suggest relevant SC actions, for example, new technologies and power systems challenges
- Monitor the need for standards on any technical subject SC C4 is responsible for
- Suggest the creation of Ad hoc Groups with a particular scope

A.2 Institutional Liaisons (AG C4.2) – to be completed by Maarit

Interaction with other technical organisations is essential for identifying and effectively dealing with emerging system performance problems. Additionally, CIGRE has the important role of providing the scientific and technical knowledge base on which new standards are developed by international organisations such as IEC. In this context, SC C4 intends to work collaboratively as appropriate with the following organisations:

- **International Electrotechnical Commission (IEC)**, in the area of conducted and radiated interferences (at industrial and high frequencies), insulation coordination, power quality. The main committees concerned are IEC 65, IEC TC 77, IEC SC77A/WG8, IEC77A/WG9, IEC TC 8 and CISPR.
- **Cenelec (CLC)**, in the same fields of activities as for IEC but in the framework of European mandates in order to achieve the requirements of the European Directives.
- **International Telecommunications Union (ITU-T)** on induction effects on telecommunications lines, potential rise above ground etc.
- **International Conference on Electricity Distribution (CIRED)** as regards Power Quality and EMC in distribution systems and at the interface between transmission and distribution.

- **Institute of Electrical and Electronics Engineers (IEEE)**, in dealing with specific problems related to all technical areas dealt with in C4. The intent is to pool resources when appropriate and to avoid duplication as well as conflicting reports.
 - **Union of the Electricity Industry (EURELECTRIC)**, in relation to Power Quality and EMC.
 - **International Union for Electrotechnology (UIE)** for power-quality problems caused or experienced by industrial installations using electrotechnologies.
 - **Liaison with other WG, SC**
- ...

A.2 Tutorials and Conferences (AG C4.3) - to be compl by Evangelos

Communication with the members of CIGRE as well as with the “outside world” is an important aspect of this Strategic Plan. The traditional methods of communication have been ELECTRA, biennial sessions, the symposiums and colloquiums. However, other means with a view to complementing the traditional methods and improving dissemination of the technical achievements re:

- More effective use of internet home page, e-mail and other electronic means.
- Joint sessions on special subjects with two or more study committees participating.
- Panel sessions on topical issues, possibly with more than one study committee involved.
- Organising short courses and tutorials on subjects of topical interest in different parts of the world.
- Organising symposiums, colloquiums, SC and WG meetings in developing countries and in Eastern European countries.
- Increased study committee participation in Regional Meetings of CIGRE.

SC C4 has a membership representing 40 countries; as far as possible, advantage will be taken of this large representation to promote the worldwide focus of CIGRE.