

# SC C1 Annual Report, 2013

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## System Development and Economics

### Overview

Study Committee (SC) C1 is focused on issues related to the development and economics of power systems. It examines the drivers for investment in power network facilities, decision processes and tools which support them. This covers both investments to increase the power transfer capability of a network and those to maintain acceptable reliability of facilities. In this regard, asset management and risk assessment in respect to existing facilities are key activities.

Throughout 2013, the work of C1 has evolved. A number of long-running Working Groups (WGs) have been concluded and several others initiated. These new Working Groups focus on emerging challenges and seek to find new or novel solutions. One such emerging challenge noted in some developed countries is the flattening and, in some cases, drop in demand growth. Along with maturing renewable technologies, the planning focus has evolved, as has business investment decisions and asset management. This represents a continuation of the impact of the Global Financial Crisis, as well as the ongoing trend of large, demand loads such as refineries and smelters moving to Asia (and away from Europe and North America). Accordingly, within the Western world, planners and those financially underwriting utilities are becoming attuned to new technologies and a drop in demand.

In the context of developing countries, C1 will soon publish a Technical Brochure (TB) giving a comprehensive review of all the nations in Africa, including information related to system development and planning at the national level. C1 is also holding a meeting in South Africa alongside a local conference. This aligns with Cigre's aim to continue expanding beyond its European birthplace and to become involved in the fast growing, emerging economies.

In light of the changing international trends, C1 is reviewing its overall program. Furthermore, in establishing study priorities and ultimately Working Groups, C1 members consider the technical aspects of the power systems, the requirements and expectations of customers, new technologies that lower cost or improve performance, total asset lifetime issues and overall business impacts.

### Strategic Direction

Study Committee C1 focuses on providing unbiased, useful information for system development practitioners and planners, as well as for policy makers, across the world. While the position, nature and role of system development and planning continue to evolve, SC C1 has mostly aligned its work with the Cigre Strategic Plan 2010-2020.

The work of Study Committee C1 is generally broken down into the following areas: system development, business investment and asset management. The emphasis of each of these three areas is refreshed every two years at the Paris SC meeting. However, from ongoing consultation with the C1 Advisory Groups and receiving input from C1 members

worldwide, it is apparent that these basic categories of Study Committee C1 work remain relevant. The asset management work is focussed on broad, high-level issues that cut across a number of Study Committees. As such, there tends to only be one or two Working Groups in this area, in operation at any one time.

A summary and brief description of ongoing, as well as recently completed, Working Groups and Technical Brochures for system development, business investment and asset management is as follows:

### **System Development**

- **TB (to be published in August) Planning Issues for Newly Industrialised and Developing Countries:** This TB documents the issues, methods and approaches to carrying out power system planning in developing and newly industrialised countries within Africa, and provides a technical summary for each country.
- **TB 523 System Complexity and Dynamic Performance:** This TB focuses on voltage stability aspects and discusses how active and passive compensation devices (FACTS) can help to improve voltage stability.
- **TB 527 Performance Coping with Limits for Very High Penetrations of Renewable Energy:** This TB investigates the impacts of an increasing global penetration of renewable energy sources (RES), in particular, variable non-synchronous renewable generation on power systems. The study assesses industry's readiness to manage the effects of greater RES integration based on survey responses from 18 countries and makes recommendations of how system operators can better prepare for these developments.
- **TB 536 Influence of Embedded HVDC Transmission on System Security and AC Network Performance:** This TB follows on from previous work on the application of HVDC and examines special control features of HVDC systems, overload capabilities and other issues.
- **WG C1.14 Review of the transmission planning access requirements:** This soon to be published TB examines transmission planning access requirements in a number of countries and looks at the differing approaches.
- **WG C1-19 Green field network, designing future networks ignoring existing constraints:** Without considering the constraints of existing infrastructure, this soon to be published TB is exploring the design of future power systems for the long term and considers the implications for the planning of today's power systems.
- **WG C1-20 Accommodating high load growth and urban development in future plans:** This WG is reviewing the methodologies and processes followed to formulate and prepare the development plans of transmission networks designed to supply high density urban areas within different countries.
- **WG C1.27 Definition of reliability in light of new developments in various devices and services which offer customers and system operators new levels of flexibility:** This WG will determine if there is a need for a modified or expanded definition of adequacy in light of the expected new devices and services.
- **JWG B4/C1.65 Recommended Voltages for HVDC Grids:** For steady state Pole-to-Ground and Pole-to-Pole DC voltages, this JWG will assess the technical limits in HVDC grids and will study economic case for voltage harmonisation.

## **Business Investment**

- **WG C1-15 Review the drivers for transmission investment decisions and the role of technical planning criteria in transmission investment:** This WG reviews the rationale used for transmission investment decisions, establishes the role of technical planning criteria in investment decisions and identifies trends in investment drivers.
- **WG C1-22 New investment decision processes and regulatory practices required to deal with changing economic drivers:** This WG is reviewing decision processes in a changing environment and will propose orientations for future processes.
- **WG C1-23 Transmission investment decision points and trees:** This WG is establishing if and how target networks are being used, and if they are used to generate decision trees and key decision points. In particular, it is investigating processes used to determine the timelines of the decision points in the different countries and the methods used.
- **WG C1-24 Tools for developing Optimum Network Development Plans:** This soon to be published TB is studying the need for new tools and techniques to assist in the development and economic justification of long-term transmission plans.

## **Asset Management**

- **TB 541 Asset Management Decision Making using different Risk Assessment Methodologies:** This TB provides insight into the application of Asset Management (AM), risk management and the information needed to prepare for future AM challenges. The TB overviews Cigre's work on AM and provides cases demonstrating AM decision making including environmental impacts, quantitative evaluation of risk treatment plans and application of risk indicators in transmission systems.
- **WG C1-25 Risk management and information processes for asset management in electricity transmission companies for current and future power systems:** This WG has already published TB 541, and will produce another TB towards the end of 2013. It will provide an insight into the current and future application of asset management, risk management and the information needed for these processes in electricity transmission companies as we prepare for future challenges.

## **Future work**

Future C1 work is aligned with the objectives outlined above and will ultimately be categorised into system development, business investment and asset management. The latter will particularly consider the implications of the activities on asset management strategies and methods. The work is also guided by two Technical Committee projects "Power Systems of the Future" and "Energy Efficiency". Both projects have helped elevate broader, system-wide issues. Furthermore, C1 is coordinating a Technical Committee paper on disaster recovery which has a range of Cigre-wide implications. Subsequently, this will be published as an *Electra* article as well as a longer technical paper which may be used to help frame some future C1 Working Groups considering planning responses after a major disaster.

### **New Working Groups**

Following the completion of five TBs in 2013 to date and another three due to be published by the end of the year, SC C1 has embarked on a refresh of its WGs. While these proposed WGs are still in various stages of internal review and preparation, an indicative list includes:

- C1.26 Impact on investment decisions due to increase of uncertainty from consumer trends and market solutions
- C1.28 Consequences to security of supply from changing meteorological events, driven by climate change, and its impact on planning approaches
- Cired/Cigre JWG C1.29 Planning criteria for Transmission Network in presence of self-sufficient distribution systems
- C1.30 Technical risks and solutions from periodic, large surpluses or deficits of available renewable generation in a particular area
- C1.31 Communication by system planners with stakeholders for new investments and deployment of future networks

### **Meetings and events**

- Paris session 2012

Further information can be obtained by contacting the SC Secretary, Peter Roddy or the SC Chairman, Phil Southwell. Contact details can be found on the C1 website.