



Study Committee C1

System Development and Economics

Chairman: Phil Southwell (Australia)

Strategy and Action Plan 2010-2018



Overview

The Study Committee C1 contributes and supports the overall aims and objectives of CIGRE and is governed by the following official CIGRE documents:

- *CIGRE Statutes* (2006)
- *Rules of Procedure* (2006)
- *CIGRE Technical Information* (2006)
- *General Rules for CIGRE Sessions* (2006)
- *Rules for Study Committees* (2008)

The C1 Strategy and Action Plan forms a subset of the following strategic plans and

- *CIGRE Master Plan 2006-2011* (2006)
- *CIGRE Technical Committee Strategic Plan 2008-2018* (2008)

The focus for C1 is to consider the electric power system as a whole. It's members, both the SC and AG/WGs, must therefore has a good knowledge about the whole power business area including, generation, transmission, distribution, regulation and the representatives could come from power companies, manufactures, universities and consultancies.



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Strategic Plan 2009-2018

1. Vision

C1 shall be recognised as part of the leading worldwide organisation CIGRE, specifically focusing on electric power system development and economics, including their technical, economic and environmental aspects and accounting for organisational and regulatory impacts.

2. Mission

Facilitating and promoting the progress of engineering and the international information and knowledge exchange in the field of system development and economics; and adding value to this information and knowledge by synthesising state-of-the-art practices and developing recommendations.

3. Scope

The scope of SC C1 is to study economic and system analysis methods important for developing power systems and assisting utilities to find the best solutions in various evolving, competitive and unbundled conditions in the context of the overall energy supply system and with social and environmental considerations.

The main areas of attention are:

- Methods and tools for power system static and dynamic analysis;
- Planning predicaments and methods in competitive and regulatory structures.
- Progress and new approaches in applying power system planning criteria and reliability (security and adequacy) assessment;
- Enhancing capacity by using risk-based security assessment and advanced information, communication and power-electronics technology for improving system stability and dynamic performance;
- Future dependence, requirements and economy of ancillary services for frequency and voltage control and other system needs;
- The impact of pricing and tariff methods for transmission services on system development;
- Asset management strategies in defining optimal policies;
- Planning issues related to long-distance transmission and international interconnections;
- System planning issues in newly industrialised and developing countries; and
- Impact on system development of new solutions and technologies in fields such as generation and demand side management (DSM).



4. Objectives

The *CIGRE Technical Committee Strategic Plan 2008-2018* sets out four major objectives; these are set out below together with the contribution from C1.

To increase its value to members and society

C1 Contribution

- Streamline administrative matters and review communication processes to support the work of members
- Reach out to a broader group of policy makers to inform them of the importance of CIGRE work
- Periodically review the structure of C1 to ensure that it meets the needs of its members and provides tools for individual members to engage with the broader society

To fully engage all stakeholders in the electricity enterprise

C1 Contribution

- Work to achieve a broad and engaged membership which is sustainable in the long-term and has appropriate governance and administrative structures that are easily transferable.

To increase the recognition of Cigré

C1 Contribution

- Ensure significant parts of the industry and world regions are represented on the study committee.
- Provide an opportunity for students to participate in the study committee as part of their personal development.
- Provide effective two-way communication with decision-makers to focus activities on their needs and provide value.

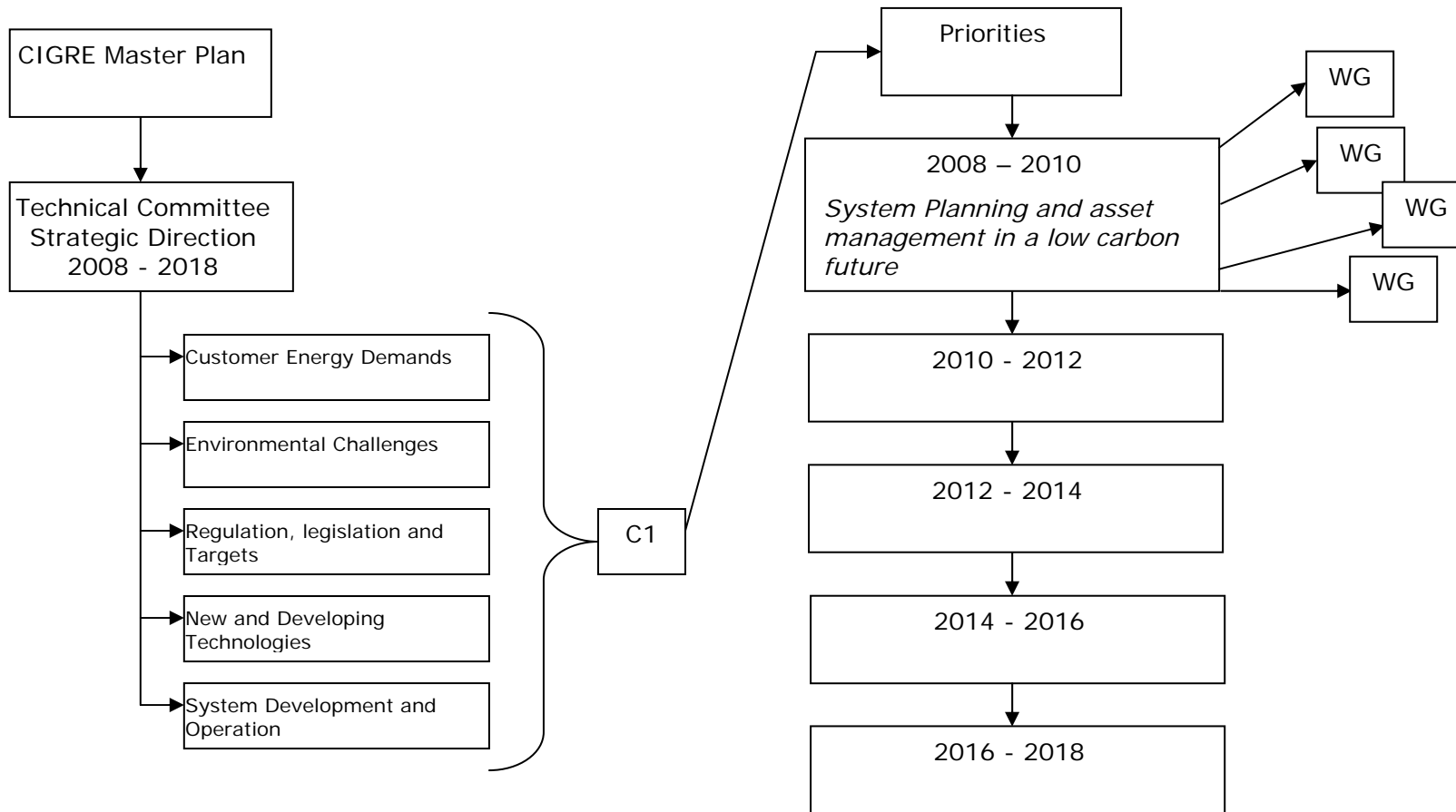
To strengthen support and cooperation between National Committees and the Central Office.

C1 Contribution

- Provide materials suitable for use by National Committees
- Engage National committees in various symposiums and conferences
- Leverage the experience of the Chairman with the Australian National Committee to apply to a wider range of National Committees

5. Strategic Direction

In line with the *CIGRE Master Plan 2006-2011* (2006) and *CIGRE Technical Committee Strategic Plan 2008-2018* (2008) the strategic direction of C1 is guided by the following framework:





Technical Committee Strategic Direction (2008-2018)		TC Strategic Directions 1-5 linking to future preferential subject themes for 10 year period	Preferential Subject Themes	
1. Customer Energy Demands	Examine on an ongoing basis the evolution of demand scenarios Analyse solutions for maintaining security of supply Investigate demand side management approaches Examine the challenges facing developing countries and explore ways to facilitate access to electricity.		2008-2010	System Planning and asset management in a low carbon future (see next table)
2. Environmental Challenges	Envisage solutions to address the environmental concerns faced by the electrical power sector Envisage solutions to address the public acceptability issues faced by the electrical power sector Record the lessons learnt and solutions adopted worldwide Study system efficiency solutions		2010-2012	
3. Regulation, legislation and Targets	Study and analyse the consequences of regulatory changes for the electrical power sector Record the solutions adopted and the experience gained worldwide Provide unbiased technical information to assist decision makers and stakeholders		2012-2014	
4. New and Developing Technologies	Identify and support new and developing technological solutions and highlight their potential contribution to the electrical power system Facilitate the adoption of new technological solutions by providing suitable CIGRE technical recommendations and supporting the subsequent standardisation process. Elaborate and provide knowledge on new technology in selected areas and act as a repository for the associated information.		2014-2016	
5. System Development and Operation	Study the transmission and distribution system as a whole Analyse the system implications of new generation technologies. Identify methods to improve the efficient utilisation of existing assets. Identify methods to maintain the supply reliability under the changes taking place. Analyse the implications of new technologies and how these can be most efficiently applied. Provide a vision of the future electrical power system.		2016-2018	



Focus of work over 2008/2010 period

While new working groups have been formed with the aim of incorporating the challenges of the requirements for a low carbon future, other issues are also being addressed. Changing technology is opening up new possibilities for power system design and the demands of regulators are requiring ever more justification for the allocation of scarce resources. Research areas fall broadly under the headings assigned to the advisory groups and can be summarised as follows:

- Planning for rapid development, uncertain generation and desired reliability
 - Newly and rapidly developing countries
 - System performance
 - Contingency planning
 - Mass penetration of renewables
 - A greenfield approach
- Investment drivers, decision processes and tools
 - Investment drivers, planning criteria, grid codes and the role of new technology
 - New investment decision processes
 - New tools and methods for increasing uncertainty
- Asset management practices including risk assessment now and in the future
 - Risk management
 - Broad trends and practices
 - New solutions for changing power system designs



Alignment of 2008-2010 Preferential Subjects to Working Groups

(In this table each WG is linked to the most pertinent PS, noting that a WG may address more than one PS and have a broader scope than just low carbon solutions)

Preferential Subject 1 Solutions for planning power systems for a low carbon energy future	Preferential Subject 2 New business processes to support / facilitate power system design for a low carbon energy future	Preferential Subject 3 Asset management challenges/strategies (replacement, refurbishment and maintenance) for a low carbon energy future
System design. New technologies. Reliability, social and economic impacts	Integrated transmission and distribution planning. Multi-regional / multi-national planning. Alternative reliability standards. More grid operational flexibility taking into account different generation and load profiles and locations.	Future integration of large scale renewables. Enhanced information needed. Dealing with flatter load profiles, active distribution networks, uncertain generation, integration of new technology.
C1.9 C1.13 C1.17 C1/C2/C6.18 C1.19 C1.20	C1.15 C1.21 C1.22 C1.23 C1.24 C1.12 C1.14	C1.16 C1.25

6. Composition

In order to facilitate world class research and output, the composition of C1, over the long-term, is designed to balance both a professional and geographical mix. There are also efforts made to ensure that there are a suitable mix according to membership status and terms of office. This is managed by the C1 Chairman. For details of the mix see Appendix A.

7. Communication

Cigré's work is of high quality and of great value to the industry. The C1 members directly involved know the value of this work, but it is not always visible others. SC C1 will raise the profile of its activities not just through the traditional routes but it will explore other avenues to promote its activities. This will involve both making information available and also seeking views on what would be valuable to the industry.

The routes that will be used by C1 to promote its activities are:

1. Paris session;
2. Regional meetings;
3. Symposium;
4. Tutorials;
5. Panel sessions;
6. Workshops;
7. *ELECTRA*;
8. The C1 web site e-Cigré;
9. CIGRE publications;
10. Liaison with other SCs;
11. Non-CIGRE conferences/symposia;
12. Target groups; and
13. Leveraging members in national committees.

While it is important SC C1 expand its communication to a broader audience, it is necessary to ensure that appropriate communication protocols are established and understood. Contact with the target groups is guided by the following points:

- Internal: For example, other study committees, through the SC chairman
- External: For example, companies/universities, by the SC members

8. Structure

1. The organisation of the work in C1 is critical to successfully focusing on current topics of interest in the industry and to communicating with decision-makers (target groups) in the industry. This is achieved through Advisory Groups and Working Groups.
2. For 2008-2010, C1's focus will fall into four main themes: System Planning (PS1); Business Management (PS2) and Asset Management (PS3); and Tutorials. Advisory Groups for each of these subject areas will identify the corresponding target groups and working group activities.



3. The work of the Advisory Groups is to anticipate emerging issues within the industry and recommend working group activities to examine these issues. Where possible the target group will be encouraged to become engaged in the work through its CIGRE member. In this way the working group reports will have increased value and relevance within the industry. This will encourage presenting the WG results at non-CIGRE events which will have the benefit of raising the profile of CIGRE and demonstrate its collective technical force. In many cases the target groups will involve other SCs as well as other parts of the industry. Many of the issues of interest within the industry will span more than one SC. This will require SCs to work in partnership to a scope of work and a timetable agreed with specific external target groups.

9. Working Group Coverage

With the restructuring that has taken place in the industry over recent years, the areas of interest and relevance to target groups has widened well beyond the narrow technical topics. In a mature industry such as electricity, the WG activities should incorporate the wider business picture involving political and social aspects of the topics being considered. To successfully achieve this broader view may require establishing links with other organisations to share views and knowledge and in this way leverage the value of WG activities to the target groups. This will also help avoid duplicating any work already done elsewhere and allow sharing of scarce resources.

10. Links to Technical Committee Projects

In line with supporting the general work of CIGRE, C1 is in a unique position to provide strategic assistance to the Technical Committee projects by providing advice on their cross-disciplinary, holistic work. This will also be used to inform the future preferential subjects and the broad direction of C1.

C1 will support a number of Technical Committee projects including:

- Network of the Future; and
- Energy Efficiency.

Building on this experience for the 2010-2012 period a new framework will be established to help support future C1-Technical Committee Projects collaboration.

Appendix A: C1 Composition

Composition: Profession

The current members of C1 are people who are very knowledgeable and from senior positions in companies throughout the industry across the world. The current spread of membership across the different parts of the industry are:

Profession/Background	Number
Utility	31
Generator	2
Institute	3
University	10
Regulator	0
Manufacturer	4
Consultant	6
Government/Ministry	3
Reliability Council	0
Association of network operators	1
Total	60

Composition: Region

In order to facilitate the international exchange of information, it is necessary to maintain a spread of membership across the world regions. The current regional membership is:

Region	Number
Africa/ Middle East	7
Asia-Pacific	11
Americas	7
Europe	35
Total	60



Composition: Membership Status

In order to achieve a reasonable mix across both the different parts of the industry and the world regions, the C1 comprises four types of membership as follows:

Membership Type	Number
Regular	24
Observer	15
Expert	19
Younger Members	0
Chairman	1
Technical Secretary	1
Total	60

Composition: Terms of Office

To ensure continuity of output from the study committee, the term of office for members is to be staggered. This will ensure the numbers of members retiring from the SC each year is kept to a reasonable level. Based on the numbers retiring each year, forward estimates are included of the new members required in future years. The current and future terms of office are as follows:

Term of office	Category	Number
N/A	Expert	19
1998 - ongoing	A National Chairman	1
2000 – ongoing	A National Chairman	1
2001 – ongoing	Technical Secretary	1
2002 - ongoing	Includes Chairman	4
2004-2010	Regular(4) /Observer (1)	5
2006-2012	Regular (4) /Observer (6)	10
2008-2014	Regular (12) /Observer (7)	19
Total		60



Appendix B: List of Current Advisory Groups

Ref.	Title	Convenor/ Secretary	Start Date	Draft for C1 website	TB/ELECTR A Date
C1. DAG	System Planning Propose new WG activities on all matters related to power system development.	Leslie Bryans (UK)	N/A	N/A Part of C1 Structure	N/A
C1. MAG	Asset Management Propose new WG activities on all matters related to the management of assets.	Eric Rijks (Netherlands)	N/A	N/A Part of C1 Structure	N/A
C1. BAG	Business Management Propose new WG activities concerning the business environment and its impact on investment in power system development.	Konstantin Staschus (Germany)	N/A	N/A Part of C1 Structure	N/A
C1. TAG	Education Tutorials Organisation of tutorials as required.	Keith Bell (UK)	N/A	N/A Part of C1 Structure	N/A



Appendix C: List of Current WGs and JWG

Ref.	Title	Convenor/ Secretary	Start Date/Status	Draft for C1 website	TB/ <i>ELECTRA</i> Date	ToR DMS#	Status Update
C1.9	Planning issues for newly industrialised and developing countries (Africa).	Riaz Vajeth (South Africa)	Autumn 2004	2010	2010	7017801	7016450
C1.12	The impact of transmission codes on the planning of systems.	Sallehuddin Yusof (Malaysia)	Sept 2006	July 2010	August 2010	7017807	7063303
C1.13	System complexity and dynamic performance.	Hans Abele (Germany)	September 2006	February 2010	March 2010	7017810	7016457
C1.14	Review of the transmission planning access requirements	Paulo Esmeraldo (Brazil)	November 2006	February 2010	March 2010	7017814	7016463
C1.15	Review the drivers for transmission investment decisions and the role of technical planning criteria in transmission investment	Adele Sleator (Ireland)	June 2009	April 2011	May 2011	5360347	7016497
C1/C2 -C6.18	Coping with limits for very high penetrations of renewable energy	Jonathan O'Sullivan (Ireland)	Beginning 2009	July 2010	August 2010	7017818	706190
C1.19	Green field network, designing future networks ignoring existing constraints	Hiroshi Suzuki (Japan)	March 2009	April 2011	December 2011	5218133	7016470
C1.20	Accommodating high load growth and urban development in future plans and their environmental effects	Kevin Leask (South Africa)	April 2009	April 2011	October 2011	5237034	7016474
C1.21	What advanced components and technologies are needed and which are available or under development to assist system development and planning? What are the limits of their use?	Andrea Mansoldo (Ireland)	September 2009	April 2011	May 2011	5557679	
C1.22	New investment decision processes and regulatory practices required to deal with changing economic drivers	Olivier Herz (France)	June 2009	April 2011	May 2011	5237030	7016477
C1.23	Transmission Investment decision points and trees	Ronald Marais (South Africa)	June 2009	April 2011	May 2011	5239000	7016493
C1.24	What new or recently developed analytical tools and methods are needed and which are available to understand and model the uncertain nature of future power systems	David Bones (Australia)	September 2009	June 2011	July 2011	5483982	7016488
C1.25	What are the factors and information that need to be considered for asset management decision making in the context of a low-carbon future?	Eric Rijks (Netherlands)	May 2010	September 2012	November 2012	6981560	7016485



Appendix D: List of Completed WGs and JWGs

Ref.	Title	Convenor/ Secretary	TB/ELECTRA Date
C1.1	What decision support tools, skills and techniques are required for asset management.	Mart van der Meijden (Netherlands)	TB 309 Published 2006
C1.2	How to provide transmission capacity whilst maintaining an acceptable level of reliability. What factors affect the management of constraints.	Phil Southwell (Australia)	TB 334 Published 2007
C1.3	What is the impact on transmission planning of uncertainty in generation and interconnection. How to determine the economic level of non-firm generation.	Leslie Bryans (UK)	[Check CIGRE Website]
C1.4	Application and required development of dynamic models to support practical planning.	Bruno Cova (Italy)	TB 312 Published 2007
C1.5	What are the challenges in how we perform economic analysis of transmission, distribution and generation equipment.	Terje Gjengedal (Norway)	No Delivery
C1.6	Impact of regulatory environments on investment decisions	Kannan Lakmeharan (South Africa)	TB 327 Published August 2007
C1.7	Managing the complexity and uncertainties of load, generation and markets in system development planning.	Richard Wakefield (USA)	TB 357 Published October 2008
C1.8	Review of structures for the system development activity.	David Elmakis (Israel)	TB 374 Published April 2009
C1.10	Review the document 'CIGRE Glossary of Terms Used in the Electricity Supply Industry'	Anca Popescu (Romania) William Reinke (US)	<i>To be published</i>
C1.11	Asset management – performance benchmarking.	Joe Toneguzzo (Canada)	TB 367 Published February 2009
JWG B2.17- B4- C1	Impacts of HVDC lines on economics of HVDC projects.	J. Nolasco (Brazil)	Complete
C1.16	Transmission Asset Risk Management	Eric Rijks (Netherlands)	TB 424 Published August 2010 7110166
C1.17	Planning to manage power interruption events	Keith Bell (UK)	<i>To be published</i> 7038492