



SC C1
SYSTEM DEVELOPMENT & ECONOMICS



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CIGRE
Comitato Nazionale Italiano

Riunione del 29 Novembre 2018
c/o Auditorium TERNA - Roma

Sintesi delle attività



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SC C1 Mission and Scope



Mission

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

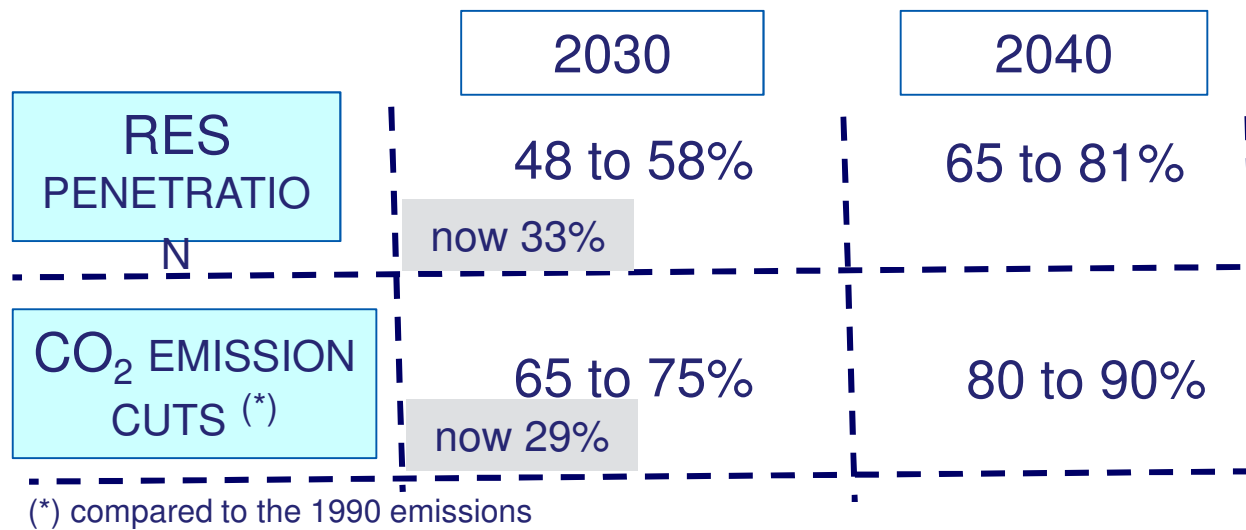
Scope

To study economics and system analysis methods for the development of power systems: methods and tools for steady state and dynamic analysis, planning issues, asset management strategies, in order to support electricity system planners worldwide to anticipate and successfully manage system changes to address the arising needs, opportunities and uncertainties while respecting multiple constraints...

Driver towards the power systems of the future

Decarbonisation of the human activities

Europe-ENTSO-e: key figures of the last TYNDP 2018



The power sector is the forerunner in the decarbonisation process



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SC C1 - Organisation



Presidente: Konstandin Staschus (Germany)

Segretario: Peter Roddy (UK)

Membro italiano: Bruno Cova da agosto 2016

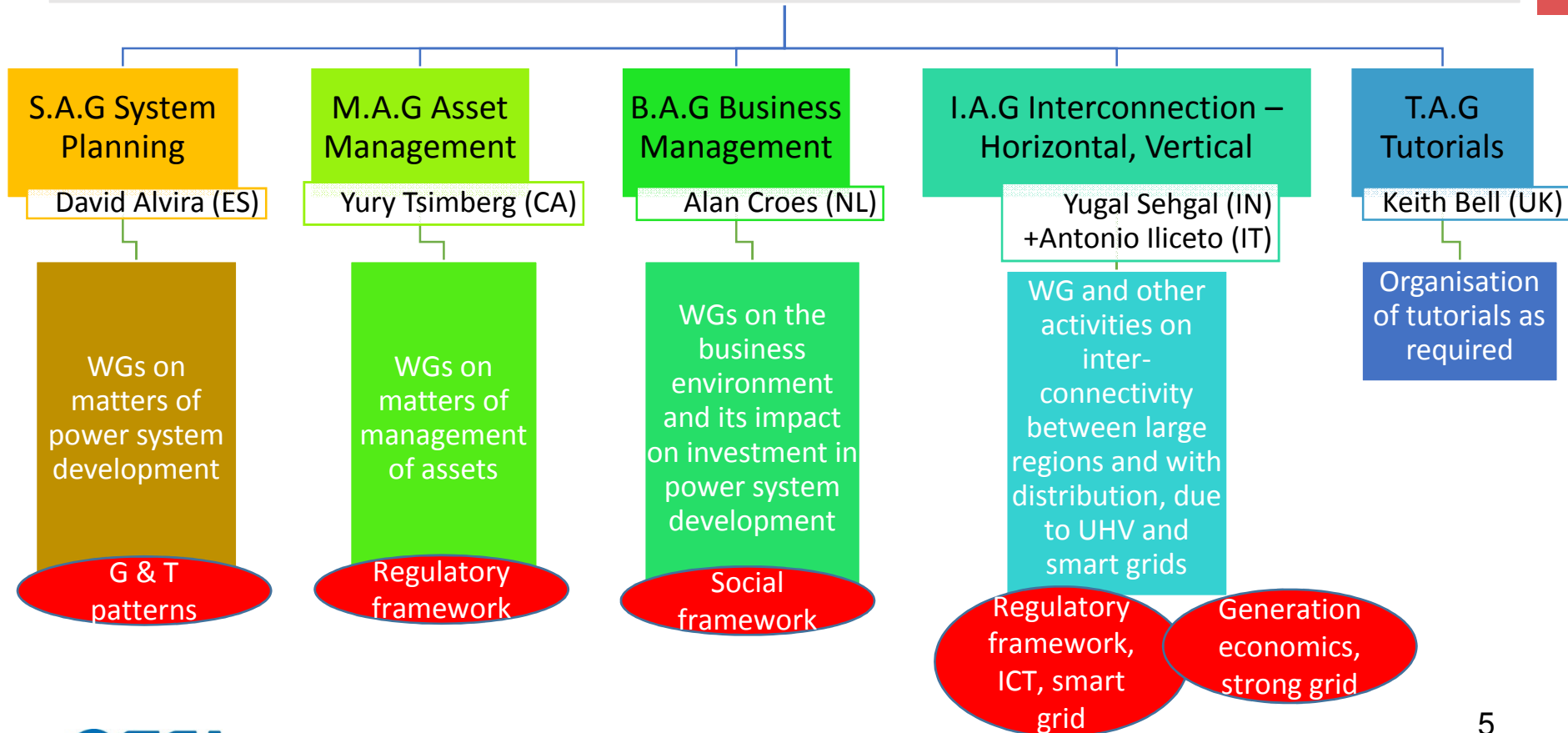
5 ADVISORY GROUPS

- **C1.SAG – System Planning**
- **C1.MAG – Asset Management**
- **C1.BAG – Business Management**
- **C1. IAG – Interconnection Horizontal and Verticals**
(Antonio Iliceto)
- **C1.TAG - Tutorials**



SC C1 - Organisation

Advisory Groups





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**SC C1 – Working Groups
in-Flight WGs (1/3)**

WG No.	WG Title	Status	Convenor
C1.22	New investment decision processes and regulatory practices required to deal with changing economic drivers	Final	Olivier Herz
C1.23	Transmission investment decision points and trees	Final	Ronald Marais
C1.33	Interface & Allocation Issues in multi-party and/or cross-jurisdiction power infrastructures projects	Final	IT Convenor: Antonio Iliceto
C1.34	ISO Series 55000 Standards: General Process Assessment Steps and Information Requirements for Utilities	Final	Boudewijn Neijens



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**SC C1 – Working Groups
in-Flight WGs (2/3)**

WG No.	WG Title	Status	Convenor
C1.35	Global electricity network feasibility study IT: Marco Stabile; Antonio Iliceto^(**)	Final	Jun Yu Gerald Sanchis
C1/C4.36	Review of Large City & Metropolitan Area power system development trends taking into account new generation, grid and information technologies (*)	Final	Stanislav Utts Valdson Jesus
C1/C6.37	Optimal transmission and distribution investment decisions under growing uncertainty IT: Fabrizio Pilo, Federico Silvestro	Final	Juan Araneda

() IT contribution on metropolitan area of Rome*

*(**) CIGRE liaison officer with IEC*



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**SC C1 – Working Groups
in-Flight WGs (3/3)**

WG No.	WG Title	Status	Convenor
C1.38	Valuation as a comprehensive approach to asset management in view of emerging developments	Final	Graeme Ancell
C1.39	Optimal power system planning under growing uncertainty	Final	Chongqing Kang
C1.40	Planning Coordination between System Operators, Transmitters and Distributors: Frameworks, Methods, and Allocation of Costs and Benefits	Final	Christopher Reali

IT: Livio Giorgi

IT: Antonio Iliceto



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SC C1 – Working Groups
Recently created WGs

WG No.	WG Title	Status	Convenor
C1.41	Closing the gap in understanding between stakeholders and electrical energy specialists	Starting	Phil Southwell IT: Chiara Vergine
C6/C1.33	Multi-energy system interactions in distribution grid	Starting	Birgitte Bak-Jensen IT: Antonio Iliceto

Italian membership recently submitted



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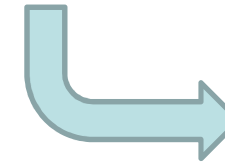


SC C1 – Publications

Technical Brochures (2018)



BROCHURE 715 (C1.27) **The Future Of Reliability** –
Definition Of Reliability In Light Of New Developments In
Various Devices And Services Which Offer Customers And
System Operators New Levels Of Flexibility



BROCHURE 701 (C1.15) Review Of Drivers For
Transmission Investment Decisions



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SC C1 – Publications

Technical Brochures (2018)



BROCHURE 715 (C1.27) **The Future Of Reliability** –
Definition Of Reliability In Light Of New Developments In
Various Devices And Services Which Offer Customers And
System Operators New Levels Of Flexibility

Reliability

A measure of the ability of a power system to deliver electricity to all points of consumption and receive electricity from all points of supply within accepted standards and in the amount desired.

Adequacy

A measure of the ability of a power system to meet the electric power and energy requirements of its customers within acceptable technical limits, taking into account scheduled and unscheduled outages of system components.

Security

The ability of the power system to withstand disturbances.



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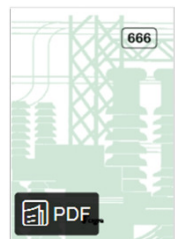
SC C1 – Publications
Technical Brochures (2017)



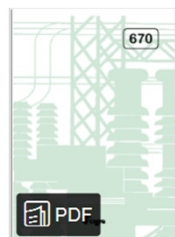
BROCHURE 681 (C1.29) Planning Criteria For Future Transmission Networks In The Presence Of A Greater Variability Of Power Exchange With Distribution Systems



BROCHURE 684 (B4/C1.64) Recommended voltages for HVDC grids



BROCHURE 666 (C1.30) Technical risks and solutions from periodic, large surpluses or deficits of available renewable generation



BROCHURE 670 (C1.32) Establishing best practice approaches for developing credible electricity demand and energy forecasts for network planning



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SC C1 – Publications

Electra invited paper

C1.35 giving an overview of the WG aims and expected results



Reference paper

Reference Paper on the management of network losses has been published in ELECTRA



The Strategic Plan 2015-2018



Main Outcomes of the 2018 SC C1 General Session

➤ P.S.1: "Expanding Role of Social Factors and Transparency in Transmission Investment Decision Approaches"

13 papers – 13 contributions from 11 countries and 21 spontaneous contr.

Key points:

- ✓ Electrification of final uses. With climate change and sector coupling tying electricity, heating and mobility systems closer together, it becomes clearer to citizens how strongly our daily lives are affected by electricity system decisions.
- ✓ Greater transparency. System planning needs to provide transparency and participation effectively and efficiently, and the papers under this PS show how the state of the art is evolving. Examples of system planning challenges are: new elements in multi criteria evaluation; new stakeholders in the decision-making process; and, management of the scope of highly uncertain investments
- ✓ Stakeholders involvement. Ultimately, transmission is paid for by the customer so it is incumbent on to us seek their views

Main Outcomes of the 2018 SC C1 General Session

➤ P.S.2: "Impact of Changing External Factors on Asset Management"

8 papers – 6 contributions from 5 countries, and 18 spontaneous contr.

Key points:

- ✓ Asset management challenges. categorised as: political, economic, regulation, weather, cyber and physical security factors, within-company strategy on grid modernization (e.g. monitoring, Big Data), asset analytics; security; and, asset usage and longevity effects from highly variable/non-schedulable generation
- ✓ IT tools for planning and asset management. Historically: 80% of our time spent collecting asset data and only 20% of our time analyzing it
- ✓ Asset management model: from maintenance planning on individual assets towards the holistic management of sustaining and developing the system's assets with interactions among assets, risks, economic impacts, and probabilistic analyses.
- ✓ Natural hazards. In all cases but one, regulators intervened post-event to allow investments that would increase network resilience

Main Outcomes of the 2018 SC C1 General Session

- P.S.3: “Coordinated Planning between Grid Operators across all Voltage Levels“ **IT: Special Reporter: Antonio Iliceto**

17 papers – 10 contributions from 5 countries, and 18 spontaneous contr.

Key points:

- ✓ Coordinated TSO/DSO Planning: As generation and storage become more distributed and demand more responsive to price signals, coordinated planning between transmission and distribution becomes necessary to manage power flows that frequently change direction both across voltage levels and between neighbouring systems.
- ✓ Need for new methodologies for planning multiple interconnected transmission grids and for transmission-distribution interaction:
 - how cost sharing and/or company organization and strategy can improve or impact coordinated planning principles;
 - evolution of planning methods to account for smart grids, distributed generation, demand response.

Main Outcomes of the 2018 SC C1 General Session

➤ Overall conclusions by SC C1 Chairman

- ✓ The integration of HVDC networks into the main transmission system is both a challenge and a great opportunity
- ✓ Planning methodologies and evaluation tools continue to evolve in order to meet the changing needs of the industry as we develop a system that is secure, sustainable and affordable
- ✓ There are institutional challenges that need to be overcome in order to encourage greater interconnection
- ✓ There is clear evidence of the need to, and benefit from, engaging/empowering stakeholders in the planning process
- ✓ Transmission and Distribution must work together to deliver the network of the future



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Next meetings



Aalborg – 4th-7th June 2019

- ✓ CIGRE Symposium “*Going Offshore – Challenges of the Future Power Grid*” (C4/B1/B4/C1/C2)

Chengdu – 20th-25th Sept. 2019

- ✓ CIGRE Symposium “*Towards active, sustainable digital networks that are resilient and integrated from UHV to distribution*” (C6/B3/C1/B5/D2/C3)
- ✓ CIGRE C1 Study Committee Meeting



Preferential Subjects 2020



PS 1: Power system resilience planning:

- ✓ Evaluating, improving and measuring power system resilience, given increasing threats from human and natural hazards, including climate change, specifically in system planning, economic assessment and asset management.

PS 2: Energy sector synergies for decarbonisation efficiency:

- ✓ Planning approaches addressing energy sector synergies across power, gas, transport, heating/cooling and new energy carriers, in order to optimise overall decarbonisation efficiency.
- ✓ How do these planning approaches include aspects of energy conversion and storage, technical and economic sector interfaces?

PS 3: Distributed Energy Resources in transmission planning:

- ✓ Tools and techniques used in transmission system planning and investment decisions to evaluate the high levels of renewables and storage at all voltage levels, as well as growing customer flexibility, especially in holistic approaches that combine technical assessment and reliability impacts on customers.