



CIGRE Study Committee C2 – Operation and Control

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG* C2.25	Name of Convenor: Jens Jacobs (Germany) E-mail address: Jens.Jacobs@amprion.net	
Technical Issues # (2): 6		Strategic Directions # (2): 1,2
The WG applies to distribution networks (4): Yes		
Potential Benefit of WG work #6: 2, 5		
Title of the Group: Operating Strategies and Preparedness for System Operational Resilience		
<p>Scope, deliverables and proposed time schedule of the Group:</p> <p>Background:</p> <p>With increased recognition of the potential adverse impact on power system operations due to physical and cyber invasions, high impact low frequency (HILF) events, and the rather frequent occurrence of system disturbances caused by natural phenomena (hurricanes, earthquakes, etc.), the electric power industry is gradually steering its focus from purely developing preventive measures to providing and enhancing resilience following major disturbances (interruptions) to the power grid.</p> <p>In power system operations, resilience generally means the ability to respond quickly to, and recover from, a disruption. To enhance system resilience, various means ranging from the provision of sophisticated operation and control capabilities to preparing for the effective and prudent operations can be pursued. As such, it is recognised that within CIGRE there could exist several working groups whose aims are to explore various means to enhance system resilience, both operational and infrastructure</p> <p>The proposed working group under Study Committee C2 will focus on operational resilience, i.e., the operating and control strategies and risk mitigation preparedness that can help system operators more effectively manage system disturbances, restore the disrupted power grid to a secure state and eventually to its pre-disturbance state. The scope of this working group will thus be limited to assessing operational strategies and risk mitigation preparedness that utilize available operation and control assets and power system resources, and proposing enhanced or innovative means in this domain. Where development or provision of new or additional facilities are assessed to be beneficial or helpful in such strategies, the working group should relay such ideas to other working groups that are addressing resilience from other perspectives, such as the C4.47 WG, for follow-up actions.</p> <p>Scope</p> <p>The working group will compile a list of conditions and the associated operating strategies and risk preparedness procedures that have been developed to help system operators to systematically manage and restore disrupted systems to their normal or pre-disturbed state. This work will essentially entail:</p> <p>1. Defining operational resilience</p> <p><i>This will set the scope and bound of the working group assessment, and the conditions under which operational resilience will be assessed.</i></p>		

2. Developing a list of events whose resultant state requires the application of operational resilience strategies, procedures and resources

This will entail developing the conditions that have high-impact but low frequency (HILF) of occurrence, such as physical or cyber security invasions, catastrophic disruption to power system infrastructure due to hurricanes, geomagnetic disturbances, etc.

3. Compile a list of established operational resilience strategies and risk preparedness procedures and resources, in broad terms, which are generally applied in response to the events listed in (2), above

This will entail a survey of system operators (SOs) in the five continents.

4. Identify areas of enhancement or improvement to strengthen operational resilience, with consideration to rapidly restoring or maintaining supply to critical services (e.g. nuclear plants)

This will entail the review of existing strategies and risk mitigation preparedness procedures, and explore enhanced or additional or innovative means to improve the effectiveness and efficiency of operational resilience.

5. Coordination with other CIGRE working groups with tasks on similar topic?

This will entail ongoing dialogue with other CIGRE working groups with tasks on similar topic to avoid potential overlapping effort and to share findings for possible enhancement to each group's conclusions and recommendations.

Deliverables:

- Technical Brochure and Executive summary in Electra
- Electra report
- Tutorial

Other Deliverables:

- International surveys on existing extreme events, practices adopted and regulatory models in Energy Industry

Time Schedule: Start: Spring 2018

Final Report: December 2020

Approval by Technical Committee Chairman:

Date: 01/06/2018



- (1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
 (4) Delete as appropriate

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction



5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit