CIGRE Study committe B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B3.71

NAME OF THE CONVENOR
Costan Crina (AUSTRIA)

TITLE
Substations Improvements to Support Network Black Start Capability

THE WG APPLIES TO DISTRIBUTION NETWORKS: NO

ENERGY TRANSITION
1 / Storage
4 / Sustainability and Climate Change
5 / Grids and Flexibility
6 / Solar PV and Wind

POTENTIAL BENEFIT OF WG WORK
1 / commercial, business, social, economic benefits
2 / potential interest from a wide range of stakeholders
5 / Guide or survey on techniques, or updates on past work or brochures
6 / work likely to contribute to improve safety

STRATEGIC DIRECTION
1 / The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-ofthe-art technological advances
2 / Making the best use of the existing systems

SUSTAINABLE DEVELOPMENT GOAL
7 / Affordable and clean energy

BACKGROUND :
The requirements for building and maintaining a resilient power network equipped to adapt to the continuous social and environmental changes impact the way substations are designed and operated.

Substations play a critical role to the network:

- Being a key element of the energy network
- Aiding the connecting renewables generation such as solar farms, wind farms
- Aiding the connecting storage such as BESS, pumped hydro and other forms of new storage technologies
- Aiding and supporting connecting of synchronous condensers that are critical infrastructure to the network stability

The operation of the substations is entirely reliant on modern control, protection and SCADA systems and these require permanent auxiliary supply and backup.

The recovery from a blackout network event is dependent on the substations' ability to maintain supply to critical control, protection and SCADA systems that will support the network restoration. Equipment design should be specifiied or mitigated to operate with loss of grid normal supply.

The substations must be provided with improved capabilities to support network black start that will assist in restoring the grid after a black out event.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

The Working Group is to produce a technical brochure which synthesises the technical knowledge and experience of all stakeholders regarding the design, construction, testing and on going monitoring and supervision of the substations to support a network black start conditions.

Scope:

1. International survey to gather feedback, experience and statistics on:
- What are the required substations improvements to support network black start conditions
- Experiences to date with testing of the substations' capability to support network black start
- Best practices in improving substation's auxiliary supplies resilience
- Reporting on network events due to the lack of performant auxiliary supply systems.

2. Develop improved capabilities to support network black start substations operation
- Outline the difference between substation blackout resilience and capability to support network black start
- Outline the requirements for critical substation equipment and services to support the blackout resilience and recovery
- Reliability requirements
- Substations configurations to support network black start capability
- Substations components to provide network black start capability
- Remote monitoring and supervision requirements

3. Develop testing methodology of a substation to support network black start capability:
- Local
- Remote

4. Preparation of guidelines for the capability, operation and maintenance of substation to support network black start capability.
Develop training requirements for design, substations operations and maintenance team to address as well as manage the substation ability to support network black start restoration.

SCOPE :

To maintain the continuity of supply or capability for critical assets to function under stringent operating conditions which requires critical equipment and services to support the blackout resilience and recovery. This brosure will only cover aspects related to B3 substations specificaly.

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee
Electra report
Technical Brochure and Executive Summary in Electra
Tutorial
Webinar

Time schedule

Q4	2025	• Recruit members (National Committees, WiE, NGN
Q1	2026	• Develop final work plan
Q4	2027	• Draft TB for Study Committee Review
Q1	2028	• Final TB
Q2	2028	• Tutorial

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:

Rannveig Loken
November 03rd, 2025