

CIGRE Study Committee C6

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG 1^N C6.45	Name of Convenor: Nasser Usman (NZ) E-mail address: faarooqui@gmail.com
Strategic Directions #²: 1, 2	Sustainable Development Goal #³: 7,11,13
The WG applies to distribution networks: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	
Potential Benefit of WG work #⁴: 2,3	
Title of the Group: The Impact of Distributed Energy Resources (DER) on the Resilience of Distribution Networks	
Scope, deliverables and proposed time schedule of the WG: Background: <p>With increased probability and severity of extreme weather events, resilience of the energy system has become a key concern to system operators. Processes before, during and after an event will need to be elaborated upon. Hardening of existing infrastructure should be revisited under the scenario of extreme weather events and global warming. Vulnerability to failure of the upstream network shall be analysed. Distributed Energy Resource integration may enhance and complement existing resilience practices. With electricity becoming the backbone of the entire energy system, and where an increase of decentralized renewable generation of electricity with highly automated operation, cyber security will become an increased risk to manage. Strengthening the inverter based energy system will be a third element requiring further investigation.</p> <p>This working group will focus on how to increase resilience in local and regional energy systems via increased DER integration.</p> Scope: <ul style="list-style-type: none"> • Introduction with definitions (resilience, reliability, security of supply, strengthening, cyber security) • Challenges to local and regional energy systems regarding resilience (Extreme weather events and system strength with inverter based generation, failure of transmission system) and to larger regions (market based events, not in the focus here but shall be mentioned) • Identification and anticipation of threats and associated vulnerabilities • Role of emergent technologies (digital and hardware such as satellites, drones, blockchain, Artificial Intelligence (AI), Performance Management Unit (PMU)) to help minimize risks, detect vulnerabilities and improve system response and recovery • Responses to prevent and contain the severity of the event and practices used to deal with the recovery after the event • Resilience strategies for communities, local and regional distribution systems based on renewable energy, distributed energy storage, electric vehicles and microgrids • Power system analysis during High Impact, Low Probability (HILP) events, representing the different stages of the events and the impact in the distribution networks • Role of AC/DC hybrid grid architectures (multiple voltage levels acting as a firewall against critical disturbances) 	

- Lessons learned and an evolution towards a new state of resilience (examples from around the globe), concentrating on technology used to harden networks, innovative practices adopted and tools and systems used to manage the resilience programs
- Impact on resilience metrics where DER integration measures were adopted to enhance the resilience of the electricity infrastructure
- Conclusion and outlook

Joint work with other SCs:

Liaison experts from SC B4, C1, C2, C4 and D2 will be invited, as this scope may imply in a multiple input from various other SCs.

Deliverables:

- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CSE
- Tutorial
- Webinar

Time Schedule: : August 2022

Final Report: December 2024

Approval by Technical Council Chairman:



Date: August 3, 2022

Notes: ¹ Working Group (WG) or Joint WG (JWG), ² See attached Table 1, ³ See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work. ⁴ See attached Table 3

Refer Comments at end of document.

Table 1: Strategic directions of the Technical Council

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-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

Table 2: Environmental requirements and sustainable development goals

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	SDG 7: Affordable and clean energy Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	SDG 9: Industry, innovation and infrastructure Facilitate sustainable infrastructure development; facilitate technological and technical support
11	SDG 11: Sustainable cities and communities Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	SDG 12: Responsible consumption and production E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	SDG 13: Climate action E.g. Increase share of renewable or other CO ₂ -free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	SDG 14: Life below water E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	SDG 15: Life on land E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

Table 3: Potential benefit of work

1	Commercial, business, social and economic benefits 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 directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	Work likely to contribute to improved safety.

Comments:

1) CIGRE Official Study Committee Rules re WG Membership:

<https://www.cigre.org/GB/about/official-documents>

No more than one member per country unless by SC Chair exception.

WG nominees must first be supported by their National Committee (or local SC Member) as an appropriate representative of their country.

Acceptance of the nomination is granted by the SC Chair and advised to the WG Convener

2) CIGRE will provision a dedicated Space for the Working Group in the Knowledge Management System. The WG will use the KMS for drafting collaboration, capture and retention of discussion and meeting records. WG Members will be sent registration instructions by the Convener.

<https://www.cigre.org/article/GB/collaborative-tools-2>