

CIGRE Study committee C6

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

JWG C6/C1/CIRED.50

NAME OF THE CONVENOR

Silvestro Federico (ITALY)

TITLE

Planning distribution networks under significant uncertainties

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION

5 / Grids and Flexibility

8 / Sector Integration

POTENTIAL BENEFIT OF WG WORK

3 / likely to contribute to new or revised industry standards

4 / state-of-the-art or innovative solutions or directions

5 / Guide or survey on techniques, or updates on past work or brochures

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-of-the-art technological advances

2 / Making the best use of the existing systems

3 / Focus of the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)

SUSTAINABLE DEVELOPMENT GOAL

7 / Affordable and clean energy

9 / Industry, innovation and infrastructure

BACKGROUND :

Planning power distribution networks under uncertainties focuses on designing reliable, resilient and efficient electrical grids that can adapt to unpredictable variables. These variables include highly uncertain spatial-temporal demand changes due to the electrification of transportation, heating and other end-use technologies, renewable energy integration, and evolving environmental factors. This process involves using probabilistic methods, stochastic optimization, scenario-based analysis, among other approaches to represent and address uncertainties in load growth, DER adoption, generation variability (especially from renewables), and unforeseen events like natural disasters. The objective is to ensure reliable and resilient power delivery, provide hosting capacity for increasing electrification and DER adoption, and ensure affordable decarbonization through right-sized capital investments and minimized operational costs. This planning is critical for developing smart grids and sustainable energy systems and requires new approaches also for multi-energy systems, including methodologies to evaluate the hosting capacity.

The WG will build on previous experience of WG C6.19, C6.25 and C1/C6.37.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

The Working Group intends to provide a global overview of best practices for tools, methodologies, and strategies for planning distribution systems under significant uncertainties. It will thus serve as a reference for utilities, regulators, and associated stakeholders to achieve the goal of a sustainable energy future planning.

SCOPE :

The scope of this working group (WG) includes several key areas of focus:

- Survey of distribution planning methodologies: A review of the requirements for planning approaches in distribution systems.
- State of the art in active distribution system planning: Analysing novel methodologies used for planning modern, multi-energy distribution networks under significant uncertainties.
- Strategies for short, medium, and long-term planning: Identifying technical, economic, and market models and strategies applicable to distribution network planning accounting for uncertainties at different time horizons.
- Algorithms for system expansion/upgrade planning: Designing algorithms suited to various scenarios and regulatory environments that optimize traditional infrastructure investments along with nonconventional solutions, such as distributed energy storage (DES) and distributed generation (DG).

Remarks:

Joint work with other SCs: Liaison experts from SC C1 and CIRED will be invited.

DELIVERABLES AND EVENTS

Deliverables Types

Time schedule

Q2	2025	Recruit members (National Committees, WiE, NGN)
Q3	2025	Develop final work plan
Q3	2027	Draft TB for Study Committee Review
Q4	2027	Final TB
Q4	2027	Tutorial

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:

Rannveig S. J. Loken

July 14th, 2025