CIGRE Study committe D2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG D2.60

NAME OF THE CONVENOR
RUIZ Jose (UNITED STATES OF AMERICA)

TITLE
Consumer-side Digital Models and Twins Application

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION
3 / Digitalization
5 / Grids and Flexibility
7 / Consumers, Prosumers and Electrical Vehicles

POTENTIAL BENEFIT OF WG WORK
1 / commercial, business, social, economic benefits
4 / state-of-the-art or innovative solutions or directions

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

SUSTAINABLE DEVELOPMENT GOAL
9 / Industry, innovation and infrastructure

BACKGROUND :

Ensuring interoperability between Electric Power Utilities (EPUs) and active consumers is increasingly essential in today's energy landscape.

This is facilitated by the Common Information Model (CIM) as described in IEC 61970, IEC 61968, and IEC 62325, which specifies the requirements for information modelling of power grids exceeding 35 kV. While local standards and documentation address digital modelling requirements for these grids, there remains a significant gap in extending information models to encompass the grid's distribution grids and consumer side. Moreover, there is a notable absence of standardized requirements for digital modelling and the creation of digital twins for active consumers.

Developing accurate digital models and twins of consumers' Distributed Energy Resources (DERs) is vital for participation in flexibility markets, enhancing grid transparency, resilience and effectiveness. Addressing this need will ensure that Transmission System Operators (TSOs), Distribution System Operators (DSOs), aggregators and consumers can effectively contribute to and benefit from a more flexible and responsive energy system.

These challenges are particularly crucial for industrial consumers and regions with a high concentration of smaller active consumers. Current standards lack comprehensive guidelines for consumers and EPUs regarding their digital modelling requirements. Furthermore, consumers often underestimate the potential positive impact that digital models and twins can have on grid resilience. It is, therefore, necessary to clearly structure this information to demonstrate the connection between digital models and digital twins and to provide guidelines for their effective use. As requirements are structured, it will become possible to implement AI to reduce the time and costs associated with digital models and twins development, verification and management, thereby ensuring consumers' rapid and effective integration into flexibility markets, which is crucial for achieving maximum decarbonization.

The working group can contribute by defining functional use cases, analyzing existing requirements for developing digital models and twins on the consumer side and developing detailed recommendations for different consumer groups. This will address the need for effective development and control of power supply and Distributed Energy Resources (DERs) by considering the integration of consumers into flexibility markets and other defined functional use cases.

The proposed activity builds on the findings of JWG D2/C6.47, "Advanced Consumer-Side Energy-Resource Management Systems," with a specific focus on developing information models for consumers. It will also consider the findings of JWG D2/C2.48, "Enhanced Information and Data Exchange to Enable Future TSO-DSO Coordination and Interoperability," and align it with the WG D2.57, "CIM (Common Information Model) Methodology."

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

Define requirements and recommend extending information models and developing digital models and twins on the consumer side.

SCOPE :

The scope is as follows:

1. Identify functional use cases for the application of Consumer-side Digital Models and Twins
2. Identify existing requirements for information models, digital models, and digital twins on the consumer side, i.e., the requirement for flexible markets.
3. Identify gaps in CIM and other standards in relation to the needs of active consumers (including the needs for participation in flexibility markets).
4. Explore use cases of information and digital models for Electric Power Utilities (EPUs) and consumers.
5. Analyze the current state of software for developing digital models and twins for active consumers.
6. Develop requirements for digital model development and management, considering consumers' rated power and the amount of Distributed Energy Resources (DERs) integrated into their grid.
7. Analyze the current state of Information and Communication Technology (ICT) for developing digital twins on the consumer side.
8. Produce guidelines for EPUs and active consumers for developing digital models and transforming them into digital twins.
9. Consider methods in implementing AI to facilitate the development and management of digital models and twins.

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee
CSE
Electra report
Meeting
Technical Brochure and Executive Summary in Electra

Tutorial
Webinar
Work Schedule

Deliverables schedule

Meeting	Q4	2024	Membership recruitment
Work Schedule	Q1	2025	Detailed work plan development
Technical Brochure	Q1	2026	Draft TB for SC Review
Technical Brochure	Q3	2026	Final TB
Tutorial	Q1	2027	Tutorial
Webinar	Q2	2027	Webinar

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:
Rannveig S. J. Løken
December 17th, 2024