

DISCUSSION MEETING SUMMARY

Study Committee B3 (Substation and electrical installations)

Wednesday 28th August 2024

Chair: Koji KAWAKITA

Secretary: Samuel NGUEFEU

Special Reporters: Mark OSBORNE (PS1) & Mark MCVEY (PS2)

1. INTRODUCTION

CIGRE Substation Study Committee B3 is responsible for activities that cover the design, construction, maintenance, and management of substations and the electrical installation in power stations, excluding generators. The aim is to bring value to the engineering community by highlighting state-of-the-art practices, establishing recommendations, and reporting best practices.

The major objectives of B3 are to facilitate technical guidance, which enables the electrical supply community to increase reliability and availability, encourage cost effective engineering solutions, manage environmental impact, support effective asset management and encourage the adoption of appropriate technological advances in equipment and systems to achieve these objectives.

The session covered a broad scope of issues, and all the preferential subject criteria have been addressed to some degree, highlighting the following key themes;

- The challenges in meeting net zero ambitions and maintaining security of supply.
- The impact of SF6 alternatives on substation construction and operation.
- Modularity and containerisation – solutions to meet the demand at distribution level of RES generation and power electronic applications.
- Impact of Digitalisation across all aspects of the substation lifecycle.

2. RUNNING OF THE MEETING

The session was attended by 895 participants over the day. There was a total of 49 contributions addressing the 2 preferential subjects, 14 for PS1 and 35 for PS2 including 1 NGN Showcase. Contributions were received from 16 different countries.

The NGN Showcase presentation was given in Preferential Subject 2 by NGN member Keisuke Murakita (Japan) on the 'Substation Insulation coordination design review following actual accident due to direct multiple lightning strikes.

Contributions from the audience were also enabled through the Sparkup application, which allows questions to be asked and responded to online. Vital and constructive discussions occurred during the meeting, and 70 spontaneous contributions, questions, and comments were recorded.



Fig 1: 2024 B3 GDM Team

3. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 1

PS1 – Challenges & new solutions in T&D substation design and construction for energy transition:

- Design impacts on substations from on-offshore wind, PV, hydrogen, small modular reactors, EV charging infrastructure, etc.
- New functions in substations (energy storage, synchronous compensators, etc.).
- HV-MV DC substation and GIS/GIL application for a DC network.

The Special Report proposed four questions, to which 14 prepared contributions were made. The key topics included clustering substation, modularisation and standardisation for faster connection to renewable energies and customers. Updating SF₆ alternative solutions was also discussed.

In addition, one summary of the recently published technical brochure (TB 930) titled “Review of Substation Busbar Component Reliability” was presented by WG representatives.

4. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 2

PS2 - Return on operational experiences for substation management:

- Challenges of managing assets: Initiatives to strengthen resilience, reliability and security, best practice and end-of-life management considering sustainability aspects.
- Lessons learned from operational experience from SF₆ alternatives solutions, digital transformation solutions and digital substation.

The special report proposed six questions, to which 35 prepared contributions, including one NGN Showcase, were made. The key topics included digitalised solutions such as remote monitoring, robotics, condition monitoring systems, Building Information Modelling (BIM), and digital substations were discussed. Asset Health Indices (AHI), life extension and transformer DP estimation were discussed for optimised management of substation assets. Modular substation design, lean management in GIS Replacement, precast concrete foundations and partial replacement strategy were discussed for faster deployment.

NGN showcase shares insights on countermeasures for lightning surges in substations, emphasising design reviews and surge arresters.

6. CONCLUSION

The session had a total of 49 contributions addressing the 2 preferential subjects, 14 for PS1 and 35 for PS2. Contributions were received from 16 different countries.

This year for the first time a short summary was also provide on CIGRE TV.

Although the agenda was full and focused on the prepared contributions, there was some opportunity for fruitful discussion. Sparkup provided a flexible platform for questions and comments from the audience. Not all of the Sparkup comments could be addressed in real-time, but responses will be provided in several weeks, along with the general report.