

DISCUSSION MEETING

Study Committee B2

(Overhead Lines)

Date: Thursday 01th September 2022

SUMMARY

Chairman: Herbert Lugschitz

Secretary: Wolfgang Troppauer

Special Reporters: Anish Anand (PS1), Balint Nemeth (PS2), Randy Grass (PS3/C3), Stefan Steevens (PS3/B2)

1. INTRODUCTION

The 2022 Group Discussion Meeting of Study Committee B2 was held on 1st September in the Grand Amphitheatre at the Palais des Congrès in a morning and afternoon session.

SC B2 has selected three preferential subjects for the Session 2022. PS3 is a joint PS B2 with SC C3.

PS 1 Challenges and New Solutions in Design and Construction of new OHL

- Design for reliability, availability, future climate parameters, more frequent extreme loads, design against theft, vandalism
- AC/DC Hybrid Lines, multi-purpose utilization, e.g. renewables, telecommunication
- OHL challenging construction projects: multiple circuits lines, high towers, long spans, heavy wind and ice, high altitudes, geology, access to site, no proper machinery, long lines and variation in reliability criteria etc.

PS 2 Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

- Preparedness and countermeasures for natural disasters and other emergencies
- Decisions of replacement based on monitoring, maintenance, operation, historical data
- Strengthening of existing lines to improve reliability, ampacity, lifespan

Joint PS 3 B2 with C3: Environmental and safety aspects from OHL

- Safety of workers in construction and maintenance of lines, e.g. equipment, methods
- Reducing environmental impacts from new and existing OHL
- Innovative engineering solutions/design to deal with environmental challenges

2. RUNNING OF THE MEETING

The Discussion Group Meeting was chaired by the Study Committee Chairman, Herbert Lugschitz, with the Special Reporters Anish Anand (PS1), Balint Nemeth (PS2), Randy Grass (PS3/C3) and Stefan Steevens (PS3/B2) and Wolfgang Troppauer as SC B2 Secretary.

The chairwomen of SC C3 Mercedes Vázquez was present at the discussion of JPS3.

The incoming B2 Study Committee Chairman Pierre van Dyke was also present.

3. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 1

Power transmission sector around the world has expanded enormously in recent past with large scale additions in many continents. Energy transition is playing a crucial role and renewable energy sources have also grown globally, requiring new lines as well as effective utilization of existing lines. Sustainable development and construction of new overhead lines has always been a challenge needing innovative techniques and solutions.

Preferential Subject-1 “Challenges and New Solutions in Design and Construction of new OHL” had following three sub-topics :

- Design for reliability, availability, future climate parameters, more frequent extreme loads, design against theft, vandalism
- AC/DC Hybrid Lines, multi-purpose utilization, e.g. renewables, telecommunication
- OHL challenging construction projects: multiple circuits lines, high towers, long spans, heavy wind and ice, high altitudes, geology, access to site, no proper machinery, long lines and variation in reliability criteria etc.

Total 22 papers were accepted under the PS from authors from 14 countries and these papers were divided into three groups:

1. **Design related** – 11 papers sharing experiences of new type of designs, design concepts, methodology etc.
2. **Construction related** – 6 papers sharing experiences related to construction challenges and new techniques, design solutions adopted
3. **Operations related** – 5 papers sharing field investigations, interference aspects, operational experiences, failure probability analysis etc.

Total 14 questions on PS-1 papers were raised in the Special Report. 12 submitted contributions on the special reporter’s questions were accepted for the GDM.

The contributions presented were on important topics of insulation design, insulator selection & performance of RTV coatings in heavy pollution areas; new overhead line design methods/standards to take care of ice & wind loads due to climate change; use of aluminium alloy towers for facilitating helicopter erection in difficult areas; challenges in relocation & construction of new lines in difficult areas; strengthening of existing towers; and requirements of constructing lines in proximity with gas/oil pipe lines.

The session invoked very good response from the audience present and 16 spontaneous contributions from the audience were also taken up for discussions.

4. CONTRIBUTIONS TO PREFERENTIAL SUBJECT 2

Most assets in the electric grid have well surpassed their expected 50-year of age, reaching in some cases the 60 to 70 years of age. Renewables and electrification of various sectors (i.e., heating, transport) will pose significant additional strain on Transmission and Distribution networks, so targeted actions are needed to ensure grid reliability. Climate-related extremes (e.g., storms, floods) are becoming more common in Europe. According to European Environment Agency, between 1980 and 2019, climate-related extremes caused economic losses totalling an estimated EUR 446 billion in the EEA member countries. Utilities need to implement new strategies to service new and shifting demand patterns. Contemporary and future trends (like self-consumption, electrification of sectors), or mounting public health challenges (like COVID-19 restrictions, working /studying from home) require new remote asset maintenance protocols, supply sources and revised capital programs priorities.

This preferential subject has a large number of 25 papers which were invited in the following topics:

- Preparedness and countermeasures for natural disasters and other emergencies,
- Decisions of replacement based on monitoring, maintenance, operation, historical data,
- Strengthening of existing lines to improve reliability, ampacity, lifespan.

During the Paris Session the following contributions was introduced in five groups:

- Group 1: INSULATOR asset management: 4 papers / 1 contribution
- Group 2: CONDUCTOR asset management: 7 papers / 5 contributions
- Group 3: TOWER asset management: 3 papers / 3 contributions
- Group 4: DLR AND ICING asset management: 5 papers / 5 contributions
- Group 5: AI AND DATA ANALISATION asset management: 3 papers / 1 contributions

In support of CIGRE's Next Generation Network Program, PS2 included three NGN presentation as well as contributions.

The conclusions from the presentation and discussions may be briefly summarized as follows: insulator coating had a fruitful discussion including sharing utility experiences, the technology and as well as e.g. handling of coated insulators depends on the chemistry of the used material. Related to the new type of conductors based agreed to need further studies for end of life calculation e.g. the carbon core types. The most contributions (21 on-site) happened related to DLR, several aspects had been discussed from the sensor, critical span analysis, algorithm, weather etc. point of view, introduced a new type of philosophy and agreed that the near future is to making further developments in scientific and also operational level.

5. CONTRIBUTIONS TO JOINT PREFERENTIAL SUBJECT 3 (SC B2 and SC C3)

Environmental and safety aspects regarding OHL are more and more known, evaluated, sensitive and taken into account during the design, construction, and operation phases. Such aspects are finding better ways to protect line workers during installation and maintenance, limiting visual impact and improving social acceptance (tower, painting, procedures...). It may also include utilizing new and innovative technologies to monitor or limit such things as EMF, audible noise, line insulation, hardware condition, optimize towers and conductor configurations, and also development of methods, tools to assess impacts and to simulate, test in laboratory or in the field.

The theme for B2/C3 Joint Preferential Subject 3 (PS3) is “**Environmental and safety aspects from OHL**” which includes:

- **Subcategory one:** Safety of workers in construction and maintenance of lines, e.g. equipment, methods
- **Subcategory two:** Reducing environmental impacts from new and existing OHL
- **Subcategory three:** Innovative engineering solutions/design to deal with environmental challenges

Summary of submitted papers:

Twenty-one (21) papers were submitted to PS3, coming from eight different countries. The papers broadly align with the three subgroups defined by the SC as follows:

- **Subcategory one:** Safety of workers in construction and maintenance of lines, e.g. equipment, methods
 - o Papers: 10135, 10152, 10546, 10888, 10908, 10915
- **Subcategory two:** Reducing environmental impacts from new and existing OHL
 - o Papers: 10489, 10531, 10306, 10361, 10576, 10889
- **Subcategory three:** Innovative engineering solutions/design to deal with environmental challenges
 - o Papers: 11086, 10138, 10146, 10304, 10448, 10719, 10775, 10776, 11145

We had good discussion for each of the three groups. The conclusions from the presentation and discussions may be briefly summarized as follows. Group 1 discussion was focused mostly on the safety of line workers with focus on worker health and safety equipment and new sensor technology to further improve safety. Group 2 discussion was focused on reducing environmental impacts including reduction in CO2 for various design and construction options and several topics around bird flight diverters. Group 3 discussion issues regarding the wildfire detection system using artificial intelligence and innovative temporary access roads.

6. CONCLUSION

A total of 68 papers has been accepted for the GDM. The prepared contributions came from 15 countries, 30% of them from Japan.

In total 53 spontaneous contributions from the audience and chat led to a lively session. The most discussed topics were:

- Climate change and determination of loads from ice and snow
- Insulator pollution and test methods
- Cores of composite conductors with new findings about ageing
- Technical aspects of Dynamic Line Rating methods
- Worker’s safety and use of new training methods (virtual reality)
- Bird protection
- Environmental friendly methods during the erection period for a line

The chairpersons of B2 and C3 thanked the Special Reporters, the Secretary and the authors of papers for their immense work beforehand in preparation for the session. They also thanked for the prepared and spontaneous contributions and the engaged discussions about them.