

Study Committee A2

Key Take Away's from Paris Session 2024



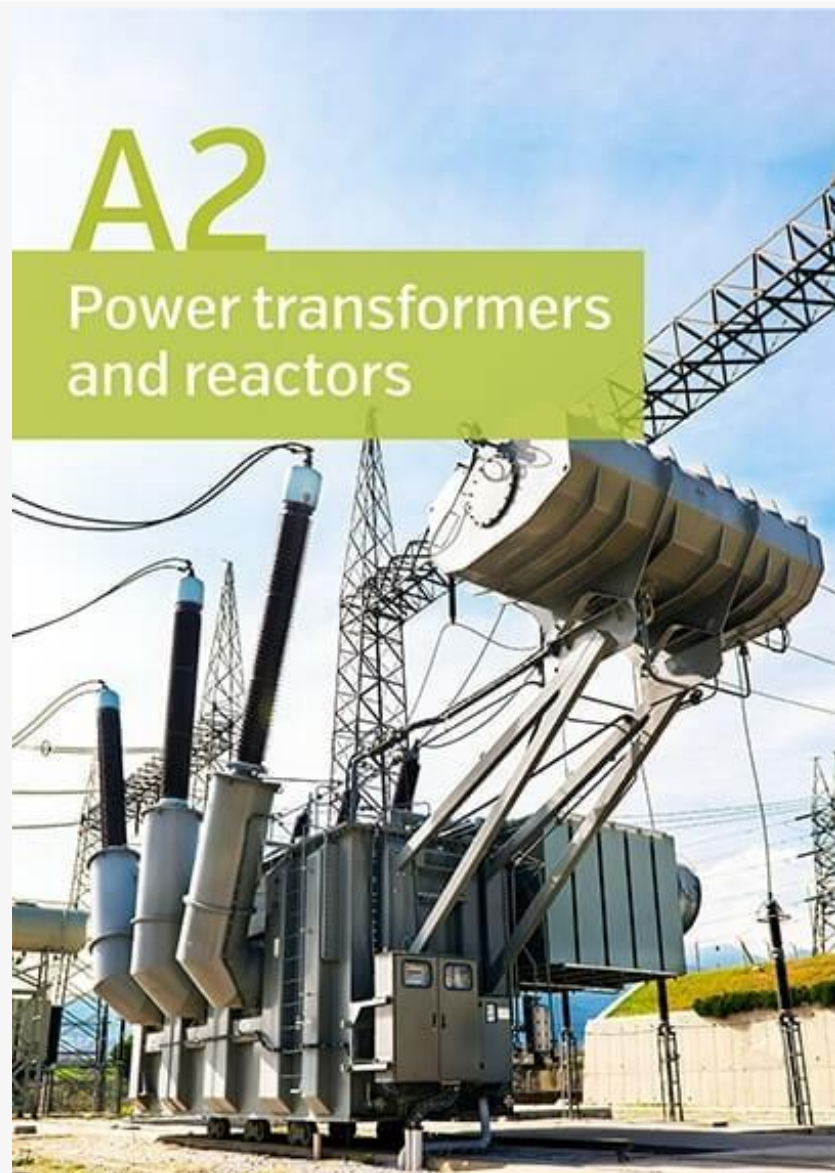
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For power system expertise

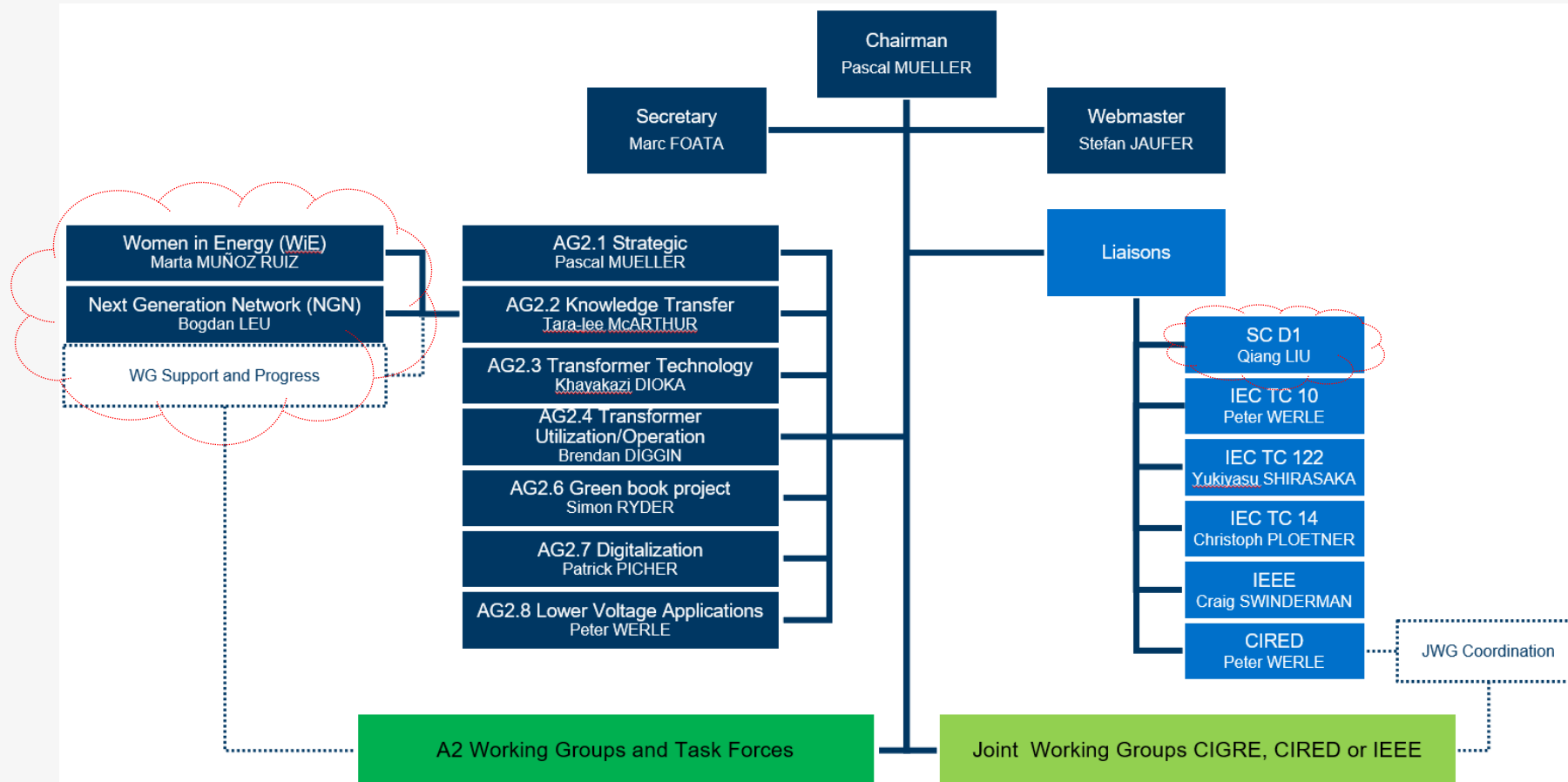
(+21)

102 Members

- Chair, Secretary, Webmaster
- 1 NGN Regular Member (+1)
- 1 Woman in Energy Regular Member (+1)
- 6 Advisory Group Conveners
- 5 Liaison Officers
- 39 Regular Members (+15)
- 6 Additional Regular Members
- 22 Observer Members
- 7 National Representatives
- 24 Working Group Conveners (+4)
- 3 Task Force Leaders



Organization



Working Groups & Task Forces (1/3)



Id	Name	Year	Status
A2.54	Audible Sound Requirements	2015	Completed ; the brochure is expected September 2024.
A2.56	Transformer Efficiency	2016	In progress; the final draft of the brochure is currently under comments resolution.
A2.57	Effects of DC Bias on Power Transformers	2016	Completed ; the brochure is expected October 2024.
A2.58	Site Installation and Pre-commissioning of Power Transformers and Shunt Reactors	2017	In progress; the brochure is currently being prepared and expected December 2024.
A2.60	Dynamic Thermal Behavior of Power Transformers	2018	In progress; the brochure is currently being prepared and expected December 2025.
A2.62	Analysis of Transformers Reliability	2018	Completed ; the brochure is expected September 2024.
A2.63	Transformer Impulse Testing	2018	In progress; the 3 brochures are currently being prepared and expected December 2024.
A2.64	Condition of Cellulose Insulation in Oil Immersed Transformers after Factory Acceptance Test	2019	Completed ; the brochure is expected September 2024.
A2/D2.65	Transformer Digital Twin	2022	In progress; the brochure is currently being prepared and expected March 2026.
A2/D1.66	Breathing systems of liquid filled transformers and reactors	2022	No progress report presented.
A2/D1.67	Guideline for online dissolved gas analysis monitoring	2022	In progress; the brochure is expected June/July 2025.

Active Working Groups & Task Forces (2/3)

Id	Name	Year	Status
A2.68	Failure Survey of Lower Voltage Generator Step Up Transformers Installed in Wind Farms and Photovoltaic Parks	2022	In progress; a data survey is currently carried out. No provisional end date is presented.
A2.69	Guide for Transformer Maintenance (update)	2022	No progress report presented.
A2/C3.70	Life Cycle Assessment (LCA) of Transformers	2023	In progress; a data survey is currently carried out. Also, the brochure is currently being prepared and expected 2025.
A2/D1.71	Modern Insulating Liquids Qualification for OLTC, Bushings and other Accessories	2023	In progress; the brochure is expected December 2026.
A2/D1.72	Retrofill of mineral oil in transformers – Motivations, considerations and guidance	2023	In progress; contributions to the brochure are currently being prepared by the 4 task forces are expected September 2026.
A2.73	Enhancing the Exchange of Transformer Information through Digitalization	2024	New ; currently forming the WG and developing a work plan.
A2/D1.74	Online Moisture Assessment of Transformers for Ageing Assessment	2024	New ; currently forming the WG and developing a work plan.
A2.79/D1	Improved Understanding of Dynamic Behaviour of Winding Insulating Materials in Liquid Insulated Power Transformers	2023	In progress; currently developing a work plan.
A2.80/D1	Functional Properties of Non-Metallic Solid Materials for Liquid Filled Transformers and Reactors and Their Compatibility with Insulating Liquids	2024	New ; currently forming the WG and developing a work plan.



Active Working Groups & Task Forces (3/3)

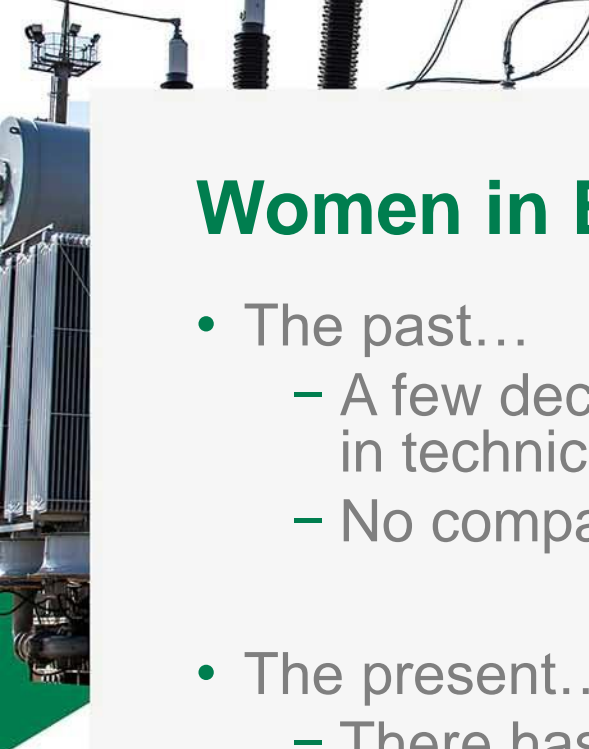
Id	Name	Year	Status
Task Force	Power Transformer Tank Specification for Passive Protection Against Internal Arc	2022	In progress; draft of the position paper is currently under comments resolution and expected 2026.
Task Force	Power Transformers Sound Levels on Site	2022	In progress; draft of the position paper is currently under review by the study committee.
Task Force	Silver Corrosion in Transformers	2024	In progress; contributions to the position paper are currently being prepared and is expected April 2025.



New Working Groups

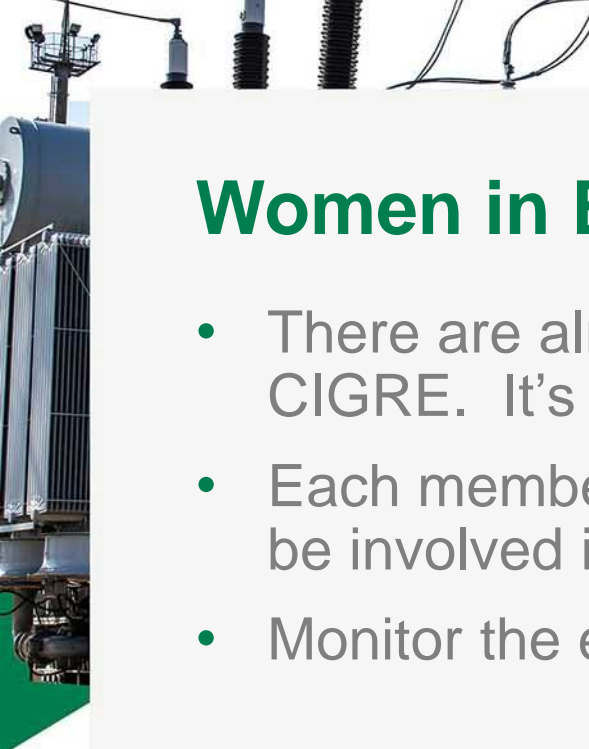


Id	Name	Year	Status
A2/A3/B3/ C3/D1.66	Guidelines for Life Cycle Assessment in Substations considering the Carbon Footprint Evaluation		New ; ToR released and convener appointed.
A2.75	Tap Changer Specification, Condition Assessment, Testing and Maintenance Guidelines		New ; ToR released and convener appointed.



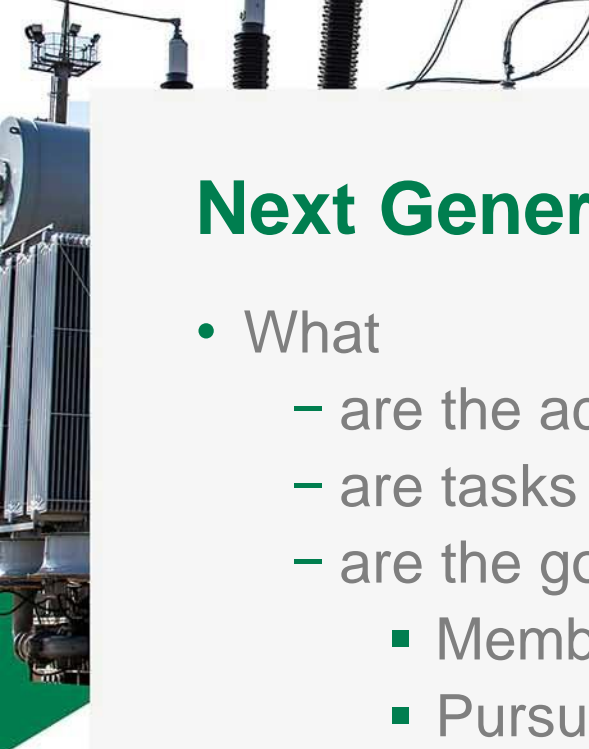
Women in Energy *by Marta Muñoz*

- The past...
 - A few decades ago there were few women in transformer industry, especially in technical areas
 - No company/organization policies supporting woman as there are nowadays
- The present...
 - There has been a change related to the role of women in an industrial environment but...there are not many woman candidates, especially for technical jobs
- The future...
 - In order to have a stronger collaboration of women in CIGRE it is first required to increase women presence in the transformers industry



Women in Energy *by Marta Muñoz*

- There are already very skilled transformers experts (women) contributing in CIGRE. It's important to continue giving visibility and recognition to their work.
- Each member should encourage and support valuable women in our network to be involved in WG/TF
- Monitor the evolution of the women participation in the different CIGRE activities.
- CIGRE can support the promotion of careers in transformer industry among female students with different initiatives.
 - Seminars in Universities / High schools
 - Publications oriented to future students
 - Role models



Next Generation Network *by Bogdan Leu*

- What
 - are the activities of NGN
 - are tasks where NGN is playing a role
 - are the goals of NGN
 - Membership growth
 - Pursue way to better engage and involve our A2 NGN membership
 - Looking at facilitating more webinars
 - Facilitate mentoring and connections with experts
 - Increase CIGRE A2 transformer awareness at the university level

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A2 Power transformers and reactors
PS1 Design of resilient transformers

GIC Field Test on 500 kV Single-Phase Transformers

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SUMMARY

During high solar activity, magnetic and energetic particles sent to earth can interact with the earth's upper atmosphere and magnetic field to cause geomagnetic disturbances (GMDs). GMDs can affect power systems by driving geomagnetically induced currents (GICs) through transmission lines into grid transformers. These GICs can saturate the transformers, which can lead to transformers overheating, abnormal voltage levels, and unusual harmonic flow. Therefore, it is vital to physically verify the potential impacts of GICs on grid operations and equipment to prepare for GMD events and ensure grid security. In this study, the effect of GIC on large power transformers was measured using a special test setup connected to a 500 kV bus at Dominion Energy Virginia. Two single-phase transformers were connected back-to-back while various levels of DC current were injected via the neutral. The results show that the internal temperature rise of these transformers stayed low. Their unique independent clamping design has the winding clamping parts located outside the windings, away from the saturated core, which reduces eddy current losses and heating. The test indicated that these designs can handle high GIC levels up to at least 55 A/phase (165 A in the neutral), for several hours. Furthermore, the test showed that the transformers' response to the injected GIC levels had no discernible impact on grid operations. However, higher-than-usual harmonic levels were observed at the test location and at substations several kilometers away.

KEYWORDS

Geomagnetic Induced Currents (GIC) - Geomagnetic Disturbance (GMD) - Harmonics - Reactive Power - Temperature - Sound - Transformer

102 Papers

- PS1
Design of Resilient Transformers 37
- PS2
Advances in Transformer Analytics 51
- PS3
Reliability of Transformers for Renewable Energy 14

Upcoming events

- **XI Workspot**
25-27 November 2024, Rio de Janeiro (Brazil)
- **2025 Symposium**
26 September – 2 October 2025, Montreal (Canada)
- **2025 A2/D1 Joint Colloquium**
26 October – 1 November 2025, Seoul (Korea)
- **7th ICTRAM**
6-9 May 2026, Catvat (Croatia)
- **2026 CIGRE Session**
23-29 August 2026, Paris (France)



Call for Papers



CIGRE 2025 International Symposium

Palais des congrès de Montréal, Québec, Canada • September 29-October 2, 2025

Paris Session 2026



PS1 Major challenges to the power transformer industry

- Impact of ageing fleet and maintenance challenges on the reliability.
Adapting/modernizing aged assets to new operating requirements and climate changes.
Integration of monitoring systems and intelligent sensors to support reliability assessment.
Strategies to mitigate supply chain disruptions and skilled labor shortages.
- Sustainability and Life Management: Transformer economics, Life Cycle Costing, Asset management practices (ISO 55000) and regulatory impacts on investment and maintenance decisions.
- Innovations in transformer technologies to meet safety, efficiency and environmental regulations: Eco-design. Life Cycle Assessment, circular economy.

Paris Session 2026



PS2 Power Digitalization Journey

- User experiences and challenges with lifetime data management, including issues with data collection, formatting, processing, storage, confidentiality, and security. Role of standardization such as the Common Information Model (CIM) and IEC 61850 in managing transformer data and facilitating exchanges between various stakeholders (OEMs, operators, contractors, regulators, etc.). Explore how standardization and digitalization can improve interoperability.
- Innovative digital solutions for sensors, nameplates, Factory Acceptance Tests (FAT) and Site Acceptance Tests (SAT), and operation and maintenance records.
- Applications of digitalization in the modeling, designing, manufacturing, testing, and operation of transformers. Side impacts of these digital solutions on the operation of transformers.



Paris Session 2026



PS3 Failure Prevention, Detection and Investigation

- Detailed case histories of failures, including examples such as component issues, short-circuits, moisture, dielectric breakdowns, paper degradation, material compatibility problems, and more.
- Guidelines for conducting investigations, including testing and troubleshooting procedures.
- Predictive maintenance: best practices for monitoring, diagnostics, and prognostics.

Thank you!

Let's talk

