

Global System Operations Summit

September 24th – 26th, 2025

50Hertz Transmission GmbH, Heidestraße 2, 10557 Berlin, Germany

Wednesday, 24th September 2025

17:15–19:00

Session 1: Higher fluctuation, dynamic career paths: challenges and opportunities for teams in the control room.

Dr. Anne-Katrin Marten & Mike Ruben (50Hertz)

→ Rooms Potsdam & Dresden

Session 2: How to achieve an ever-deeper integration of power system and energy market(s). The Electricity Market Coupling Compass software (Emc2) and possible paths leading into the future.

Marius Schrader & Julia Breuing (50Hertz)

→ Room Brüssel

Session 3: Strive to (close-to) real time congestion management processes in a RES & Storage driven energy system. (New) Perspectives from Germany and Europe.

Roman Sikora (50Hertz)

→ Room Hamburg

Session 4: More Power Electronics – More Headaches? Insights & discussion on challenges & future concepts in grid operation with a high proportion of power electronics.

Franz Linke (50Hertz)

→ Room Magdeburg

Session 5:

G-PST EPICS Session: Sub-synchronous oscillations in an Inverter Based Resources (IBRs) dominated system, the good, the bad and the ugly.

Mark O'Malley & Janusz Bialek (Imperial College London),

Callum Henderson (SP Energy Networks)

→ Room Schwerin

19:00–24:00

Dinner

Zollpackhof

Elisabeth-Abegg-Straße 1, 10557 Berlin

Breakout Sessions Day 1

Wednesday, 24th September 2025

Session 1:

Higher fluctuation, dynamic career paths: challenges and opportunities for teams in the control room.

Interactive session on challenges and opportunities of demographic and social changes that are leading to new career paths (more flexible, more dynamic, more individual): how does this fit in with the existing and new requirements of system management? We ask participants to bring along a challenge or solution approach.

Dr. Anne-Katrin Marten & Mike Ruben (50Hertz)
→ Room Potsdam & Dresden

Session 2:

How to achieve an ever-deeper integration of power system and energy market(s). The Electricity Market Coupling Compass software (Emc2) and possible paths leading into the future.

In future, the system and market must be viewed in a much more interconnected way. This session will discuss concepts for the future and present and discuss the Electricity Market Coupling Compass software developed by 50Hertz.

Marius Schrade & Julia Breuing (50Hertz)
→ Room Brüssel

Session 3:

Strive to (close-to) real time congestion management processes in a RES & Storage driven energy system. (New) Perspectives from Germany and Europe.

Increasing volatility in electricity generation necessitates accelerated optimisation in congestion management. How can we organise ourselves collectively to achieve close-to-real-time optimisation of time-critical process components in congestion management?

Roman Sikora (50Hertz)
→ Room Hamburg

Session 4:

More Power Electronics – More Headaches? Insights & discussion on challenges & future concepts in grid operation with a high proportion of power electronics.

The growing presence of power electronics in the grid introduces new challenges for observability, simulation, and control – especially across grid levels and operator boundaries. The session presented future concepts for automation and system operation to efficiently manage increasingly complex switching processes.

Franz Linke (50Hertz)
→ Room Magdeburg

Session 5:

G-PST EPICS Session: Sub-synchronous oscillations in an Inverter Based Resources (IBRs) dominated system, the good, the bad and the ugly.

Power system oscillations are common and generally well understood and operators know how to navigate them. However, with increasing shares of IBR there are new oscillations that are occurring, and these are less well understood and are difficult to navigate. EPICS and the G-PST have several active research efforts dedicated to understanding, foreseeing and mitigating them via a multi-layered defence strategy. This session will introduce the challenge and highlight the research being conducted to deal with the oscillations.

*Mark O'Malley & Janusz Bialek (Imperial College London),
Callum Henderson (SP Energy Networks)*
→ Room Schwerin

Overview Break-out Sessions

Thursday, 25th September 2025

On Thursday we have parallel sessions in four different streams.

These sessions offer space for inspirational talks, interesting presentations, deeper exploration, open discussion, and shared learning.

You are free to switch between streams and choose the sessions best matches your interests or current challenges.

Topology Optimizer Symposium

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

- **Topology Optimizer Symposium Poster Fair**
→ Foyer
- **Topology Optimizer Symposium Panel Discussion Solutions for Topology Optimization – What is available today?**
- **Topology Optimizer Symposium Panel Discussion: How research tackles the challenges of tomorrow**

Enhancing Power System Resilience

→ Room Rostock

- **Elia Group Research Challenge – Closing the Gap between Research & Operation**
- **Next-Gen Data: Expert Session on Data Modeling, Master- & Real Time Data (Session I and Session II)**

Operational Stability and Monitoring

→ Room Schwerin

- **PMU & WAMS Reimagined: Precision, Granularity & Real-Time**
- **Pushing the Boundaries: Online Dynamic Assessment for Real-Time Grid Stability**
- **Real-Time System Strength Monitoring: Tools for a Resilient Grid**

Design of the Control Center of the Future

→ Room Magdeburg

- **Control room applications and new physics**
- **Combined Session: Discussion Open Source Uncovered – Policies, Practices and OSPO Support at Elia Group**
- **Designing for Decision-Making: Human Factors in Modern Control Rooms**
- **From Work to Space: Designing the New Control Center – human-centric, next to technology**

07:30–09:00

Breakfast Snack & Networking Opportunity

→ Foyer

09:00–09:35

Welcome & G-PST Session

Mirko Pracht (50Hertz) and further 50Hertz & G-PST team)

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

09:35–12:30

Topology Optimizer Symposium Poster Fair

→ Foyer

09:35–10:55

A TSO perspective on cooperation in system operation, system extensions and recent blackouts in 2025

Ana Cigarán Romero (50Hertz), Rory McBride (50Hertz), René Suchantke (50Hertz), Anne-Katrin Marten (50Hertz), Elena Ackoska (MEPSO), Klaus Kaschnitz (APG), Rodrigo Espinoza (Coordinador Eléctrico Nacional Chile), Tetiana Tkachuk (ENTSO-E)

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

10:55–11:15

Coffee Break

→ Foyer

11:15–12:30

Elia Group Research Challenge – Closing the Gap between Research & Operation

Mohamed Abdalmoaty (ETH Zürich), Benjamin Requardt (Fraunhofer IEE), Farhad Safargholi (Fraunhofer IEE), Luigi Vanfretti (Rensselaer Polytechnic Institute), Pauli Petersen (Energinet), Franz Linke, Malte Scharf, Sabine Oberhausen (50Hertz)

→ Room Rostock

PMU & WAMS Reimagined: Precision, Granularity & Real-Time

Ralf Heisig, Wolfgang Diestelkamp (50Hertz)

→ Room Schwerin

Control room applications and new physics

Tim Green & Gabriel Covarrubias Maureira (Imperial College London), Pierluigi Mancarella (University of Melbourne)

→ Room Magdeburg

12:30–14:00

Lunch

Reinhard Bär
Am Hamburger Bahnhof 4, 10557 Berlin

14:00–15:30

Topology Optimizer Symposium Panel Discussion Solutions for Topology Optimization – What is available today?

Clemens Wasner (EnliteAI), Noémie Verstraete (N-SIDE), Alexis Godefroy (Artelys), Simon Krah (FGH), Nico Westerbeck, Christian Merz (Elia Group), Pablo Ruiz (NewGrid), Sjoerd Kop (Tennet)

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

Next-Gen Data: Expert Session on Data Modeling, Master- & Real Time Data (Session I)

Frederic Koppenberg, Kirsten Engbring, Noah Magel, Arend Berndt, Dominik Heide, Sören Dittmann (50Hertz)

→ Room Rostock

Pushing the Boundaries: Online Dynamic Assessment for Real-Time Grid Stability

Dr. Christoph Pache (50Hertz), Dr. Andrea Benigni (FZ Jülich), Dr. Jochen Cremer (TU Delft)

→ Room Schwerin

Combined Session: Discussion Open Source Uncovered – Policies, Practices and OSPO Support at Elia Group

Gord Stephen (NREL), Sven Fritzsche (50Hertz)

→ Room Magdeburg

Designing for Decision-Making: Human Factors in Modern Control Rooms

Vikas Singhvi (EPRI), Lina Ramirez (G-PST)

→ Room Magdeburg

15:30–16:00

Coffee Break

→ Foyer

16:00–17:00

Topology Optimizer Symposium Panel Discussion: How research tackles the challenges of tomorrow.

Dr. Alberto Del Rosso (EPRI), Dr. Lars Schewe (University of Edinburgh), Dr. Jochen Cremer (Delft University of Technology), Felix Preuschoff (IAEW RWTH Aachen),

Malte Lehna (Fraunhofer IEE), Ian Dytham (NESO), Nico Westerbeck (Elia Group)

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

Next-Gen Data: Expert Session on Data Modeling, Master- & Real Time Data (Session II)

Frederic Koppenberg, Kirsten Engbring, Noah Magel, Arend Berndt, Dominik Heide, Sören Dittmann (50Hertz)

→ Room Rostock

Real-Time System Strength Monitoring: Tools for a Resilient Grid

Lina Ramirez (G-PST)

→ Room Schwerin

From Work to Space: Designing the New Control Center – human-centric, next to technology

Ralf Heisig (50Hertz), Klaus Grotz (fasterhead)

→ Room Magdeburg

17:00–17:30

Wrap-Up

Ana Cigarán (50Hertz)

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

18:30–22:30

Dinner hosted by G-PST

Food Factory
Washingtonplatz 3, 10557 Berlin



Program Day 2

Thursday, 25th September 2025

Topology Optimizer Symposium

→ Rooms Hamburg & Brüssel & Potsdam & Dresden

09:35–12:30

Topology Optimizer Symposium Poster Fair

→ Foyer

More than 25 different topics around topology optimization clustered into research, vendors and TSO/DSO will be present in a poster sessions. Engage with the authors, ask questions, and connect with colleagues from a variety of fields. Take this opportunity to discuss your ideas and expand your network.

14:00–15:30

Topology Optimizer Symposium Panel Discussion Solutions for Topology Optimization – What is available today?

Clemens Wasner (EnliteAI), Noémie Verstraete (N-SIDE), Alexis Godefroy (Artelys), Simon Krahl (FGH), Nico Westerbeck, Christian Merz (Elia Group), Pablo Ruiz (NewGrid), Sjoerd Kop (TenneT)

Moderated by Christian Merz (Elia Group)

During the last years multiple groups have been working on solutions for topology optimization on a full-scale TSO grid. In this panel each participant will pitch their solution in terms of applicability on real grid data, action space, diversity of solutions, UI, simplification/limitation and speed/scalability which will be discussed more in-depth in the time afterwards. Questions from the audience are highly welcomed.

16:00–17:00

Topology Optimizer Symposium Panel Discussion: How research tackles the challenges of tomorrow.

Dr. Alberto Del Rosso (EPRI), Dr. Lars Schewe (University of Edinburgh), Dr. Jochen Cremer (Delft University of Technology), Felix Preuschoff (IAEW RWTH Aachen), Malte Lehna (Fraunhofer IEE)

Moderated by Ian Dytham (NESO), Nico Westerbeck (Elia Group)

In a panel discussion format, researchers from leading institutions around the globe join to discuss on the open challenges in the field of transmission topology optimization (TTO). While initial breakthroughs surfaced the first viable product within the last 5 years, tough challenges like continent-scale grid optimizations or integration of voltage and dynamic stability aspects are still immature. This panel will investigate how to improve on the current, heuristically dominated approaches, working towards a holistic optimization.

The Topology Optimization Symposium is hosted by:



TRANSPORT BW



Program Day 2

Thursday, 25th September 2025

Enhancing Power System Resilience

→ Room Rostock

11:15–12:30

Elia Group Research Challenge – Closing the Gap between Research & Operation

Mohamed Abdalmoaty (ETH Zürich), Benjamin Requardt (Fraunhofer IEE), Farhad Safargholi (Fraunhofer IEE), Luigi Vanfretti (Rensselaer Polytechnical Institute), Pauli Petersen (Energinet), Franz Linke, Malte Scharf, Sabine Oberhausen (50Hertz)

The Elia Group Research Challenge aims to collaborate with leading research institutes in an agile, dynamic, and practice-oriented manner – delivering actionable results within just one year that can be directly integrated into system operations. Research activities began in May 2025. In this session, we will present three research questions currently being addressed by four institutes. The topics include:

- Optimizing grid monitoring using power system simulators
- Exploring new approaches to grid control via impedance frequency scans
- Accelerating simulations in Modelica (in collaboration with Energinet)

14:00–15:30

Next-Gen Data: Expert Session on Data Modeling, Master- & Real Time Data (Session I)

16:00–17:00

Next-Gen Data: Expert Session on Data Modeling, Master- & Real Time Data (Session II)

Frederic Koppenberg, Kirsten Engbring, Noah Magel, Arend Berndt, Dominik Heide, Sören Dittmann (50Hertz)

Join an expert session on the future of data management for system operations. Choose from the topics Data Governance Strategy, Data Modeling with CGMES, Master Data Management, Field Data Collection & Protocol Abstraction and Movement Data Handling in MDCS. Participants will vote on short pitches, and the top topics will be introduced with a short presentation followed by an open discussion.

Program Day 2

Thursday, 25th September 2025

Operational Stability and Monitoring

→ Room Schwerin

11:15–12:30

PMU & WAMS Reimagined: Precision, Granularity & Real-Time

Ralf Heisig, Wolfgang Diestelkamp (50Hertz)

For years or decades, we've deployed PMUs and pursued Wide Area Monitoring Systems—yet we still only truly understand our grids when failures occur. Now, we're developing ways to see the grid with greater precision, finer granularity, and closer to real-time. Join us to explore how these innovations are unlocking deeper insights and transforming grid awareness.

14:00–15:30

Pushing the Boundaries: Online Dynamic Assessment for Real-Time Grid Stability

*Dr. Christoph Pache (50Hertz), Dr. Andrea Benigni (FZ Jülich),
Dr. Jochen Cremer (TU Delft)*

Discover the latest advances in real-time grid stability analysis through Dynamic Security Assessment (DSA). This session combines a transmission operator's hands-on experience with pioneering research on parallel simulation technologies and cutting-edge AI-based approaches.

16:00–17:00

Real-Time System Strength Monitoring: Tools for a Resilient Grid

Lina Ramirez (G-PST)

As grids evolve and become more dynamic, real-time tools for assessing system strength are critical for maintaining voltage and frequency stability. This session explores key indicators and operational strategies that help prevent blackouts and support secure, data-driven decision-making in control rooms.

Program Day 2

Thursday, 25th September 2025

Design of the Control Center of the Future

→ Room Magdeburg

11:15–12:30

Control room applications and new physics

*Tim Green & Gabriel Covarrubias Maureira (Imperial College London),
Pierluigi Mancarella (University of Melbourne)*

Control rooms are having to deal with higher dimensional, more complex problems, that require faster response times. System strength is an excellent example of this trend. This session will highlight the challenges of system strength as a vehicle to highlight the changing physics and how it is impacting on the required functionality of future control rooms.

14:00–15:30

Combined Session: Discussion Open Source Uncovered – Policies, Practices and OSPO Support at Elia Group

Gord Stephen (NREL), Sven Fritzsche (50Hertz)

A fast-paced journey into the world of Open Source! In this session, we'll explore how Open-Source shapes Elia Group's innovation and daily practices. You'll learn about different license types, the insights into our internal open-source policies, and why license compliance matters for every team. Discover how the OSPO supports your work and enables secure, responsible use and contribution to open-source software across our organization. We will include practical tips, myth-busting, and surprising facts about open source.

Designing for Decision-Making: Human Factors in Modern Control Rooms

Vikas Singhvi (EPRI), Lina Ramirez (G-PST)

This session explores how human-centered design can enhance decision-making in modern control rooms. Experts will share practical insights on improving operator performance through better visualization, communication, and integration of advanced technologies.

16:00–17:00

From Work to Space: Designing the New Control Center – human-centric, next to technology

Ralf Heisig (50Hertz), Klaus Grotz (fstahead)

This talk explores how work in the control center is evolving. Drawing on insights from the planning process of 50Hertz's new control center, we show how the energy transition is reshaping cross-role collaboration and inspiring new spatial concepts.

Friday, 26th September 2025

08:00–08:30

Breakfast Snack

→ Foyer

08:30–09:30

G-PST/EPICS Research Agenda

Mark O'Malley, Michael Nestor, Andrey Churkin
(Imperial College London)

Moderated by Karin Wadsack (G-PST)

→ Rooms Brüssel & Hamburg

09:30–13:00

Topology Optimization: Session for TSOs only

→ Room Magdeburg

09:30–12:00

Technical Session: New understanding of operational risks from IBRs

Xiaoyao Zhou (NESO), Enriquez Mallada & Sijja Geng
(Johns Hopkins University), Kai Strunz (TU Berlin)

Moderated by Mark O'Malley (Imperial College London)

→ Rooms Brüssel & Hamburg

The following sessions are part of the
Grid Forming Implementation Council:

12:00–13:00

Project-Specific GFM Integration Lessons Learned: Blackhillock

Xiaoyao Zhu (NESO)

Project-Specific GFM Integration Lessons Learned: Australian Experience

Behrooz Bahrani (Imperial College London)

→ Rooms Brüssel & Hamburg

13:00–14:00

Lunch

Restaurant Netzquartier 1. OG

14:00–15:30

State of the Art of GFM Testing Procedures

Benjamin Kroposhi (NREL)

→ Rooms Brüssel & Hamburg

15:30–15:45

Coffee Break

1st Floor restaurant

15:45–16:50

Developing GFM Controls for Wind Resources and Experiences from Wind GFM Demonstration Projects

Pedro Santos (GE Vernova)

→ Rooms Brüssel & Hamburg

16:50–17:00

Summary of the Session and Next Steps

→ Rooms Brüssel & Hamburg

Program Day 3

Friday, 26th September 2025

08:30–09:30

G-PST/EPICS Research Agenda

Mark O'Malley, Michael Nestor,
Andrey Churkin (Imperial College London)

Moderated by Karin Wadsack
→ Rooms Brüssel & Hamburg



09:30–13:00

Topology Optimization: Session for TSOs only

→ Room Magdeburg

09:30–12:00

Technical Session: New understanding of operational risks from IBRs

Xiaoyao Zhou (NESO), Enriquez Mallada & Sijia Geng
(Johns Hopkins University), Kai Strunz (TU Berlin)

Moderated by Mark O'Malley (Imperial College London)
→ Rooms Brüssel & Hamburg

Grid Forming Implementation Council

12:00–13:00

Project-Specific GFM Integration Lessons Learned: Blackhillock

Xiaoyao Zhu (NESO)
→ Rooms Brüssel & Hamburg

Project-Specific GFM Integration Lessons Learned: Australian Experience

System operators present roadblocks and lessons learned during the process of interconnecting GFM projects.

Behrooz Bahrani (Imperial College London)
→ Rooms Brüssel & Hamburg

14:00–15:30

State of the Art of GFM Testing Procedures

Presentation of state-of-the-art procedures, assumptions, and challenges in developing testing procedures and standards.

Benjamin Kroposhi (NREL)
→ Rooms Brüssel & Hamburg

15:45–16:50

Developing GFM Controls for Wind Resources and Experiences from Wind GFM Demonstration Projects

Presentations and discussion on experience and lessons learned developing GFM controls for wind and the complexity of grid interconnection technologies.

Pedro Santos (GE Vernova)
→ Rooms Brüssel & Hamburg

Poster Fair

TSO & RCC

Network Topology Optimisation – Enabling Automation at Scale, Accuracy & Efficiency for System Operations

Ali Ahmadi (EY), Ian Dytham (NESO)

NESO have commissioned a study of Network Topology Optimisation progress around the world in order to baseline what is current best practice and understand the potential gap to full optimisation automation. This study will be nearing completion at the time of the Symposium and we would like to share findings so far.

Optimal Topology Switching – Innovation research journey for PSE

Endika Urresti Padrón, Katarzyna Wardęga, Jacek Gałęski, Sergio Fernández Mallorquín, Zbigniew Gawłowicz (PSE)

In PSE, we are currently developing an OTS decision support tool for short-term process that should provide the results in less than 20 min. For that, there are three methods that we have applied: MILP optimization problem, LP problem with duals and GLODF. We highlight their pros and cons, including some novelty modelling tricks to make the solution in less than 20 min.

ROSC process and its requirements and challenges regarding RA optimization

Michalis Stamoulis (TSCNET), Benedikt Wagener (Coreso)

- Legacy CSA services – overview of current processes
- Future ROSC service – process overview and key challenges
- Topological RAs – challenges in coordination, modelling, and optimization complexity

ToOp – Topology Optimizer @ Elia Group

Christian Merz, Nico Westerbeck, Leonard Hilfrich, Benjamin Petrick (Elia Group), Akash Sinha (InstaDeep)

We develop a gpu-based topological action optimizer to provide remedial topological actions as a decision support tool to the colleagues in the day ahead planning. The poster showcases the current capabilities, explains the architectures and provides an outlook on the roadmap. The goal is to open-source the solution to enable joint development.

Extending topology optimization for congestion management with phase-shifting transformer taps

Sascha Petznick (Elia Group)

At Elia Group, we built a topology optimizer that leverages GPUs and this work extends it to include phase-shifting transformer set points to its action space. By comparing different classes of algorithms and assessing them on grids, we conclude that sub-gradient methods perform best when considering speed, optimality, and integration into the existing software.

GPU-Based Load-Flow Solver for N-X SSA

Mikhail Farber (Elia Group)

An improved batched ACPF GPU-based Solver with preconditioned conjugate gradient for FDPF. In our work we utilize a shared preconditioner and shared variables which only get updated for contingency cases. Because of the updates the solver can efficiently utilize the device memory and scale even to process N-2 SSA for large grids in one batch.

Accelerated DC loadflow solver for topology optimization

Nico Westerbeck, Christian Merz (Elia Group), Joost van Dijk, Jan Viebahn (TenneT TSO B.V.), Dirk Witthaut (FZJ)

Reaching 1 billion loadflows per second through GPU accelerated low rank updates to the PTDF matrix, this tool forms the backbone of the ToOp Topology Optimizer.

Self-Supervised Graph Neural Networks for Node-Breaker Topology Optimization

Antoine Martinez (RTE), Dr. Balthazar Donon (RTE), Prof. Louis Wehenkel (ULiège), Dr. Efthymios Karangelos (UCD)

We investigate the problem of finding the appropriate switch-states that maximize the cross-border exchange potential between two TSOs. We explore the use of fast deep neural networks (GNN) to predict the vector of switch states. The GNN is trained in an unsupervised fashion, by directly interacting with a non-differentiable simulator that returns a cost for each switches configuration.

GridOptions Tool: Real-World Day-Ahead Congestion Management using Topological Remedial Actions

Sjoerd Kop (TenneT TSO B.V.)

GridOptions is TenneT's decision support tool to improve congestion management, of which a first version is already deployed for use by operators in the control room. The development of the tool is being done in an agile, incremental way. We highlight the current status of development, the next steps, what we envision for the longer term future, and the challenges we see on our path.

Research

Voltage sensitive distribution factors for contingency analysis and topology optimization

Maurizio Titz, Dirk Witthaut (FZJ), Joost van Dijk (TenneT TSO B.V.), Benjamin Petrick, Nico Westerbeck (Elia Group)

We present a linearized AC framework for voltage-sensitive distribution factors, enabling efficient contingency analysis and topology optimization. By leveraging low-rank updates and the Woodbury identity, the method supports GPU acceleration. The approach shows strong accuracy in voltage magnitude, voltage angle and active power and some limitations in the reactive power approximation.

New formulations for linear optimal power flow

Juliane Siems, Dirk Witthaut (FZJ), Lars Schewe (UoE), Nico Westerbeck (Elia Group)

Grid topology optimization represents a huge computational challenge as the setting of switches and busbars couplers is discrete. In this contribution, we introduce novel formulations of the linear optimal power flow problem with switches. In particular, we introduce additional decision variables that capture the impact of closing a switch transforming the optimization problem to an MILP.

Poster Fair

A parallel load-flow solver on GPUs – For N-1 contingency analysis and topology optimization

*Marc Hunkemöller, Dirk Witthaut (FZJ),
Mikhail Faber, Nico Westerbeck (Elia Group),
Lars Schewe (UoE)*

We present a novel GPU-parallel load-flow solver that efficiently handles Newton-Raphson iterations across a large set of grid topologies such as N-1 security assessment and topology optimization. Our approach, using low-rank updates, allows us to reuse LU factorizations and unlock parallelism on GPU hardware with only minor overhead.

Scalable iterative solution of the Optimal Transmission Switching Problem with de-energization

Benoît Jeanson (TU Delft / Cresym)

This will address the secured Optimal Transmission Switching for the TSO. N-1 are taken into account assuming the risk of losing part of the grid is accepted if it prevents violations of current limits. The approach relies on the DC approximation of the power flow and the model is solved multiple calls to a MIP solver.

Security-Constrained Substation Reconfiguration Considering Busbar and Coupler Contingencies

Ali Rajaei, Jochen L. Cremer (TU Delft)

Existing methods often neglect the security of substation topology, particularly for substations without busbar splitting. We develop a security-constrained substation reconfiguration (SC-SR) MILP formulation that accounts for N-1 contingencies, including line, coupler, and busbar outages. We propose a heuristic with multiple parallel master problems (HMMP), which enables scalable optimization.

Addressing Model Inaccuracies in Transmission Network Reconfiguration via Diverse Alternatives

Paul Bannmüller (TU Delft)

Model inaccuracies are inevitable in decision support tools for transmission network topology reconfiguration. We propose an approach that addresses specific model inaccuracies by generating diverse alternatives. This approach incorporates feedback from a human operator or any postprocessing evaluation that guides the generation of valuable alternatives.

GNN4GC Graph Neural Networks for Grid Control

*Malte Lehna (Fraunhofer IEE), Christian Merz (50Hertz),
Clara Holzhüter (Uni Kassel),
Wiktor Geggelman, Sjoerd Kop (TenneT TSO B.V.)*

We highlight the latest results from the GNN4GC research project, created in collaboration with 50Hertz, TenneT, and the University of Kassel. The goal is a recommender system for congestion management using Deep Reinforcement Learning and Graph Neural Networks. It suggests grid topology changes like busbar switching, line operations, and tap adjustments.

Topology optimization with sequentially solved mixed integer convexified quadratically constrained quadratic programming

*Dr.-Ing. Thomas Leveringhaus, Julian Waßmann,
Prof. Dr.-Ing. habil. Lutz Hofmann (LUH)*

We explain how optimal power flow combined topology optimization can be reformulated as mixed integer non-convex quadratically constrained quadratic program.

Sequential decision-making of reinforcement learning agents for topology reconfiguration & GridBooster coordination

*Harald Jendrian, Reinaldo Tonkoski Junio (TUM),
Ilja Krybus (BearingPoint)*

The poster describes our approach that applies a dual-agent approach together with a GridBooster dispatch to relieve grid congestion during Model Improvement Phase in European Day-ahead Congestion Forecast. In a case study it is shown how overloads are reduced for a specific time stamp in a German TSO grid.

InnOpTEM – Amprion

*Markus Geulen, Sebastian Stein, Julian Lichtinghagen
(Amprion)*

In our poster we showcase the work from Amprion in the research project InnOpTEM. InnOpTEM is a research project that evaluates innovative approaches to optimize topological actions for congestion management. The poster highlights the goals of the research projects, provides a description of the degrees of freedom/constraints and explains the simulation environment.

Part of Project InnOpTEM: Co-Optimization of Remedial Actions and Topology including Heuristic Topology Preselection

*Felix Preuschoff, Christian Fester, Raphael Houben,
Markus von Heel (RWTH)*

Here we showcase the work from RWTH Aachen in the research project InnOpTEM. The main idea of the approach is to preselect Network Topologies by filtering for promising measure combinations first.

Poster Fair

InnOpTEM: Security-Constrained Optimal Transmission Switching using MILP and Benders Decomposition

Tim Donkiewicz, Oliver Gaul (RWTH Aachen & Gurobi)

In our poster we describe the work from Gurobi in the research project InnOpTEM. InnOpTEM is a research project that evaluates innovative approaches to optimize topological actions for congestion management. We try different approaches for decomposition, subproblem selection & solving, cut selection & strengthening (Benders decomposition with N-1 scenarios as subproblems).

InnOpTEM FGH Approaches – Innovative approaches for optimizing topological remedial actions in grid congestion management

Andrea Ewerszumrode, Marco Gehrmann, Philipp Reuber, Martin Schmitz (FGH)

We highlight our work from FGH e.V. in the research project InnOpTEM. The poster describes a multi-agent reinforcement learning approach, an iterative sensitivity based approach as well as how to create a human machine interface for end-users.

GT's "Two Cents" on Topology Optimization

Sergio A. Dorado-Rojas, Ryan Pianski, Samuel Talkington, Xiangxin An, Constance Crozier, Daniel K. Molzahn (Georgia Tech)

Georgia Institute of Technology (Grid Optimization & Algorithms Lab) provides an overview on their research fields in regards to topology optimization: a) A Survey on Transmission Network Reconfiguration, b) Randomized Switching Algorithms, c) Data Center Congestion Management, d) ACOPF and ACOTS and e) Topology Switching for Mitigating Wildfire Ignition Risk.

Vendor solutions

Remedial Action Optimization by N-SIDE – we support TSOs and RCCs to prevent grid congestion at the lowest costs

Giancarlo Marzano, Pierre Artoisenet, Noémie Verstraete (N-SIDE)

In our poster we explore the world of topology optimization through the lens of two very different use-cases: a robust industrial application in capacity calculation and an innovative solution in system operation. We compare the efficacy of traditional MILP methods with heuristic approach. Gain valuable insights from the lessons we've learned, drawn from our extensive expertise in this field.

Imagine what a supercomputer can do for network topology optimization – Unleash the Power of Possibility: Microsoft Supercomputers for Grid Intelligence

Owen Dignam, Leonardo Altemore, Mark Schütz, Alex Grubb (Microsoft)

Bringing examples how HPC has been leveraged to transform the industry (Pacific Northwest Library for instance) in a regulated environment. How MSFT Cloud can support complex simulations and calculations.

NewGrid Router: NewGrid's "Google Maps for the Grid" Topology Optimization Package

Pablo A. Ruiz, Sophie Leamon (NewGrid)

NewGrid Router is a topology optimization software package that identifies reconfiguration options to mitigate flow constraints. It can tackle multiple pre- and/or post-contingency constraints and solution can be implemented as corrective or preventive measures. It performs a broad search of branch switch and substation reconfiguration actions, with AC power flow modeling and contingency analysis.

Towards Efficient Multi-Objective Optimisation for Real-World Power Grid Topology Control

Yassine El Manyari (EnliteAI), Stefan Zahlner (EnliteAI), Alberto Castagna (EnliteAI), Jan Viebahn (TenneT TSO B.V.), Anton R. Fuxjäger (EnliteAI), Joost Van Dijk (TenneT TSO B.V.), Davide Barbieri (TenneT TSO B.V.), Marcel Wasserer (EnliteAI)

We present a two-phase, scalable Multi-Objective Optimisation (MOO) method designed for grid topology control, combining an efficient RL learning phase with a rapid planning phase to generate day-ahead plans for unseen scenarios. We validate our approach using historical data from TenneT demonstrating minimal deployment time, generating day-ahead plans within 4-7 minutes with strong performance.

PowSyBI: an open-source toolbox for European power grid operations and planning

Alexis Godefroy, Catherine Cheylan, Adèle des Moutis, Nicolas Omont (Artelys)

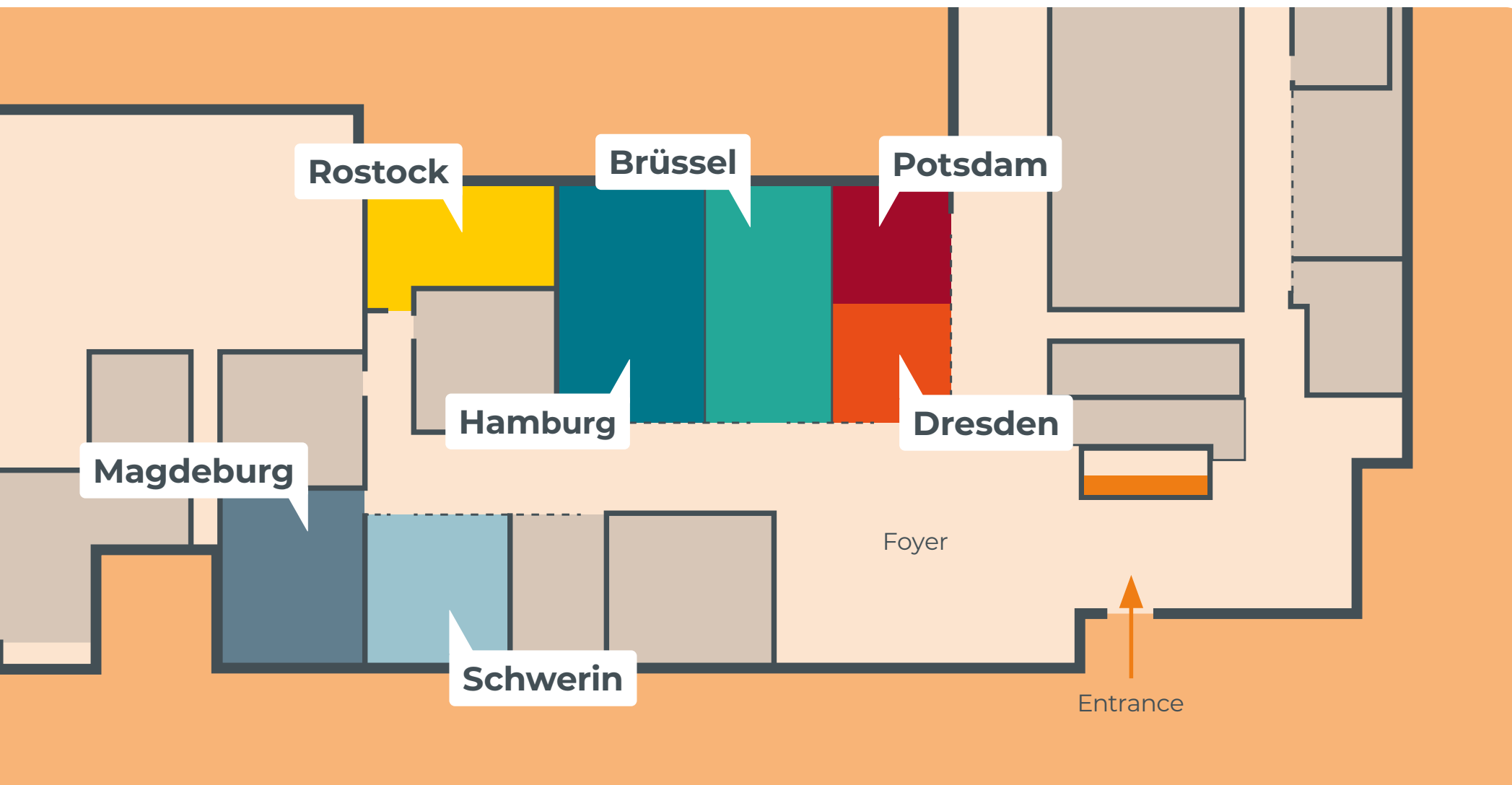
We highlight how we use the open-source PowSyBI framework to effectively bring benefits to the European Transmission System Operators (TSOs) and Regional Coordination Centers (RCCs). We will present PowSyBI Metrix for grid reinforcement studies that optimizes for preventative and curative remedial actions using a MIP approach and the open-source PowSyBI OpenRAO using a tree-search heuristic.

Optimizing our Energy Future: from Ambition to Action

Frank Häger (Gurobi)

The poster will showcase how Gurobi supports in optimizing our future.

50Hertz Netzquartier (NQT) Floor Plan



Restaurants

Restaurant Reinhard Bär

Am Hamburger Bahnhof 4
10557 Berlin

Restaurant Food Factory

Washingtonplatz 3
10557 Berlin

Restaurant Zollpackhof

Elisabeth-Abegg-Straße 1
10557 Berlin

