



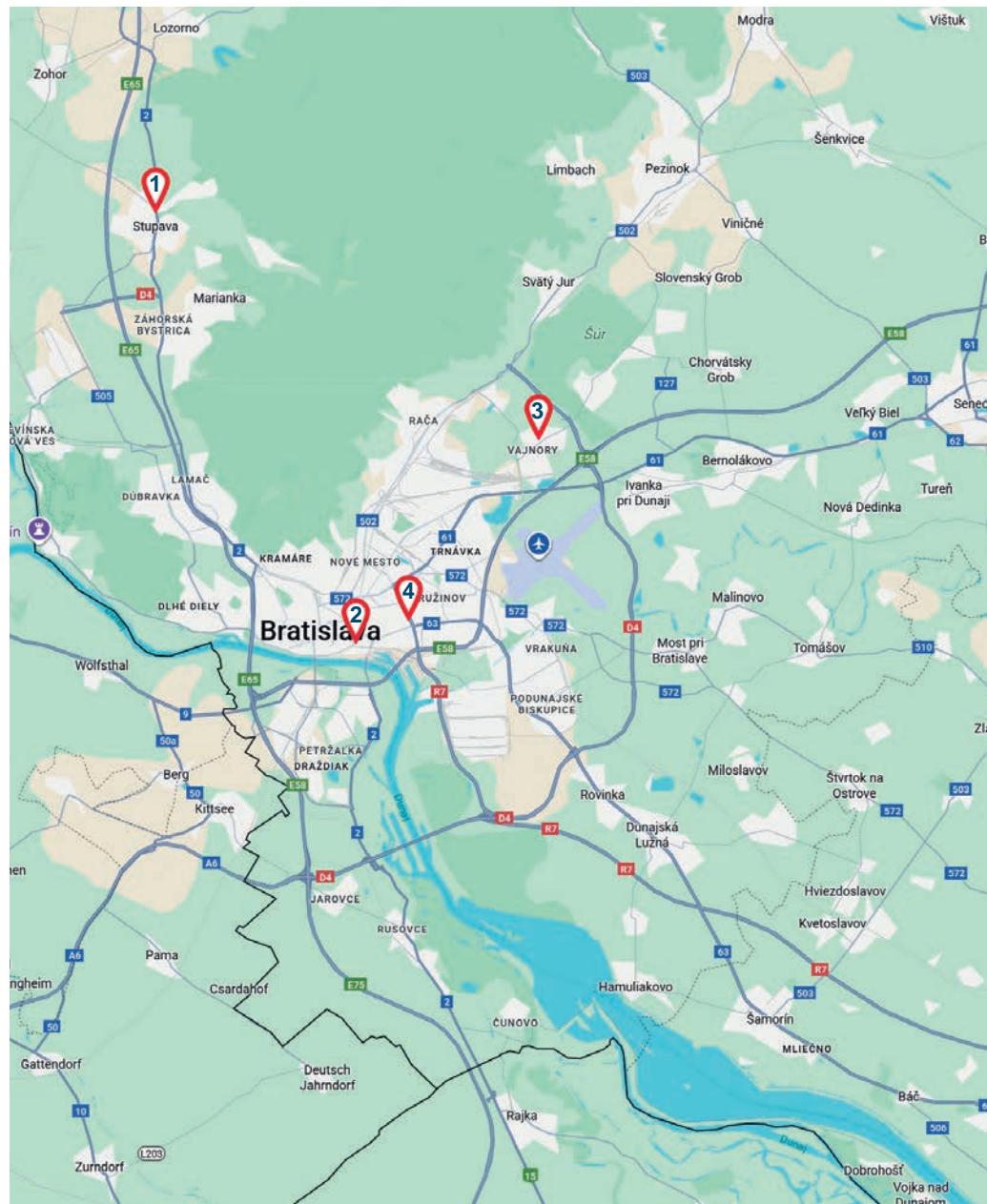
Overview of Danube InGrid

CINEA Site Visit, October 29, 2025

Action No: 10.7-0008-SKHU-W-M-20

Project No: 29103567

Welcome



Site Visit Agenda

1. Substation Stupava 400/110 kV - Technical Tour
2. Danube InGrid Action Progress Review Meeting
3. Substation Vajnory 110/22 kV and 400/110 kV - Technical Tour
4. Dispatching Centre of Západoslovenská distribučná, a.s.

“Every meter of cable laid and every digital component integrated represents our shared European effort - to deliver clean energy in a reliable, secure and sustainable way for all.”

Oto Frič
Danube InGrid Coordination Team

Location: Stupava (SK)

Substation Stupava 400/110 kV - Technical Tour

The extension of the Stupava substation with a new bay for connecting the new Vajnory substation is not just a technical upgrade — it's a strategic move to strengthen the energy backbone of western Slovakia. With the installation of a brand-new 350 MVA transformer, Stupava is stepping into a new era of grid reliability and capacity, capable of handling significantly higher loads and ensuring smoother integration of renewable sources. This modernization supports regional development and helps future-proof the grid for decades to come.



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Location: Vajnory (SK)

Substation Vajnory 110/22 kV - Technical Tour

“The 110 kV substation in Vajnory represents a major step forward for the Danube InGrid project. Coordinating such a large construction site requires detailed planning, precision, teamwork — but above all, an uncompromising commitment to the safety of our people.”

Pavol Gašparín

Západoslovenská distribučná, a.s.

North – east suburban area of Bratislava is growing rapidly. In the proximity of the existing D1 and new D4 highways intersection, business and logistic centers are growing. Even new state hospital in Vajnory with planned area of 288ths sqm is currently being planned as major investment in this area of interest. DSO infrastructure is a vital condition of progress.



Substation highlights

- Substation will enable new TSO/DSO interconnection making the power grid in Bratislava region more robust and resilient
- 2 x 40 MVA transformers operating on 110/22 kV interface
- 2 x 40 MVar compensation coils to ensure voltage quality
- 22 pcs of 110 kV bays and 34 pcs of 22 kV bays, future extension possibility
- Substation Vajnory will become one of the key DSO substations in the region
- Smart assets installed in the station enable remote monitoring and control of the operation, station will be operated as unmanned

Substation Vajnory 400/110 kV - Technical Tour

A state-of-the-art 400/110 kV substation under construction designed as an unattended, remote-controlled outdoor air-insulated substation.

It will include approximately 6 high-voltage bays, 2 feeders, 1 transformer, 2 busbar combination switches, and 1 metering bay. A new 400 kV loop line — composed of two single 400 kV overhead lines totaling roughly 1 km — will connect the new substation to the existing transmission network.

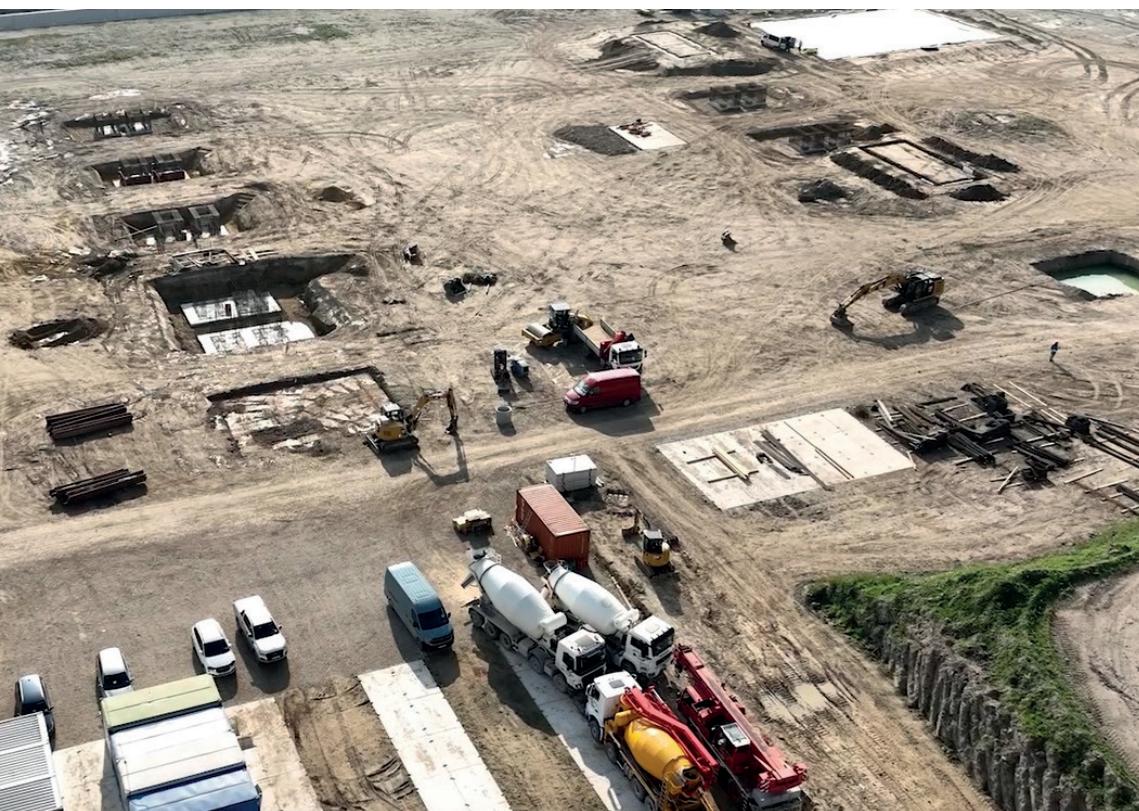
The project also features a modern control building equipped with cutting-edge automation: digital protective relays, advanced measurement systems, bay control units, substation central control units, and transformer monitoring units. Together, these elements will deliver real-time supervision, enhanced safety, and optimal grid performance.

"The transformation of Europe's electricity networks relies on collaboration at every level — between TSOs and DSOs, engineers and communities. Danube InGrid stands as a strong example of this cooperation, combining innovation as well regional engagement. Together, these elements deliver real-time supervision, enhanced safety, and optimal grid performance."

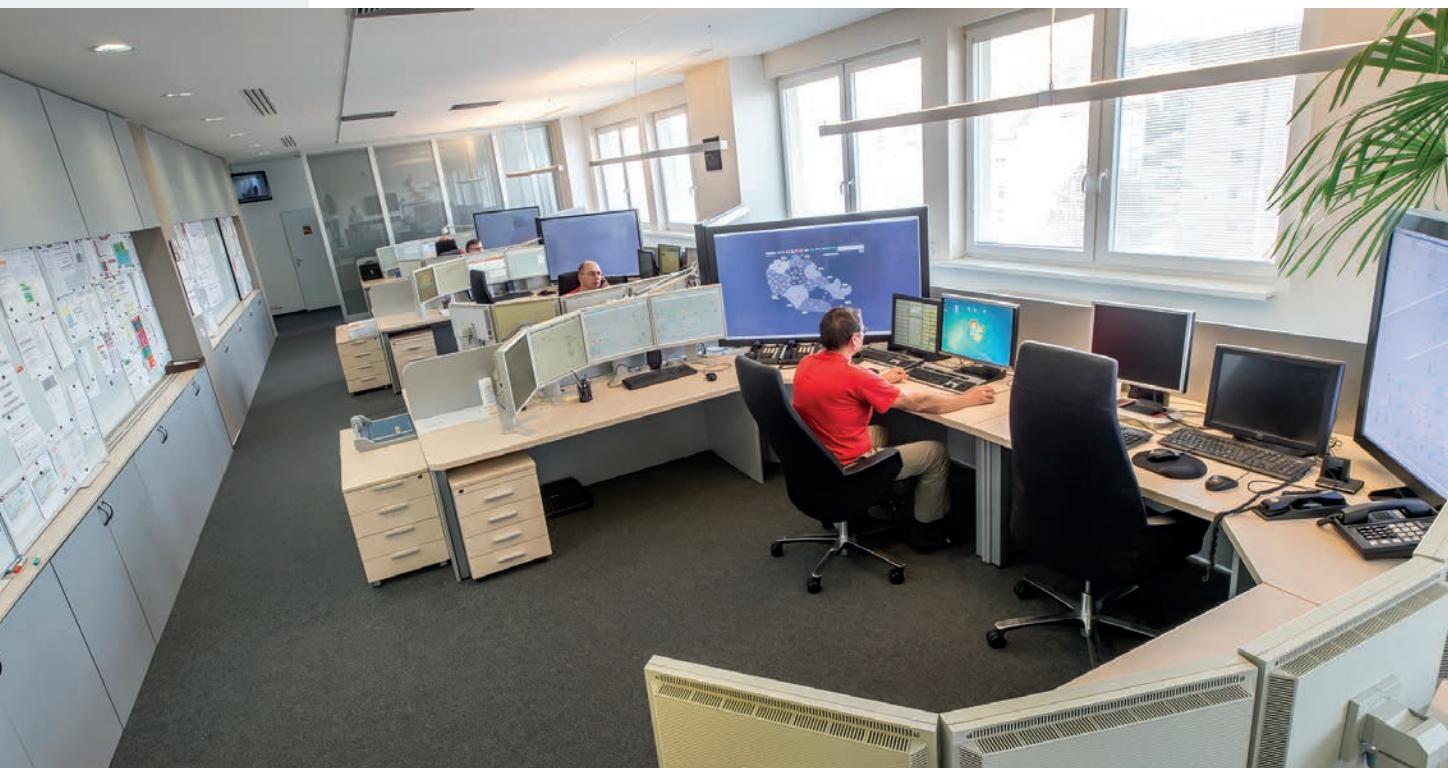
Magdaléna Brachová
Slovenská elektrizačná prenosová sústava, a.s.



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Location: Bratislava (SK)
Dispatching Centre of Západoslovenská distribučná, a.s.
Smart Grid Operations, Meteorological Monitoring, Cybersecurity



Smart Grid Technologies and Climate Resilience in Action

Within the Danube InGrid project, ZSD and EED has expanded their network of weather stations, enabling real-time monitoring of sites exposed to higher climate risks. Meteostations operated by national Meteo Offices in SK and HU are not always located in the areas, where DSO needs real-time monitoring, therefore proprietary DSO stations are needed. Data is transmitted directly to the operational system, where automatic alerts are triggered when thresholds are exceeded.

Shared SK-HU cross-border meteodata platform

- exchange of meteorological information
- improving situational awareness
- coordination during critical events
- enhances operator preparedness and rapid response capabilities
- informs the strategic design of future distribution lines, ensuring that new infrastructure can better withstand climatic extremes



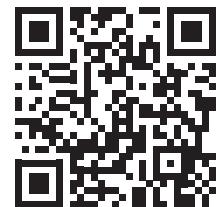
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Meteo Stations



“By combining digital monitoring, cross-border data exchange and operational experience, we can anticipate risks, respond faster, and design a reliable grid. We can provide service personnel with real-time information about weather conditions they may face in the field.”

Máté Csőre
E.ON Észak-dunántúli Áramhálózati Zrt.



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Focus on Cybersecurity

Enhanced network security systems increasing the reliability of supply and cyber-resilience of substations:

- Firewalls installed and integrated across 65 substations
- Anomaly Detection System (Flowmon/Kemp): identifies network anomalies based on behaviour analysis
- OT Threat Detection Platform: ensures real-time monitoring within operational technology environments
- SOAR (Security Orchestration, Automation & Response): automates incident responses and accelerates containment actions
- SIEM (Security Incident & Event Management): correlates security logs and alerts
- A-EDR (Antivirus-Endpoint Detection & Response): provides proactive protection against malware attacks
- Continuous Threat Detection System: enables real-time visibility of all OT devices through deep packet inspection

Technical progress and the use of smart devices in electricity distribution are causing increased volume of communication and processed data from the grid. For this reason, the implementation of tools aimed at eliminating cyber threats, with a strong focus on protecting distribution infrastructure, is crucial.

Diagram of the incident handling process from the SOAR (Security Orchestration, Automation & Response) system, co-financed by the EU under the Danube InGrid project.





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More Highlights of Danube InGrid

Within Danube InGrid, Hungary is delivering 12 substation developments at record pace—unprecedented—adding extensive hosting capacity and smart, future-ready technology across the region.

Location: Veszprémvarsány (HU)

Veszprémvarsány connected to the ~64 km-long Kisbér–Veszprémvarsány–Zirc–Litér 132 kV distribution line, as well as the already commissioned Kisbér substation and the Zirc substation which is under construction. The substation was commissioned and equipped with 2 pcs of 25 MVA transformers.

As a result of the investment more photovoltaic generators and large energy consumers will be able to connect to the grid without overloading it.



Location: Várpalota (HU)

Várpalota Kelet substation is a key energy hub for the region. It features seven 132 kV line bays and two 132/22 kV, 25 MVA transformers, fully integrated after an extensive reconfiguration of local 132 kV lines.



Location: Répcelak (HU)

Répcelak is our latest substation, we installed 2×132 kV line bays, a new 132 kV busbar, and 1×132/22 kV, 25 MVA transformer. The substation enhances supply quality across the area and creates room for additional connections. Designed for straightforward expansion, it can be scaled as needs grow—future-proof by design.



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Smart installations across the grid (HU)

On-load tap-changer transformers

By end-2025, EED will have installed 50 on-load tap-changer (OLTC) transformers across the MV network. OLTCs adjust voltage in real time, countering PV-driven fluctuations on overhead feeders. The result is fewer voltage violations, higher hosting capacity for distributed generation, and better power quality --enabled by digital, adaptive control.



Fault indicators

We've installed 500 fault indicators across EED's network to pinpoint grid faults and short circuits faster. Easy to install and SCADA-ready, these devices drastically shorten fault identification, speeding up dispatch and restoration.

Meanwhile, fault indicators continuously learn the overhead line's electromagnetic "fingerprint." When a short circuit hits, they spot the change instantly and show us where to go—speeding up restoration.



Dissemination in action

Public engagement and awareness are essential for the successful implementation of strategic infrastructure projects.



Conference in Slovakia



PCI Summit Ljubljana



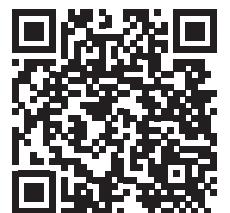
Conference in Hungary

#PublicConsultationDanubeInGrid



Bringing Danube InGrid closer to the public

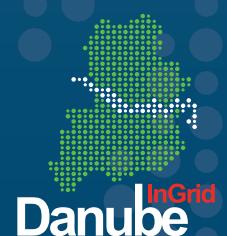
Our stakeholder dialogue goes beyond formal meetings. Besides presentations on the municipality level, we also included children and schools among our outreach partners. Our goal is to inspire the next generation about how energy, technology and responsibility come together to build our energy future.

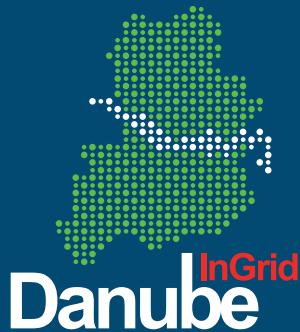


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How do you explain traffic re-routing plans during major construction works?

On May 23, 2025 more than 700 students, teachers, and residents joined us in Vajnory, for an interactive day focused on safety, energy education, and public engagement. This event was part of our broader effort to bring the Danube InGrid closer to communities and explained closer about traffic re-routing actions in the area.





**“Thank you for your support and cooperation.
Together, we build the smart, resilient, and sustainable grid for the future.”**

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