Innovation and technology: best practices from E.DSO members to overcome emerging DSO challenges

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E.DSO - Who we are

E.DSO is the only **100% DSO, 100% electricity** association at EU level

36 Distribution System Operators, including 2 national associations

>190 million customers

7 million kilometres of distribution lines

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E.DSO – What we do

ADVOCACY

Enhance the understanding of the **critical role of distribution grids** in the energy transitions, and guide advocacy and debate between **our industry and policymakers**.

TECHNICAL EXPERTISE

Foster **knowledge exchange** and debate among DSOs on **technological topics** that impact smart distribution grid development.

INNOVATION

Contribute to **EU Research & Innovation** in smart grids, supporting members' participation in projects and dissemination of learnings and results.

COMMUNICATION & PARTNERSHIPS

Represent the **trusted voice of DSOs** to educate stakeholders and **communicate our policy asks,** build strategic **alliances with other sectors and interest groups.**

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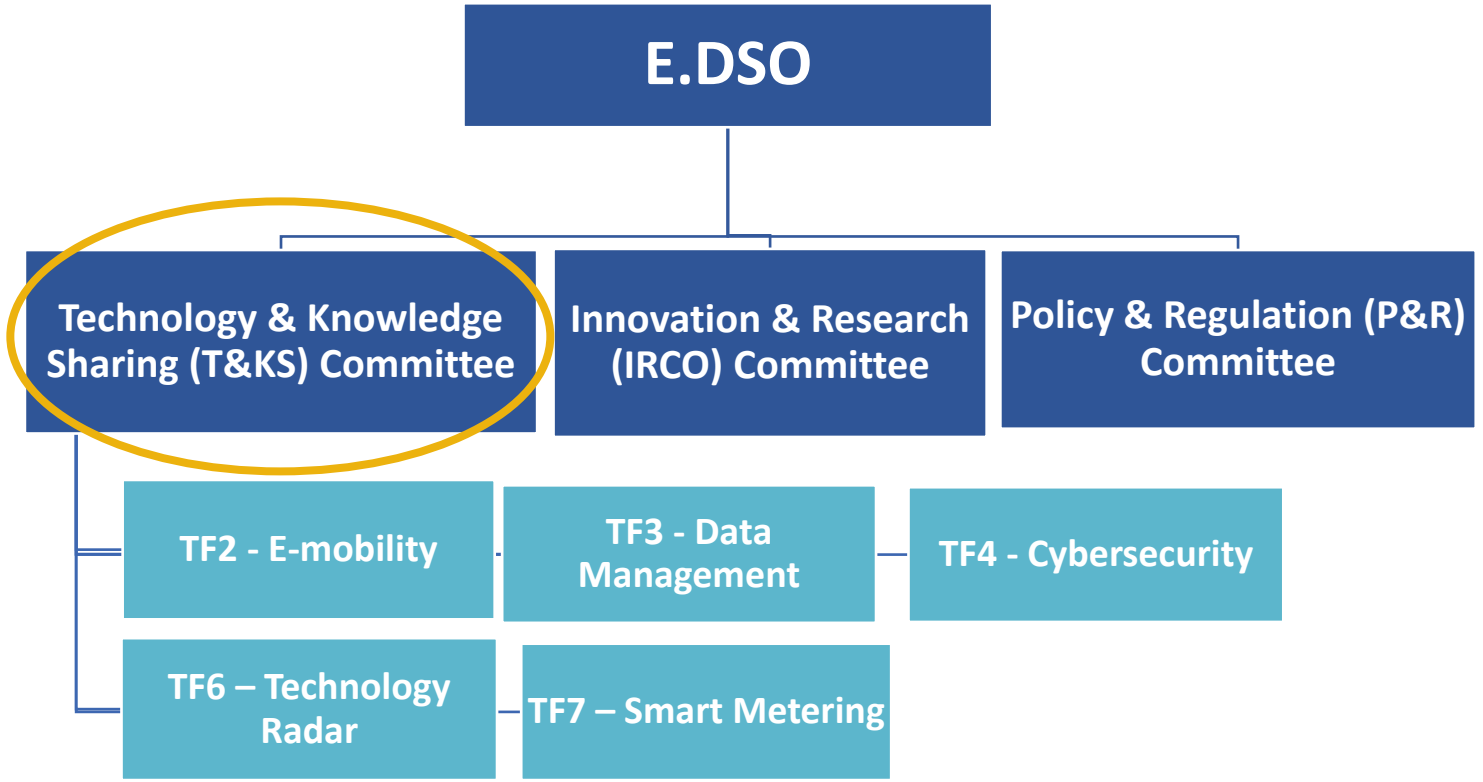
E.DSO – How we work

The T&KS Committee pursues a twofold mission:

1. Representing the voice of the DSO industry on technological developments.
2. Evaluating EU policy developments and steering their future direction.



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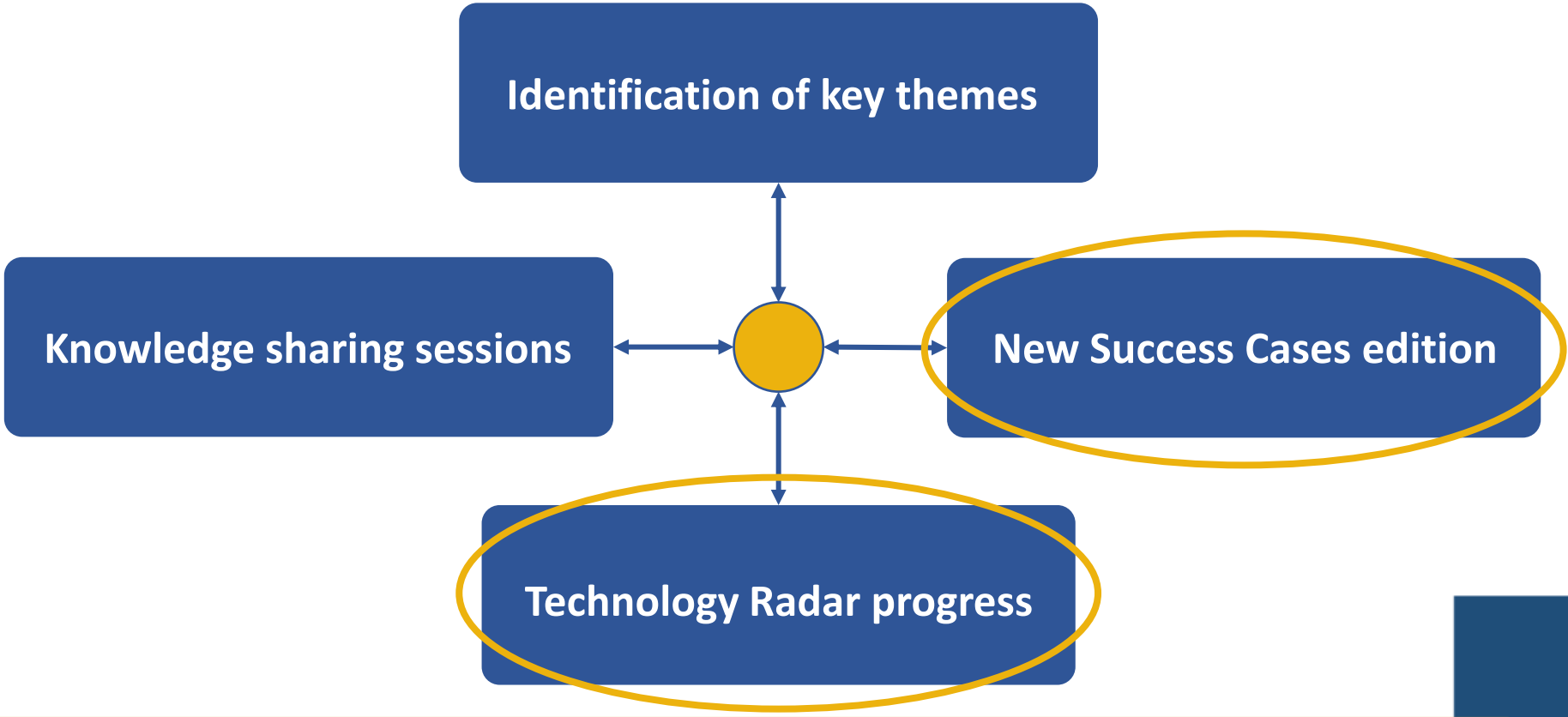
2025 T&KS Strategy

The T&KS Strategy for 2025 aims at strengthening **knowledge-sharing** and **benchmarking** among DSOs, supporting **dialogue** with external stakeholders and increasingly integrating the activities of the group.



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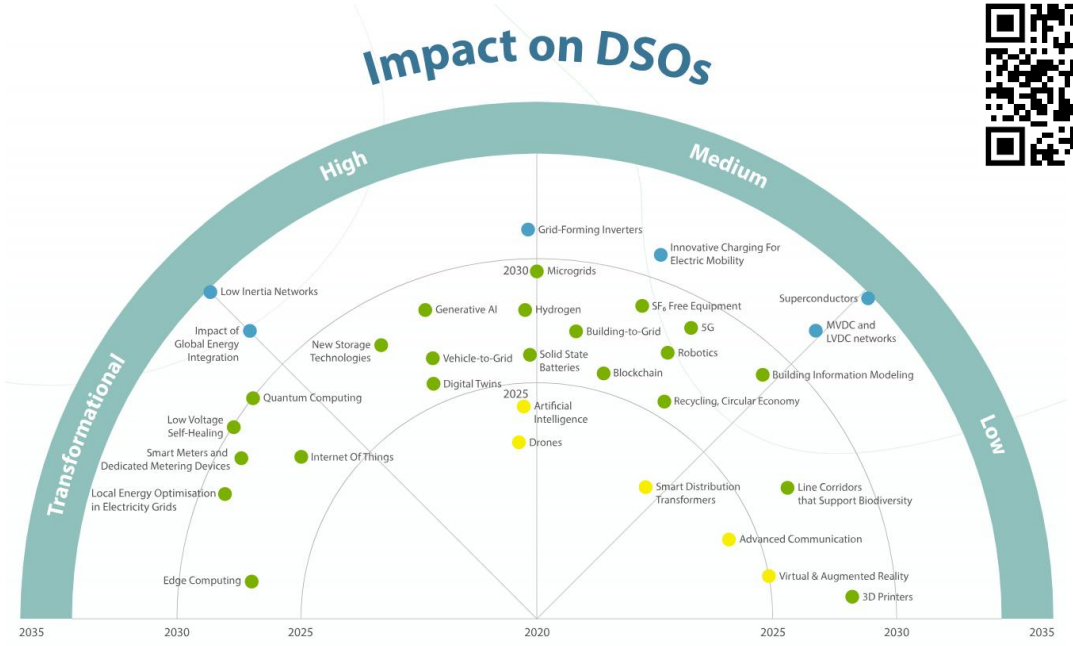
E.DSO Technology Radar

Aim: Provide guidance on **mid- to long-term technology forecast** to the T&KS Committee by producing and regularly updating a **Technology Radar** thanks to the work of a dedicated Task Force 6.

Published for the first time in October 2022, the **E.DSO Technology Radar:**

- Supports the **early identification of new technologies**, trends and potential disruptions.
- Increases **awareness** of associated **opportunities and threats.**
- Stimulates **innovation**.

The next release is expected in late spring!



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E.DSO Success Cases

Aim: Demonstrate how DSOs **overcome emerging challenges** by implementing **technological innovation** and **forward-looking strategies**.

The first edition of the Success Cases was published in October 2024. The 33 cases from individual E.DSO describe the **implementation of technical solutions** and the **concrete befits** they brought to distribution grid operation.

The next release is expected in late June, while a special edition of Cases on education, training and **skilling** of DSO workforces will be released in the next weeks.

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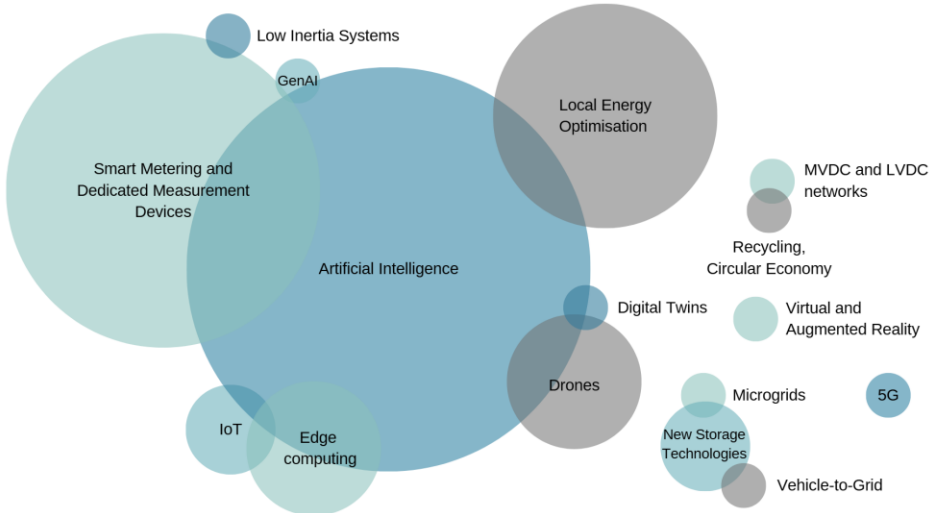
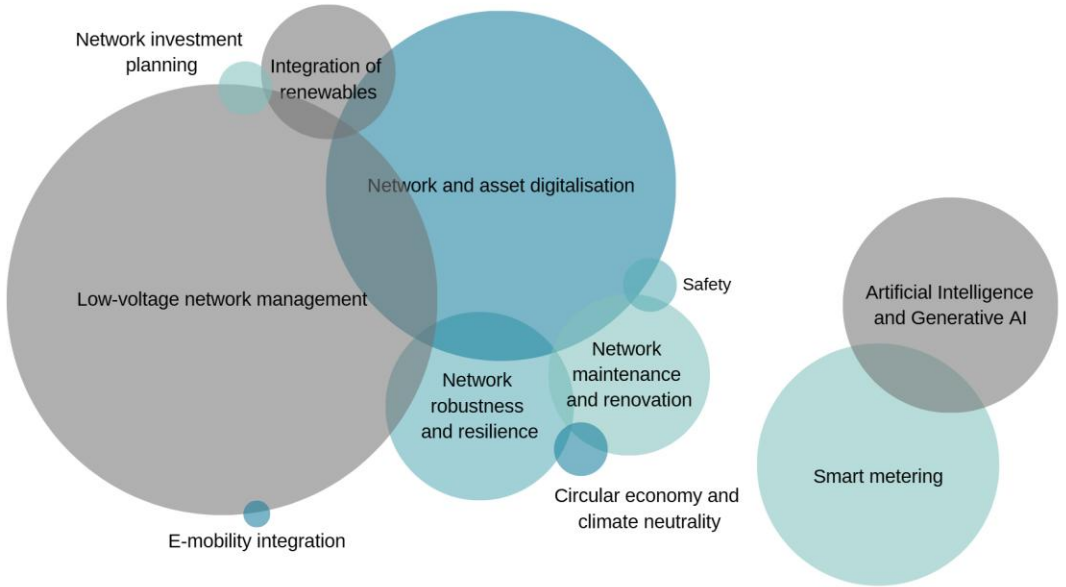
E.DSO Success Cases

The Cases were mapped to:

- The **technologies** on the Tech Radar (left) with the objective of supporting their **maturity and impact assessment** and the **identification of emerging technologies** not yet on the Radar.
- **Key areas** of interest for DSOs (right) to support **benchmarking** and **identification of priorities**.





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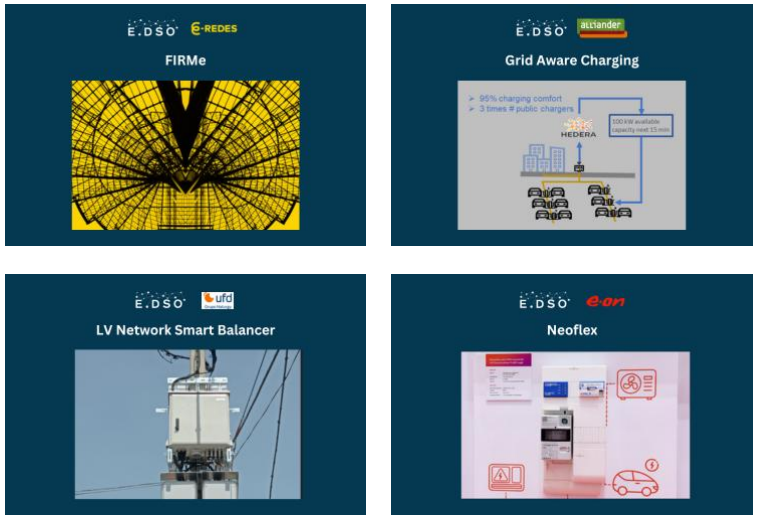
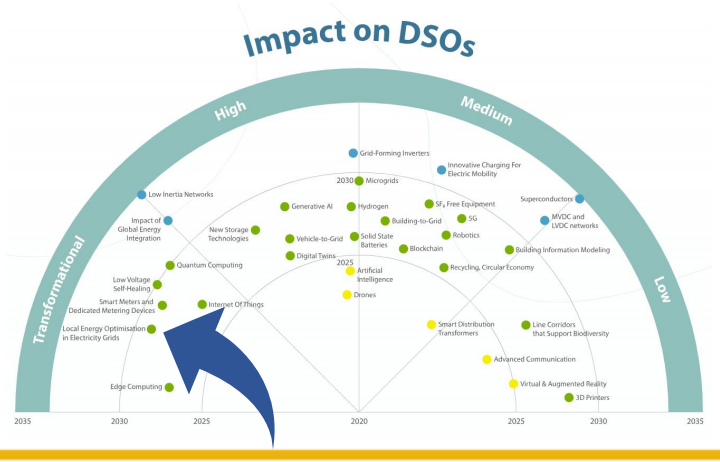
Focus: Local energy optimisation

Building on the latest update on the Technology Radar, four insightful Success Cases and an E.DSO survey on the topic, we organised a knowledge-sharing session on ***local energy optimization in electricity grids***.

We focused on the **use of advanced technologies and innovative approaches** for **improving energy and flexibility management in LV grids**, e.g.:

- **Congestion management** and public **EV charging**.
- Decentralised solutions for **phase balancing** and improving LV grid stability and resilience.
- Contracting **flexibility services** from aggregators and individual consumers.





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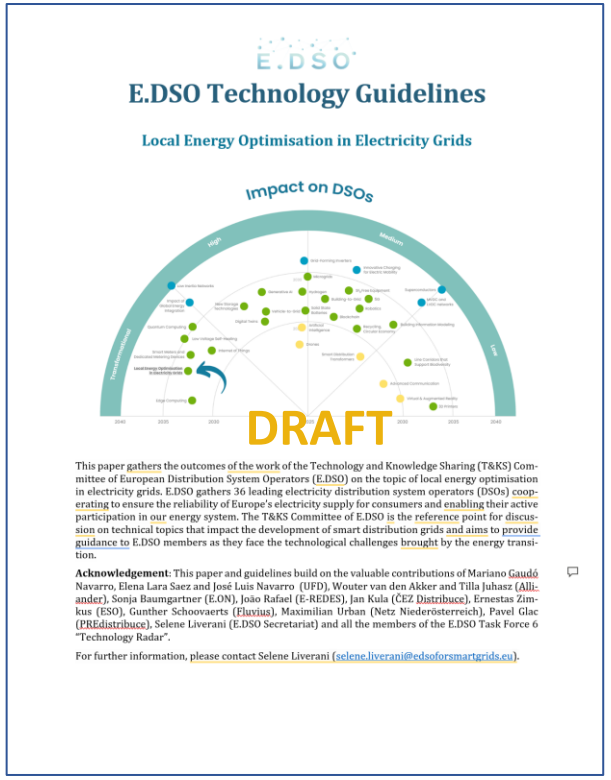
Focus: Local energy optimisation

Local energy optimisation presents a **multi-faceted challenge** to be overcome with strategies that account for the specific context (penetration of PVs and EV charging infrastructure, national laws and regulations, …). Our recommendations:

- Strengthen **MV/LV grid investment** and promote the **extensive deployment of smart meters** to support the implementation of data-driven solutions and procurement of flexibility.
- Make use of **real-laboratory testing and proof-of-concept demos** to assess innovative flex mechanisms and support the shaping of new regulatory frameworks.
- Assess combinations of **dynamic capacity allocation, flexible connection agreements** and **new tariff structures**.
- Adopt **solutions that support grid stability** in a context of increasing DER penetration (e.g., smart transformers, LV balancers and regulators) and ensure their **continuous improvement** to comply with future laws and guidelines.
- Promote **cooperation with (international) stakeholders** to ensure scalability and replication of innovative solutions.



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E.DSO Technology Guidelines

Local Energy Optimisation in Electricity Grids

Impact on DSOs

DRAFT

This paper gathers the outcomes of the work of the Technology and Knowledge Sharing (T&KS) Committee of European Distribution System Operators (E.DSO) on the topic of local energy optimisation in electricity grids. E.DSO gathers 36 leading electricity distribution system operators (DSOs) cooperating to ensure the reliability of Europe's electricity supply for consumers and enabling their active participation in our energy system. The T&KS Committee of E.DSO is the reference point for discussion on technical topics that impact the development of smart distribution grids and aims to provide guidance to E.DSO members as they face the technological challenges brought by the energy transition.

Acknowledgement: This paper and guidelines build on the valuable contributions of Mariano Gaudó Navarro, Elena Lara Saez and José Luis Navarro (UFD), Wouter van den Akker and Tilla Juhasz (Alliander), Sonja Baumgartner (E.ON), João Rafael (E-REDES), Jan Kula (ČEZ Distribuce), Ernestas Zimkus (ESO), Gunther Schoovaerts (Fluvius), Maximilian Urban (Netz Niederösterreich), Pavel Glac (PREdistribuce), Selene Liverani (E.DSO Secretariat) and all the members of the E.DSO Task Force 6 "Technology Radar".

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E.DSO – How we work

The activities of IRCO strengthen E.DSO members' role in innovation, and participation in international projects and favour replicability of solutions across Europe. These include:

- Monitoring relevant project opportunities.
- Coordinating members' participation.
- Facilitating experience exchange.
- Formulating future R&I priorities.

int:net Interoperability Network for the Energy Transition

flow

BE FLEXIBLE

TwinEU

U2DEMO

eclipse

INSIEME

Interreg North Sea Co-funded by the European Union
COPPER

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TwinEU

A digital twin for European grids

Timeline: Jan 24 – Dec 26

Budget: €25.2 million (€20 million EU budget)

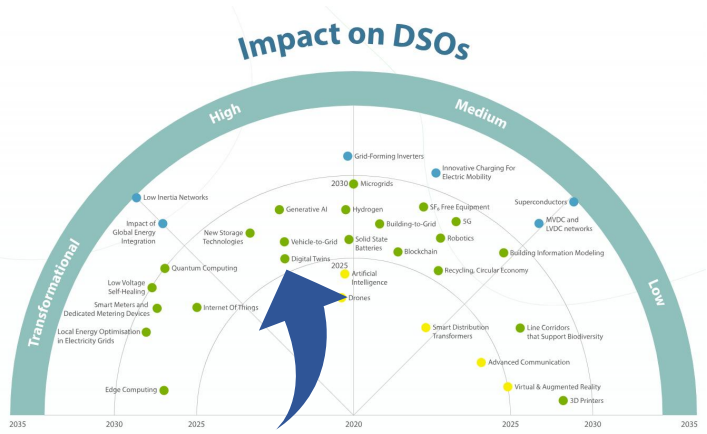
Consortium: 75 partners, incl. grid operators, tech providers, research institutes, market operators, energy service providers, …

E.DSO members involved: Alliander, Areti, E.ON, EAC, Enel Grids, HEDNO, i-DE and Stedin.

Strategic goal: deploying a Pan-European concept of digital twin for the electricity system based on the federation of local twins.

Testing: 8 demos across 11 EU countries, validated the TwinEU solution on Use Cases the focus on the key areas of:

- Enhanced observability and controllability.
- Efficient and coordinated infrastructure and network planning.
- Operations and simulations to improve the physical and cyber-resilience of the grid.
- Advanced forecasting and active network management for optimised market actions.



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FLOW

Flexibility and optimal integration of EVs

Timeline: Jul 22 – Jun 26

Budget: €9.8 million (€9.8 million EU budget)

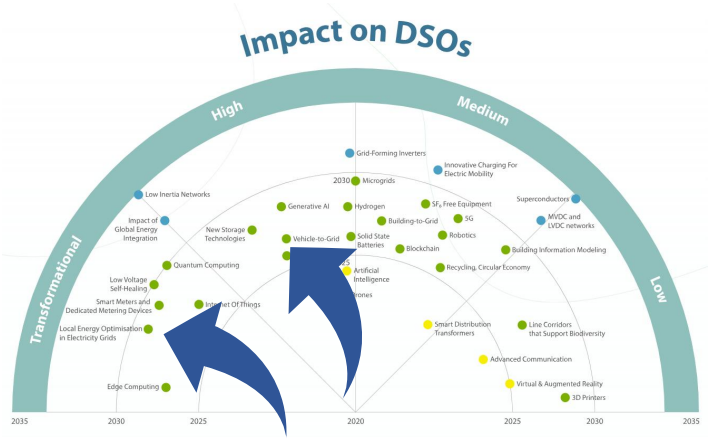
Consortium: 22 partners, incl. grid operators, CPOs, research institutes, energy service providers, …

E.DSO members involved: Areti, Enel Grids

Strategic goal: boost optimal **vehicle-grid integration** by developing and promoting user-centric concepts of flexibility services from EVs.

Testing: 3 demos (DK, ES and IT) and two testbeds (CZ, IR) aimed at validating:

- Smart charging in public parking spaces.
- Flexible connection agreement offers in areas characterized by limited available grid capacity.
- Integration of EV flexibility offers into existing local flexibility markets.
- Vehicle-to-grid solutions in areas affected by seasonal congestion.



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EU4ENERGY PHASE II
Thank you for your attention!
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