# GridCloud

## Advancing Decision-Making in Distribution Grids through Digital Process Twin Integration for Grid Planning and Operations

> *The GridCloud project will develop advanced Digital Twin technologies to optimize grid management in Austria, Germany, and Turkey, laying the groundwork for a resilient and efficient energy grid with broad adoption potential.*

The GridCloud project, aimed at European Distribution System Operators, seeks to advance decarbonization through innovative digital solutions. Positioned against Europe's energy transition challenges, GridCloud integrates artificial intelligence and data analytics to optimize grid management. The multi-faceted strategy encompasses: fostering stakeholder collaboration for a seamless green energy transition; developing "Digital Process Twins" for system information digitalization and real-time decision-making; and automating digital twin creation while ensuring IoT compatibility for superior system performance. With country-specific goals in Austria (augmented grid control and stakeholder engagement), Germany (grid data integration and standardization), and Turkey (anomaly detection and operational optimization), GridCloud aspires for a sustainable, efficient, and reliable energy distribution landscape.
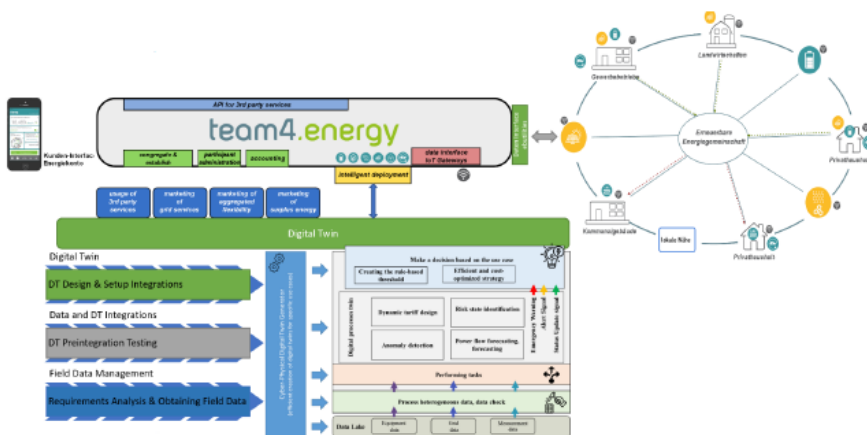


**ERA-Net Smart Energy Systems**

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**Project Duration**

01.04.2024 - 31.03.2026

**Project Budget**

Total Budget: € 1,778,896-
Funding: € 1,378,250-

**Project Coordinator**

AIT Austrian Institute of Technology GmbH (AT)

**Project Partners**

- Energie Kompass GmbH (AT)
- TU Dortmund University (DE)
- Stadtwerke Wunsiedel GmbH (DE)
- Hochschule Bonn-Rhein Sieg (DE)
- Ef.Ruhr GmbH (DE)
- Sivas Cumhuriyet University (TR)
- GDZ Elektrik (TR)
- EnergyHub (TR)

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## Main Objectives

The GridCloud project aims to revolutionize the energy sector by leveraging advanced digital technologies, particularly Digital Twins, to optimize grid management and control. The primary objectives are to enhance stakeholder engagement, drive technological development, and conduct rigorous testing to empower Distribution System Operators (DSOs) in Austria, Germany, and Turkey. This initiative focuses on the seamless integration of grid data, standardization of digital tools, proactive anomaly detection, and scalability of Digital Twins to ensure robust, real-time monitoring and predictive capabilities. Through these efforts, GridCloud seeks to facilitate a smooth energy transition and promote sustainable, efficient energy distribution across multiple regions.

## Main Results

1. Developed and tested an augmented grid control Digital Twin for Austria, exploring various use cases.

2. Engaged end-customers via workshops and surveys to align project objectives with stakeholder concerns.

3. Platform Development in Austria: Created a control platform with APIs and databases for DTs, integrating with the Act4.Energy control platform.

4. Grid Data Integration in Germany: Identified and deployed grid data for Digital Twins, ensuring compatibility and performance in field tests.

5. Established and validated plug-in and parser standards for DT data modules across diverse grid models.

6. Anomaly Detection: Agreed on data management with grid operators, developed anomaly detection systems, and created an anomaly data database for predictive modeling.

7. Integrated Grid Mapping: Combined infrastructure mapping with regulatory analysis to tailor energy deployment to local energy communities (LECs).

8. Digital Twin Validation: Developed and validated a real-time Digital Twin architecture for reliable grid monitoring and management in Germany, Austria, and Turkey.

9. Proactive Anomaly Detection: Implemented early detection tools for power transmission line anomalies in Turkey, integrating data with the DT platform for advanced maintenance.

10. Scalability of DTs: Evaluated and validated the scalability of Digital Twins, emphasizing broad adoption and advanced grid management across multiple regions.

**Joint Programming for Flourishing Innovation –
from Local and Regional Trials towards a Transnational Knowledge Community**

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