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DATAWEEK

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Odyssey of AI:

Navigating the Data Seas

27 - 28 May / Athens

IN COLLABORATION WITH

ATC ATHENS TECHNOLOGY CENTER

ΕΠΙΣΕΥ ICCS

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DEMOKRITOS NATIONAL CENTRE FOR SCIENTIFIC RESEARCH

FORTH INSTITUTE OF CHEMICAL ENGINEERING SCIENCES

NEUROPUBLIC Information Systems & Technologies

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Energy Data Spaces & AI Trends and Challenges

Tuesday, May 27, 11.30 - 13.00

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IN COLLABORATION WITH ATC, CORE|IC, FORTH, ICCS, DEMOKRITOS, NEUROPUBLIC

Grid AI: An innovative AI framework for supporting the resilient operation of electricity distribution grids

Funded by the European Union NextGenerationEU

Cyprus tomorrow RECOVERY AND RESILIENCE PLAN

Republic of Cyprus

RESEARCH & INNOVATION FOUNDATION

The Project is funded by the European Union Recovery and Resilience Facility of the NextGenerationEU instrument, through the Research and Innovation Foundation

Tasos Tsitsanis

Business Development Director

Suite5

We Deliver Intelligence

Why GridAI

- Distribution Grid is dominated by a wealth of dispersed DERs of stochastic/ intermittent nature (RES) and rapidly growing number of new assets (EVs) → expanding system edge and operational complexity
- Increased uncertainty in traditional operational routines and significant challenges for system resilience
- Need for **increased (interoperable) data reach** and **enhanced accuracy in demand/ generation forecasts (AI-powered)** at various spatio-temporal granularities for early definition of anticipated congestions/ violations

The GridAI Solution

WHAT?

GridAI introduces a novel **end-to-end solution for the management and analysis of big data** coming from diverse sources (data APIs, historical data, statistics, IoT data, weather data, energy market data and various other open data sources) to help DSOs to simultaneously achieve the effective and **interoperable management of the data they own**, **increase their data reach through the integration of external data that are required for driving operational decisions** (e.g. weather data, energy market data, DER data, etc) and **blend them together towards improving their internal intelligence and driving evident decision-making for the resilient operation of the distribution grid** by stepping on **accurate AI-based demand and generation forecasts** across varying spatial and temporal resolutions

TO WHOM?

- ✓ **AI-as-a-Service (AIaaS) offering**, addressing the data management and analytics needs of DSOs, while progressively expanding to the whole electricity data value chain stakeholders (Electricity retailers, Local Energy Communities, Facility Managers, Energy Service Companies, Aggregators and Prosumers)

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Key Results

- 6 Business Scenarios addressing the data, AI and business needs of DSOs
- 10 dedicated Use Cases and 120 functional requirements driving the development of the GridAI solution
- 1 comprehensive data model, semantically harmonizing >10 standards-based energy sector ontologies/ data models
- Multiple data harvesting methods addressing the various data sources across the energy system

ID	Title
BS1	Effective management of DSO data, ensuring high-quality, reliability and interoperability
BS2	Maintenance of full control of DSO data, under enhanced security and sovereignty terms
BS3	Advanced Demand Analysis and Forecasting for Grid Stability
BS4	Advanced Distributed Generation Analysis and Forecasting for Grid Stability

Requirement_ID	Requirement Description	Use Cases Relation
Req_068	GridAI shall support demand forecasting at portfolio level.	GridAI_UC_7, GridAI_UC_8, GridAI_UC_9
Req_069	GridAI shall support 72 hours-ahead demand forecasts at portfolio and substation level.	GridAI_UC_7, GridAI_UC_8, GridAI_UC_9
Req_070	GridAI shall support day-ahead demand forecasts at portfolio and substation level.	GridAI_UC_7, GridAI_UC_8, GridAI_UC_9
Req_071	GridAI shall support hour-ahead demand forecasts at portfolio and substation level.	GridAI_UC_7, GridAI_UC_8, GridAI_UC_9
Req_072	GridAI shall support 15 minute-ahead demand forecasts at portfolio and substation level.	GridAI_UC_7, GridAI_UC_8, GridAI_UC_9

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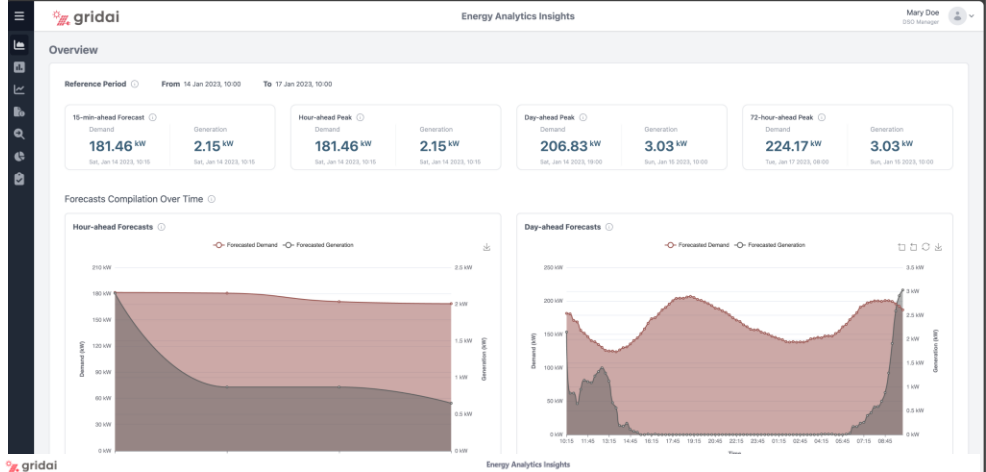
Key Results

- >20 AI Analytics Pipelines trained, spanning:
  - Demand/ Generation forecasting (15 min-ahead up to 3 days-ahead)
  - Demand/ Generation forecasting (from DER-level to Grid-level)
  - Descriptive analytics for demand/ generation portfolio analysis
  - Outlier detection and correlation with external parameters (weather, market, extraordinary events)
- 1 Comprehensive Dashboard to evidently support decision-making for distribution grid control and operation (early detection of congestions/ voltage violations, identification of flexibility needs, triggering flexibility market transactions and activation through DR and direct control



Metrics

	Market (Accurate)	Market (Acceptable)	Business Reqs	Suite5 Analytics
MAPE	<10%	10-20%	<10%	6.50%
Generation Forecasting (day ahead)				
NMAE	10%	10-20%	6%	3.05%
NRMSE	10%	10-20%	8%	6.28%

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Thank you for your attention!