i-nergy
Artificial Intelligence for Energy

I-NERGY Project Overview

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Online

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Project Facts

Artificial Intelligence for Next Generation Energy

I-NERGY

Started:
01/01/2021

Duration:
36 Months

Coordinator:
Institute of Communication and Computer Systems (ICCS)

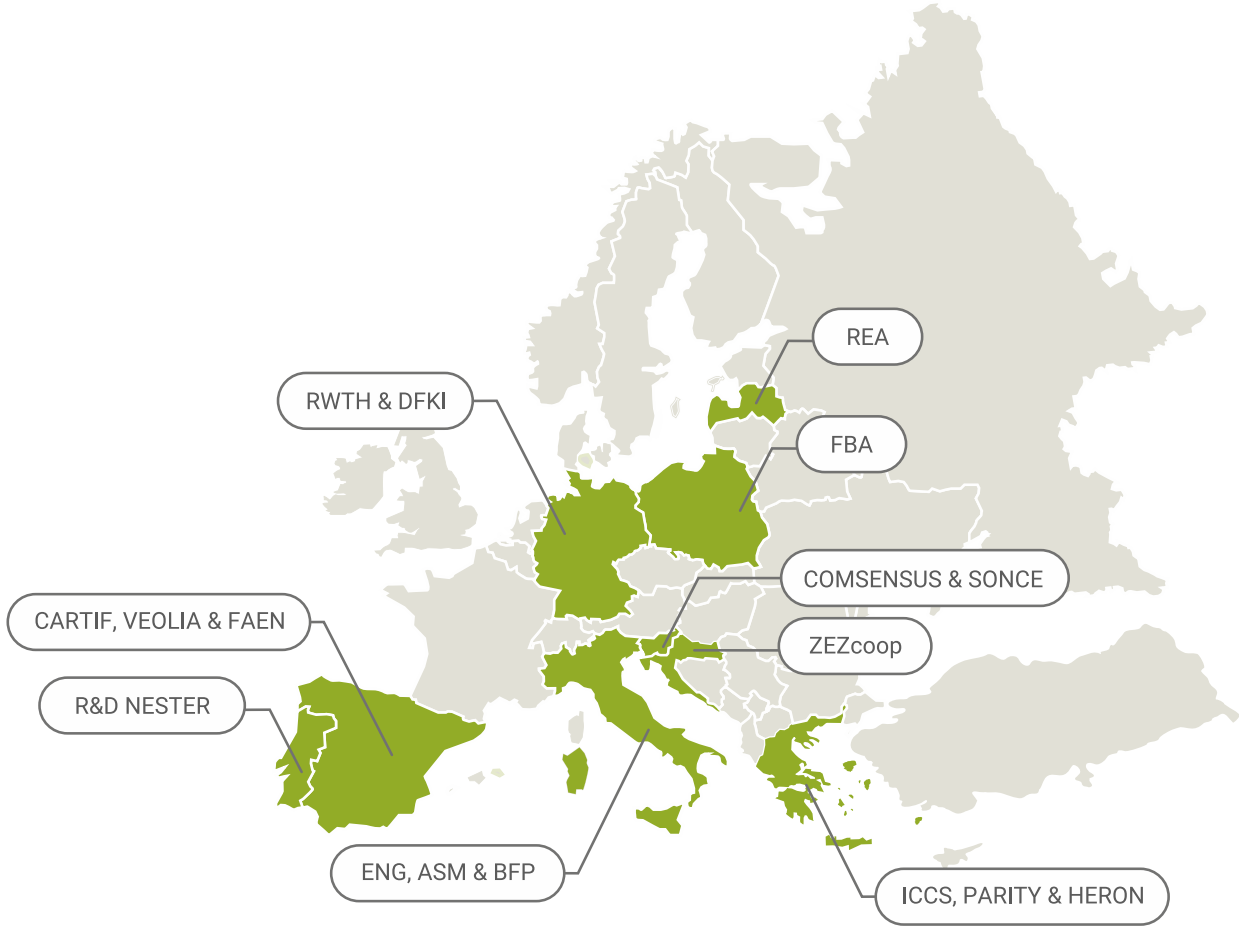
European Union's **Horizon 2020** Research and Innovation Programme

Budget:
4,999,844.50 €

Grant Agreement Number:
101016508

ICT-49-2020 Artificial Intelligence on demand platform

Who we are



17 partners from 9 Countries

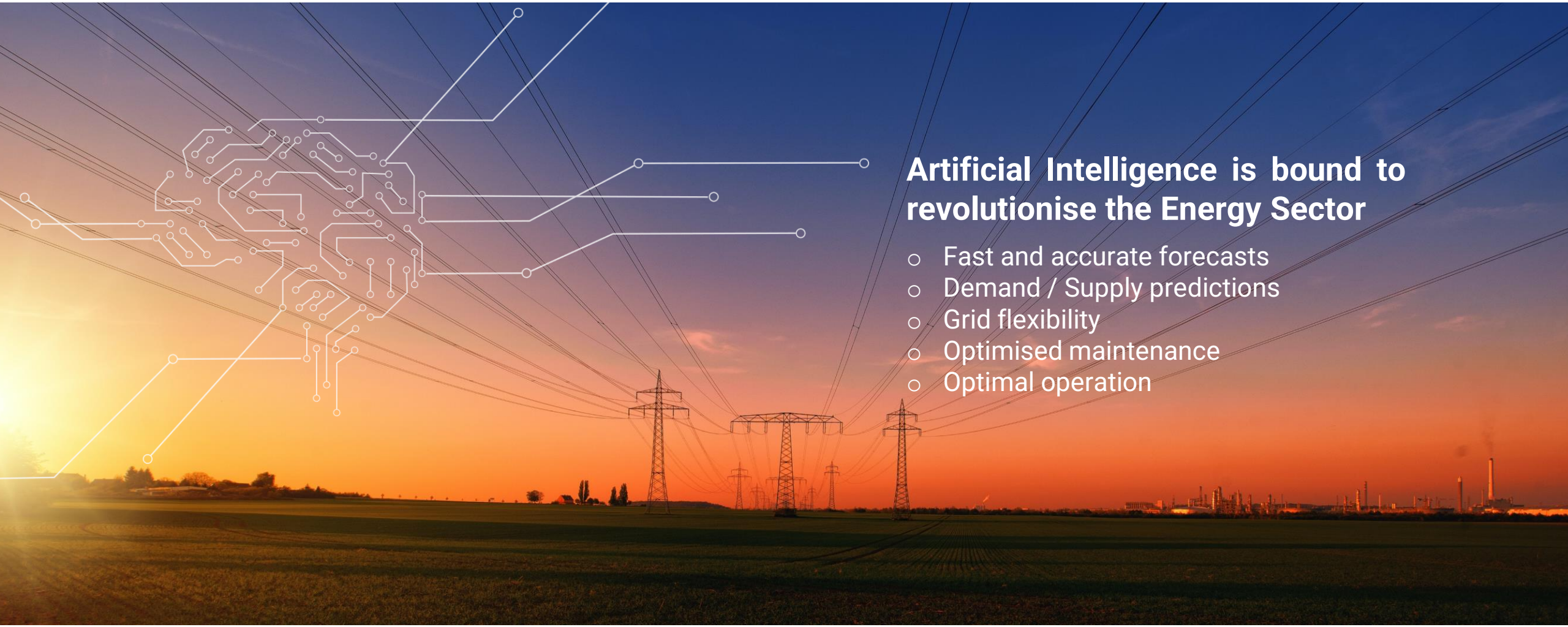
7 Leading Research & Academy Institutions, SMEs and Large ICT companies - With leading expertise on AI, ICT and Data in the energy sector

Funding box - cascade funding to start-ups and SMEs

9 EPES stakeholders covering the **full energy value chain**:

- Power network operators, including TSO and DSO
- Energy suppliers
- Aggregator/Energy Cooperative
- Power market actors
- ESCOs
- Financing institutions, energy agency and policy makers

Motivation (1/2)



Artificial Intelligence is bound to revolutionise the Energy Sector

- Fast and accurate forecasts
- Demand / Supply predictions
- Grid flexibility
- Optimised maintenance
- Optimal operation

Motivation (2/2)

AI proliferation in the **energy** sector holds the premise for a larger **environmental** and **social impact**

- Decentralisation, Democratisation Digitalisation } of energy

- Environmental sustainability
- Alleviating energy poverty
- Fighting climate change and environmental degradation

Challenges to be addressed

- **EPES Community**
  - Lack of appropriate tools for capturing the real time dynamics
  - Scarcity of and competition for AI experts
  - Need for knowledge transfer to and for training AI in new contexts

- **@ Application Level**
  - Lack of holistic view of how AI techniques can be integrated from the energy system perspective
  - Lack of a cross-stakeholder coordination perspective
  - Fear of AI and potential misuse

- **@ ML Models Level**
  - Lack of system-level data models (going well beyond the asset–level models)

- **@ Data Services Level**
  - Existence of consolidated functional / organisational silos combined with lack of semantic and business interoperability across data stream providers

I-NERGY Vision...

Deliver an energy-specific **open modular framework for supporting AI-on-Demand in the energy sector (AI4 Energy)**

Based on state-of-the-art AI and Data technologies

Energy Commodities Networks: AI for energy networks optimised operation

Distributed Energy Resources: AI for RES generation, buildings, districts, communities

Energy Efficiency and Non-energy related Services: AI enabling synergies / implications on other energy and non-energy domains

… and Objectives

O1. Reinforce the service layer of the AI-on-demand-platform:

O1.1 **Strengthen European-wise Research and Innovation on AI** through synchronising, liaising, contributing and extending the AI4EU Platform service and research across a variety of cross-fertilisation activities, which bring AI4 Energy vertical center stage.

O1.2 **Deliver** a TRL 7 DLT/blockchain/smart contract-based implementation of an **energy data decentralised governance technological enabler**.

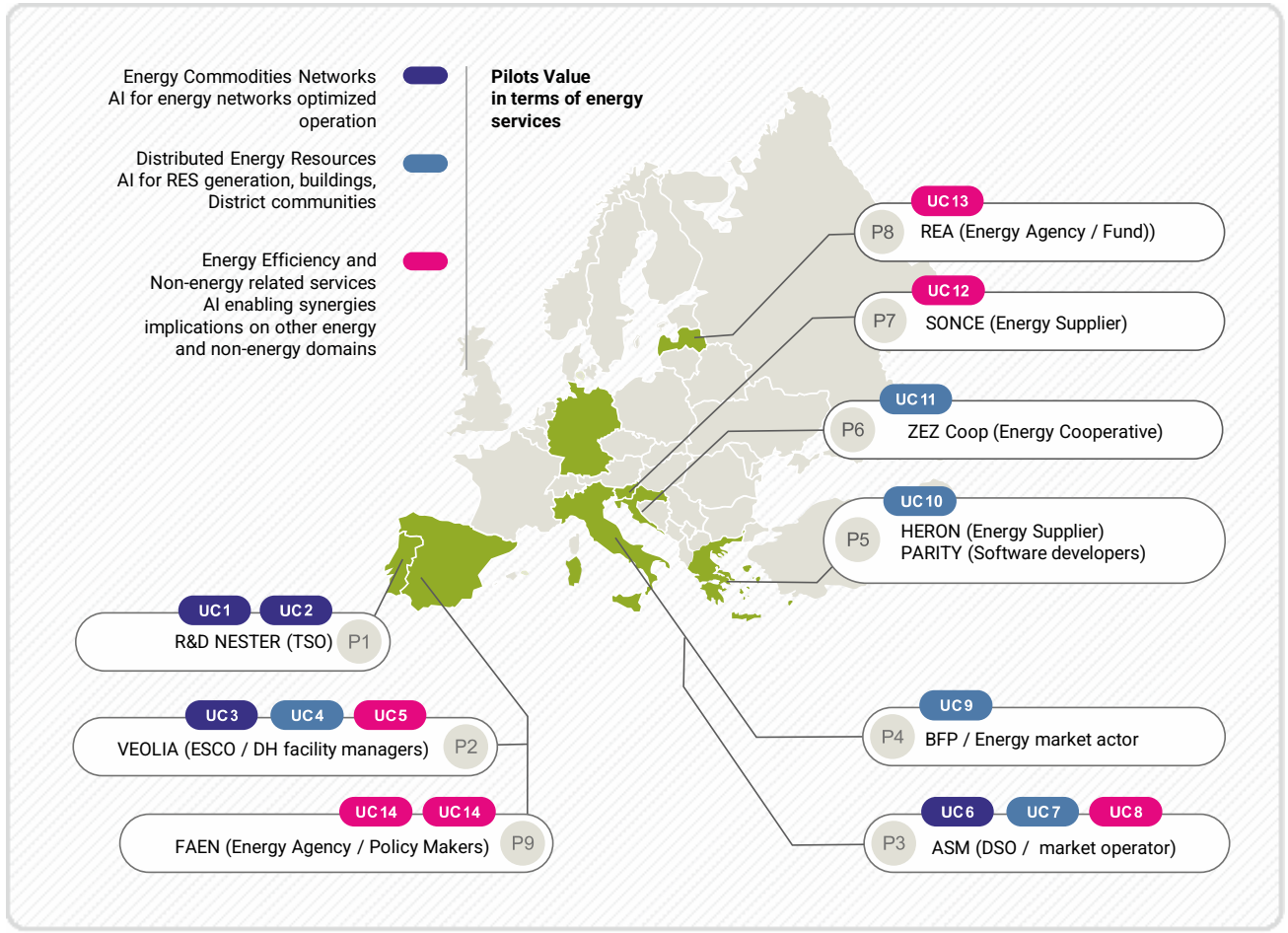
O1.3 Adapt, evolve, upscale and deploy a TRL 7 technology enabler for advanced AI-based data management, learning and analytics, and **deploy the I-NERGY Energy Analytics Applications** along different deployment modes, ranging from experimental on-premise sandboxes to AI-as-a-Service (AIaaS) Energy Analytics operation.

O2. Reach out to new user domains and boost~~ing~~ the use of the platform through use cases and small-scale experiments:

O2.1 **Validate** the I-NERGY analytics by developing a variety of near real time edge-level AI-based descriptive, predictive and prescriptive analytics, along a number of **cross-function, cross-stakeholders, cross-domain piloted applications.**

O2.2 Lay the foundation for p**an European AI for energy ecosystem**, boosting EU-scale data economy and use cases experiments by leveraging on systematic **community-building and financing support** to innovative technology/solution provider from **EPES community**.

Pilots



The overall I-NERGY service analytics framework is applied, implemented, demonstrated and validated in real life pilots in:

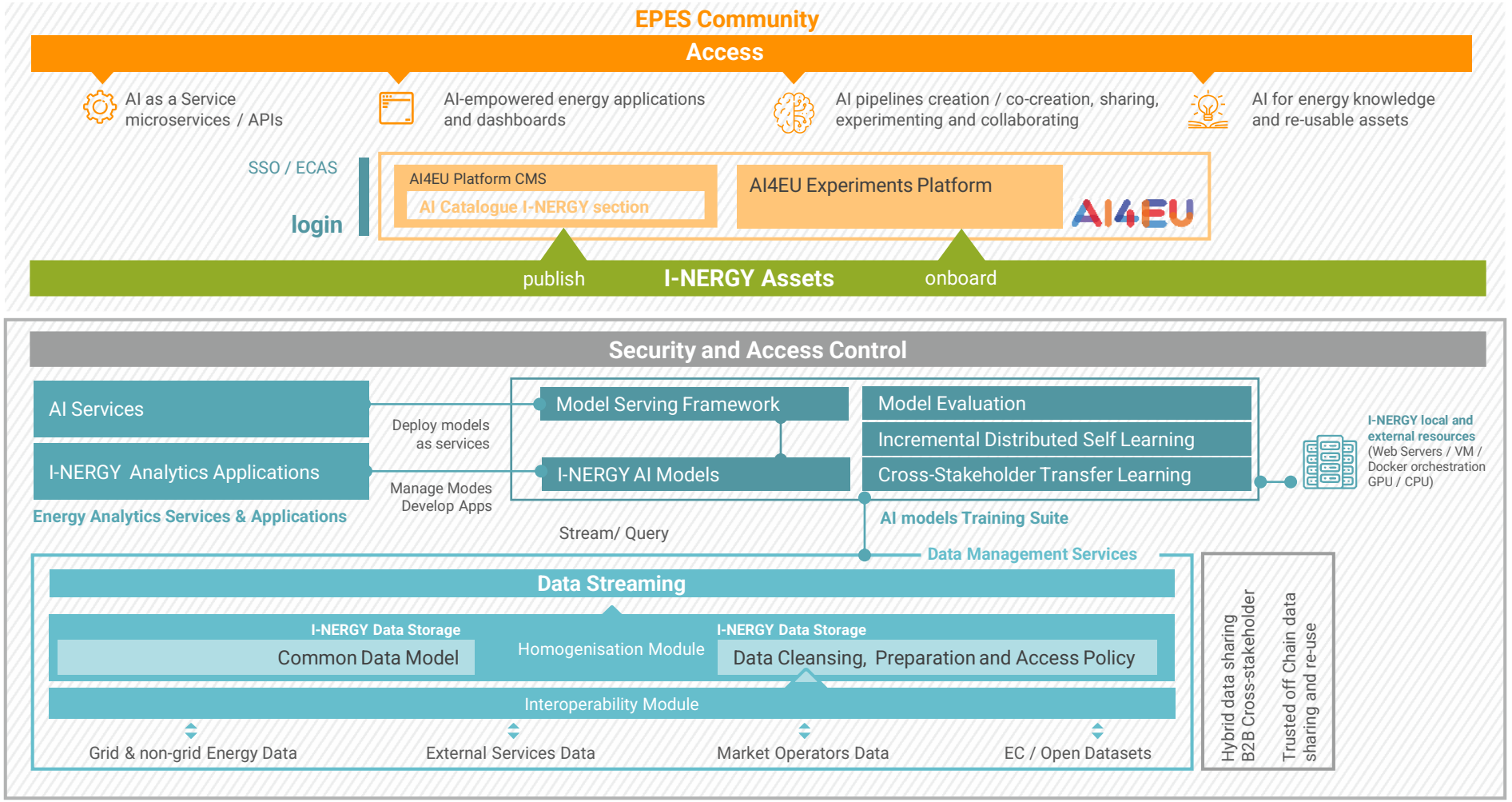
- **9** pilot hubs (15 use cases)
- across **8** countries

Open Calls

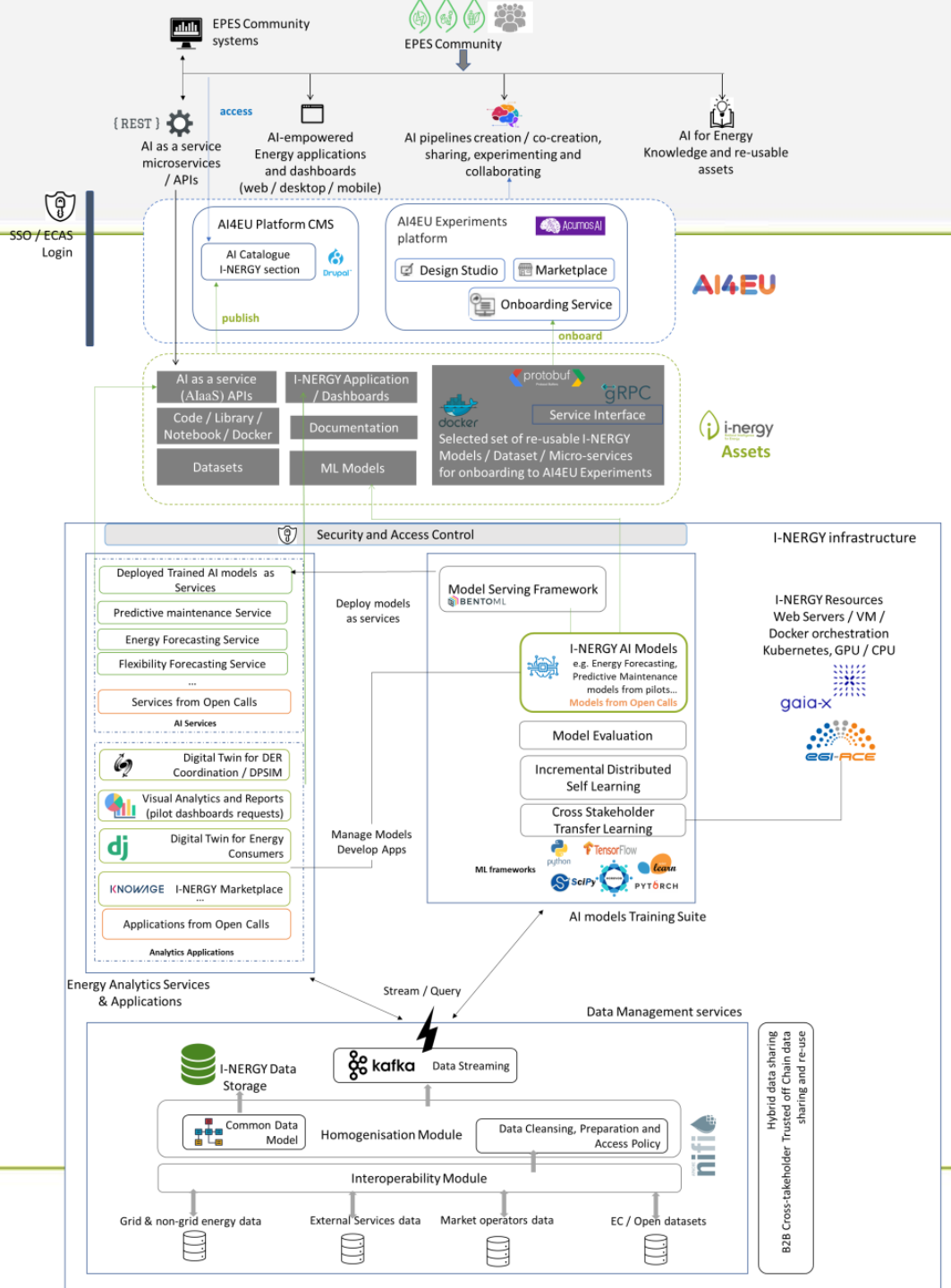
- **2 M€** Financial Support to Third Parties (FSTP)
- Technical Mentoring

	TECHNOLOGY TRANSFER PROGRAMME I	TECHNOLOGY TRANSFER PROGRAMME II
CALL LAUNCH	NOV 2021- JAN 2022I	OCT- NOV 2022
WHO CAN APPLY	SMEs Including Startups	SMEs, Startups, EPES beneficiaries, research institutions, other relevant stakeholders (At least 2 organizations per bottom-up project are required)
SCOPE	Building blocks for new AI algorithms / services and small-scale experiments (prototypes)	Developing new services on top of existing technologies (MVPs)
DURATION OF SUPPORT PROGRAM	6 months	9 months
BOTTOM-UP PROJECTS	10	15

I-NERGY Conceptual Architecture



I-NERGY Architecture (Technical)



I-NERGY Services

- Energy Load Forecasting
- Predictive Maintenance
- Operation planning
- Digital Twin for DER
- Digital Twin for Electrical Communities
- Energy Flexibility Forecasting and Demand Response
- Anomaly Detection in citizen patterns from Smart Meters
- Energy Efficiency Action Plans Evaluation and Prioritisation
- Forecasting Changes in Solar Radiation

Services from open calls

- Predictive maintenance in electrical distribution network and critical assets (Maintenet)
- AI-based Digital Twin solution for AI-driven hydropower energy intelligence and optimal production forecasting (SmartRIVER)
- Monitor and predict hydropower generation, providing an estimate of the snow water equivalent (SnowPower)
- Applied to drone imagery to improve power line monitoring (SuperPower)
- AI applications in energy and Predictive maintenance (ADIOS)
- AI applications in energy and Demand forecast (AI4Demand)
- AI applications in energy, Analytical applications in energy, Monitoring, energy usage optimisation and Demand forecast(AI4EOHotel)
- AI applications in energy, Analytical applications in energy and Predictive maintenance (AI4Hydro)
- Data governance and data valorisation for energy services, Analytical applications in energy, Monitoring, energy usage optimisation and Demand forecast (DemandData)
- AI applications in energy, Data governance and data valorisation for energy services, Analytical applications in energy, Monitoring, energy usage optimisation and Demand forecast (E-ModelOps)

More information available here

Relation to the AI4EU Platform

AI4EU

AI Catalogue
I-NERGY section

AI4EU
Experiments

AI4EU Energy

Proliferate AI4EU platform with AI and resources for the Energy Sector

- AI as a Service (AIaaS) APIs
- I-NERGY Applications / Dashboards
- Code / Library / Notebook / Docker
- Documentation
- Datasets
- ML Models

__AI4EU__ is a __one-stop-shop__ for anyone looking for __AI__ knowledge, technology, tools, services and experts.

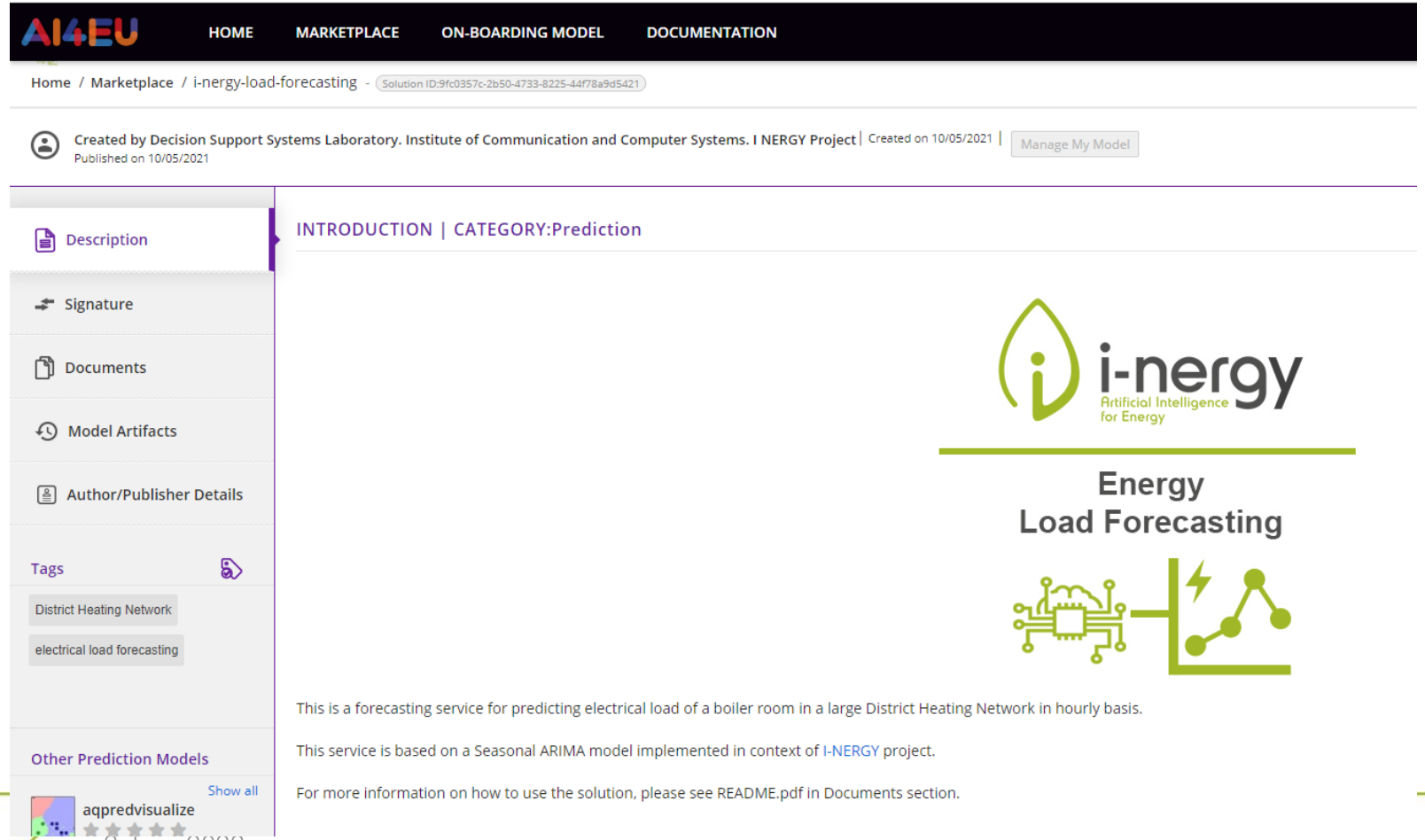
i-nergy **Assets**

Project assets tested on real pilot cases

Open Calls

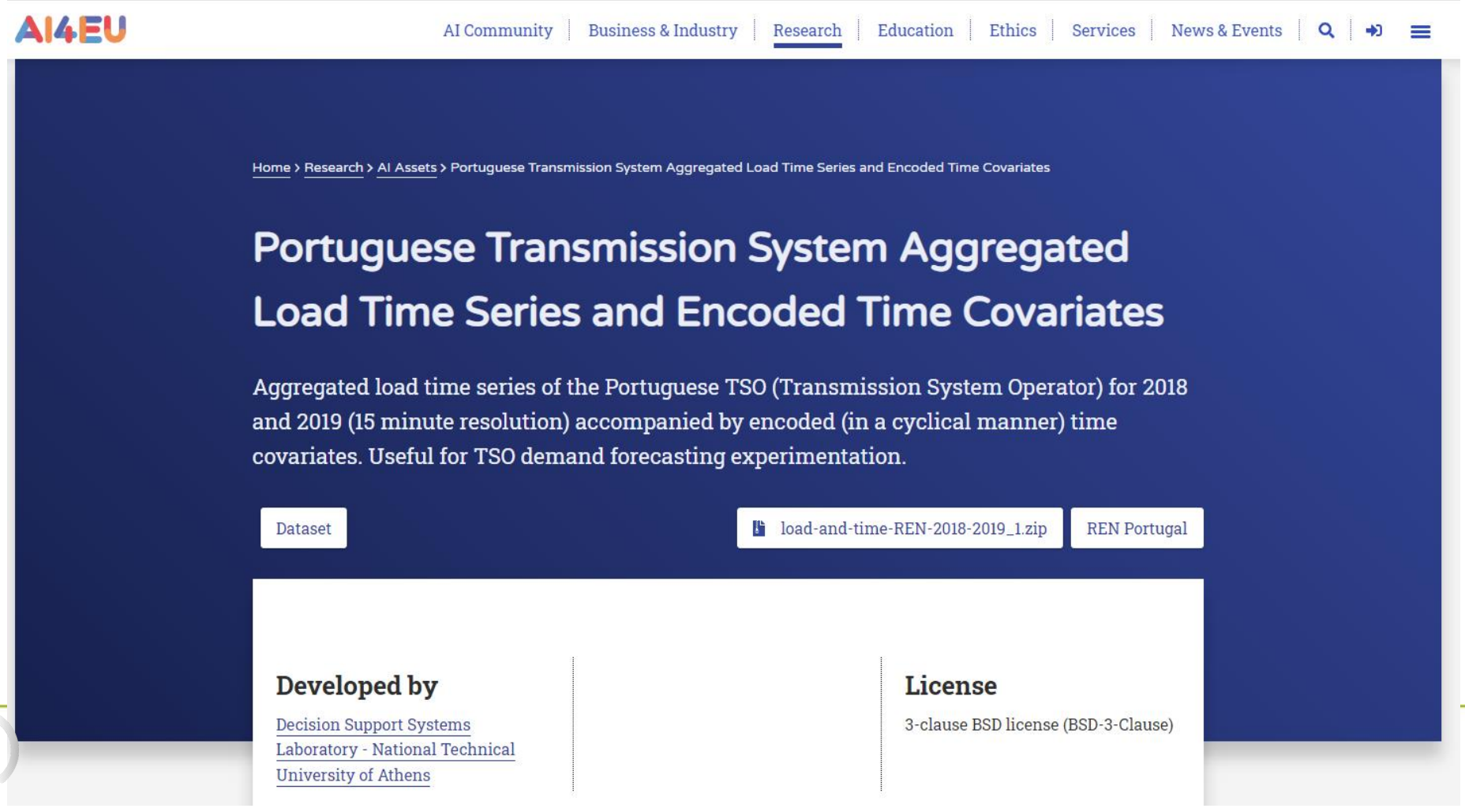
I-NERGY Assets to AI4EU Experiments

Energy load forecasting service



I-NERGY Assets AI4EU catalog

Portuguese Load and Time covariates dataset



Integration plan with AI4EU

I-NERGY

- Public Services created in the context of I-NERGY will be onboarded to AI4EU experiments
- Other assets created in the context of I-NERGY will be published to AI catalog

General

- Common tagging/semantics system amongst the projects would be very valuable
- Attempt for a common approach towards the main technical interfacing elements of the AIonD platform is very important
  - Catalogue, experiments platform, and searching
- Work towards a more uniform view of ICT-49 products on the AIonD catalogue

Open issues for discussion

- Security – Authentication
  - APIs are not secured through AI4EU SSO/ECAS
  - Need for a common approach
- Is AI4EU experiments planned to be used for serving models for commercial use in the future or it is just for experimentation?
- What about access policies to datasets published to AI Catalog?

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Thank you!

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