



PLATFORM FOR OPERATION
OF DISTRIBUTION NETWORKS

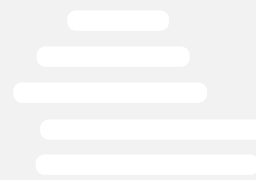
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Platone

PLATform for Operation of distribution NETworks

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**Media
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Managing the Electricity System with Blockchain

In the European project Platone, an international consortium of energy and IT experts jointly develops first-of-a-kind solutions to make flexible power generation and consumption a tradable good. Unlocking these flexibilities allows integrating more renewable energies while maintaining grid stability.

Electricity grid operators are in charge to guarantee an uninterrupted flow of electricity. But sources of renewable energy are intermittent and unpredictable. This can quickly lead to dips in production. Even the inverse situation – too much electricity – can be a problem. Innovative information and communication technologies (ICT) can help grid operators to manage such situations of under- as well as overproduction. This is what partners from Germany, Italy, Belgium and Greece are going to investigate and implement. In the next four years the experienced consortium will develop processes and IT platforms to increase flexibility in the energy system and to realize an open and non-discriminatory market, linking electricity generators and consumers with grid operators.

Platone – PLATform for Operation of distribution NEtworks – uses blockchain technology as a key enabler to manage the electricity system. The blockchain technology stores information on transactions in “blocks” of a distributed database in a safe and transparent manner. Entries in the database are dispersed and highly protected and as such cannot be easily corrupted or hacked. Accordingly, blockchain technology helps to meet the requirements of cybersecurity. In Platone, this network of intelligent block controllers stores information on available flexibilities and executes them on demand. On the basis of technical as well as economic algorithms, autonomous controllers negotiate an optimal set of actions and automatically switch distributed generators, storage and consumption devices on and off as needed. Via the blockchain, every person and company in a local energy community shall be able to contribute to grid stability and to be remunerated for this flexible behaviour.

Project coordinator Antonello Monti, University Professor and Director of the Institute for Automation of Complex Power Systems at RWTH Aachen University: “Platone is unique in its approach. While creating open and fair conditions for all the stakeholders in managing flexibility, it promotes a tight interaction between markets and operation. This tight link is critical for the grid of the future where the dynamics will be faster requiring more and more real-time services and a high level of awareness for the operators.”

Platone is based on a two-layer architecture. On the bottom layer blockchain technology allows trusted data management and interconnection supporting participation and also enabling peer-to-peer solutions. On the higher level the architecture supports dual use of the information: on the one hand for the market platform (eventually also blockchain-based, and possibly using the same blockchain infrastructure) and on the other hand for the distribution system operator (DSO) platform supporting the operator in the system awareness and in all the operational tasks aiming at continuity and quality of service. Platone envisions the creation of an open concept of DSO platform supporting operators in the transition to a digital grid thanks to Open Source and standardized open databus. The European Commission as well as national and international industry associations are committed to help disseminate Platone solutions. To foster this uptake, the European association of distribution grid operators, E.DSO, is a formal member of the Platone consortium.

Platone solutions will be implemented and tested in three of the participating countries.

In the Italian case, Acea Energia S.p.A., represented by Areti S.p.A., with the support of Siemens, experienced Engineering – Ingegneria Informatica S.p.A. and start-up Apio S.r.l., will implement a local flexibility market in the metropolitan area of Rome. Elements of the network of flexible generation, storage and consumption are various types of users including a wastewater treatment plant connected directly to the primary cabin, a virtual energy community in low-voltage, residential homes equipped with renewable energy sources, a business smart building and electric vehicle charging station pools. All will be connected to a blockchain to bring their flexibilities to the market. Project manager of the Italian demonstration Ercole De Luca, Engineering & Innovation at Areti: “With the implementation of Platone solutions our customer is no longer just a client but becomes a partner in the management of the future more sustainable and climate friendly energy system.”

The German distribution system operator, Avacon Netz GmbH, focuses on decentralized flexibility management mechanisms on a local level. Energy communities in Avacon's low voltage grids are already today characterized by a high penetration of distributed energy resources. The objective of the field test is to implement a flexibility management instance balancing generation and demand within an energy community to a virtual island. The platform will enable the provision of flexibility out of the balanced grid on request of the DSO or markets. Within Platone, Avacon will further develop and test new mechanisms for a package-based energy supply. Benjamin Petters, Avacon Netz GmbH, project leader of the German demonstration: "Avacon will become an active member of a unique project for the investigation of new solutions for decentralized, decarbonized and digitalized grids with active customers enabling new energy supply mechanisms."

The Greek demonstration will take place in the Mesogeia area, which is considered suitable for demonstration purposes since it has a good penetration of various types of renewable energy sources, provides a mix of rural, urban and suburban areas with a customer mix including households and small, medium and large industries. Hellenic Electricity Distribution Network Operator S.A. (HEDNO) and the National Technical University of Athens (NTUA) work towards advanced observability, automation and controllability in the distribution network fault-detection, self-reconfiguration and self-healing for increased security and resilience. The main objectives are the economically optimized use of distributed energy sources to provide ancillary services for grid balancing to the transmission system operator and to alleviate line and voltage limit violation problems within the distribution network. Provision of such flexibility services shall be remunerated on market places on multiple levels.

About Platone

Platone – PLATform for Operation of distribution NEtworks – is a four-year project, funded in the EC Horizon 2020 Research and Innovation program with more than 7 million Euro. Horizon 2020 aims at fostering competitiveness, growth, and increasing benefits to the European Union economy and citizens. Under different funding schemes the framework programme supports research and development activities resulting in new knowledge, new products and services, and also in non-technological and social innovation. In these funding schemes, Platone works under the topic "Flexibility and retail market options for the distribution grid" within the Horizon 2020 focus area "Secure, Clean and Efficient Energy". The Platone consortium is an association of 12 partners from the European countries Germany, Greece, Italy and Belgium. The platforms will be tested in three large pilots in Europe and analysed in cooperation with a large research initiative in Canada. Platone has officially been launched on September 1st, 2019 under coordination of RWTH Aachen University and runs until 31st of August 2023.

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Project website: www.platone-h2020.eu

Platone Facts & Figures

Duration

1st of September 2019 until 31st of August 2023

Financing

- Overall budget: € 9 600 957.58
- EU contribution: € 7 535 148.02, of it
 - 2 788 650.02 € in Italy
 - 3 363 870.50 € in Germany
 - 409 640.00 € in Belgium
 - 972 987.50 € in Greece

Consortium

12 project partners from 4 European countries working together:

- 1 from Belgium
- 3 from Germany
- 2 from Greek
- 6 from Italy

RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (RWTH Aachen University)

- Location: Germany, Aachen
- Main operating domain: Research centre with key competences in smart grids and computer science
- Role in Platone: Coordination of the project, platform development

EUROPEAN DISTRIBUTION SYSTEM OPERATORS FOR SMART GRIDS (E.DSO)

- Location: Belgium, Brussels
- Main operating domain: Key-interface between Europe's DSOs and the European institutions
- Role in Platone: Review of technical solutions, coordination between the demonstration sites and monitoring developments within the relevant policy and regulatory framework

ACEA ENERGIA S.P.A. (Acea Energia)

- Location: Italy, Rome
- Main operating domain: One of the main Italian national operators in the energy market
- Role in Platone: Operating the aggregator platform developed by the Italian demonstration

SIEMENS S.P.A (SIEMENS)

- Location: Italy, Milano
- Main operating domain: Global technology powerhouse focusing on the areas of electrification, automation and digitalization
- Role in Platone: Implementation, adoption and extension of the platforms

APIO S.R.L. (Apio)

- Location: Italy, Rome
- Main operating domain: Software and Hardware Design with focus on Internet of Things
- Role in Platone: Blockchain technology

ARETI S.P.A. (areti)

- Location: Italy, Rome
- Main operating domain: One of the main operators in Italy for energy infrastructure
- Role in Platone: Leader of the Italian demonstration

ENGINEERING - INGEGNERIA INFORMATICA S.P.A (ENG)

- Location: Italy, Rome
- Main operating domain: Design, development and management of innovative solutions for digitalization in high impact business areas including Smart Energy & Utilities
- Role in Platone: Leading the design and development of the Platone Platform

RICERCA SUL SISTEMA ENERGETICO – RSE S.P.A (RSE)

- Location: Italy, Milano
- Carries out research in the field of electrical energy with special focus on national strategic projects funded through the Fund for Research into Electrical Systems
- Role in Platone: Consistency, scalability and replicability of the demonstrations and use cases

DIACHEIRISTIS ELLINIKOU DIKTYOU DIANOMIS ELEKTRIKIS ENERGEIAS AE (Hellenic Electricity Distribution Network Operator S.A. – HEDNO)

- Location: Greece, Athens
- Main operating domain: Distribution system operator, responsible for the development, operation and maintenance of the Hellenic electricity distribution network all over Greece
- Role in Platone: Implement and run the Greek industry-scale demonstrator

NATIONAL TECHNICAL UNIVERSITY OF ATHENS – NTUA (NTUA)

- Location: Greece, Athens
- Main operating domain: Research centre with key competences in smart grids, distribution grid automation, microgrids and forecasting
- Role in Platone: data driven state estimation methodologies; Standardization along with device, system and data interoperability

AVACON NETZ GMBH (Avacon)

- Location: Germany, Helmstedt
- Main operating domain: Energy system operator
- Role in Platone: Implement and run the German industry-scale demonstrator

B.A.U.M. CONSULT GMBH (B.A.U.M.)

- Location: Germany, Munich/Berlin
- Main operating domain: Consulting company, involved in the smart energy system development
- Role in Platone: System modelling and user integration; dissemination and exploitation of the results

Demonstrations

3 real-scale demonstrations in different European countries, of it

- 1 in Italy
- 1 in Germany
- 1 in Greece

German Demonstration

- Balancing between local and higher-level networks
- Low voltage network in a rural area with a high penetration of distributed energy resources
- Coordination between local balancing mechanism and centralized grid operation and the allocation of flexibility in local networks between the local network and higher-level networks

Greek Demonstration

- Connecting flexibility between distribution and transmission system operators
- Good penetration of various types of renewable energy sources in a mix of rural, urban and suburban areas with a customer mix including households and small, medium and large industries

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- Economically optimized use of distributed energy sources to provide ancillary services and balancing market participation to the transmission system operator

Italian Demonstration

- Cutting barriers, unlocking flexibility
- Metropolitan area with various types of users including a wastewater treatment plant connected directly to the primary cabin, a virtual energy community in low-voltage, residential homes equipped with renewable energy sources, a business smart building and electric vehicle charging station pools
- Comprehensive implementation of a local flexibility market

Disclaimer

All information provided reflects the status of the Platone project at the time of writing and may be subject to change. All information reflects only the author's view and the Innovation and Networks Executive Agency (INEA) is not responsible for any use that may be made of the information contained in this deliverable.