Platone

PLATFORM FOR OPERATION OF DISTRIBUTION NETWORKS

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PLATform for Operation of distribution NEtworks

# D6.9 v1.0

# Report on solutions and recommendations for the roll-out of the designed solutions

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**Abstract**

The deliverable 6.8 of the project entitled "Report on the analysis of the regulatory and legislative framework" focused on the main characteristics of the distribution grids in Europe and the description of the national and European legislative and regulatory framework concerning the innovative solutions developed in Platone and the three demonstration examples placed in Germany, Greece and Italy. In this deliverable 6-9, we go further by analysing the action steps and the goals and, hence, the permissible and necessary limits under which the three demonstration networks may be developed. Possible obstacles or gaps are examined which further clarify the current needs of the consumers and the optimal operation of the distribution networks.

**Keyword list**

Distributed system operators, consumer, legislation, clean energy package, blockchain, distribution management, energy management, demand response, energy storage, cybersecurity, blockchain

# Executive Summary

This report provides an analysis of the European legislation for electricity networks according to the three demonstrations sites that will be developed in the framework of Platone project. Platone, thanks to a multilayer platform architecture collecting data and delivering secure information both to Distribution Management Systems and to an open Marketplace, will provide a seamless integration of operation and market, simplifying the life of customers, distribution grid operator, aggregators and other energy related players. This project targets identifying new approaches to ameliorate renewable energy sources (RES) observability and mitigating the load predictability in order to achieve a reliable and cost-effective power system. To achieve this, the main goal is to develop advanced management platforms which will combine the two aforementioned actions giving priority to the distribution system operators' (DSO) policies and putting the consumers' involvement in the center.

The following report will concentrate on the analysis of the laws which should be followed towards the development and implementation of the three demonstration sites (Italy, Greece, and Germany). Separate descriptions of the legislation of each participating country will give the principles and basis on which the implementation of each demo should be structured. This analysis is very useful, since obstacles, which concern mainly the active factors of a distribution network (protection of the consumers and interests of the distribution operators), will be discussed and possible gaps, which should be further improved and developed, are identified.

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# Table of Contents

# 1 Introduction

The project "PLATform for Operation of distribution Networks – Platone - aims to develop an architecture for testing and implementing a data acquisitions system based on a two-layer approach (an access layer and a service layer).that will allow greater stakeholder involvement and will enable an efficient and smart network management. The tools used for this purpose will be based on platforms able to receive data from different sources, such as weather forecasting systems or distributed smart devices spread all over the urban area. These platforms, by talking to each other and exchanging data, will allow collecting and elaborating information useful for DSOs, Transmission System Operators (TSOs), customers and Aggregators. In particular, the DSO will invest in a standard, open, non-discriminating, economic dispute settlement blockchain-based infrastructure, to give to both the customers and to the aggregator the possibility to more easily become flexibility market players. This solution will see the DSO evolve into a new form: a market enabler for end users and a smarter observer of the distribution network. By defining this innovative two-layer architecture, Platone removes technical barriers to the achievement of a carbon-free society by 2050 [1], creating the ecosystem for new market mechanisms for a rapid roll out among DSOs and for a large involvement of customers in the active management of grids and in the flexibility markets. The Platone platform will be tested in three European trials in Greece, Germany and Italy and within the Distributed Energy Management Initiative (DEMI) in Canada. The Platone consortium aims to go for a commercial exploitation of the results after the project is finished. Within the H2020 programme "A single, smart European electricity grid" Platone addresses the topic "Flexibility and retail market options for the distribution grid".

Features of the Platone platform along with other functionalities will be tested in three European demonstration sites formed in Greece, Germany and Italy:

- in Italy, a field trial in Rome will demonstrate a complete local market architecture.

  The principal goal of this demonstration site is to develop a complete flexible environment, i.e. an integrated market where, applying highly innovative technologies like blockchain and new grid equipment, retail and business customers will be able to interact with both aggregators (to reach new flexibility market options) and DSOs and will become active players in an optimized management environment within an effective and efficient distribution network.

- in Greece, a field trial in Mesogeia will be structured which will focus mainly on the customer's flexibility with indirect control methods.

  The main objectives of this demo are to economically optimize the use of distributed energy resources (DERs) to provide ancillary services and reserve market participation to the TSOs, advanced observability, automation and controllability in the distribution network. Indirect control mechanisms such as the use of network tariffs will be demonstrated.

- in Germany, the field trial will focus on the flexibility implementation.

  This demonstration example aims at the supervision between local balancing mechanisms and centralized grid operation. Furthermore, the flexibility arrangement in local networks among the local network and the higher-level networks will be addressed. Then, an effective informational and temporal uncoupling of low and medium voltage networks is another goal which will be treated by handling energy supply and export in bulk packages instead of a real-time exchange.

For the sake of the project's achievement, specific European and national laws and regulations should be considered. The European Commission (EC) proposed a regulatory framework to determine the new European energy policies which brought new legislation and regulatory measures to mitigate pollution caused by greenhouse gas emissions and to enable the increase in the use of renewable energy sources (RES). Furthermore, the development of an internal energy market is one of the main priorities of the EC. Adapting the already existing electric regulatory framework, the EC published new legislation [2], taking into account simultaneously the energy, financial and environmental aforementioned factors, targeting a sustainable and reliable power supply. From that perspective, each one of the aforementioned countries has been continuously developing its policies concerning energy planning, power quality and electricity cost, which force the electric power companies to accurately declare their infrastructures, their systems' performance and the quality of their services. The specific regulations necessary to be followed for the completion of the project and its demo separately will be outlined in this deliverable.

## 1.1 Task 6.9 - Solutions and recommendations for the implementation of the designed solutions

Task 6.9 aims at identifying the risks and gaps in the legislation and regulatory framework studying the Use Cases and functionalities separately for each demonstration within Platone. The purpose is that the solutions proposed for Platone project will be developed following the existing European and national legislation so that the practical realization of the demos will be implementable and scalable. Possible obstacles will be analyzed and will be taken into account for future discussions on the development of the already existing regulatory framework.

## 1.2 Objectives of the Work Reported in this Deliverable

In Deliverable 6.9 the legislation and regulatory framework developed in Deliverable 6.8 will be related to the Use Cases and functionalities identified for each demo. Following D6.8, the demo leaders identify the allowed limits under which the three demonstration examples can be formulated. Through this analysis, the allowed limits are identified according to which these three demonstration examples can be developed. In addition, possible obstacles or gaps which could be later appear can be outlined.

## 1.3 Outline of the Deliverable

Starting with Italy, the second chapter describes the regulatory and legislative framework on which the completion of the Italian demonstration site will be based. In the third chapter, the laws and regulations necessary to be followed for the Greek demo are introduced. The fourth chapter presents the legislation and regulatory framework for the completion of the German demo. Each of these three aforementioned chapters highlight also possible gaps and solutions which need to be addressed in future regulatory frameworks. Finally, in the conclusion, the main highlights of this document are presented.

## 1.4 How to Read this Document

Deliverable 6.9 concerns the European and National legislations suitable and applicable for each demonstration site in Platone related to its corresponding use cases and functionalities. The main focus here is on the laws that concern Platone project. The reader should refer to D6.8 [3] for a more general treatment.

The reader is not expected to have a detailed knowledge of Platone or the specific standards, he should have however some basic understanding of electrical engineering, ICT and the modern power system structure.

# 2 The Italian demonstration site

In this chapter we describe the laws and regulations necessary to be followed for the completion of the Italian demo. Furthermore, possible obstacles or gaps are mentioned concluding with possible solutions or suggestions.

## 2.1 Legislation and regulatory framework

In this subchapter, the legislation and regulatory framework considered for the Italian demo are described divided according to the following factors, the electricity market framework, the role of consumer and its protection already described in D6.8 [3].

### 2.1.1 Flexibility and demand response

The Italian Demo has been designed taking into consideration national and EU laws and policies on the electricity dispatching market to be followed for the completion of the field pilot.

Within the national context, in 2017, ARERA (Italian Regulator for Energy, grid infrastructures and environmental matters) issued the **Resolution 300/2017/R/eel** [4], that was the starting point of three pilot projects managed by Terna (the Italian Transmission System Operator), focused on the involvement of DERs (Distributed energy resources) in the dispatching market. For those resources, which until then had been excluded from the market, this resolution defines the criteria to provide flexibility services, by introducing the concept of aggregation and localization.

To increase the resources involved in the pilot projects, further resolutions followed Resolution 300/2017, specifically:

- **Resolution 372/2017/R/eel** [5] (ARERA), which identifies the requirements to aggregate the demand (also in medium and in low voltage) in groups named UVAC ("Unità Virtuali Abilitate di Consumo" - Consuming Aggregated Virtual Unit) for providing Replacement Reserve and Balancing services exclusively in favour of the TSO;
- **Resolution 583/2017/R/eel** [6] (ARERA), which identifies requirements to aggregate the generation power plants (also in medium and in low voltage) in groups named UVAP ("Unità Virtuali Abilitate di Produzione" - Producing Aggregated Virtual Units) for providing Replacement Reserve, Congestion and Balancing services exclusively in favour of the TSO;
- **Resolution 422/2018/R/eel** [7] (ARERA), that replaced the previous two resolutions, identifying the requirements to aggregate production and consumption (also in medium and in low voltage) in groups named UVAM ("Unità Virtuali Abilitate Miste" - Mixed Aggregated Virtual Units) for providing Replacement Reserve, Congestion and Balancing services exclusively in favour of the TSO;
- **Resolution 383/2018/R/eel** [8] (ARERA), which identifies the requirements to enable the significant generation power plants (upper than 10 MW), today excluded from the dispatching market, to provide Replacement Reserve, Congestion and Balancing services exclusively in favour of the TSO;
- **Resolution 402/2018/R/eel** [9] (ARERA), which identifies the requirements to enable the significant generation power plants integrated with a Battery Storage, to provide the TSO with Frequency Containment Reserves.

All those resolutions contributed to the definition of the new **Italian Despatching Code** [10], together with the **Consultation document 322/2019/R/eel** [11] issued by ARERA in 2019, allowing the achievement of a very important milestone for the Italian flexibility market. The document reports ARERA's guidelines aimed at achieving two macro objectives:

- the identification of the main lines of intervention for the evolution of the dispatching service in the new context in rapid and continuous evolution, , due to the spread of non-programmable renewable sources and distributed generation, as well as the progressive disappearance of the programmable plants that have historically made the resources available to guarantee the balance between electricity supply and demand;

- the completion of the integration of the Italian markets with other European countries, taking into account the European regulatory framework, with particular reference to the coupling of the intraday markets characterized by continuous trading (possibly integrated with auction mechanisms) and by the shift of the gate closure to the hour preceding the one to which the subject of the negotiation refers, as well as the harmonization and sharing of the services necessary to guarantee the security of the system (ancillary services).

The document is structured in four main chapters:

1) European context: comprising all relevant European acts for the Italian framework, specifically dealing with the **Regulation (EU) 2015/1222 CACM** [12](Capacity Allocation and Congestion Management), the **Regulation (EU) 2017/2195** [13] **establishing a guideline on electricity balancing**, the **Clean Energy Package** (adopted in May 2019, comprising of a series of policy documents and legislative proposals that included provisions on prosumers) with **Regulation (EU) 2019/943 on the internal market for electricity** and the **Directive (EU) 2019/944 on common rules for the internal market for electricity** and amending Directive 2012/27/EU;
2) Market participation: reporting a revision of the ancillary market mechanisms to increase the resources involved and facilitate their planning;
3) Dispatching Regulation: proposing in the medium term to redefine the concept of dispatching market with the definition of new ancillary services and new aggregation perimeter;
4) Special context: describing the future aspects for the dispatching and the impacts of the dispatching in specific territories (e.g. islands). **This special context introduces a new role for the DSO, representing it as a "facilitator" in the medium term in the provision of flexibility services while in the long term it can directly buy the services for solving local grid issues.**

The Italian Despatching Code elaboration is part of the review process of the European Network Codes, requested by the European Commission with Regulation (EC) 714/2009 [14] on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No. 1228/2003. This regulation defined non-discriminatory rules for grid connections and energy exchanges, in order to guarantee a better functioning of the European Electricity Market.

In 2016, the European Commission issued three Regulations, considered as of primary reference for the implementation of the Italian Demo:

- **Regulation (EU) 2016/631** [15] establishing a network code on requirements for grid connection of generators (RfG), which defines the connection requirements for production power plants. This regulation groups generators in four categories based on the technical specifications;
- **Regulation (EU) 2016/1388** [16] establishing a Network Code on Demand Connection (DCC), of HV consumers and of the Distribution System connected to the TSO grid;
- **Regulation (EU) 2016/1447** [17] establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules.

In order to adapt the Italian framework to the aforementioned EU regulations, specifically to Regulation (EU) 2016/631, ARERA reviewed the rules for LV and MV defined in the Connection Code Arg/elt 99/08 [18], by publishing a series of Resolutions at national level (namely **Resolution 67/2017/R/eel, Resolution 273/2017/R/eel, Resolution 554/2017/R/eel and Resolution 349/2018/R/eel**), which must be taken into account.

Moreover, **Regulation 592/2018/R/eel** [19] issued by ARERA defines for the Italian generation power plants the categories requested in Regulation (EU) 2016/631, and **Regulation 82/2019/R/eel** [20] issued by ARERA provides technical guidelines for allowing the transposition of the European DCC and HVDC (High Voltage Direct Current Connections code) into the national TSO network code.

With respect to the **interaction between the DSO and TSO**, the Platone project also aims at supporting the TSOs in their system level responsibilities while providing a cost-effective, seamless and secure power supply for customers as active players.

The Italian Demo will realize a fully functional system that enables distributed resources connected in medium and low voltage to provide grid services in different flexibility market models, which includes all the relevant stakeholders (TSO, DSO, aggregators and end-users).

In the system proposed as to be developed and tested, the role of the TSO will be simulated through the development of a tool capable of simulating the TSO flexibility requests, involving the resources connected in medium and in low voltage.

In this respect, all relevant policies and regulatory references concerning data exchange between electricity operators (DSO and TSO) will be taken in consideration and will be monitored.

The **KORRR** [21], for example, issued by ENTSO-E (European Network of Transmission System Operators for Electricity) defines the TSOs' proposal for the Key Organisational Requirements, Roles and Responsibilities for data exchange, for scheduled and real time data, in accordance with the EU Regulation 2017/1485. In this legal framework, each TSO shall be capable of exchanging scheduled data with TSOs and with DSOs or third parties within its control area to whom the exchange of scheduled information may have been delegated, as stated in Art. 9.

Another relevant reference relating to data management and exchange between electricity operators (DSO and TSO) is the **GLDPM** [22] - Generation and Load Data Provision Methodology, a document elaborated by national TSOs for defining a common methodology for the establishment of a Europe-wide grid model which avoids power outages, ensures cost efficiency, and optimizes the use of resources and energy networks. The participating network operators - transmission system operators (TSO), distribution system operators (DSO), and generation operators - are now required to supply operational data and information from their networks and connected stations. This includes generation schedules of generating plants or load forecasts.

### 2.1.2 Consumer - Prosumer

The EU Clean Energy Package adopted in May 2019, comprising of a series of policy documents, rules and legislative proposals including provisions on prosumers, constitutes the base reference concerning consumer – prosumer role within the Italian Demo.

The new rules outline a comprehensive framework for consumer protection, information and empowerment in the EU electricity sector. The most relevant of the directives are the EU Directive 2018/2001 (RED II) [19] and the e-Directive [20]. For the first time ever, the EU has established a right for energy consumers to both produce and consume (prosume) their own electricity and obliged its Member States to adopt a legislative framework to enable prosumers to exercise this right.

Prosumer is a new term that, in the energy field, most often denotes consumers who both produce and consume electricity. They self-consume some of the electricity they produce and sell the excess to the grid. But when their production falls short, they also buy power from the grid, which makes them both producers and consumers. Examples of prosumers include residential, commercial and public prosumers and citizen-led energy cooperatives.

In addition to this, reference laws and regulations considered for the implementation of the Italian Demo on the side of Consumer – Prosumer also concern the European and national legislative framework on the matter of Energy Communities and self-consumption.

In this respect, EU Directive 2018/2001 [21], namely the second Renewable Energy Directive [22] (RED II), introduced in art. 21 the definition of Collective Self-Consumption (CSC) and in art. 22 the definition of Renewable Energy Community (REC).

The transposition of RED II into the Italian legislative framework is expected by 30/06/2021.

With the approval of Law 8/2020 [23] (converting Law Decree No. 162 of December 30, 2019, “Decreto Milleproroghe”), the Italian Government decided to test, during this transitory period, the first configuration of CSCs and RECs. Hence, ARERA (Italian Regulator for Energy, grid infrastructures and environmental matters) published the Resolution 318/2020/R/eel [23] providing the following two definitions:

- CSC: when participants are in the same building or condominium. Customers are associated only if the activities of energy production do not constitute the main commercial or professional activity.
- REC: Consumers’ withdrawal points and injections points (connection points to the grid) are in low-voltage electricity grids underlying the same medium/low voltage transformer station at the date the aggregation was set-up. Shareholders or members are natural persons, small and medium sized enterprises, regional or local authorities, including municipalities, and the participation in the renewable energy community may not constitute the main commercial and industrial activity.

The other crucial act in this context taken into consideration as reference law is the EU Directive 2019/944 [25] (e-Directive). The directive, which will be adopted at national level by 31/12/2020, comprises other two pivotal concepts for the future role of the customer in the electricity sector: the Citizen Energy Community (CEC) and the Active Users (AU) defined in art. 16. The CECs are groups of citizens, Small and Medium-sized Enterprises, and public bodies in an area where one or more power plants owned by the CEC are located. The Active users (AU) recall the concept of collective self-consumption, but the power plants used by AU can be also fed by fossil fuel.

### 2.1.3 Energy storage

The Energy Storage technology was introduced in the Italian legislation few years ago. After a test period, ARERA (Italian Regulator for Energy, grid infrastructures and environmental matters) stated that the Storage belongs to the Generation Technologies domain. The main acts linked to the storage domain in Italy are the following:

- Resolution 574/2014/R/EEL issued by ARERA [26], for the integration of the battery storage in the electrical system. This resolution has been also enhanced by legal provision adopted by GSE (Gestore Sistemi Energetici), the Italian Authority for the promotion of renewable energy; in particular, GSE made possible the installation of storage system on incentivised plants;

- Resolution 642/2014/R/EEL issued by ARERA [27], that defines the functional requirements for storage systems for their proper connection to the grid according to the European legal framework and standards (CEI 0-21 ; CEI 0-16);

- GSE Technical rules [28], for the application of rules related to the integration of energy storages to the national electric system, establishing the technical standards for storage system manufacturers in order to benefit from incentives within different type of storage configuration.

The rules are based on the regulation issued by the Italian energy regulator AEEGSI in November 2014, defining, among other things, the conditions for the use of storage systems connected to PV systems installed under national incentive schemes.

### 2.1.4 Aggregator

The Italian Electricity Market has only recently opened its doors to the aggregation of DERs (Distributed energy resources). Nevertheless, the figure of the aggregator has not been defined yet, including its role and responsibilities with respect to the other market parties. The first opening was in May 2017, with **Resolution 300/2017/R/EEL issued by ARERA** [4] (Italian Regulator for Energy, grid infrastructures and environmental matters). With this deliberation, the Italian regulator started to acknowledge the **European Directive 2015/1222** [24] concerning the alignment of the different national Balancing Codes, by allowing the aggregation of small energy resources. Market operators, therefore acting as aggregators, can qualify clusters of DERs, according to the zonal perimeters already existing in the Italian energy market.

This resolution is also the starting point for three pilot projects, managed by Terna, the Italian Transmission System Operator. These three pilots regard respectively the **Consuming Aggregated Virtual Unit (UVAC), Producing Aggregated Virtual Units (UVAP) and the Mixed Aggregated Virtual Units (UVAM)**. In September 2018, the pilot project regarding UVAM has started, and it is still defining methods, timing and conditions for the actual participation of the UVAM in the Italian Electricity Market. With this pilot, the UVAMs (clusters of DERs, including both producing and consuming units), reaching a minimum available flexibility (downward or upward) of 1 MW, are allowed to bid in the Ancillary Services Market. These aggregated flexibility resources are eligible to provide tertiary reserve service and balancing service within the Ancillary Service Market. In Italy, in 2019, around 1 GW of flexibility was operated through the UVAMs.

The technical requirements defined by Terna for qualifying UVAM will be used as a reference for the Italian Demo.

The UVAM project laid the foundation for the **Resolution 322/2019** [11]**,** in which **ARERA** proposed some amendments to the Integrated Text of Electricity Dispatching by updating it with recent developments in the electricity markets. Concerning the aggregator matters, one important novelty is the definition of BRP (Balancing Responsible Party) and BSP (Balance Service Provider) in the Italian energy regulation. Currently, in the Italian energy market, except for the pilot projects related to Resolution 300/2017, the roles and responsibilities of BRP and BSP are unified in the role of the dispatching user. It defines the BRP as the subject in charge of the execution of the production/consumption programme, responsible for the effective unbalancing and for respecting the dispatching contract with Terna. On the other hand, the BSP is the subject responsible for providing ancillary services, whether they are mandatory or selected through the participation in the Ancillary Services Market, and they are responsible for respecting the related contract with Terna. The text states that when fully operational, the formal consent between BRPs and BSPs will be not necessary to the UVAM qualification in MSD (Mercato dei Servizi di Dispacciamento – Market of dispatching services), so the aggregator can qualify the UVAM without formally notifying the BRPs.

One of the main regulatory gaps is, with respect to the aggregator in the actual context of the local flexibility market, the complete lack of regulation defining roles and responsibilities of DSOs, BRPs, and BSPs.

### 2.1.5 Cybersecurity

The main legislative source concerning cybersecurity in the energy sector at European level is certainly **Directive (EU) 2016/1148 (NIS Directive)** [25]. This directive introduced measures for a high common level of security of network and information systems across the Union.

With **Legislative Decree 65/2018** [26] issued on May 18th, 2019, EU provisions were adopted at national level.

Based on Article 7 of the abovementioned EU Directive, Italy has adopted the **National Plan for cyberspace protection and ICT security** [27], which identified the operational guidelines, the goals to be pursued and the lines of action to be carried out. It specifically provides the establishment of a cyber-risk assessment plan and cyber security training and awareness programmes in preparation, response and recovery of services following cyber incidents.

Basing on that, the CSIRT, Computer Security Incident Response Team, was established at the Presidency of the Council of Ministers to manage and prevent cyber incidents.

Moreover, the National Plan for cyberspace protection and ICT security also identified the obligation to notify the NIS (Network and Information Security), the responsible authority , [28] in the event of an accident, which in the specific case for the energy and electric sector is the Italian Ministry of economic development (MiSE).

The Italian Government has recently taken a further step towards the implementation of a comprehensive national cyber-security framework through the adoption of the **Law Decree n. 105 of September 21st, 2019** [29]. The Decree has brought along significant innovations in relation to the creation of a perimeter of national cyber security that will have a great impact on public administrations and both public and private national operators.

### 2.1.6 Data protection

The Italian Demo is strongly committed to ensure the respect of users' personal data. The rights of customers on the matter of data protection are guaranteed by the Italian law framework, which is influenced by the European law.

In this respect, the national Legislative Decree no. 196 of 30 June 2003 (namely the Italian "Data protection Code") [30] was modified and integrated by **Legislative Decree no. 101 of 10 August 2018** (D.Lgs. 101/2018), which formally transferred provisions of the **EU Regulation 2016/679** [31] (GDPR - General Data Protection Regulation) into the Italian laws. The Legislative Decree no. 101 entered into force on 19 September 2018.

In accordance with the national and European reference laws, within the Italian Demo, customers' personal data will be confidential, and they will be treated in a restricted way and not as open data.

All the project partners will be allowed to carry out their respective project tasks in the full respect of National and European laws.

Customers' energy consumption data, directly linkable to customers' personal data, which will be collected during the implementation of the pilot testing and which will be used for the realisation of flexibility analysis, will be expressively accessible exclusively by Areti (which has already access to this kind of data according to its role as DSO, for the provision of its energy supply service for customers served by the network managed by the same DSO).

Before sharing these data with project partners with the unique aim to pursuit research purposes within the Platone project, **Areti will completely anonymize them**, avoiding any violation of the GDPR rules by itself and the project partners.

Moreover, according to the GDPR, before starting the activities, customers who will freely participate in the pilot testing will be requested by Areti to sign a dedicated information document, illustrating project methods and purposes and the use of customers' consumption data specifically for testing the Italian Demo solution.

By signing the document, the customer will formally express his/her interest in participating in the project and therefore will give his/her consent to the processing of data for the aforementioned purpose.

To support and guarantee the above-mentioned customers' rights, Areti established a dedicated internal Governance, based on which customers have the right to request from the Controller (whose role is defined in Article 4 of GDPR) access to, rectification or erasure of personal data. They can also demand a restriction of processing of their data. Customers can communicate to the Data Protection Officer (DPO) of the Acea Group using the dedicated mail privacy@aceaspa.it and/or to the Controller by a registered letter sent to P.le Ostiense n.2 – 00154 Roma (Italia). The DPO is the subject designated by the owner or by the data controller to perform support and control, consultative, training and information functions relating to the application of the GDPR.

In order to support these rights, in case of a possible violation, customers can send a complaint to the Data Processing Supervisor ("Garante per la protezione dei dati personali"), the Independent Administrative Body established by Italian Law in 1996 for ensuring the protection of personal data of Italian citizens. The complaint can be delivered by hand or sent by registered letter to the Data

Processing Supervisor office in Piazza Venezia 11 - 00187 Roma or by using certified mail to protocollo@pec.gpdp.it.

All above specified, the Italian Demo will also use technical data (such as topology and asset description, measurements, market, prediction and planning) which are not considered as personal data.

### 2.1.7 Data management

**Customers' energy and personal data**

As described in chapter 3.1.6, within the Italian Demo, Areti will be the unique partner enabled to manage personal data of customers who will accept to participate in the pilot testing, by virtue of its ownership as DSO to process customers' consumption and measurement data based on the already existing transport contract.

Customers' energy data (which are directly linkable to personal data) collected and analysed during the pilot implementation will be anonymized by Areti before communicating them to the other partners within the project.

According to **Legislative Decree no. 196 of 30 June 2003** [30] and **EU Regulation 2016/679** [31] (GDPR), before starting the testing activities, customers who will freely decide to participate in the Italian Demo will be duly informed about this process, and will be requested by Areti to sign a dedicated information document, illustrating project methods and purposes and the use of customers' consumption data specifically for testing the Italian Demo solution.

The document will be drawn up pursuant to articles 13 and 14 of the GDPR, highlighting the methods for personal data processing, specifying that they will be managed during the implementation of the project anonymously, so that it won't be possible for any of the project partners (with the exception of Areti, which already owns these measures by virtue of its concession as distributor and of the consequent transport contract) to trace identification data linkable to the holder of each POD.

Areti - leader of the Italian Demo - is also subject to the compliance with the **Acea Group's Ethics Code**, which - in accordance with the GDPR - provides rules of conduct for the employees of the company. By adapting the corporate organizations to GDPR provisions, Acea has identified also a Data Protection Officer and a Privacy Governance for the entire Group.

**Consumers' right to access and share their own energy data**

With reference to measurements and energy data, concerning the provision of end-users with dedicated equipment for measurements observation, collection and communication within the Italian Demo, particular attention is dedicated to the respect and compliance with the legislative framework related to consumers' right to access and share their own energy data.

Specifically, **EU Directive 2012/27/EU** [32] **on energy efficiency** (the Energy Efficiency Directive), which sets out rules in relation to metering. In particular, the Directive establishes the importance of customers, or third parties acting on behalf of customers, being provided with good quality data. It also reinforces the importance of ensuring the security of data provision and protecting the privacy of customers. Article 9 of this Directive regulates the obligations of Member States with regard to measurement, providing that in the case of smart meters, the security of data communication and, in particular, the privacy of end customers must be guaranteed. The same user can request his own consumption data related to the input and withdrawal of electricity. Article 10 also ensures that customers can have easy access to (historical) consumption data, setting rules in relation to the type and amount of consumption information. Furthermore, customers will be able to use new smart technologies to manage their energy consumption and production or may choose to engage service providers to manage their interface with the energy market. With **Legislative Decree no. 102/2014** [33] (July 4$^{th}$, 2014), national provisions for the transposition of Directive 2012/27/EU on energy efficiency into the national legislative context entered into force.

Within this context, ARERA issued **Resolution 87/2016** [34], defining the functional requirements that the new Italian Smart Meter must have, indicating those requirements that are important for sharing instantaneous data, to be taken into account during the design and implementation of the Italian Demo. Finally, consumers have been given the right to access and share their own energy data by recent EU legislation from the **Third Energy Package** and the **General Data Protection Regulation (GDPR)** to the Clean Energy Package (CEP). Annex 1 to the Third Energy Package states that consumers shall "have at their disposal their consumption data, and shall be able to, by explicit agreement and free of charge, give any registered supply undertaking access to its metering data. The party responsible for data management shall be obliged to give those data to the undertaking. Member States shall define a format for the data and a procedure for suppliers and consumers to have access to the data. No additional costs shall be charged to the consumers for that service".

**Data dissemination**

Within the Italian Demo, pilot testing results will be collected and analysed based on energy consumption data of customers participating in the trial. To this respect, in order also to ensure full compliance with **Antitrust national laws (**Legge Antitrust (10 ottobre 1990, n. 287**)** and avoiding any risk to involuntary favour a specific energy trader, project results will be communicated to the project partners and subsequently delivered to the European scientific community (as required by all EU-funded projects) anonymously and in aggregated form. Only in the event that a specific customer participating in the trial shows the need to know the results correlated to his/her energy related data in a non-anonymous and disaggregated form (the performance and benefits deriving from the participation in the local flexibility market experienced in Platone), the latter can request the details to Areti (by request to be sent to the Independent Operator), the unique Italian Demo partner that will be able to trace the technical data and the relative results of the flexibility analyses to the individual end-customers.

**Commercially sensitive data**

The anonymization procedure concerning identification data linkable to a specific customer (holder of the Point of Delivery) which has been defined as to be applied within the Italian Demo, allows to completely avoid the communication of commercially sensitive information between Areti (DSO) and Acea Energia (energy trader), expressively denied by **Resolution 296/2015/R/COM** [35] issued by ARERA (the Italian Regulatory Authority for energy, networks and environment) for the unbundling of companies in energy and gas sector. According to this resolution, they are classified as commercially sensitive information those data […] which, as such, could create an advantage to the company vertically integrated, and which refer, at least, to data useful for identification of end customers (including the existing commercial offer), the data of measure, the status of payments and their solvency.

These provisions are a fundamental part of the Italian **TIUF** [36] (Testo Integrato di Unbundling Funzionale) stating the provisions on unbundling, issued by ARERA.

**Technical data**

Topology and asset description, Measurements, Market data and Prediction and planning data will be generated in, and through the operation of the Italian Demo in relation to the management by the DSO (Areti) infrastructure in the DSOs' distribution grid in the pilot sites.

According to project internal provisions (described in D9.1 [28]) datasets in raw form, that is generated through the execution of the Italian Demo grid management functions (mainly time-series data), will remain the property of the respective partners and will be deleted after the Platone project ends.

Only curated versions of these datasets (anonymised and encrypted) will be made openly available in the FIWARE Lab Data repository. Concerning Topology and asset description, all the technical data will be available without the confidential information (like supplier; model, brand, owner, etc.).

The anonymized and encrypted data which can be made openly available (Public) will be detailed in D9.2.

**Research data**

General rules about Intellectual property rights (IPRs) within Platone are defined in the project Grant and Consortium Agreements.

### 2.1.8 Blockchain and Smart Contracts in the energy sector

The use of blockchain technology plays a fundamental role in the Italian Demo. **Italy** is moving rapidly towards the adoption and regulation of blockchain technology. In fact, in July 2019, Italy obtained the presidency of the EBP (the European Blockchain Partnership) for one year, together with Sweden and the Czech Republic and it **was the first in Europe to have regulated the two instruments of the future: i.e. blockchain and smart contract.** In February 2019, the **Law n. 12 of 11 February 2019** for the conversion into law of the Simplification Decree (Decree Law no. 135 of 14 December 2018, “containing urgent provisions on support and simplification for businesses and public administration”) was established and gave blockchain technology a full legal value. Particularly, art. 8 concerning technologies which are based on distributed registers and smart contracts were added to the Decree.

"Technologies based on distributed registers" are defined as technologies which use a shared, accessible simultaneously, distributed, replicable register, and architecturally distributed on the cryptographic basis, in order to enable the recording, updating, validating and archiving of information both in clear and further secured by cryptography verifiable by every partaker, not changeable and unmodifiable.

The Italian Demo is also attentive to the European framework, monitoring the progress on the matter, as highlighted in the new report named “Legal and regulatory framework of blockchains and smart contracts” [37] published by the Blockchain Observatory and Forum of the European Union (launched in February 2018 by the European Commission), focusing on the main areas of tension between technological properties of the blockchain and the current regulatory framework.

A further reference milestone to be considered within the Italian Demo is the **National Strategy on technologies based on shared registers and Blockchain**, defined by the Italian Ministry of Economic Development in 2020 **Invalid source specified.**.

The Strategy has been elaborated through the involvement of 30 experts for the analysis of the current scenario and for possible developments and obstacles in order to facilitate the diffusion of Blockchain technology in Italy and thus facilitate the speed and certainty of exchanges between private and public administration. According to this Strategy, the energy market can benefit from significant advantages from the use of the blockchain. Specifically, with respect to the central role of the prosumer, to the services provided to the network and for the payment of bills by the end user.

## 2.2 Obstacles, gaps and recommendations

As indicated in chapter 3.1.4, with respect to the aggregator role in the actual framework of the local flexibility market, one of the main regulatory gaps in the Italian context is the complete lack of regulation defining roles and responsibilities of DSOs, BRPs, and BSPs.

The Italian Electricity Market has only recently opened its doors to the aggregation of DERs. Nevertheless, the figure of the aggregator has not been defined yet, including its role and responsibilities with respect to the other market parties.

The technical requirements defined by Terna for qualifying UVAM (see chapter 3.1.4) will be used as a reference for the implementation of the Italian Demo.

# 3 The Greek demonstration site

In this Chapter we describe the laws and regulations necessary to be followed for the completion of the Greek demo. Furthermore, possible obstacles or gaps are mentioned concluding to possible solutions or suggestions.

## 3.1 Legislation and regulatory framework

In this subchapter, the legislation and regulatory framework considered for the Greek demo are described divided according to the following factors, the electricity market framework, the role of consumer and its protection already described in D6.8 [3].

### 3.1.1 Flexibility and demand response

For the implementation of the Greek demo, RES producers and residential/commercial customers provide flexibility procured by the DSO and TSO in UC-GR-3 and UC-GR-4 respectively [38]. The DSO and TSO access the aforementioned flexibility following the network tariff approach by "designing cost-reflective network tariffs to better align the charges grid users face with the network costs they cause", as described in ch.3 of D6.8.

Regulatory changes and regulations for DSOs' procurement of flexibility, aiming at a cost-effective grid operation, applying in UC-GR-3, are proposed and introduced in specific articles of e-Directive and e-Regulation.

For the implementation of UC-GR-4 guidelines and regulation concerning TSO-DSO cooperation, data management and exchange shall be taken into account. The Electricity Balancing Guideline outlines the cooperation between TSO and DSO in order to ensure the robust operation of the distribution grid when the TSO procures flexibility services. Whereas data exchange and interoperability issues between TSO-DSO are addressed in the e-Regulation and Regulation (EU) 2017/1485 [39].

In all Use Cases of the Greek demo, the resources providing flexibility are RES producers and residential/commercial customers through the corresponding aggregator. All rights and obligations for the connection in the distribution network and participation in the electricity markets as outlined in Electricity Balancing Guideline, e-Regulation and e-Directive need to be applied for the implementation of the Use Cases.

As part of efforts aimed at facilitating the integration of the Greek wholesale market to the European electricity market, Law 4425/2016 [40] envisages the integration of demand response into the Balancing Market.

### 3.1.2 Consumer - Prosumer

In UC-GR-3 and UC-GR-4, as they are described in D4.1, consumers and prosumers are actively responding to flexibility requests initiated by an Aggregator. The Aggregator is the stakeholder enabling their participation in energy markets through contracts. These contracts are conducted between consumers-prosumers and the Aggregator representing them and define the legal terms of their cooperation. The participation of consumers-prosumers in the energy markets individually or by forming Renewable Energy Communities (RECs) is defined in the RED II EU directive.

In order to evolve the role of consumers-prosumers in the electricity markets HEDNO is obliged by legislation to have 80% of consumers in a telemetering system. It is worth mentioning that telemetering meters that have already been rolled out in Greece cover the 48% of the installed power at all voltage levels (Low, Medium and High).

In Greece, Law 4513/2018 [41] outlines the role of energy communities in the Greek energy markets and defines the members of an energy community and the minimum number of members.

### 3.1.3 Energy storage

Energy storage systems are not considered for the implementation of the Greek demo. However, national law 4513/2018 [41] for energy communities provides for the usage of energy storage for self-consumption purposes, for self-producers using net-metering infrastructure. Self-consumption can increase the flexibility availability of the customers used in the UC-GR-3 and UC-GR-4 for voltage and frequency support respectively.

### 3.1.4 Aggregator

Aggregators have a key role in the implementation of the Greek demo and especially in the UC-GR-3 and UC-GR-4 where they enable the participation of residential/commercial customers and RES producers in day-ahead and intra-day markets respectively. The EU Directive for internal market in electricity, e-Directive [42], outlines the equal participation of demand response and generation in the organized markets through contracts with aggregators.

In UC-GR-4 RES producers and residential/commercial customers, included in an Aggregator's portfolio are responding in a frequency support request initiated by the TSO. This balancing service is offered by the Aggregator outlined in The Electricity Balancing Guideline (2017/2195) [43], in follow up of the Regulation (EC) No 714/2009 [14].

The Energy Efficiency Directive 2012/27/EU [32] which introduces the term "Aggregator" was integrated in the Greek legislation with Law 4342 of November 2015 [44]. It is worth mentioning that currently in Greece aggregators are representing only RES producers and high-efficiency CHP.

### 3.1.5 Cybersecurity

In all the Greek Use Cases there are several cybersecurity issues regarding the ICS-SCADA systems, metering infrastructure, measurement collection and data exchange between different stakeholders.

The "Council Directive 2008/114/EC of 8 December 2008 [45] on the identification and designation of European Critical Infrastructures and the assessment of the need to improve their protection" not only points out the need to designate and protect Critical Infrastructure but also identifies actors responsible for different activities at high level.

Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 [25] concerning measures for a high common level of security of network and information systems across the Union, also applies in the Greek demo.

### 3.1.6 Data protection

The EU has recently updated its data protection laws, in the form of the General Data Protection Regulation (GDPR), Greece has implemented the GDPR in its national legislation under Law 4624/2019 [46]. Concerning smart metering systems in particular, the Directive for the internal market gives specific provisions on final customer data protection and security in electricity (e-Directive).

It is noteworthy that for the implementation of the Greek demo, only anonymized aggregated data will be processed and the Aggregator's role is simulated for the scope of the implementation of UC-GR-3 and UC-GR-4. However, the DSO and Aggregators, participating in the energy markets have contracts with their customers, obtain and manage personal data essential for their operation following the current data protection regulation, GDPR.

### 3.1.7 Data management

In the Use Cases of the Greek demo, DSO is the actor responsible for data collection and elaboration. Art. 9 of EU Directive 2012/27/EU [32] on energy efficiency (the Energy Efficiency Directive) [47] which outlines the data management rules, related to metering, was implemented in the Greek national legislation under Law 4342/2015 [44]. The aforementioned legislation corresponds to all Greek Use Cases.

Furthermore, for the implementation of UC-GR-3 and UC-GR-4, where the TSO and Aggregators are also involved, rules and guidelines for cooperation and data exchanges between all stakeholders (DSO, TSO, Aggregators) are being imposed, as outlined in the Regulation on the internal market for electricity (e-Regulation), as described in chapter 9 of deliverable D6.8.

### 3.1.8 Blockchain and Smart Contracts in the energy sector

In all Use Cases of the Greek demo, Blockchain technology is used mainly for data (measurements, customer data) certification, for security and integrity with the implementation of the Blockchain Access Platform (BAP). Blockchain Access Platform (BAP) is part of the Blockchain Access Layer of the Platone Framework, further details for the different components of Platone Framework can be found in deliverable D2.1 [48].

A national Blockchain strategy is not yet defined in Greece, but the benefits of the technology leads the way for its implementations in different sectors and especially in the energy sector. Therefore, rules and guidelines are expected to be introduced.

## 3.2 Obstacles, gaps and recommendations

The main legislation gap that needs to be discussed for the Greek demo and Platone project is the lack of European and national guidelines for the implementation of Blockchain technology in the energy sector. More specifically in Greece the integration of Blockchain technology is at an initial stage and many legislative steps need to be taken.

Another issue that can be identified as a gap for the Greek demo is that although the term “Aggregator” has already been introduced in 2015, law 4342/2015 [44], its role in the Greek energy market is still limited in representing RES producers and high efficiency CHP units. In the coming months, Greece will reach the final stage for the harmonization of domestic electricity and natural gas markets with the European Directives and Regulations for the electricity and natural gas markets (Target Model). Within this scope the role of aggregators is expected to be further expanded in order to include consumers-prosumers or energy communities representation.

# 4 The German demonstration site

This chapter describes the laws and regulations necessary to be followed for the completion of the German demo. Furthermore, possible obstacles and gaps are mentioned.

## 4.1 Legislation and regulatory framework

In this chapter, the legislation and regulatory framework considered for the German demo are described divided according to the following factors, the electricity market framework, the role of consumer and their protection.

### 4.1.1 Flexibility and demand response

In the German demo, Avacon foresees to integrate private customer households volunteering to provide flexible loads for the integration into the Use Case approaches. The legal basis on flexibility and demand response can be found in the directive 2012/27/EU. The directive 2012/27/EU [32] art 15 (4) states that "Member States shall ensure the removal of those incentives (…) that might hamper participation of demand response, (…) " as well as improving customer participation in demand response. In Germany we found these aspects reflected in §14a Energy Industry Act (EnWG) [49], which states that "Network operators are obliged to offer a discount on grid charges for those customers who offer controllability and flexibility to the system operator ". It further states that the details of this controllability and flexibility scheme remain to be defined in a statutory law which is yet to be finalized. Until then however, historic flexibility- and control-mechanisms have been grandfathered in under EnWG §14a.

The most common among these historic control mechanisms is a DSO-controlled switching of storage heaters that once applied to double-tariff customers. This kind of customer would receive a discounted energy tariff during off-peak hours. These tools were conceived in an era before the German energy system underwent unbundling, so back then the discount would apply on a combined retail- and grid charge price. The distribution company would determine the discount and retain control over the definition and switching between peak and off-peak windows. Today retail and grid are unbundled so that the retail share of a customer's energy does not necessarily reflect the old double tariff model. However, under §14a EnWG the grid operator is still granting a grid charge discount in exchange for controllability and is still using the same systems to carry out the tariff switching, even though it might not have any effect on the retail side. The contractual agreement states that the DSO defines preferred charging times, guaranteeing a sufficient number of hours to cover customers' energy demand. In practice, DSOs usually have fixed charging windows during the night that amount to 8 hours of charging time. During these hours, the customers' heating devices would charge up with thermal energy and release the heat throughout the following day. On particular cold days and in some regions, DSOs might also activate heaters for additional heating periods during the day to cover high demand.

Heat pumps on the other hand have not been around in large numbers when the first installation of the double-tariff scheme took place in the 60s and 70s, so they are less burdened with historic flexibility mechanisms. Taking into account customers' expectation for comfort and the capabilities of the devices, today's agreement between DSO and customer under §14a EnWG states that Avacon has the right to interrupt the heat pumps operation for up to 2 hours, up to 3 times per day.

### 4.1.2 Consumer - Prosumer

In frame of the German field test trial the curtailment of RES provided by prosumers is not in focus, but from a technical perspective the developed mechanism can be simply applied to them in all of use cases. The legal basis for steering and curtailment of DER is given in the renewable energy act ("Erneuerbare Energien Gesetz" or "EEG") [50]. §12 EEG states that grid operators are obliged to connect all sources of renewable energy to their network at request and ensure that their network offers enough hosting capacity to accommodate all energy that is produced under the EEG. This includes the obligation to optimize, expand and reinforce the network whenever necessary. If the grid capacity is temporarily insufficient, §14 EEG enables a curtailment mechanism which allows grid operators to temporarily reduce the feed in by DER to maintain safe and stable operation. When curtailments are carried out, owners of DER qualify for financial reimbursements which are recovered via the grid operator's grid charges. The obligation to increase grid capacity remains nonetheless.

In practice, this curtailment mechanism is triggered when a grid operator identifies a critical situation and has exhausted all other options to bring the network back to normal. TSO and DSO can trigger the mechanism alike, if the TSO owns the congestion it can request underlying DSO to reduce feed-in on relevant lines and substations accordingly. Common scenarios to trigger a curtailment are for example:

- Overloading of power lines in the VHV system
- Overloading of transformers connecting HV and VHV networks
- Overloading of power lines in the HV system
- Overloading of transformers connecting HV and MV networks

The curtailment mechanism is rarely triggered by events below the HV/MV-substation because of a lack of monitoring and control capabilities in these networks. In the future, technologies like the Avacon local Flex Controller in combination with a Smart Meter and Control Box infrastructure can enable curtailment mechanisms on the MV and LV level, which may even react to a violation of voltage bands.

### 4.1.3 Energy storage

The directive 2019/944/EU art 36 (4) [42] states that "Distribution system operators shall not own, develop, manage or operate energy storage facilities ". However member states of the EU may allow DSO to operate energy storages facilities, "where they are fully integrated network components and the regulatory authority has granted its approval "or a list other additional requirements are met. Even if the European law contain exceptions, the current legal situation does not intend that DSO makes direct use of batteries storages for grid operation purposes. German law, on the other hand, is not clear at this point whether battery storage devices can be controlled at least as part of load management.

### 4.1.4 Cybersecurity

The regulation and promotion of cybersecurity in German law is achieved by a variety of different laws. Some regulate cybersecurity in particular industries or sectors, some to particular types of data, some and some regulate cybersecurity in companies as part of broader compliance requirements.

The basis for cybersecurity obligations and standards in relation to the processing of personal data is provided in the EU-wide General Data Protection Regulation (GDPR) [31] and the Federal Data Protection Act [51]. Meanwhile the Telecommunications Act (TKG) [52], the Telemedia Act (TMG) [53], the Act on the Federal Office for Information Security (BSIG) [54] and the Act on Raising the Security of Information Technology Systems (IT-SiG) [55] as amended by the Act Implementing the European Directive Concerning Measures for a High Common Level of Security of Network and Information Systems (the NIS-Implementation Act) [56] form the basis of cybersecurity regulation in Germany.

For the German demonstrator of the Platone the relevant law will be GDPR and the Federal Data Protection Act.

### 4.1.5 Data protection

During the field test implementation and completion of the German demo Avacon will apply and will act fully in line with the European and national laws and regulation for data protection. These national laws and regulations are described in General Data Protection Regulation – „Datenschutzgrundverordnung"and the Federal Data Protection Act [51].- as a supplement to the GDPR; "Bundesdatenschutzgesetz" [31]. Furthermore Avacon applies additional group policies for data protection called Group Policy - People Guideline PG04 - Data Protection and Company Policy 054 – Privacy.

### 4.1.6 Data management

During the field test implementation and completion of the German demo Avacon will apply and will act fully in line with the European and national laws and regulation for data protection. These national laws and regulations are described in General Data Protection Regulation – „Datenschutzgrundverordnung“and the Federal Data Protection Act [51].- as a supplement to the GDPR; “Bundesdatenschutzgesetz” [31]. Furthermore Avacon applies additional group policies for data protection called Group Policy - People Guideline PG04 - Data Protection and Company Policy 054 – Privacy.

### 4.1.7 Blockchain and Smart Contracts in the energy sector

To comply with current national regulation Avacon will follow obligations and standards in relation to the processing of personal data is provided in the EU-wide General Data Protection Regulation (GDPR) [31] and the Federal Data Protection Act [51]. As for smart contracts, they are not in scope of the German demonstration.

## 4.2 Obstacles, gaps and recommendations

**Obstacles and gaps to utilize flexibility by interruptible loads and electric vehicles in particular**

The control of flexible elements in low voltage networks by the DSO is governed in §14a Energy Industry Act [49] and states that DSO must offer a discount on grid charges to those customers and suppliers, that are offering some form of controllability in return. It explicitly states that electric vehicles fall under this definition. It does not comment on the exact meaning of “controllability” or the design of the contractual agreement between DSO and owners of interruptible loads, nor does it make comments on how the discount is be determined. Instead it empowers the government, in this case the Federal Ministry of Economics, to define these details in a statutory law that defines what control actions shall be owned by the DSO and which belong to the supplier. The statutory law shall also take care of adjusting the laws governing the meter service provision to enable these use cases.

This mandate has been introduced 2016 and since then no progress has been made. Rather discouragingly, the German government has just announced that the first draft of the statutory law in question will be delayed at least for another year until 2020. Taking into account that the draft will require political discussions and go through the legislation process we cannot expect results before 2021.

This situation is dissatisfying for many stakeholders in the field of local flexibility. DSO, customers, aggregators, suppliers and operators of DERs alike share the opinion that this situation hinders the energy transition in Germany. The lack of a clear regulatory framework and a lack of vision makes it increasingly difficult to justify the efforts towards developing much needed technologies and strategies for the management of flexibilities in low voltage networks.

**Shortcomings of present approach and potential for improvements**

Even though both regulatory mechanisms could theoretically offer a fair amount of flexibility to the DSO, the technological limitations prevent DSOs from making use of it. For once, the existing technologies to control these flexibilities are not suited to enable a dynamic and integrated approach to the control of small scale flexibilities. On the other hand, the uncertainty about future developments of the regulatory framework, particularly the final content of the statutory law concerning §14a EnWG [49], leaves DSOs hesitant to commit resources to design a decision- and control framework that can take full advantage of the target segment. Before Platone there was also a lack of suitable technologies that enabled precise, dynamic and transparent control of small-scale flexibilities.

To sum up the shortcomings of the existing approach:

- No or limited possibility to discriminate for location;
- No possibility to control individual devices;
- Outdated analogue systems;

- Limited integration with peripheral IT/OT-systems;
- Limited potential to increase degree of integration with peripheral IT/OT-systems;
- No potential to integrate with future smart meter systems.

**Obstacles and gaps for RES integration into flexibility mechanism**

The future smart meter framework provides necessary functionalities and infrastructure for the application of solution concepts developed in the German demonstrator. While the ALF-C provides necessary energy management functionalities, the measurement data provision and control of RES can be realized by future smart meters equipped with a control box and a smart meter gateway. However, RES in low voltage networks are often not compatible with the control box of smart meters and do not offer a suitable interface for an externally triggered control. There are three commonly used technologies to carry out the control actions for the curtailment of generation from RES.

First, there are clock timers installed locally on the customers' installations. These simple devices open and close the charging windows for storage heaters at fixed and predefined times each day, independent of temperature, load or other grid considerations. This simplest of all technologies has no communication, no online data and cannot be accessed or modified from the outside. Customers equipped with clock timers do not offer flexibility.

Secondly, we find load control via long wave radio signals. Here customers are equipped with a long wave radio receiver that switches devices on or off according to the current status of the signal. The sender is owned and operated by a third party and not part of the DSO infrastructure. This system does not provide any live data or signal confirmation.

Lastly, some grid operators employ acoustic ripple control to carry out load control. The senders are owned and operated by the DSO and often fully integrated with the grid OT. However, the system does not have any advanced data processing capabilities and offers very limited options for dynamic load control. In practice, the system is used to broadcast the same signals day in day out. Signals are only modified by manual intervention when a fault occurs.

What all three systems have in common is a lack of data processing capabilities and that none of them fits into the smart meter framework that in future will build a potential link to flexibility in low voltage network. This circumstance makes it impossible to carry out complex use case algorithms as applied in the German demonstrator of Platone and in turn renders the existing flexibility in households useless for the DSO.

**Obstacles and gaps for RES to increase the use of batteries**

For system operators a battery presents an ideal source of flexibility. Batteries can deliver bi-directional flexibility and do so independently of daytime, weather or season. This makes batteries particularly useful and sources of flexibility of the second highest grade. The only real downside is their limitation in duration when providing flexibility. Depending on the technology, a battery runs out of flexibility within a few hours.

Economic reasons led the government and regulator to encourage battery systems in combination with a PV generator as means to increase self-consumption and reduce feedback to the public network. The rationale was that by increasing self-consumption and reducing grid interaction, the overall costs of integrating DER into low voltage networks could be kept in check. While it can be argued that this aim has been achieved to some extent, the regulations applying to batteries have created tall barriers to use domestic batteries for anything but the increase of self-consumption.

In Germany, renewable tax applies to self-consumption. That means if a customer is producing his or her own electricity, a renewable tax of currently 6,405 cent/kWh applies. Installations with a rated power of less than 10 kWp are exempt from this rule. This exemption does extend to batteries, if they are considered "EE-Stromspeicher" or "Renewable Power Storage". To qualify as such the owner must ensure that the battery can only be charged directly from the PV and under no circumstances from the public grid.

Installations like these are commonplace in Germany and are expected to represent most storage offers among Platone. Because of this, these customers will not be integrated in the Platone field trial, even though they are willing and open to participating in the project. Including these customers in the field trials would require disabling of the power flow indicator and an alteration of the mode of operation of the battery system. While this could technically be possible, participants would have no understanding for the necessary installation measures and additional costs leading to little acceptance of the overall project. In addition to this, the customers would also suffer the application of renewable tax on the share of self-consumption that was stored in the battery prior to consumption.

The way in which renewable tax is applied under these circumstances has created a situation where customers are clearly discouraged from designing a storage-PV-installation that could also offer flexibility to the DSO.

In 2017, an updated renewable energy act introduced additional rules that should, in theory, alleviate this issue. Now, storage systems could be used for multiple use cases. A requirement for this is that customers install several metering points to ensure that power flows could be clearly discriminated on a 15-minute basis. In order to qualify for the renewable tax exemption but still be able to participate in other flexibility markets customers would have to have their main point of connection, their PV-production and their battery metered in 15-minute intervals with a certified meter. They would also be required to discriminate between battery-stored self-consumption and energy exchanged between battery and grid on a 15-minute basis and report this data to the DSO for the handling of renewable tax.

While this rule poses an improvement over the previous situation by introducing the possibility of multiple-use batteries in households, it is still too complicated. For one, it requires setting up the system for this purpose from the start, as the space for additional metering equipment is often difficult to find later after installation. The lack of space for metering equipment is often also the reason why retrofitting older systems according to the new regulation doesn’t make much sense. Secondly, it also introduces additional costs.

Therefore, Avacon targets to equip households with new storages that so far have not make use of it. Avacon will co-finance new storage. In return, the customer must agree to make the storage available for demand response purposes and accept renewable tax charges or installed additional metering equipment.

# 5 Conclusion

The overall EU energy legislative ecosystem, as outlined in the Clean Energy Package, is a very decisive step towards leading the EU and its members to the clean energy transition. A series of directives, such as the Renewable Energy Directive, are of relevance to Platone and provide an overarching framework under which new initiatives can take place. Apart from providing the necessary directives and tools for the member states, the directive provides leadership by example that encourages member states to adopt, implement, and in some cases expand the necessary legislative and regulatory tools in their disposal. It is this environment, under which Platone is operating, that we describe in this report.

Apart from the overview of the EU-wide framework, this report analyses further the interaction between the Platone innovation suggestions and the EU and country level regulations and legislation. The analysis is based on eight themes that are of relevance to Platone, Flexibility and demand response, consumer-prosumer, energy storage, aggregator, cybersecurity, data protection, data management, blockchain, and smart contracts. By looking at thematic categories, the reader can easily have an overview of each topic and compare across countries.

For the case of the Italian field trial, a number of country level initiatives, such as Resolution 300/2017/R/eel have driven the overall regulatory framework significantly forward, for example by defining producing virtual units, among other. The analysis showed that there are contexts under which the aggregator is not well defined, or defined at all. It is, therefore, one of Platone's recommendations that the role and responsibilities of entities similar to aggregators are more accurately and extensively defined by the Italian regulatory framework.

In the case of the Greek demo, a number or recent developments have advanced the regulatory and legislative framework. The adoption of laws on energy communities and data protection are some of them. In a number of areas, where national regulation is lacking, the EU directives apply, especially when it comes to Platone initiatives. One of the main conclusions of the analysis for the Greek case is the need to adopt a regulatory framework on blockchain technology. The role of the Aggregator, although defined, has to be expanded to be able to represent more DER technologies.

The German regulatory and legislative framework is also been expanded the past few years; an effort spearheaded by the Erneuerbare Energien Gesetz. The German demo brings forward a number of potential obstacles and gaps. Regarding flexibility mechanisms, the need for a framework where the necessary equipment is present in remote devices, in order to facilitate complex control methods, is highlighted. For the use of batteries, the German demo identifies that the current regulatory framework should be simplified and provide clear incentives for the use of batteries in distribution systems for a number of functionalities. This will encourage battery owners to be increasingly active.

# 6 List of References

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# 7 List of Abbreviations

| Abbreviation | Term |
|---|---|
| BSIG | Gesetz über das Bundesamt für Sicherheit in der Informationstechnik, German Act to Strengthen the Security of Federal Information Technology |
| BRP | Balance Responsible Party |
| BSP | Balance Service Provider |
| CEC | Citizen Energy Community |
| CEP | Clean Energy Package |
| CSIRT | Computer Security Incident Response Team |
| DCC | Demand Connection Code |
| DER | Distributed Energy Resource |
| DSO | Distribution System Operator |
| EBP | European Blockchain Partnership |
| EC | European Commission |
| EEG | German Renewable Energy Act |
| ENTSO-E | European Network of Transmission System Operators for Electricity |
| EnWG | Energiewirtschaftsgesetz, German Energy Industry Act |
| EU | European Union |
| GDPR | General Data Protection Regulation |
| ICT | Information and Communication Technology |
| MS | Member State |
| POD | Point of Delivery |
| REC | Renewable Energy Communities |
| RED | Renewable Energy Directive |
| RES | Renewable Energy Systems |
| RR | Replacement Reserve |
| SO | System Operator |
| TKG | Telekommunikationsgesetz |
| TMG | Telemediengesetz |
| TSO | Transmission System Operator |
| UC | Use Case |