Gruppo Professione Energia

THE ENERGY PROFESSIONALS

ENERGY USER SYSTEMS

A unitary vision between past, present and future

Report V.0
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Gruppo Professione Energia - The Energy Professionals (GPE) is the integrated consulting firm founded and managed by Marco Pezzaglia, a graduate in electrical engineering from the Polytechnic of Milan in 1993, began his career in the field of modeling and studies of electrical systems in a liberalized environment at the Italian Experimental Electrotechnical Centre (CESI www.cesi.it). In 2001 he joined the Authority for Electricity and Gas (now Regulatory Authority for Energy, Networks and the Environment – ARERA www.arera.it) where, in 2003, he was appointed Head of the Electricity Networks unit, dealing in particular with the terms and conditions for access to the electricity networks of production and consumption plants (connection and rules for dispatching) and the use of the interconnection network with foreign countries. On 1st January 2007, he took up the position of Head of the Renewable Sources, Energy Production and Environmental Impact Unit within the Markets Department, where he was actively involved in issues relating to assessments of the development of renewable sources, production and consumption systems and access to the system and the electricity market for electricity production and self-production/self-consumption systems. Since the beginning of 2010, he has been providing strategic consultancy and services in the energy sector both to private customers and to numerous sector associations, with particular reference to technical-regulatory and market issues. Expert in Energy Management certified EN 11339.

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The Report product is part of a series of specific general studies on particular topics of interest to the energy sector and regulation. The articles are made available by the author on request, either from www.enusyst.eu (Energy User Systems) or on his own Linkedin page. For further requests or further information, please contact GPE.

The information contained in this document is purely reconnaissance: to this end, some technical details for the benefit of the narrative have been omitted. The author does not assume responsibility for any choices and actions that market operators may make on the basis of the information contained in the document. It should be noted that the application of the regulations on user systems must be duly analysed in relation to each specific case

Preface by the author

The issue of user systems and private networks is gaining more and more importance in recent times; these objects, initially seen as the main tools for the development of a certain form of electricity production, are assuming an increasingly important role in the development of new models of local energy use and new market models. To this must be added the fact that the recent plans to amend regulations at European level contain guidelines aimed at promoting new ways of developing and using renewable energy and efficiency by directly linking the various realities at local level that can contribute to the achievement of the objective of a decarbonized energy system.

The issue of user systems has been widely debated and regulated within the Italian and other systems since the first years of the start of the process of liberalization of the electricity system. There have been several acts that have followed each other both at the level of primary legislation and at the technical-regulatory level. All of this has led to a stratification of standards, which makes it appropriate to rationalize them with a view to the orderly development of user systems and private networks.

Drawing on the experience gained by the author in 25 years of activity in the sector, in principle as a researcher in the field of electrical systems, then as Head of the national regulatory authority and finally as a professional engaged in the application of standards and in the implementation and management of systems in many industrial and service sectors, some conclusions can be drawn at a general level.

Given the continuous development of the regulation under way, the work proposed here is not and cannot be final. This document may therefore be subject to further revision and supplementation on the basis of any comments that may be received by the author, as well as on the basis of regulatory developments in the field of user systems and private networks.

In particular, the following activities are still under way
- Preparation of a proposal to harmonise definitions of user systems
- Analysis of the state of international implementation of closed distribution systems and self-consumption systems (analysis of which we give a first set of results already in this report)
- Preparation of a proposal for an integrated text of user systems

The various contributions will be published on the website www.enusyst.eu

INDEX OF CONTENTS

Other useful links (referred to Italian system)

Regulation of simple user system
https://www.arera.it/it/docs/13/578-13.htm

Regulation of closed distribution systems
https://www.arera.it/it/docs/15/539-15.htm

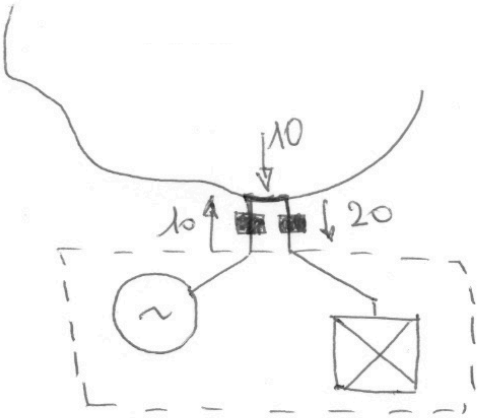
CHAPTER "ZERO"
THE FUNDAMENTAL ISSUES

1. The theme of the themes

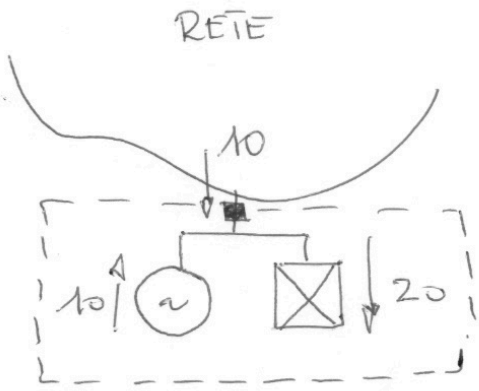
Please try to answer the following (simple) question.

Given the following two cases, identify the difference in impact on the electricity grid resulting from the different conn :hat in case 1 the two conne

CASE 1
GRID



CASE 2
GRID



Possible answers [1]

☐ In practice, none ☐ The network is impacted by less usage ☐ The network is more widely used

Other: _____

-*-

Having provided the correct answer, which can also be demonstrated analytically although this is not possible at this level of treatment, the reader will realize that the difference between the two solutions indicated is essentially due to a mere different way of accounting for the energy exchanged with the network, since this is impacted in practice always in the same way (we speak of course of the portion of the network in front of the system under examination). To say that, in practice, in the same site, the "dialogue" with the network must or must not take place "by difference" is, in principle, a pure assumption of a conventional character. We must therefore ask ourselves what the difference is between assuming such a convention and not assuming it. If the reader has the patience to follow the path of analysis proposed in this document, he will be able to draw useful indications of why such an assumption can be

[1] SOLUTION

In practice, none ☒ The network is impacted by less usage ☐ The network is more widely used ☐

adopted. A little earlier, although elementary, response can still be derived already from what is indicated in the next paragraph.

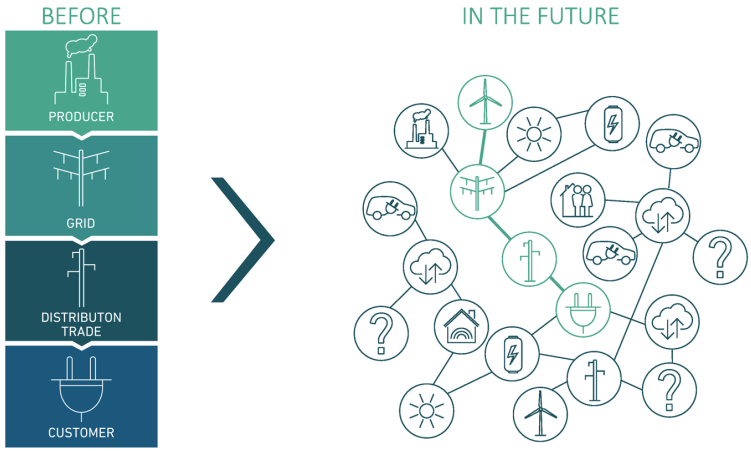
2. Energy User Systems at a glance

On 13 November 2018, the European Parliament confirmed the provisional agreement reached in June with the Council on energy efficiency, renewable energy and governance of the Energy Union. These agreements provide that:

- Energy efficiency in the EU should be improved by 32.5% by 2030, while the share of energy from renewable sources should represent at least 32% of EU gross final consumption. Both targets will be reviewed by 2023 and can only be increased, not lowered;
- Member States must ensure that citizens have the right to produce renewable energy for their own consumption, to store it and to sell excess production;
- For biofuels at least 14% of transport fuels must come from renewable sources by 2030 but, from 2019, the contribution of first generation biofuels with a high risk of "indirect land-use change" will be phased out and reach zero by 2030.

In addition, the European Commission recently announced on 28 November 2018 that it had adopted a long-term strategic vision for a prosperous, modern, competitive and climate-neutral economy by 2050. Faced with such challenging objectives of environmental sustainability and carbon neutrality, it is clear that the role of the use of renewable energy sources and energy efficiency is one of the fundamental elements destinated to impact on the evolution of energy infrastructures. While energy infrastructure systems tend to become a whole at the macro level, this does not ignore what happens at the local level.

Faced with new challenges, energy infrastructure and its use patterns to support new market models will change.

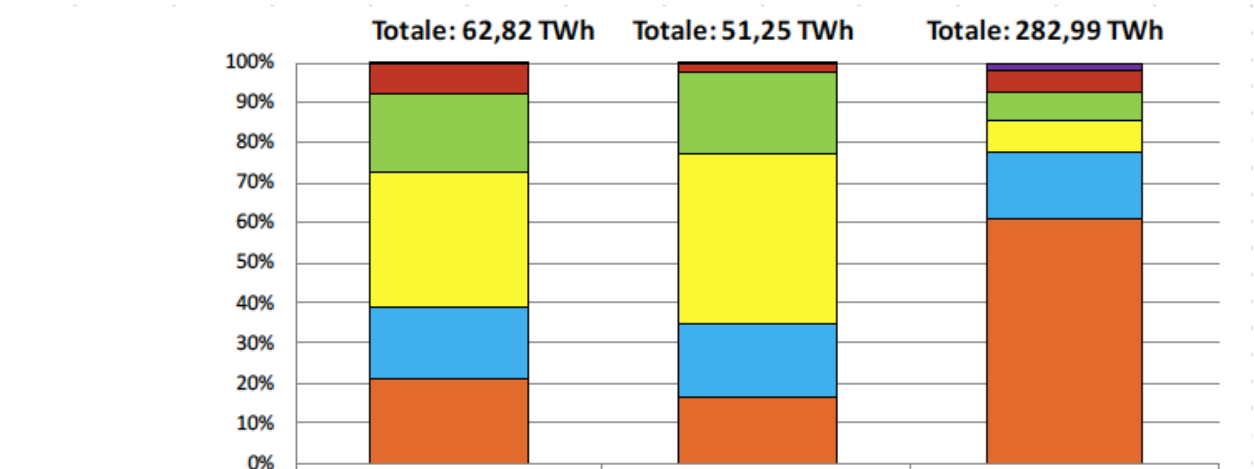


Evolution of energy infrastructure in the face of new environmental sustainability and decarbonisation objectives [2]

The increase in the use of renewable sources, in particular for the production of renewable energy carriers (renewable electricity and renewable gas) will lead to an increase in so-called distributed generation. The latest data available on the monitoring of distributed generation carried out by the Italian regulatory authority shows that the growth in distributed generation corresponds to a much higher rate of use of renewable sources than non-distributed generation (see figure below). In commenting on these data, it is necessary to make a consideration that goes beyond the defining character of distributed generation

[2] http://www.energy-infrastructure-forum.com/doc/[d1-s3-p02]%20HLS%20on%20digitalization_Concl%20Digital%20RT_Egebo_Energinet.pdf

and that grasps the fundamental point of the sustainable energy evolution of systems. In principle, the correct term to use would not be distributed generation, but "diffuse source" generation; it is not, in fact, a matter of distributing an energy source so that it is used locally, but rather of using an energy source that is widespread throughout the territory and that could not otherwise be used except in this form. This characterization of territorial spread is typical of the renewable source, in particular, the solar source, biomass and, up to certain levels, the wind source. Micro and small generation solutions in distributed form based, in general, on high-efficiency cogeneration solutions are proposed for this purpose.



	GD	GD-10 MVA	ITALIA
Geotermica	0,3%	0,0%	2,2%
Eolica	7,4%	2,4%	5,2%
Biomasse, Biogas e Bioliquidi	19,7%	20,0%	6,9%
Solare	33,9%	42,6%	8,1%
Idrica	17,6%	18,6%	16,6%
Fonti non rinnovabili	21,1%	16,4%	61,0%

DG monitoring - year 2015

In order to achieve the above objectives, energy production and consumption models also represent a significant variable in the evolution of the system. If energy takes on more and more a local connotation, models based on local user systems and markets based on the cooperation and exchange of energy among users will become more and more important according to a logic, at least, of territorial proximity.

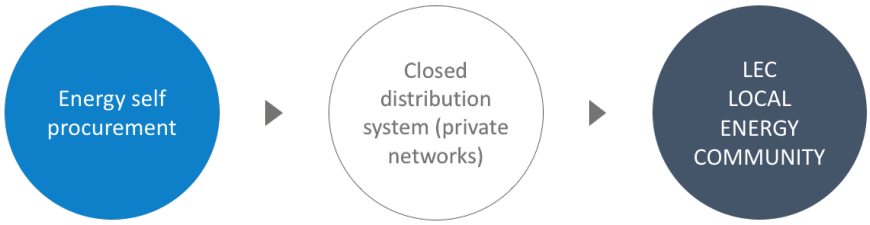
User systems are a long-standing feature of our system, but their definition and regulation is limited to a few models. More in detail, it is possible to synthetically trace an evolution (currently in progress) of the systems "participated" by users in which the energy supply is merged with the creation of infrastructural parts.

At the beginning of the chain, self-supply systems can be placed where self-supply refers to the situation in which a natural or legal person consumes the electricity that he has produced himself ("simple" self-supply). This person must be in direct geographical relation with the electricity production plant and must manage the installation itself. In this case, the electricity must not pass through a network.

In particular, the closed distribution system (CDS) referred to in Directive 2009/28/EC is a private electricity network, which distributes electricity within an industrial, commercial or geographically limited shared service site and which does not supply household customers: an exception is made for households that are employed by the owner of the distribution system, or have a similar relationship with the owner of the distribution system, including households for which there are employment relationships with companies linked to a CDS and initially belonging to the same group of companies as the owner of the CDS. The CDS, in the ownership and operation of entities other than the concession holders of the transmission and distribution activities, is characterised by the fact that, for specific technical or safety reasons, the operations or production process of the system users in question are integrated or by the fact that it distributes electricity primarily to the owner or operator of the system or to their related undertakings.

Based on these two models, the directives currently being adopted as a result of the so-called Winter Package introduce the definition of the energy community: in summary, the (renewable) energy communities involve groups of citizens, social entrepreneurs, public authorities and community organizations that participate directly in the energy transition by jointly investing, producing, selling and distributing renewable energy. In addition to reducing greenhouse gas emissions, there are many benefits for the communities involved, including economic development, job creation, cheaper energy, self-sufficiency, community cohesion and energy security. Regional authorities can support the emergence of energy communities by providing funding.

The increase in the use of diffuse energies (renewables and high efficiency) involves the evolution of production and consumption patterns and markets.



Simple system with single user(prosumer)

Network system with more user in a limited territory

Market system (including private networks)

All these models are characterized, at different levels, by the possibility of creating private energy infrastructures: from the moment in which the principle of the creation of the internal market is the maximum contestability of supply, the question arises whether and how it is appropriate (and also efficient) to create physical links between supply and demand. A precise answer to this question cannot yet be given: it is quite clear that it is necessary to adopt solutions that:
- avoid production inefficiencies;
- in the long term are not limiting to the development of the internal market.

CHAPTER I
DEVELOPMENT OF THE INTERNAL MARKET, ELECTRICITY NETWORKS, USER SYSTEMS AND TARIFFS

3. Electricity networks and market development in Directive 2009/72/EC

With the aim of initiating a wide-ranging reflection on the issues of electrical consumer systems [3], some elements of Directive 2009/72/EC, which provide a lot of interesting elements.
First of all, it should be noted that, starting from the assumption that the objective of the aforementioned Directive is the creation of a fully operational internal market in electricity, the limitations to access or discriminatory access to networks has been recognized as an obstacle to the development of the internal market.[4].
The Directive goes on to say that in order to develop competition in the internal electricity market, [...] customers should be able to choose their suppliers and to conclude contracts with different suppliers to cover their electricity needs while protecting those customers against exclusivity clauses, the effect of which is to exclude competing and/or complementary offers.[5]. All this is understandable if we consider that obtaining the maximum allocative efficiency in economic terms for the supply of an asset can be obtained by favouring the contestability of the offer.[6]: Although this issue is dealt with for interconnections, there is no doubt that the principle can also very well be transposed to user systems [7].

> The principle of the Directive is to allow the widest possible market contestability. In a system of users, for its nature, a physical connection is typically realized that establishes in fact a form of exclusivity of supply. For the purposes of the relationship between the evolution of the markets and the evolution of the systems of users, this is one of the principal questions that must be taken into account.

Another element of interest is that for which the Directive considers that in the absence of an effective separation of networks from the activities of generation and supply (effective separation), there is a

[3] It might be more appropriate to speak of "energy systems of users", but as far as the interest of this discussion is concerned, we will limit ourselves to the subject of electrical systems.
[4] Recitals (4) of the Directive 2009/72/CE
[5] Recitals (20) of the Directive 2009/72/CE
[6] Recitals (5) of the Directive 2009/72/CE
[7] On the subject of the development of a truly contestable market, Directive 2009/72/EC considers the following:
(39) The internal market of electric energy suffers from a lack of liquidity and transparency, which hinder the efficient allocation of resources, the coverage of risks and the entry of new actors. It is necessary to ensure that competition and security of supply are improved by facilitating the integration of new power plants into the electricity grid in all Member States, in particular by encouraging new market entrants. Confidence in the market, its liquidity and the number of market participants should be increased and, therefore, the supervision by regulators of electricity supply undertakings should be increased. These requirements should be met without prejudice to, and be compatible with, existing Community legislation on financial markets. Energy regulators and financial market regulators need to cooperate so that each of them has an overview of the relevant markets.
(50) Citizens of the European Union and, where Member States deem it appropriate, small enterprises, should be able to enjoy public service obligations, in particular with regard to security of supply and reasonable prices.
(57) The promotion of fair competition and easy access for different suppliers, as well as of new electricity generation capacities, should be of the utmost importance for Member States in order to allow consumers to fully benefit from the opportunities of a liberalised internal electricity market.

permanent risk of creating discrimination not only in the management of the network, but also in the incentives that companies (vertically integrated) have to invest adequately in their networks.[8].

With regard to the distribution function of electricity, the Directive reiterates that non-discriminatory access to the distribution network is a key prerequisite for access to downstream customers at the retail level. The Directive [at the time of its adoption] considered that the risk of discrimination as regards third party access and investment is, however, lower at the level of distribution than at the level of transmission, where congestion and the influence of generation or supply interests are generally greater than at the level of distribution.[9].

4. Closed distribution systems and self-consumption systems

As regards the use of networks for the supply of electricity, the Directive appears to establish a general regime accompanied by specific regimes. More precisely, the Directive considers that electricity can be supplied to EU citizens only through the network.[10] unless the possibility of using networks other than public ones, such as closed distribution systems, is expressly provided for. The Directive in question does not mention self-consumption configurations, even if such configurations are not unknown to the Commission, which deals with them in separate acts.

As the closed distribution systems are distribution networks to all intents and purposes, the critical conditions found in the market with "traditional" configuration - that is, the configuration on which the considered of the Directive have dwelt most - to the increase in the share of distributed generation could also affect the CDSs and user systems in general.

In the light of all the above, there is a natural question of why, while European legislation is pushing for a framework to maximise contestability and guarantee supply, which can be achieved by fully developing the market, systems are being introduced which would appear to be physically linking demand with supply.

<u>Closed distribution systems</u>

As regards closed distribution systems, the Directive assumes that where a closed distribution system is used to ensure the optimal efficiency of an integrated energy supply requiring specific operating rules or where a closed distribution system is maintained primarily for the use of the system owner, it should be possible to exempt the distribution system operator from obligations which would constitute an unnecessary administrative burden due to the particular nature of the relationship between the distribution system operator and the system users. Industrial, commercial or shared service sites such as railway station buildings, airports, hospitals, large campsites with integrated facilities or chemical industry establishments may include closed distribution systems due to the specialised nature of their operation.[11].

What is considered by the Directive outlines the profiles of the particular network regime consisting of closed distribution systems; more specifically, it is possible to resort to a closed distribution system if:

[8] Recitals (9)) of the Directive 2009/72/CE
[9] Recitals (26)) of the Directive 2009/72/CE
[10] Recitals (25)) of the Directive 2009/72/CE
[11] Recitals (30)) of the Directive 2009/72/CE

- The case of having to guarantee the optimal efficiency of an integrated energy supply that requires specific operating rules;
- the system is maintained mainly for the use of the system owner.

The definition of a closed distribution system is referred to in Article 28 of the Directive.

Article 28 – Closed distribution systems

1. Member States may provide for national regulatory authorities or other competent authorities to classify a system which distributes electricity within a geographically confined industrial, commercial or shared services site and does not, without prejudice to paragraph 4, supply household customers, as a closed distribution system if:

(a) for specific technical or safety reasons, the operations or the production process of the users of that system are integrated; or

(b) that system distributes electricity primarily to the owner or operator of the system or their related undertakings.

2. Member States may provide for national regulatory authorities to exempt the operator of a closed distribution system from:

(a) the requirement under Article 25(5) to procure the energy it uses to cover energy losses and reserve capacity in its system according to transparent, non-discriminatory and market based procedures;

(b) the requirement under Article 32(1) that tariffs, or the methodologies underlying their calculation, are approved prior to their entry into force in accordance with Article 37.

3. Where an exemption is granted under paragraph 2, the applicable tariffs, or the methodologies underlying their calculation, shall be reviewed and approved in accordance with Article 37 upon request by a user of the closed distribution system.

4. Incidental use by a small number of households with employment or similar associations with the owner of the distribution system and located within the area served by a closed distribution system shall not preclude an exemption under paragraph 2 being granted.

Further clarifications on the nature of closed distribution systems are provided by the European Commission itself in one of its *working document*[12].

The European Commission has further clarified the meaning of CDS In that note, the Commission points out that Closed Distribution Systems are primarily distribution systems built within a geographically limited

[12] COMMISSION STAFF WORKING PAPER 22 JANUARY 2010 -INTERPRETATIVE NOTE ON DIRECTIVE 2009/72/EC CONCERNING COMMON RULES FOR THE INTERNAL MARKET IN ELECTRICITY AND DIRECTIVE 2009/73/EC CONCERNING COMMON RULES FOR THE INTERNAL MARKET IN NATURAL GAS - RETAIL MARKETS- https://ec.europa.eu/energy/sites/ener/files/documents/2010_01_21_retail_markets.pdf

location and this distinguishes them from more general Public Networks. This also means that the TSO operator cannot independently connect outside the site, as defined above. Secondly, CDSs could be located on common industrial, commercial or service sites such as, for example, railway station buildings, airports, hospitals, shopping centres, large campsites with integrated facilities or industrial plants because of the specialised nature of their operation. Users connected to CDSs are industrial or commercial customers, entities providing shared services, or, as provided for in paragraph 4, households employed by the owner of the distribution system, or linked to the latter by a similar link (the Commission would point out in this connection that households employed by the owner of the distribution system, or linked to the latter by a similar tie must be identified flexibly, including households for which there are working relationships with companies linked to a CDS and initially belonging to the same group of companies as the owner of the CDS), as well as, where appropriate, electricity producers. Moreover, the requirement in Article 28(4)(a) ('for specific technical or safety reasons, the operations or production process of the users of the system in question shall be integrated') refers to situations where several entities share a distribution network that allows the optimisation of energy supply or requires specific technical, safety or management standards. For example, this is common in industrial sites where the heat produced by a cogeneration system is used, for the respective production processes, by the different entities present there; or this requirement arises when the different entities present need to operate with different electrical standards from those commonly applied to public networks (e.g. grid frequency).

The emergence of the definition of TDI in the Directive has undoubtedly been generated by the judgment of the Court of Justice of the European Communities in Citiworks (Case C-439/06)[13] as a result of which, the European Commission considered it appropriate to provide for the possibility for member countries to exempt certain systems from the application of general rules on distribution systems in order to avoid unnecessary administrative burdens: such are the systems in which the nature of the relationship between the distribution system operator and system users is very different from that commonly found for the "public" network.

But on the basis of what criteria can a distribution system be classified as 'closed'? These criteria are set out in Article 28(1) of the Directive.

- The first point is that the closed distribution system must be located on a geographically limited site.[14]. This distinguishes it from the general public network. It also means that it would not be possible, in general, for off-site users to be connected to the closed distribution system.
- Secondly, the site should be a site for industrial, commercial or shared services. As already mentioned, several examples of such sites are given in recital (30) of the Directive, including hospitals and chemical industry sites. It is not necessary for the site to have a commercial

[13] In the Citiworks case, the Court was asked whether the obligation imposed on Member States by Article 20(1) of Directive 2003/54/EC (4), now Article 32(1) of Directive 2009/72, to ensure that free access is provided to transmission and distribution systems (5) applies to a system which supplies electricity only to its operator, the managing body of Leipzig/Halle airport, and to 93 other undertakings established in the area of that airport. The Court found, first, that such a system should be regarded as a distribution system in so far as Directive 2003/54 did not lay down conditions relating to the size of the system or to electricity consumption. Second, the Court held that Article 20(1) of Directive 2003/54 was applicable to the system in question because free access for third parties to the distribution system was one of the essential measures which the Member States were required to implement in order to complete the internal market in electricity, and that system did not fall within the scope of any exception or derogation to the obligation to provide free access laid down in Directive 2003/54. Following the Court's judgment in the Citiworks case, there was a growing concern that the requirements laid down in Directive 2003/54 were too burdensome for distribution system operators such as the one under discussion in that judgment.
https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX:62017CC0262

[14] Due to the fact that they operate on confined geographic sites serving only non-household customers, closed DSOs will not have more than 100,000 customers. Member States will therefore be allowed to apply the provisions of Article 26(4) of the Electricity and Gas Directives, which allow Member States not to require such DSOs to be unbundled.

function, as indicated by the inclusion of hospitals in the examples, but the site cannot be used to supply household customers. Only incidental use of the closed distribution system by households having an employment or similar relationship with the site owner is compatible with the classification of the system as a closed distribution system. In particular, the total number of households should be small. The definition of what constitutes an employment relationship depends on the precise circumstances, in particular the historical relationship between the owner and the users of the system, for example when a company that has developed a distribution system exclusively for its own operations is subsequently divided into several separate companies.

- Finally, the site must meet one of the two additional criteria set out in Article 28(1) in order to be classified as a closed distribution system. These are
    - (1) for specific technical or security reasons, the operations or production process of the system users are integrated; or
    - (2) the system distributes electricity primarily to the system owner or operator or to their respective undertakings.

In relation to the last two criteria mentioned, the Commission itself provides some useful clarifications, in particular:

- Criterion (1) covers situations where different companies jointly use a distribution system that optimises an integrated energy supply or requires specific technical, security or operational standards. This is particularly common in industrial sites where, for example, the heat generated by electricity generation is used in the production process of other system users. Another reason could be that it is necessary for site users to operate with different reliability standards than those applying to the public grid, for example in relation to frequency. The interrelationship between the operations of users of these systems means that it should be possible for them to reach an agreement to ensure that the externalities associated with their operations are duly taken into account. It is for Member States to define precisely the circumstances in which this criterion would be met.
- Criterion (2) allows a modified regulatory regime to be established where an undertaking has allowed users to connect to a system developed for its own use.

An important point to note is that closed distribution systems are distribution systems and do not constitute a new and separate category of systems. Therefore, the general obligations applying to DSOs also cover closed DSOs. In particular, the obligation to grant third party access to the system also applies to closed DSOs.

Where a Member State has provided for the classification of a closed distribution system, it may also allow the national regulatory authority to exempt the closed DSO from the specific provisions of the Directive. The most important of these, which applies to both electricity and gas, is the provision of Article 28(2), which allows for exemption from the obligation to approve the tariffs or methodologies underlying their calculation before they enter into force. This exemption is extremely important as it allows users, owners or operators of closed distribution systems to reflect the particular nature of their relationships and to take into account the impact of interdependencies in their operations. While the definition of domestic tariffs to a TDI is not subject to prior approval by the regulatory authority as a guarantee to users, Article 28(3) of the Directive provides that, at the request of a closed distribution system user, the regulatory authority must review tariffs in accordance with its powers and obligations. This provides important safeguards for both the closed distribution system user and the system operator. In order to manage a possible multiplicity of realities, the Directive offers regulators the possibility to also establish general rules guiding the definition and revision of internal tariffs to a TSO.

Self-consumtion systems

One of the first references of the European Commission in which the issue of self-consumption is analysed in an organised manner is the Commission Staff Working Document of 15 July 2015 on Best practices on Renewable Energy Self-consumption. If, on the one hand, the Commission intended to introduce specific regulations for particular distribution networks, i.e. closed distribution systems, on the other hand, for self-production/self-consumption initiatives, the Commission assumes in fact that such systems can exist and in the aforementioned document analyses their main and prospective aspects. For a more precise definition of own consumption by official European sources, reference should be made to further documents such as, for example, the opinion documents of DG Competition on certain exemption schemes for the application of tariffs and charges for own consumption systems.[15].
In particular, the various definitions referred to in the abovementioned Commission documents articulate the following concepts:

- own production, i.e. decentralised and localised electricity production at the user's premises;
- self-production/self-consumption as a measure of the share of locally produced energy taken by a user directly serves the user's own needs;
- self-supply as an activity of "self-supply" of one's own energy needs, which is accompanied by a possible supplementary supply from the public network.

Production, self-production and self-consumption are concepts of a physical nature, self-supply must be framed from the point of view of the commercial relationship between the user and other players in the electricity system.

This results in the definition of self-supply.

Self-supply is defined as the situation in which a natural or legal person consumes the electricity that he has produced himself. This person must be in a direct geographical relationship with the electricity production plant and must operate the plant itself. The electricity must not pass through a network. A network is defined as the totality of all technical installations connected to each other and serving for the use, transmission and distribution of electricity to the public.

Then there is the issue of how to manage any surplus energy in terms of sales on the market or other terms of exploitation for the user such as, for example, exchange on the spot / net metering.

While self-supply initiatives are, under certain conditions, potentially critical to the tariff stability of a system (the issue will be addressed later), the Commission recognises a number of potential benefits for the development of new market models.

The development of self-sufficiency is an important tool for the transition to new market models and allows the development of variables that underpin these new models. Any critical issues of a tariff nature must be managed with a view to encouraging such a development.

[15] See for example
Brussels, 19.12.2017 C(2017) 8482 final - State Aid SA.46526 (2017/N) – Reductions on EEG-surcharges for self-consumption http://ec.europa.eu/competition/state_aid/cases/270196/270196_1977568_124_2.pdf
Brussels, 1.8.2018 C(2018) 5019 final - State Aid SA.49522 (2017/N) – Germany - Reductions on EEG-surcharges for self-supply of electricity in high energy efficient cogeneration installations that entered into operation after July 2014 http://ec.europa.eu/competition/state_aid/cases/271872/271872_2007236_108_4.pdf

Among the variables whose development is favoured by self-supply initiatives, the following emerge.

- Aware use of energy: the need to maximize the share of on-site consumption of the production carried out pushes users to implement forms of flexibility and / or targeted use of energy. The two tools considered in this case are demand side management and the use of storage. Studies taken as a reference by the European Commission arrive at quantifying the benefits of flexibilisation. For example, it is recalled how demand-side management for household customers can involve the use of intelligent appliances (e.g. washing machines, dryers, dishwashers, refrigerators, etc.) estimating that the volume of intelligent appliances that can be controlled in the EU by 2025 will be at least 60 GW - the shift of this load from peak to other periods can reduce the need for peak generation in the EU by about 10%. In this sense, it has been estimated that an effective use of the demand side response can lead to annual savings in the order of €60-80 billion by 2030.[16] These numbers are obviously the result of research and projections on which there is always uncertainty about the future; but the most interesting aspect is that the exercise of making one's own load flexible represents the first part of a wider development of the active role of demand, which in this way would prepare for a real demand side response to price signals. This development concerns both consumers and technology suppliers without neglecting the role of market operators/aggregators.
- Development of storage systems: The Commission estimates that with appropriate demand-side-managemet techniques combined with storage, the rate of self-consumption of photovoltaic production can be as high as 65% to 75%.

In addition to these variables, there are at least two other variables that could contribute significantly to two areas of major importance:

- Development of local markets: self-sufficiency contributes to increasing energy awareness on the part of the user and favours forms of local energy exchange;
- Combating energy poverty: the spread of self-consumption could also find its place in the context of energy poverty. The combination of a single-producer model (which is achieved by investing in its own facilities for disadvantaged users using the sources of distributed energy available to these users) and multi-user systems of use (i.e. by creating the possibility that these users can be directly connected to each other to form a single user system) could bring undoubted benefits to social housing settlements, as well as the fact that such interventions could be framed in a broader context of interventions for the modernization and energy efficiency of the building stock.

The European Commission was not the only body to carry out a survey on these systems; the Italian regulatory authority, almost ten years before the European survey, already expressed itself, albeit at the level of survey, on the model of self-supply (act no. 54/07 of the then Authority for Electricity and Gas).

[16] Paragraph 3
https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_autre_document_travail_service_part1_v6.pdf

Clarification of the terms and conditions for the provision of on-site energy services to third parties by a free end-customer

December 13, 2007

In recent times, driven by the incentive programmes for the production of electricity from renewable sources, from high-efficiency cogeneration, as well as by energy saving initiatives, we have witnessed the spread of the installation of plants for the production of small-scale electricity (even in a cogeneration configuration) operating in the context of an end customer's self-supply of energy. Often, the end customer, instead of personally managing the generation plant, entrusts its management to a third party as part of a broader service provided to the end customer. This service generally includes the design, construction and management of electricity generation plants installed within the customer's property and serving its consumption site, as well as the activity of buying and selling surplus and/or integrated electricity.

With regard to the numerous requests for clarification regarding the regulatory framework of the aforementioned cases, it is clarified, first of all, that if the plant for the production of electricity is built within the property of a single end customer even by a party other than the end customer and is connected to the plant of the same customer, the transfer of electricity produced to the consumer equipment of the customer is not configured as a distribution activity, understood as a service of public utility. Therefore, for the purposes of determining the electricity injected into and taken from networks with the obligation to connect third parties, for the purposes of current legislation, reference must be made only to the electricity measured at the point of connection with the aforementioned networks.

With regard to the framework within the current legislation of the performance of the service mentioned in the above mentioned plant configuration and with reference to the role of the service provider and its relationship with the system, given the current legislation, it should be noted that, only if the end customer is a customer of the free market, for the purpose of concluding or transferring the ownership of contracts for access to the electricity system, the provisions of Article 4, paragraph 4 apply.4, of Resolution no. 111/06, according to which the interposition of a third party for the purposes of concluding contracts for the transmission and distribution service and for the dispatching service takes the form of a mandate without representation and the party concluding the two contracts must be the same. Where such a mandate exists, access to the network may not be made conditional on the end customer ceasing its activity.

Finally, it should be noted that the Authority is still carrying out technical studies on the applicability of the above in relation to the stipulation or transfer of ownership of contracts for access to the electricity system in the case of end customers under greater protection.
December 13, 2007

5. Nature of electricity networks in the development of user systems

With regard to the framework of the actual role of private systems in the electricity system, interesting ideas can be drawn from the classification of networks carried out by the Authority [17]. The classification drawn up by the Italian regulatory authority goes beyond the national reality and, in its essential features, has a general value that is in line with what can be found in the evolution of European legislation.

In particular, the Italian regulatory authority assumes that the term electricity grid is to be understood as an electrical system with a complex configuration which, as a result of the relationships between the various users of the system, cannot be traced back to a simplified scheme in which there is a single point of connection, a single electricity producer responsible for managing the production plants connected to that system and a single end customer. An electricity grid is an object in which a plurality of end customers and/or producers of electricity coexist and in which the transport of electricity for delivery to end customers is configured as a transmission and/or distribution activity. As defined, the electricity grid differs from simple user systems (defined by the Authority as Simple Production and Consumption Systems) which,

[17] https://www.arera.it/allegati/docs/15/539-15TipologiaReti.pdf

on the other hand, can be traced back to configurations characterised by a single producer and a single end customer.[18].
In summary, the Italian authorities conclude that all the electricity networks can be divided into the following two subsets:
- public networks;
- closed distribution systems (SDCs).

The public system (public grid/network) is any electricity system operated by an entity holding a concession for the transmission or distribution of electricity. This operator, being a public service operator, has the obligation to connect to its network all those who request it, without compromising the continuity of service and provided that the technical rules provided for are respected[19].

The Closed Distribution System (CDS) referred to in Directive 2009/28/EC is a private electricity network, which distributes electricity within a geographically limited industrial, commercial or shared services site and which does not supply household customers, with the exception of households that are employed by, or have a similar relationship with, the owner of the distribution system, including households for which there are employment relationships with companies connected to a CDS and initially belonging to the same corporate group as the owner of the CDS. The CDS, in the ownership and operation of entities other than the concession holders of the transmission and distribution activities, is characterised by the fact that, for specific technical or safety reasons, the operations or production process of the system users in question are integrated or by the fact that it distributes electricity primarily to the owner or operator of the system or to their related undertakings.

In addition to the above classification, the Italian authority goes further by defining in a precise manner some concepts of particular importance for the development of the framework of the relationship between user systems and electricity networks; these concepts include the notions of obligation to connect third parties, obligation to ensure free access to the electricity system, obligation to make available.

The **network with the obligation to connect third parties** is an electricity network managed by an operator who has the obligation to connect all those who request it. All public networks are networks with the obligation to connect third parties. TSOs are networks with the obligation to connect third parties, limited to connectable users, i.e. users who do not fail to comply with the definition of TSOs.

The **network with an obligation of free access to the electricity system** is an electricity network operated by an operator that has the obligation to allow users connected to its network to exercise the right of free access to the electricity system (i.e. the right to freely buy or sell energy on the market). All TSOs are networks with an obligation of free access to the electricity system. This obligation is fulfilled by guaranteeing each user of a CDS, as an alternative:

- access only to the free electricity market and the possibility of being able to use a sales company other than the one historically operating in the CDS, while remaining a user of the CDS (i.e. a user to whom the electricity transmission service is provided by the CDS operator at the tariff conditions established independently within the CDS);

[18] The Authority's assertion opens up a very important issue, which is the definition that a person must correspond to in order to be recognised as a final customer.

[19] According to the Authority, all the public networks can be divided into the following two subsets:
a) the electricity grids used by Terna to provide the transmission service. These are the whole consisting of the national transmission grid (NTG) and the sections of the grids and lines of entities not licensed for transmission or distribution used by Terna for the provision of the transmission service that are not part of the NTG;
(b) distribution networks. These are all the electricity networks operated by the licensed distribution companies for the purpose of carrying out and providing the public distribution service as governed by Article 9 of Legislative Decree 79/99. The distribution networks are made up of the networks owned by the distribution companies and by the sections of the networks and lines owned by persons who are not concessionaires of the distribution activity that are used for the provision of the public service.

- access to the electricity system in all its parts, becoming to all intents and purposes a user of the public network (guarantee that it will benefit from the tariff treatment in force on the public networks, from the technical connection rules provided for therein and from all the other services provided for therein, including access to the free market).

The **network with an obligation to make available** is an electricity network operated by an entity which does not hold a distribution or transmission licence in relation to the territory in which that network is established and which must be made available to the concessionary network operator in that territory in order for it to be able to fulfil its obligations in relation to the provision of the public service of distribution or transmission. [20].

On the other hand, user systems that do not provide a network service, can be classified as simple systems characterized by the presence of a single manufacturer and a single user (in the Italian system this configuration is called "**simple system of production and consumption - SSPC**").

6. User systems and tariff system

One of the main aspects of user systems is the way in which network tariffs and tariffs covering other charges are applied. The question is essentially how the general tariff system applies to these systems.

The tariff system generally covers two types of cost:

- System costs: these are the costs incurred for the electricity transmission service on the transmission and distribution networks for delivery to end users and the costs incurred for maintaining the safe operating conditions of the whole electricity system (dispatching costs);
- Other general costs: these are costs incurred in the general interest of the electricity system and which the legislator or the regulatory authority has established should be borne by the users of the electricity system.

Therefore, while the first costs have a direct relationship with the use that a user makes of the network and, more generally, of the electricity system, the latter are generally independent of this and the fact that they are often coupled to the network tariffs reflecting, typically, also the structure is a method of collection that implies a choice on how to share the costs between the various types of users in the system (ie with the same mode in which the charges are collected to cover the costs of the transport service).[21].

[20] In Italy they are networks with an obligation to make them available:
These are networks with an obligation to make available:

- networks with a voltage of more than 120 kV which are not part of the national transmission network, as per Article 3(3) of the Ministerial Decree of 25 June 1999, and which are still used by licensed distribution companies for the provision of the distribution service;
- the networks owned by the distribution companies operating at the date of entry into force of Legislative Decree 79/99 and to which the relative distribution concession has not subsequently been assigned, which are already managed by the distribution companies in order to provide the distribution service;
- the private lines already used by Terna or by the licensed distribution companies for the provision of the public transmission and distribution service and not included in the National Transmission Grid;
- the networks of the company RFI - FSI Group (formerly FF.SS.);
- networks owned by persons who are not concessionaires and do not fall within the category of TSOs
- (private networks not CDS);
- CDSs that operate in isolated territories not served by other networks (including CDSs in mountainous territories).

[21] Very often, this is also due to the fact that the collection of network and general charges makes operational use of the same technical methods.

The analysis of tariff structures will be carried out later. It is now important to understand, on the basis of existing legislation, whether and how user systems should be interested in the application of the tariff system.

For CDSs, it is the very definition of CDSs in the Directive that allows these systems to have an autonomous internal tariff system without the need to be approved by the regulatory authority. For the systems of users in self-consumption (simple systems) it is necessary to analyze the specific regime of imposition of network charges and general charges: from this point of view there are two approaches of a general nature, both valid and typically chosen at Member State level (the European Directives on this subject have never provided precise indications), namely[22]:

- a general scheme in which tariffs are applied to the consumption of a user regardless of how it is supplied (i.e. regardless of whether part of its consumption can be supplied in the form of self-supply);
- a general scheme in which tariffs are applied to the withdrawal of a user from the network regardless of how he is supplied (the same configuration as above applies).

The first of the two schemes is also often accompanied by an exemption scheme for the application of tariffs to the part of consumption covered by the self-supply mode, with the result that the two schemes thus become equivalent from an economic point of view, although formally different. In relation to this equivalence, it is useful to recall the position of the European Commission that "Measures which, in various forms, mitigate the charges which are normally included in the budget of an undertaking and which, without therefore being subsidies in the strict meaning of the word, are similar in character and have the same effect are considered to constitute aid".[23]". However, the general scheme under which tariffs are applied to the withdrawal of a user from the network irrespective of how the user obtains his supplies, without including specific exemptions from the general scheme, may be considered to be non-discriminatory, since no user of the system is, in principle, denied the possibility of setting up self-handling systems. It is, in fact, the regime that provides for exemptions that is considered by the European Commission to be subject to analysis in the light of the State aid guidelines.[24].

The exemption scheme is often linked to the fulfilment of certain conditions, such as, for example, that production within the system is carried out by plants producing from renewable sources or in high-efficiency cogeneration mode, or, for example, that the size of the production plants does not exceed a certain threshold, or that the quantity of self-consumed production exempted does not exceed a certain quantity.
The need to impose restrictions on exemptions is often linked to the fear of instability of the mechanism from the point of view of its effect on the distribution of the burden on different categories of users. For example, the German legislator considered that this exemption scheme "had negative consequences for the support of renewables in Germany as such and for the development of the German electricity system. On the one hand, the increase in the number of self-consumption installations not subject to the EEG surcharge was leading to a reduction in the amount of electricity purchased from the grid and thus to a reduction in the basis on which the EEG surcharge was applied and made it necessary to further increase the level of the EEG surcharge, which in turn will further exacerbate the incentives to invest in self-supply (vicious circle). This was therefore threatening the sustainability of the financing of the support for electricity renewables and also reducing the acceptability of the policy of promoting renewables in Germany. On the other hand, this also leads to a reduction in the flexibility of the electricity system by

[22] In this passage, when it comes to 'tariffs', this means, in particular, the tariff components covering system charges.
[23] Point (85) http://ec.europa.eu/competition/state_aid/cases/270196/270196_1977568_124_2.pdf
[24] See, for instance, point (100)
http://ec.europa.eu/competition/state_aid/cases/271872/271872_2007236_108_4.pdf

removing from the grid those flexible consumers who were consuming electricity supplied through the grid and were able to react to market signals by adjusting their demand. Flexible demand, however, is important in a system with high RES penetration. Finally, the climate protection objective of the EEG has benefited not only final consumers supplied by third parties but all electricity consumers in Germany. The German legislator decided that all actors in the electricity supply sector should contribute to the financing of renewable support and that final consumers producing their own electricity were also part of this system.[25].

Returning to the subject of CDSs, in addition to the fact that the fixing of the tariff system derogates from the general tariff system for public networks and is defined independently of them by the operator of the TDI, it is useful to recall certain passages connected with the Italian jurisdiction which concerned the European Court of Justice which reinforce this assumption. In the question put by the Regional Administrative Court of Lombardy[26], the question has been raised as to whether the Court considers it possible or necessary for the Member State to lay down rules which take account of the specific nature of closed distribution systems, whether it precludes the provisions of [Directive 2009/72] - and in particular recitals 29 and 30 in the preamble to that directive; Article 15(7); Article 37(6)(b); Article 15(1) and (2); Article 37(2) and (3) thereof - from being interpreted as precluding the application of Directive 2009/72. 26(4) - national legislation, such as that relevant in the present case, which makes closed distribution systems subject to rules on dispatching and unbundling which are entirely similar to those laid down for public networks and which, as regards general electricity system charges, provides that the payment of those charges is also partly proportionate to the energy consumed within the closed system[27]». In response to a request for clarification by the Court pursuant to Article 101 of the Rules of Procedure, the Tribunale Amministrativo Regionale per la Lombardia (Lombardy Regional Administrative Court) declared, by order of 12 April 2018, that, firstly, the obligation to separate functions no longer applies to operators of closed distribution systems as referred to in Article 38(5) of Legislative Decree No. 2092/94. 93/2011 (22) and, secondly, Article 24(2) of Decree-Law No 91/2014 has been repealed, so that the general electricity system charges currently apply to the electricity that the closed distribution system, as a whole, withdraws from the public network. Consequently, the national court has withdrawn the question referred for a preliminary ruling as regards the unbundling requirements and general electricity system charges. However, it maintained that question as regards dispatching charges. The Advocate General of the Court of Justice, in the expression of his opinion, considered that "the preliminary question should be answered by stating that Articles 15(7) and 37(6)(b) of Directive 2009/72 preclude national legislation under which dispatching charges paid by users of closed distribution systems to the main system operator are applied to electricity injected by each user into the closed distribution system, or to electricity taken by each user from the closed distribution system. Those charges should apply only to electricity supplied by each user of the closed distribution system to the main system, or to electricity removed by each user of the closed distribution system from the main system.

[25] Point (54) - http://ec.europa.eu/competition/state_aid/cases/270196/270196_1977568_124_2.pdf

[26] https://eur-lex.europa.eu/legal-content/IT/TXT/HTML/?uri=CELEX:62017CN0263&from=IT

[27] Charges are levied on system users for the provision of dispatching services. Pursuant to Article 22.1 of Annex A to Resolution no. 539/2015, the rules applied to users of closed distribution systems, as regards dispatching charges, are those applicable to users of the public network. The same provision specifies that, as far as users of closed distribution systems are concerned, dispatching charges shall apply "in relation to the electricity injected into and taken by each user through the point of connection of its users to the [closed distribution system] network". Prior to the entry into force of Resolution No 539/2015, dispatching charges were applied only in relation to electricity fed into or taken from the closed distribution system as a whole through the point of connection of that system to the public network. This means that dispatching charges were applied only in relation to electricity fed into or withdrawn from the public grid. They were not applied in relation to electricity produced within the closed distribution system.

The Court of Justice, by issuing its preliminary ruling on 28 November 2018[28], however, it decided to give the following indication by referring the final judgment back to the national court.

Articles 15(7) and 37(6)(b) of Directive 2009/72 must be interpreted as meaning that, in the absence of objective justification, they preclude national legislation, such as that at issue in the main proceedings, which provides that dispatching charges payable by users of a closed distribution system are to be calculated on the electricity exchanged with that system by each of its users through the point at which they connect their users to that system, if it is established, which it is for the national court to verify, that users of a closed distribution system are not in the same situation as other users of the public network and that the provider of the public network dispatching service incurs limited costs in relation to those users of a closed distribution system.

It would then appear that:

- in the case of CDSs, subject to the conditions laid down in the definition of CDSs, domestic tariffs may be set independently and independently by the system operator and the effects of public network tariffs must be applied only to electricity that may be taken from the public network by the closed distribution system;
- a general system of charging may be adopted which only covers electricity taken from the public network, irrespective of the way in which it is supplied by the end user, given the freedom of all users to set up a self-supply system at any time.

7. From user systems to new market models

7.1 The role of closed distribution systems in the evolution of electricity networks

With regard to the role of closed distribution systems in relation to the prospective development of electricity networks towards new market models, the decision of the Italian Antitrust Authority of 8 August 2016 concerning closed distribution systems is certainly of interest [29].

The Authority first of all clarifies that private electricity networks are infrastructures that allow to connect production plants and specific end customers in a limited geographical area, other than public transmission and distribution networks that distribute electricity to all customers. Encouraging the introduction of private networks in public electricity systems also means encouraging the spread of production systems based on the use of renewable sources, as well as reducing the saturation phenomena, real and virtual, of the networks, the costs associated with grid losses and the distortion of signals of investment in production plants in different areas of the country. Finally, it also means pushing the national electricity system towards innovation.
The Authority recalls that it has already stated in the past that support for the diffusion of private electricity networks can determine adequate competitive incentives in the management of public networks: although the former cannot become a substitute for the latter, they introduce potential competitive stimuli for the purposes of a more efficient management and organization of the public networks themselves and, more generally, of the functioning of the electricity system.
This would happen first of all because of the risk that the development of private networks would lead to a partial reduction in demand (thus acting as an incentive for more efficient management in the public sector); secondly, the same competitive processes can also be developed with regard to the generation

[28] http://curia.europa.eu/juris/document/document.jsf;jsessionid=DF98B2B2723A6D6403484F3F2F781CA9?text=&docid=208243&pageIndex=0&doclang=IT&mode=lst&dir=&occ=first&part=1&cid=5812642
[29] http://www.osservatorioantitrust.eu/it/wp-content/uploads/2016/09/AS1288.pdf

plants that feed energy into the public network, because any reduction in demand would also be reflected in their regard and would therefore encourage them to use more efficient technologies.
In view of these considerations, the Authority notes that any obstacles to the existence of private networks define discrimination in favour of the dominant model of organisation of the electricity system, based on the centralisation of electricity generation in large installations and on the transmission and distribution of electricity to consumption units through public networks. Such an organization mainly reflects the technological choices made in the past and does not favour the evolution of the networks towards new models of organization of the electrical system, which can usefully contribute to the achievement of the general objectives of energy convenience for users, innovation, security and financial sustainability of the national electrical system, as well as the protection of competition.
The Authority then goes on to analyze the European regulatory framework, consisting of the directives referred to above, reporting in particular the definition, given in art. 28 of Directive 2009/72/EC, of Closed Distribution System "a system that distributes electricity within an industrial site, commercial or shared services geographically limited and [...] does not supply household customers," which meets one of the following criteria: "a) for technical or safety reasons, the operations or production process of the system users are integrated; b) the system distributes electricity mainly to the owner or operator of the system or to related companies".
Against this, the Authority defines the national legislative and regulatory framework as more complex and contradictory, and in need of an overall review.
In particular, in the national legislation in force, the TSOs referred to in the Community legislation have been identified as including without doubt the Internal User Networks ("UI") as a finite subset, as well as the "other private electricity networks" (mentioned in Article 30, paragraph 27 of Law 99/096), which are not subject to any exact definition and regulation by the national legislator. According to the Authority, this absence is a clear gap in the national regulatory framework, capable of creating conditions of uncertainty such as to discourage the dissemination and development of CDSs, especially new ones.
The Authority therefore stresses the need for greater specification of the applicable regulatory framework, in the sense of transposing the concept of CDS provided for in the Community directive without limiting to the CDS alone the broadest set of CDSs introduced by the latter, but on the contrary, explicitly including in that set also the other private electricity networks, in order to allow, and not already limit, the development of new private electricity networks in Italy.

7.2 The concept of energy communities

In the development of new market models, the so-called Energy Communities (Renewable Energy Producer/Consumers Communities) play an important role. In summary, renewable energy communities involve groups of citizens, social entrepreneurs, public authorities and community organisations directly involved in the energy transition by jointly investing, producing, selling and distributing renewable energy. In addition to reducing greenhouse gas emissions, there are many benefits for the communities involved, including economic development, job creation, cheaper energy, self-sufficiency, community cohesion and energy security. Regional authorities can support the emergence of energy communities by providing funding, expertise and advice and by ensuring that regulatory issues can be easily understood and managed.[30].
From a regulatory point of view, the new Renewable Sources Directive currently under preparation would provide that:

- Member States shall ensure that final customers, in particular household customers, have the right to participate in a renewable energy producer/consumer community, while maintaining their rights or obligations as final customers and without being subject to unjustified or discriminatory conditions or procedures which would prevent their participation in a renewable energy

[30] https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/2018-08-30_Policy_brief_Renewable_Energy_Communities_PB_TO4_final.pdf

producer/consumer community, provided that, in relation to private undertakings, their participation does not constitute the main commercial or professional activity.

- Member States shall ensure that renewable energy producer/consumer communities have the right to:
    - producing, consuming, storing and selling renewable energy, including through renewable electricity purchase agreements;
    - sharing the renewable energy produced by the production units held by the renewable energy producer/consumer community, within the same community, without prejudice to the maintenance of the rights and obligations of the members of the renewable energy producer/consumer community as final customers;
    - access all appropriate electricity markets, directly or by aggregation, in a non-discriminatory manner;
- Member States shall carry out an assessment of existing barriers and the potential for development of renewable energy producer/consumer communities in their territories.
- Member States shall provide a support framework to promote and facilitate the development of renewable energy producer/consumer communities. This framework shall ensure, inter alia, that:
    - unjustified regulatory and administrative barriers for renewable energy producer/consumers communities are removed;
    - renewable energy producer/consumers communities providing energy or aggregation services, or other commercial energy services, are subject to the provisions applicable to these activities;
    - the relevant distribution system operator cooperates with the renewable energy producer/consumer communities to facilitate energy transfers within the renewable energy producer/consumer communities;
    - renewable energy producer/consumers communities are subject to fair, proportionate and transparent procedures, in particular registration and licensing procedures, and to cost-reflective network charges, as well as relevant levies and taxes, ensuring that they contribute in an appropriate, fair and balanced manner to the overall cost allocation of the system in accordance with a transparent cost-benefit analysis of distributed energy resources carried out by the competent national authorities;
    - renewable energy producer/consumers communities are not subject to discriminatory treatment as regards their activities, rights and obligations as final consumers, producers, suppliers, distribution system operators, or other market participants;
    - participation in renewable energy producer/consumer communities is open to all consumers, including those from low-income or vulnerable households;
    - tools are available to facilitate access to finance and information;
    - public authorities are provided with regulatory and capacity building support to support the creation of renewable energy producer/consumer communities and help authorities to participate directly in them;
    - standards are available to ensure fair and non-discriminatory treatment of consumers participating in a renewable energy producer/consumer community.
- Member States may provide that renewable energy producer/consumers communities are open to cross-border participation.
- Without prejudice to Articles 107 and 108 TFUE, Member States shall take into account the specificities of renewable energy producer/consumers communities when developing support schemes, in order to allow them to compete on an equal footing with other market participants for support.

CHAPTER II
REGULATORY REVIEW OF USER SYSTEMS IN THE NATIONAL (ITALIAN) FIELD

8. Introduction to national review

The national legislation on user systems has followed a stratified evolution over time and on it has been interested, moreover, by a ruling of an administrative court that has had a strong impact on the evolutionary state of user systems. This part of the document deals in a concise explanatory way with the succession and development of the regulations in the national field of user systems and private networks, highlighting the fundamental aspects, differences, correlations between different systems and aspects of a tariff nature. This will provide useful indications for future action to rationalise the primary regulatory framework and lay the foundations for the future development of user systems.

9. Historical models: the case of cooperatives

First of all, the historical models at the basis of the evolution of the user systems are recalled: cooperatives, consortia (comparable, according to the regulations, to cooperatives), self-producers.
Of particular interest is the analysis of cooperatives which, at present, are intercepted by the current relationship only in relation to those of a historical nature. More generally, the definition of a cooperative is that of a society constituted not for profit, but to guarantee its members greater economic equity than that of the market. For the purposes of regulation, the cooperative is a legal entity organised in a cooperative form, whose purpose is to produce electricity mainly for the supply of its members.
More specifically, the historical cooperative is a cooperative for the production and distribution of electricity as per article 4, number 8 of law 1643/62, already existing at the date of entry into force of legislative decree 79/99 (therefore already existing at the date of the start of liberalization of the national electricity system). In the context of cooperatives there are two distinct cases:

- historical licensee cooperative - a historic cooperative which has obtained the concession for the distribution of electricity;
- historical non-licensee cooperative - a historical cooperative operating in a territorial area for which the distribution concession is held by a third party company.

Historical cooperatives can have their own network as well as being without their own network: in particular, the cooperative without a network is a historical non-licensing cooperative that does not have in its availability a network for the distribution of electricity to its members.

Depending on the type of connection to the network of the cooperative, the members of the cooperative may be direct or indirect: the direct member customer is a person who owns a user directly connected to the electricity grid in the availability of the cooperative. On the other hand, the indirect member customer is a member customer with a user connected to the electricity grid of a party other than the cooperative.

It is quite clear that in the case in which the cooperative does not have its own network, all the member customers are of the indirect type, while it can be verified that, in the case in which the cooperative has its own network, there are also non-member customers, i.e. subjects other than the direct member customers, but having their own users directly connected to the cooperative's electricity network.

In the context of a cooperative, energy produced by the cooperative's production plants and intended for consumption by the cooperative's member customers is generally defined as energy produced by the cooperative itself:

- self-produced energy "on site" is the electricity produced by the direct production plants for consumption by the direct member customers of the same cooperative (this obviously presupposes that the cooperative has its own network)
- off-site" self-produced energy is the electricity produced by direct production plants (assuming that the cooperative has its own network) [31] intended for consumption by member customers connected to a third network and electricity produced by production plants connected to a third network and intended for consumption by member customers (this is the case where the cooperative does not have its own network).

The issue of the regulation of cooperatives will be taken up in the last chapter of the report as it constitutes a case of particular interest for the development of the regulation of further types of user systems that could be introduced into the system in the near future such as energy communities.

10. Self-producers

The genesis of the figure of the self-producer as it is known today is to be found in the implementation of the national energy plan 1988-1992. In implementing this plan, Article 20 of Law No 9 of 9 January 1991 allowed "self-producing" companies to produce electricity not only for their own use, but also for sale to ENEL, and in the case of companies formed as companies, for use by subsidiaries or parent companies; the then Ministry of Industry authorised the self-production of electricity by the above parties, taking into account the compatibility with the general interest objectives of the public service and the correspondence of the link between the various companies to economic and production needs with the economic and production needs of the various companies. The standard also deals with the destination of the energy produced, requiring the transfer to ENEL of energy exceeding the quota consumed by the producer, referring in this regard to special agreements between them.
However, these new provisions did not have a decisive impact on ENEL's monopoly position: with regard to the production of electricity for sale to ENEL, the entity that took such an entrepreneurial initiative did not aim to compete with ENEL on the market; on the contrary, its activities remained confined to ENEL's production orbit.[32].

Technically, the definition of self-producer is as follows [33]: self-producer is the natural or legal person that produces electricity and uses it at least 70% per year for its own use or for the use of subsidiaries, the parent company and the subsidiaries of the same parent company, as well as for the use of the members of the cooperatives for the production and distribution of electricity referred to in Article 4, number 8, of Law No. 1643 of 6 December 1962, members of consortia or consortium companies formed for the production of electricity from renewable energy sources and for uses of supply authorized in industrial sites before 1 April 1999 (date of entry into force of the decree).

11. Inquadramento normativo dei sistemi di utenza nel contesto liberalizzato

11.1 Simple systems

Without prejudice to historical definitions, user systems have taken on a central role in the liberalised environment. The first official recognition of the role of user systems in simple conformation as tools for

[31] Direct production plant is an electricity production plant of the cooperative directly connected to the electricity grid of the same and intended for the supply of customers members.
[32] "Il processo normativo nel settore dell'energia elettrica" Marco D'Orta - http://webcache.googleusercontent.com/search?q=cache:noq_vp-4mUMJ:bpr.camera.it/bpr/allegati/show/6136_1116_t+&cd=2&hl=it&ct=clnk&gl=it&client=firefox-b-ab
[33] Art. 2.2, legislative decree n. 79/99 http://www.camera.it/parlam/leggi/deleghe/99079dl.htm

self-supply was made by the national regulatory authority with the publication of the aforementioned act no. 54/07. However, it should be remembered that this act was not normally valid, but was only a reconnaissance act. The first legislative act that defines the user system in a liberalized context is Legislative Decree 115/2008 with the introduction of efficient user systems (EUS). The current definition of an efficient user system is as follows[34].

Efficient user system (EUS): system in which one or more electricity production plants powered by renewable sources or in a high-efficiency cogenerative configuration, managed by the same producer, possibly different from the final customer, are directly connected, through a private connection without the obligation to connect third parties, to the consumption unit of a single final customer (natural or legal person) and are carried out within an area, without interruption, net of roads, railways, waterways and lakes, owned or fully available to the same customer and from this, in part, made available to the producer or owners of the relevant production facilities.

The connotation of efficient derives from the fact that the definition was drawn up in the context of a legislative act that transposed a directive on energy efficiency, for this reason, the definition contains, among other things, the characterization of the production that must be particularly efficient (from the energy point of view: high-efficiency cogeneration) or from the environmental point of view (production from renewable sources).

The Ministerial Decree of December 10, 2010 has better clarified the connotation of simple systems by defining a "superior" set of simple user systems in which the SEU could also be enclosed.

Self-Energy Supply System [35] understood as "plant configuration in which one or more power generation plants, even in the ownership of an entity other than the final customer, are directly connected, through a private connection, to the plants for the consumption of a single legal entity, or of several entities belonging to the same group of companies, and are carried out within the area owned or at the disposal of the same customer or group of companies" (Article 2, paragraph 1, letter f) of the Ministerial Decree of December 10, 2010), providing that this configuration, of which the Efficient User Systems (SEU) are a subset, is excluded from the electricity networks and therefore is not subject to the obligation of connection of third parties, nor to the obligation of free access to the system.

In this sense, the EUS became a characteristic portion (especially with regard to the type of production) of the larger set of systems of self-sufficiency in energy.

11.2 Network systems (private networks)

The first official recognition of a private network in the liberalised context dates back to the adoption of Law 99/2009. More precisely, Article 33 of Law No 99/2009 provides for a particular type of private network, called "Internal User Networks" (IUNs), which meet the following definition.

[34] For the sake of simplicity and effectiveness, the precise historical evolution of the definition is not reported except for the aspects considered to be of interest, for the rest it is preferred to deal with the actual existing model.
[35] Article 2.1, f)of the decree of 10 December 2010

Internal user network

(...) an Internal User Network (IUN) is defined as an electricity network whose layout complies with all of the following conditions:

a) is a network existing at the date of entry into force of this law, or is a network whose construction work was started on the same date or all the authorizations required by current legislation were obtained;

b) connects industrial consumption units, i.e. connects industrial consumption units and electricity production units that are functionally essential for the industrial production process, provided that they are included in areas insistent on the territory of no more than three adjacent municipalities, or no more than three adjacent provinces only if the production units are powered by renewable sources;

c) is a grid not subject to the obligation of connection of third parties, without prejudice to the right of each of the parties included in the same network to connect, as an alternative to the grid with the obligation of connection of third parties;

(d) is connected through one or more connection points to a grid with an obligation to connect third parties at a nominal voltage of not less than 120 kV;

(e) it has a responsible party acting as the sole operator of the same network. This entity may be different from the entities owning the consumption or production units, but may not hold transmission and dispatching concessions or electricity distribution concessions.

Article 30(27) of Law No 99/2009 also provided that in order to guarantee and improve the quality of the electricity service to end customers connected to the national electricity system through private networks with possible internal production, the Ministry of Economic Development would establish new criteria for defining the relationships between the network operator, the distribution companies under concession, the owner of the private networks and the end customer connected to these networks. The Regulatory Authority should then have implemented the abovementioned criteria in order to reconcile and safeguard the acquired rights, also with reference to the need for rational use of existing resources.

This resulted in the Ministerial Decree of 10 December 2010 which, among other things, clarified the distinction between public and private networks, introducing a definition of private networks "by difference" with respect to public networks.

Private networks

Private networks, everything that is not a public network and that performs a network function (i.e. the movement of energy between different users) are networks with an obligation of free access to the electricity system: this imposes on the operator of these networks the obligation to guarantee to the subjects connected to their network the possibility of free access to the electricity system according to the procedures defined by the Authority. The definition of private networks is based on the principle that public networks are those operated by persons holding a concession for the transmission or distribution of electricity. These operators, being operators of a public service, have the obligation to connect to their network all the people who request it, without compromising the continuity of service and provided that the technical rules are respected.

Legislative Decree no. 93/2011 has framed the issue of internal user networks and private networks according to European legislation, transposing the concept of a closed distribution system into national law, which has already been discussed in detail in the first part of this document.

Closed distribution systems (as per legislative decree 93/2011[36])
"Without prejudice to the rules on efficient user systems set out in Article 2(1)(t) of Legislative Decree No 115 of 2008, closed distribution systems are internal user networks as defined in Article 33 of Law No 99/2009 of 23 July 2009 and other private electricity networks as defined in Article 30(27) of Law No 99/2009 (...)".

In summary, only IUN and other private networks are considered closed distribution systems under Italian law.

11.3 Main differences between simple systems (EUS) and CDS

The fundamental difference between a simple system of users and a closed distribution system is the publicistic characteristic carried out by the connection between the various elements that make up the system; in simple terms, in a simple system of users the transfer of electricity from production to consumption is not configured as an activity of distribution of electricity, while in a closed distribution system (private network) the transfer of energy is intended as carried out through a distribution network that is the electrical system of the system itself. The difference is absolutely significant in terms of the obligations that the system operator has to assume. In particular, in a simple user system the operator is the same and only final customer, while in a closed distribution system (private network) the operator assumes the role of distributor and is required to comply with the rules applicable to electricity distributors with the only difference that the tariffs applicable to the distribution service are defined independently by the operator and are not subject to regulation by an external body, the same applies, in general, for the quality standards of the service provided.
There is another significant difference between the two systems is the development dynamics that affect them (this does not derive from primary European provisions, but as will be seen later, the condition refers to the current state of regulatory evolution in the national field, the same applies to the question of the application of the dispatching charges of which we have already mentioned in part above): while a simple system of users has the possibility of expanding and reconfiguring itself over time, albeit in compliance with the definition of EUS, a closed distribution system, to be such, must have existed on August 15, 2009 and the territorial area that characterizes it can not change over time compared to the aforementioned date of August 15, 2009.

The most important aspect that characterizes a simple system of users in respect of the closed distribution system is that of the presence of a single end customer with the consequence that the possible presence of additional end customers (to be understood as physical or legal entities other than the person who is the owner of the point of connection to the network and who consume electricity for their own use) must be managed in such a way that these customers meet their needs through an independent purchase without them being entitled to the tariff benefit arising from the self-consumption of production within the system. This autonomy regime is substantiated by the creation of an independent grid connection point for each third party final customer and the meaning of connection point must be understood as the presence of a meter that establishes the commercial presence (in relation to the provision of the distribution service) at the point of measurement of the public distributor. It follows that the connection point can be both real and "virtual", i.e. only through the installation of a meter inside the system and not also through a real physical connection with the public distributor.

[36] Article 38.5 legislative decree n. 93/2011

11.4 Tariff aspects

As far as the tariff aspect is concerned, reference is made below to the temporal evolution of the discipline that has established over time the different articulation of the tariff benefits for the user systems.

- (2008) The first version of the legislative decree that defined the EUS had established that the regulation of access to the electricity system for the EUSs should be carried out exclusively with reference to electricity exchanged with the electricity grid at the connection point, i.e. the variable part (energy share) of the tariffs covering network costs and system charges.

- (2009) Subsequently, without prejudice to the EUS rules, the law defining the IUN established that, as a general rule, system charges should be paid over the entire consumption, with the exception of the IUN, whereby the variable components (energy share) of the fees covering system charges should be paid only in relation to the energy exchanged by the IUN with the public network.

- (2014) It is Decree Law 91/2014, converted into Law 116/2014, which rationalizes the previous provisions, establishing that the general regime of payment of system charges is that for which these must be applied to consumption in any case supplied. For internal user networks and for EUSs (and equivalent systems), which enter into operation by December 31, 2014, the fees covering general system charges, limited to variable components, apply to electricity consumed and not withdrawn from the network, to the extent of 5% of the corresponding unit amounts due on energy withdrawn from the network. In this way, the exemption from payment of charges on energy consumed by the system is no longer total, but partial.

- (2017) Law No. 19 of 27 February 2017, converting Decree Law No. 244 of 30 December 2016, consolidated the new system of payment of general system charges (currently in force). More specifically, the scheme for the payment of general charges was amended, which, under the previous scheme in force until 31 December 2016, had to be paid by customers on the basis of consumption, regardless of whether or not customers had internal self-production. This general system did not apply, as already mentioned in the previous point, to particular cases such as internal user networks and efficient user systems, for which the rule was that the aforementioned tariff fees should be applied only to electricity taken from the network (which resulted in significant economic savings in the case of self-production), less than a share of contribution to consumption corresponding to only 5% of the total. The new regime provides that the above tariff fees must be applied only to the withdrawal of electricity from the network whatever the system of production and consumption, establishing this as a general regime and no longer as a particular one. It should be noted that the rule does not intervene to change the types of systems that can be implemented, but only intervenes to say how the system is called to cover the general costs.

11.5 Obligations on different systems

Per quanto concerne gli aspetti funzionali dei sistemi di utenza, il già citato decreto Ministeriale 10 dicembre 2010 ha stabilito, in particolare, i seguenti obblighi:

i) l'obbligo, per i gestori delle reti private, di consentire agli utenti finali che vi siano connessi di richiedere ed ottenere il collegamento, fisico o virtuale, alla rete pubblica;

ii) l'obbligo, per i gestori delle reti private, di consentirne l'utilizzo da parte dei gestori delle reti pubbliche al fine di assicurare il diritto degli utenti finali di ottenere la connessione alla rete pubblica. Tali obblighi sono frutto dell'individuazione, effettuata dal decreto, di nuovi criteri

per la definizione dei rapporti intercorrenti fra gestori di reti elettriche di trasmissione e di distribuzione in concessione, gestori di reti elettriche private e soggetti connessi a tali reti.

E' da tali criteri che scaturiscono definitivamente nel settore italiano i due obblighi già citati in precedenza:

a) **obbligo di connessione di terzi** in senso stretto, inteso come l'obbligo, posto in capo ad un gestore di una rete elettrica, di connettere alla propria rete tutti i soggetti che ne fanno richiesta, senza compromettere la continuità del servizio e purché siano rispettate le regole tecniche all'uopo previste a cui sono sottoposti i soli gestori di rete titolari di una concessione di trasmissione o di distribuzione;
b) **obbligo di libero accesso al sistema elettrico**, inteso come il diritto di un soggetto connesso ad una rete privata di accedere, su richiesta, alla rete pubblica, a garanzia della libertà di scelta del proprio fornitore di energia elettrica a cui sono sottoposti i gestori di reti private, ivi inclusi i gestori delle reti interne di utenza. Tali gestori non hanno l'obbligo di connettere alla propria rete tutti i soggetti che ne fanno richiesta (obbligo di connessione di terzi), attribuito solo ai gestori di rete titolari di una concessione pubblica, ad eccezione delle RIU in relazione ai soli utenti connettibili (secondo la definizione di SDC).

Nel contempo, decreto Ministeriale 10 dicembre 2010 ha dato mandato all'Autorità affinché questa:

a) determini i criteri e le condizioni in base ai quali un gestore di rete titolare di una concessione di distribuzione o di trasmissione dell'energia elettrica può disporre delle infrastrutture di un gestore di rete sottoposto all'obbligo di libero accesso al sistema elettrico, per l'esecuzione di attività legate all'erogazione del servizio di distribuzione o di trasmissione, ivi inclusa l'erogazione del servizio di connessione;
a) individui i rapporti, ivi incluse le condizioni economiche, tra un gestore di rete sottoposto all'obbligo di libero accesso al sistema e il gestore titolare di una concessione di distribuzione o di trasmissione dell'energia elettrica, con l'obiettivo di garantire condizioni efficienti per l'accesso alla rete pubblica da parte dei soggetti che ne fanno richiesta, siano essi già connessi ad una rete privata ovvero richiedenti una nuova connessione;
b) individui apposite misure per monitorare l'aggiornamento dei soggetti appartenenti ad una RIU, prevedendo opportuni accorgimenti atti a contenere l'estensione territoriale di tali reti.

With regard to the functional aspects of user systems, the aforementioned Ministerial Decree of 10 December 2010 established the following obligations in particular:

i) the obligation for private network operators to allow connected end users to request and obtain a physical or virtual connection to the public network;
ii) the obligation for private network operators to allow their use by public network operators in order to ensure the right of end users to obtain connection to the public network. These obligations are the result of the identification, carried out by the decree, of new criteria for the definition of the relationships between operators of electricity transmission and distribution networks under concession, operators of private electricity networks and subjects connected to these networks.

It is from these criteria that the two obligations already mentioned above arise definitively in the Italian sector:

a) **third party connection obligation** in the strict sense of the term, understood as the obligation imposed on an electricity system operator to connect to its own network all those who request it, without compromising the continuity of service and provided that the technical rules laid down for that purpose and to which only network operators holding a transmission or distribution licence are subject are complied with;
b) an **obligation of free access to the electricity system**, meaning the right of a person connected to a private network to have access, on request, to the public network, guaranteeing the freedom of choice of his electricity supplier to which private network operators, including operators of internal user networks, are subject. These operators are not obliged to connect to their own network all those who request it (third party connection obligation), which is assigned only to network operators holding

a public concession, with the exception of the IUN in relation to connectable users only (as defined by the CDS).

At the same time, the Ministerial Decree of 10 December 2010 gave the Authority a mandate to carry out a public concession:
a) determines the criteria and conditions on the basis of which a network operator holding a concession for the distribution or transmission of electricity may dispose of the infrastructure of a network operator subject to the obligation of free access to the electricity system, for the performance of activities related to the provision of distribution or transmission service, including the provision of connection service;
(a) identify the relationships, including economic conditions, between a network operator under an obligation of unrestricted access to the system and the operator holding a concession for the distribution or transmission of electricity, with the aim of ensuring efficient conditions for access to the public network by those who request it, whether they are already connected to a private network or requesting a new connection;
b) identify appropriate measures to monitor the updating of entities belonging to a IUN, including appropriate measures to contain the territorial extent of such networks.

11.6 The judicial framework and its implications

The provisions introduced by the ministerial decree of December 10, 2010 have been challenged by Enel Distribuzione. [37] who contested several aspects of it. According to Enel Distribuzione, in fact:

- the rules set out in the aforementioned decree, allowing, albeit implicitly, the possibility of building new private electricity networks in addition to the existing ones, allow their proliferation in contrast with the regime of exclusive distribution activities of the concessionaires;
- since it is not expressly forbidden for the owners of private networks to connect new users, the decree would in fact allow the exercise of the activity of distribution even to non-licensees;
- the decree would introduce a new plant configuration (the Self-Provisioning Energy System) not provided for by primary legislation;
- the decree would introduce provisions that would be exorbitant with respect to the indications of the primary standard.

The Lazio Regional Administrative Court, with sentence no. 6407 of 13 July 2012, partially upheld Enel Distribuzione's appeal:

- annulling Article 2(1)(f) and Article 6 of the Ministerial Decree of 10 December 2010 in so far as, by defining a new case (the SAAE (Self-Energy Supply Systems)), they would unlawfully expand the area of configurations not covered by the electricity grids, at the same time reducing the area of the grids, in the absence of a primary rule legitimising such an operation and, above all, without this finding adequate justification in the mandate provided for in Article 30(27) of Law No. 99/09 based on the aim of increasing the quality of the electricity service in favour of final customers connected to the national network through private networks;
- rejecting, on the other hand, the other objections raised by Enel Distribuzione on the grounds that, according to the Regional Administrative Court, the decree did not introduce any liberalisation of private networks, nor did it provide for such liberalisation, nor is it permitted by the primary legislation. In fact, although the decree does not expressly prohibit private network operators from connecting third parties, that prohibition is already enshrined in the primary legislation and, in particular, in the provisions of Legislative Decree No 79/99, which establish the licensing system for distribution activities. In this context, therefore, the Regional Administrative Court confirms, in line with the structure defined by Legislative Decree no. 79/99, that the distribution (public service) activity can only be carried out by concessionaires and, exceptionally, by other subjects for whom there are precise provisions in primary legislation (for example:

[37] Now e-distribuzione Spa

operators of small isolated networks and those authorized to operate the limited portions of the transmission system that are not directly functional to the same).[38]

Ultimately, according to the TAR, the distribution activity is carried out exclusively by the concessionaires and therefore the private networks are to be considered as a historical category, which cannot be extended either through an extension of the existing networks through the connection of new end customers, or through the construction of new private networks.
In this respect, therefore, Law No 99/09, in defining the URIs (Article 33) and in providing for all private networks that acquired rights and the rational use of existing resources are safeguarded (Article 30, paragraph 27), limits itself to acknowledging and regulating a pre-existing factual situation and rationalising it.

It is quite evident, as the Authority also concludes in a consultation document, as well as in numerous reports and opinions in the institutional sphere, that, from an evolutionary point of view, sentence no. 6407 of the Lazio Regional Administrative Court makes it necessary to revise the general approach of the defining framework in matters of Simple Systems of Production and Consumption and Private Networks.

[38] To these entities should be added the closed distribution system operators.

CHAPTER III
THE STATE OF DEVELOPMENT AT EUROPEAN LEVEL

12. Preconditions for the European survey

In order to compare the state of national development with European foreign systems, a series of direct contacts with foreign regulators was initiated as part of this study on the basis of a simple ad-hoc questionnaire. This part provides a first simple and general review of the responses. It should be noted that, as is also happening in Italy, the issue of user systems in general and, in particular, closed distribution systems is undergoing rapid evolution in all countries. Therefore, at the moment, in-depth studies are still underway with the individual regulatory authorities, which will be reported to readers at a later date.

13. Questionnaire

The Questionnaire used for the purposes of this survey is set out below.

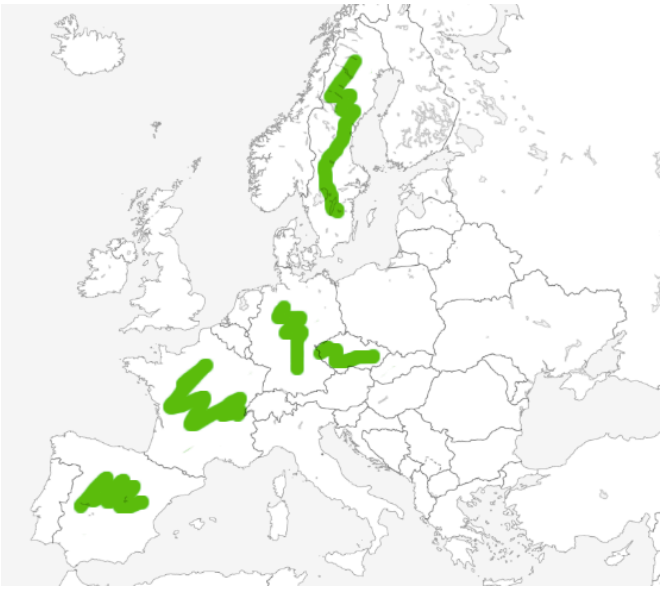
Questionario

Q1 - Does the definition of closed distribution system (CDS) apply in your country? If so, are there any relevant laws/rules?

Q2 - Is self-consumption allowed and, if so, under what conditions? Are there any reference laws/rules?

Q3 - How, if any, is the tariff system applied in the case of CDS and own consumption?

The reporting countries (as of the date of publication of this report) are as follows:



14. Main reults (preliminary)

Q1	**Does the definition of closed distribution system (CDS) apply in your country? If so, are there any relevant laws/rules?**
SE	Yes, Electricity Act, Chapter 2, 2§ (Ellagen, SFS 1997:857) and Regulation concerning exemption from the requirement of concession (Förordning (2007:215) om undantag från kravet på nätkoncession enligt ellagen (1997:857))
FR	Closed distribution systems are specified by law, in the articles L. 344-1 à L. 344-13 of the energy-code
ES	n.a.
DE	In Germany, there is no legal definition of closed distribution systems. Of course, there are some special rules for closed distribution systems. These are outlined in § 110 EnWG. Operators of closed distribution systems have to substantiate towards Bundesnetzagentur that their distribution system fulfils some necessary requirements stated in § 110 EnWG. Bundesnetzagentur then can classify a distribution system as closed distribution
CZ	There are no closed DS in the meaning of art. 28 as it has not been transposed into Czech law. The Czech republic has not transposed the Article 28 of Directive 2009/72.
Q2	**Is self-consumption allowed and, if so, under what conditions? Are there any reference laws/rules?**
SE	Yes, Regulation concerning exemption from the requirement of concession (Förordning (2007:215) om undantag från kravet på nätkoncession enligt ellagen (1997:857))
FR	Self-consumption is permitted in France. A law form july 2016 also introduce “collective self-consumption”, which enables consumers and producers situated on the same part of the network to exchange energy
ES	Sobre el autoconsumo, la regulación que le aplica es el RD 900/2015, de 9 de octubre, por el que se regulan las condiciones administrativas, técnicas y económicas de las modalidades de suministro de energía eléctrica con autoconsumo y de producción con autoconsumo.
DE	In general, self-consumption is allowed regardless of the grid the self-consumer is connected to. However, self-consumption is only possible if three requirements are met: 1. The producer of electricity and the consumer must be the very same (legal) person. 2. Production and consumption have to take place in a direct territorial context. (i.e. grid usage is not allowed) 3. The producer of electricity has to be the operator of the unit producing the electricity.
CZ	Yes, self-consumption is permitted.
Q3	**How, if any, is the tariff system applied in the case of CDS and own consumption?**
SE	As it is exempted the tariff regulation is not applicable.
FR	CRE published a deliberation on the application of network tariff to self-consumers. Individual self-consumers as any other consumer, on capacity and energy withdrawn from the network (possibly with time differentiation). Collective self consumer can ask for a specific tariff, that distinguishes between “local consumption” and “national consumption”-
ES	Rl Real Decreto 900/2015 ha sido modificado –y derogado en parte- por el RD Ley 15/2018, de 5 de octubre, de medidas urgentes para la transición energética y la protección de los consumidores. Lo que afecta a autoconsumo figura en el artículo 18, en la disposición adicional segunda, disposición transitoria segunda y disposición derogatoria única
DE	Self-consumers do not have to pay network tariffs on the amount of self-consumed electricity but self-consumers do have to pay the renewables surcharge. With respect to this, there are some exemptions for small renewables and chp (installations smaller than 10kw) and there are reductions for renewables and CHP bigger than 10 kw. These pay only 40% surcharge. All others have to pay except old installations that were installed and operated as self-consumption installations before the rules on surcharge for self-consumption were introduced. They have the right of continuance.
CZ	N.A.

As mentioned, further updates will be made available on the subject.

CHAPTER IV
METHODS OF ANALYSIS

15. Introduction

The question arises of developing a sufficiently general methodology that allows the evaluation of the convenience from the point of view of the user to proceed to the realization of a system of users. This part of the document will provide practical guidance on how to proceed on the basis of the experience gained in the implementation of numerous user systems.

16. Process

The phases of establishing a system of users embrace a complex and articulated set of activities that require knowledge of different areas ranging from the technical to the regulatory and economic. Moreover, from the moment in which the analysis of the convenience of a user system is closely connected to the context conditions that regulate the access and use of networks, this is all the more "good" in that it allows the user to assess and quantify the risk profiles that the implementation of a user system brings with it.

16.1 Initial context elements

The initial elements of context that must be known for carrying out a convenience analysis of a user system relate:

- the system models allowed by the regulations;
- the technical and regulatory framework for access to and use of electricity networks.

With regards to system models allowed it is necessary to refer to specific regulation of each Country.

As far as the technical and regulatory framework for access to and use of electricity grids is concerned, a distinction needs to be made:

- the regulation of grid connection (connection tariffs)
    - they are the conditions to be met in order to connect a mixed system to the network (i.e. consisting of both a consumer and a production user): they concern both economic conditions and procedural conditions;
- regulation of network use (usage tariffs)
    - they are, in practice, the network tariffs for the use of electricity grid.

In addition to the second conditions, other cost components must be taken into account:

- the dispatching fees that are typically charged on the electricity withdrawn at the point of connection to the networks;
- tariff fees to cover other costs than network costs (system charges, e.g. renewable support development costs).

A very important aspect is the rate of updating of the tariff components. In fact, from the moment in which the tariffs are charged as general value for all users regardless of the date of entry into operation, the revision of the tariff components can lead to a discontinuity in the implementation of business plans of energy user systems.

The tariffs for use and to cover system charges can be broken down into different components. For the purposes of a general discussion, a trinomial formula must be assumed for all components so as to allow a very general approach, case by case the different parts can then be set at zero (for example, in the

case of a fee for access to the network that is applied only to energy will have fixed quotas and for power set at zero).

- Connection charge = CC
- Use of system charge = UOC
- Levies charge = LC
- Balancing charge = BC

For example, with regard to the specific Italian situation, the matrix of fees is as follows:

Italian matrix of fees			
	Fixed	Power	Energy
Charge	(euro/point of connection/year)	(euro/kW/year[39])	(euro/kWh)
CC	X		
UOC	X	X	X
LC	X	X	X
BC			X

16.2 Economical convenience analysis

The analysis of economic convenience is initially dealt with for a simple user system; the analysis methodology will then be illustrated in the case of a closed distribution system.

First of all, it is necessary to check what is the system for applying charges to self-produced and self-consumed energy for the specific system to be adopted: this depends on the specific legislation or regulations in force in the country.

For example, on the basis of current Italian legislation, the presence of an efficient user system or a closed distribution system means that the variable components of the network tariff and system charges (euro/kWh component) are not applied to the electricity produced and self-consumed within the system. It is quite clear that the maximum level of benefit is directly related to the degree to which the system's electricity consumption is covered by internal production.

In relation to the avoided network costs between the two systems under analysis there is the difference that while in the efficient user system the tariff savings also concern the dispatching item, for closed distribution systems the dispatching item is to be considered applied to the entire consumption even if it is covered by internal production. However, the matter of the application of dispatching charges is still the subject of litigation and could converge towards a different structure from that currently in force.
In short, it can be said that the tariff benefit connected to user systems is the greater the higher the level of self-consumed production, and that there is a difference between efficient user systems and closed distribution systems for dispatching in favour of efficient user systems that are not required to pay this component on the energy produced and self-consumed within the system.
With regard to the structure of the tariff, it should be noted that from 1 January 2018 the tariff reform came into force, which, in addition to a change in the items of the bill, attributes a greater weight to fixed components than to variable components. More specifically, with Resolution 922/2017/R/EEL, the Authority completed the reform of the tariff structure for general system charges for non-domestic

[39] Typically, the power taken as a reference is the so-called "committed power", i.e. the maximum quartorary power in each month applied to 1/12 of the annual fee

customers in the electricity sector, coordinating it with the new mechanism for recognising subsidies for energy-intensive businesses, and approved the new Integrated Text of the provisions for the provision of electricity transmission and distribution services (TIT) effective from 1 January 2018.

More generally, given a particular user who wants to create a simple system of production and consumption, these will face a series of costs/revenues that can be summarized as follows:

	Costs (CO)	Avoided costs (AC)	Revenues (RE)
Fixed	• Costi per studi, progettazione • Costo processo autorizzativo • Costo di connessione alla rete dell'unit√† di produzione (CC) • Costo di realizzazione dell'impianto		
Variables	• - Operating cost of the production unit in terms of operating costs and fuel purchase costs (specific case of a cogeneration production unit)	On the part of electricity produced and consumed by the customer - UOC (energy share) - LV (energy share) - BC (energy share) - Market price for the purchase of self-consumed energy	In cases where the producer and the final customer are two different parties, the total avoided costs constitute a margin which is normally allocated between producer and customer on the basis of an internal agreement between the parties.[40].

Under current conditions in the Italian system (first quarter of 2018), the intrinsic value of own consumption, assuming a value for the dispatching fee of 0.8 euro cent/kWh, is shown in the table below.

The first quarter of the year 2018 is taken as the reference, as this is the best representation of the real situation. As is well known, in the subsequent tariff updates adopted by the Authority in 2018, it exercised a power of tariff policy to shield users from the constant rise in the price of energy on the market. In order to avoid an increase in energy prices to final consumers, the Authority has zeroed and frozen some tariff components to cover general costs. This situation cannot, of course, last indefinitely and sooner or later the uncollected charges will have to be recovered. However, this element also provides important information on what may be the risk profiles of economic assessments of user systems.

[40] This agreement does not represent an activity of sale of electricity intercepted by the regulation of the authority, but is the result of a pure private agreement to which are applicable only the rules of civil and commercial nature.

Application of closed distribution systems to the case

The case of the simple user system is directly transposable on the CDSs if one considers that, from the point of view of network and system charges, these are treated as a whole as a simple system. It will then be the CDS operator who will have to share among all CDS users the charges that should be paid at the connection point in terms of fixed quota, power quota and energy quota on the part of the energy taken from the interconnection point and not produced internally. The same CDS operator is required to collect these charges from its network users and to pay them to the system.

More in detail, the quantification of the charges that must be paid in total is given by the sum of the following components:

(a) the components A and UC expressed in euro cents/point of withdrawal per year, applied at each interconnection point of the CDS to the public network
(b) components A and UC expressed in euro cents/kW committed per year, applied at each interconnection point of the CDS to the public network;
(c) components A, UC and MCT expressed in euro cents/kWh, applied to the total electricity taken from the public grid by the CDS.

As regards the distribution of the charges among the various users, the CDS operator is required to operate as follows.
The operator of a CDS calculates the amount of the general system charges directly attributable to the individual final customers who use its own network and invoices them to the relevant sales companies under the transmission contract, and for this purpose
(a) the total amount of the components referred to in subparagraph (a) above shall be apportioned among all end-user customers of the CDS using as weights the charges that would have been applied to individual end-users on the basis of the voltage level at the point of connection of the relevant customer to the CDS;
(b) the total amount of the components referred to in subparagraph (b) above shall be distributed among all end-customers who use the CDS in proportion to the power used at the point of connection of the relevant end-customer to the CDS;
(c) the total amount relating to the components referred to in subparagraph (c) above shall be distributed among all end-customers using the CDS in proportion to the electricity withdrawals from the CDS measured at the point of connection of the relevant user to the CDS.

16.3 Process flow

The process flow for the establishment of a new user system can be summarised as follows.

- Feasibility analysis and economic evaluations (including sentivity analysis for the management of risks connected to the operation of user systems)
- Design - authorizations
- Grid connection request (includes the activities of plant registration and all activities leading to the stipulation of the operating rules and the entry into operation of the plant)
- (in the case of a manufacturer third party to the user) conclusion of the internal contract between the user and the manufacturer and its commercial management

- Monitoring of the regulatory situation and the trend over time of the tariff components relevant for maintaining the validity of the economic viability conditions
- Conduct of annual procedures/various declarations

16.4 Configuration of the internal reports of the user system

With regard to the relations between the subjects within a user system, in this case those who are particularly important when the producers and the final customer do not correspond, have already been the subject of recognition by the Italian regulation authority and for the purposes of this discussion it will be sufficient to refer to this recognition. For this purpose, please refer to the following link (in Italian) - https://www.arera.it/allegati/elettricita/profili_SSPC.pdf .

17. Identification of users

The identification of users, also called consumption units (CU), is independent of the classification of the user system and represents, indeed, the starting point of any consideration.

In order to identify the CUs, the current regulations use the following definition, as amended and supplemented by resolution 894/2017/R/eel, according to which the consumption unit (CU) is the set of plants for the consumption of electricity connected to a public network, also through networks or private power lines, such that the total withdrawal of electricity relating to the aforesaid set is used for a single use or production purpose. It normally coincides with the individual property unit. It is possible to group several building units into a single consumption unit in the following cases:

- real estate units in the full availability of the same natural or legal person linked by a bond of pertinence (main real estate unit and its appurtenances) and that insist on the same cadastral parcel or on contiguous parcels;
- pertinent real estate units (floors, garages, cellars), even in the availability of several natural or legal persons, forming part of a single condominium. The aforesaid set of pertinent real estate units can in turn be incorporated into the consumption unit relating to condominium users;
- real estate units in the full availability of the same legal entity, possibly made available by the latter to third parties, located on adjacent land parcels, within a single site and used for production activities of goods and / or services intended primarily for the construction, in that same site, a single end product and / or service.

According to the definition drawn up by the Authority, each consumption unit is connected to the public network at a single point, unless the activation of an emergency connection point is not required [...] Each consumption unit must necessarily be associated, depending on the particular type of use of the electricity withdrawn, with a single transport contract for withdrawal.

With regard to the last of the above paragraphs, the same Authority has clarified that, in such cases,

- the legal person carrying out the main activity is the final electricity customer and provides services, not electricity, to the subjects carrying out the secondary activities (they are typically the so-called "service providers"): therefore, an internal activity of sale of electricity cannot be configured and there must be no invoicing regarding electricity consumption;
- availability is to be understood not only in the sense of possession of a contractual title attesting to the right of use by a specific person, but also in the sense that the same person coincides with the final customer (i.e. it must be the person who uses the electricity supplied to that group of real estate units for his own final consumption and must be the holder of the POD code).

The possibility of including third parties in a UC according to principles of functional competition (the so-called "service providers") is an element clarified only at the end of 2017 and represents a very important

element for the analysis in question. As regards its application, it is considered that a conservative criterion should be adopted that identifies functional competition on the basis of the relationship between the input/output of the third party and the activity carried out by the main subject. In other words, in the case in which the third party receives hospitality from the principal subject in structures in the full availability of the principal subject and is made available by the principal subject to the third party and the output of the latter's activity mainly flows into the output of the principal subject, then it is not necessary for the third party to configure an autonomous consumption unit. On the contrary, in the case in which the third party, eventually also hosted by the main subject, uses spaces, services and the electricity deriving from the connection to the plants of the main subject to carry out its own activity, the usefulness of which does not fall within the scope of the activities supplied by the main subject (or falls marginally within it), for it, provided that the conditions for the identification of a real estate unit associated to it on an exclusive basis are met, an autonomous CU must be identified. For the purposes of the analysis of the CU, it is, therefore, of fundamental importance:

- carefully isolate the object of the activity of the principal subject and verify the relations between the activity of the third subject and that of the principal subject;
- correctly carry out the cadastral analysis in order to verify the exclusive associability between the third party and any property unit occupied by it.

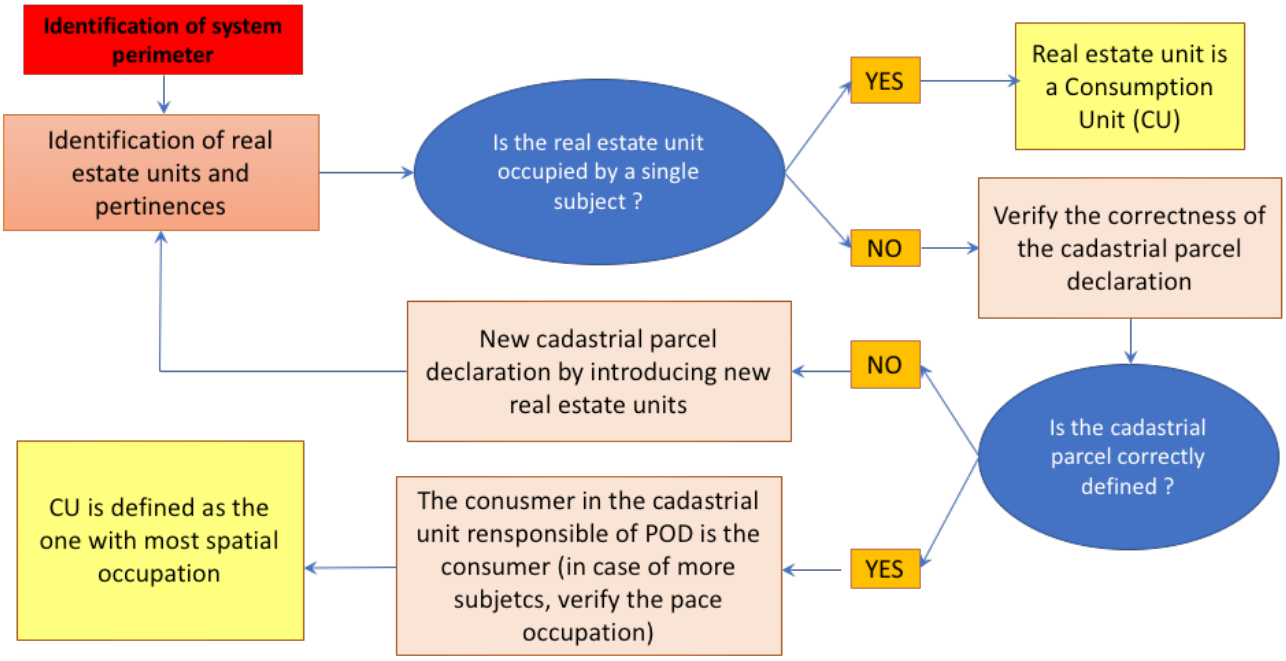
Rapporto tra unità di consumo e unità immobiliari

In order to correctly identify the consumption units and the relationship between them and the land registry regulations, the clarifications on the subject published by the Authority must be taken into account (see FAQ Authority of 1 January 2018 with particular reference to Section F of which the main elements are reported below).[41]). In this respect, it is useful to recall what the Authority concludes in its clarifications, namely:

- The real estate unit is defined by cadastral law as any building, or portion of a building or set of buildings, or an area that belongs to the same owner and that, in the state in which it is located and according to local use, has potential for functional and income autonomy and therefore represents an independent asset. The real estate unit is therefore identified through three different parameters: (1) is a physical entity: an entire building (boarding school, school, etc.), or a portion of a building (apartment, shop, etc..), or a set of buildings (factory, barracks, hospital consisting of several pavilions, etc..); (2) is a legal entity: belonging to the same owner as a cadastral company; (3) is an economic entity: an independent asset, understood as a minimum real estate perimeter with the capacity to produce an independent income and therefore having functional and income autonomy;
    - if in a single real estate unit distinct legal persons carry out distinct activities, it constitutes a single unit of consumption; it remains of course necessary to verify whether the stacking carried out complies with the current cadastral legislation;
    - if there are two or more separate building units, in each of which the consumption of electricity is attributable to a separate legal entity or a distinct product and / or service, it is not possible to consider all these building units as a single unit of consumption.

The process flow for the identification of CUs can therefore be summarised in the following figure.

[41] https://www.arera.it/it/schede/O/faq-tisspc_faq.htm



More in detail, the Authority has indicated that in the presence of complex structures such as ports, airports, railway stations, the cadastral regulations require that they be distinguished:

- buildings or parts of buildings used by travellers and transport staff, such as ticket offices, waiting and embarkation rooms, traffic control rooms, toilets for travellers and staff, areas occupied by tracks (i.e. airport runways or maritime piers) and quays for public service, are undoubtedly part of the public service provided, including those used for the handling of goods, the car parks located within the perimeter of the station that can be used by employees, the areas used by or for the parking of transport vehicles served by the station, the premises used for first aid, those used for the storage of luggage, as well as the premises, of limited size, used for security and order services, when located in the buildings housing the station. The following also constitute a single asset with the "station", strictly functional to the management of the transport infrastructure: control towers, warehouses and areas for the temporary storage of goods, areas or workshops for the ordinary maintenance of means of transport, plants for the transformation and production of electricity, necessary to ensure continuity in the functionality of the station, fuel storage and distribution plants for the transport service within the station and any other space or premises essential to the operation of public transport - which can therefore be seen as a single property unit and a single unit of electricity consumption: "station" property unit).
- from buildings or parts of buildings in which activities are carried out that do not appear to be strictly functional to the provision of the aforementioned service - constitute autonomous real estate units, census in ordinary or special categories, houses and guest houses, premises hosting bars or restaurants, the resale of newspapers and tobacco, premises used for the sale or display of any other goods, shopping malls, duty free, hotels, hostels, dormitories, and public or private offices, the premises of the after-work. The following are also considered autonomous real estate units: barracks for supervisory and security bodies if housed in specific buildings, hangars and sheds for the construction and/or extraordinary periodic maintenance of vehicles and their housing, warehouses, storage areas for storage containers or goods in general, garages and parking areas specially built and other destinations independent of public transport services - the latter should be counted as separate building units, as they are not closely related to the transport service and this regardless of whether they are physically located within the "station enclosure"; consequently, the aforementioned building units, distinct from the "station" building unit, must each be identified as a separate electricity consumption unit.

With regard to the relationship with entities (e.g. government agencies), which is particularly implemented at the airport, the Authority has clarified that in the presence of legal provisions that make the exercise of public transport activities subject to the free provision of premises and services, including the supply of electricity, by the public service concessionaire, to the State Administrations and to the entities and bodies responsible for controlling and supervising such transport (the Air Force, ENAC, the State Police, the

Guardia di Finanza, etc.), if these assets are seen as separate building units from the 'station' building unit, they may be included in the 'station' consumption unit, since the following conditions are met at the same time:

- the supply of electricity is subject to a specific legal requirement;
- is carried out free of charge;
- is carried out in relation to one or more persons who do not carry out an economic activity aimed at carrying out a service or good that is the subject of remuneration by the public service concessionaire.

Finally, with regard to the issue of appurtenances, it should be noted that the notion of pertinence can be found in Article 817 of the Italian Civil Code according to which: "Appliances are those things which are permanently intended to be used as a service or as an ornament to another thing. The purpose may be carried out by the owner of the main thing or by a person who has a right in rem in respect of the same". It can therefore be assumed that two conditions are necessary for the existence of a pertinential relationship between two assets:

- objective: the destination must be characterized by the requirement of durability, to be understood that the pertinential relationship is not merely occasional, and must be an ornament of another thing to be understood as the main good;
- subjective: the willingness of the owner or holder of a right on both things to place relevance in a relationship of functional instrumentality towards the main good.

CHAPTER V
INDICATIONS FOR THE FUTURE

18. Introduction to the indications

On the basis of all the above, it can be understood that, whatever the application regime of the charges, there is no doubt that the user systems enjoy a tariff benefit corresponding to the non-payment of the variable portions of the general charges (and also of the grid charges) for electricity produced and self-consumed on site or in any case within the user system identified. Such a regime inevitably implies that the economic collection for the coverage of the charges is reduced and that such reduction goes to fall on those users who do not have the possibility or choose not to proceed to adopt models of self-supply or to be part of private networks (provided that this is possible for them). This poses a great dilemma of social acceptability of a hypothetical manoeuvre of great openness to the model of self-consumption which needs to be faced.
Once the potential dimension of the self-consumption market has been clarified on the basis of the evaluation of its impact on the different types of users, two further questions must be faced:

- The first concerns the introduction of a function to control tariff inequality.
- the second concerns the generalisation of the definitions of user systems and private networks.

Finally, it will be necessary to proceed with the development of regulatory models for the management of the various systems, not least of the local energy communities.

19. The issue of social acceptability

In recent months, there have been major debates on existing and new models of user and self-consumption systems. As in any market, the models have their importance, but it is the thickness of this market and the actual operability that determine its fate.
Therefore, before entering into endless model discussions that risk remaining an end in themselves, the real first question to be asked is how much this market could be worth and whether the system is able to withstand the impact that the effects of this market would have in terms of social acceptability (in terms of redistribution of tariffs).
As in the past, at the beginning of the expansion of distributed generation, the Italian regulatory authority was concerned to assess the hosting capacity of networks, it is natural that now it is necessary to deal, before anything else, with the social acceptability of the tariff effects induced by the user systems.

Following this path, it is useful to recall the development potentials of the two technologies that are mainly candidates for the development of user systems, namely (efficient) cogeneration and the production of electricity from photovoltaic solar energy. As far as cogeneration is concerned, it is sufficient to recall the assessments carried out by the Ministry of Economic Development, through the GSE, on the potential of CAR according to the indications set out in Article 10 of Legislative Decree 102/2014 transposing Directive 2012/27/EU.[42]. The estimated technical potential of electricity from cogeneration is shown in the table below.

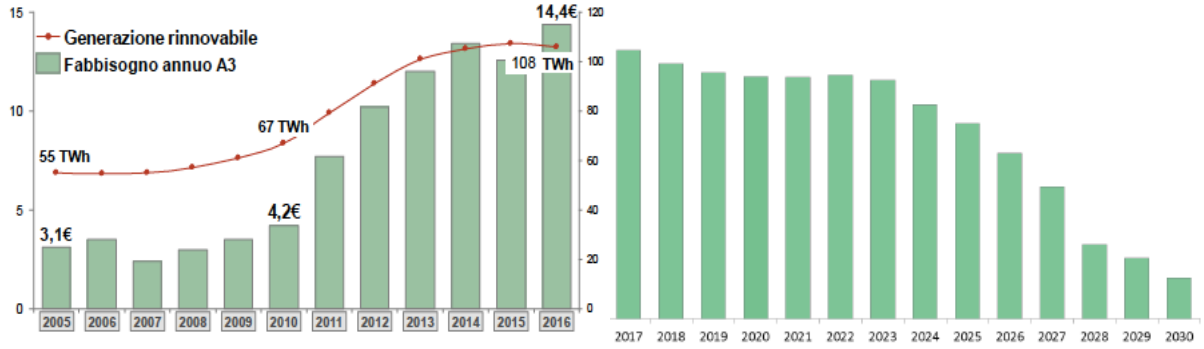
42 https://ec.europa.eu/energy/sites/ener/files/documents/it_potenziale_car_tlr_nazionale_e_regionale_dic_2016.pdf

Potenziale (tecnico) cogenerazione - Energia elettrica (GWh)						
Settori						
Domestico	Monofamiliare		Medio condominio		Grande condominio	**Totali**
	6.226		1.968		1.717	8.194
Terziario	Sanità		Alberghiero		Altro	
	Struttura sanitaria minore	Ospedale	Piccolo albergo	Grande albergo		
	1.614	2.521	352	595	1.843	7.469
Industriale						40.637
Totale						**56.300**

As a conservative measure, for the assessments that follow, the technical potential is considered and not the economic potential (which is lower than the technical one) precisely because it is assumed that the political choices go in the direction of relaxing the regulatory constraints that at this time prevent us from moving from the economic potential to the technical one.
As far as the potential of photovoltaic production is concerned, the assessments of the International Energy Agency - Photovoltaic Power Systems Programme (IEA-PVPS, Task 7), which has quantified the potential of integrated photovoltaics in buildings in some OECD countries, remain valid. For Italy, an area of roofs potentially available for the inclusion of PV has been estimated at 763.53 km^2 (about 410 km^2 for residential buildings and the remainder in agricultural, industrial and commercial buildings) and an area for facades of 286.32 km^2 (for a total per capita value of about 18 m^2). The potential production from photovolatics in Italy would be about 126 TWh/year.[43]
The energy consumed by the user systems could therefore be increased from the current 30 TWh to a potential range between 100 and 150 TWh.

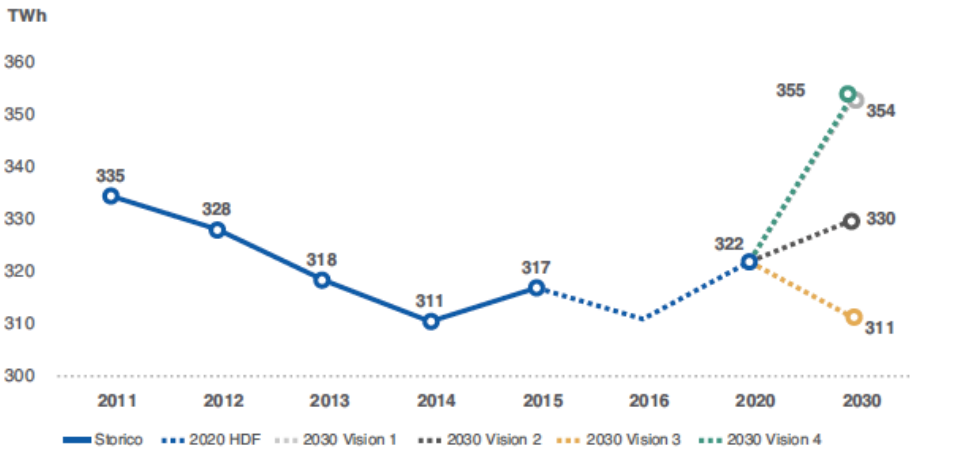
What are the other variables that come into play? These variables need to be distinguished between those that represent an avoided cost, i.e. transport costs and dispatching costs, and last but not least, the trend over time of the system charges that need to be covered, as well as the demand forecasts of the electricity system. Looking ahead to 2030, if we want to make an initial general assessment, neglecting the efficiency effects induced by the mechanism of the "RPI-X" which is the basis of the tariff technique established by Law 481/1995, we can assume a substantial constancy of network costs. Another thing is the prospective evaluation of the trend of dispatching costs that will follow the trend of the increase in the penetration of the VRE (variable renewabe energy) in the system: for the purposes of the preliminary evaluations it has been assumed that the overall burden that must be covered by the uplift component of the electricity bill increases by 50% compared to the current level. This last hypothesis assumes that adequate energy management systems are developed at the user's premises through storage systems and that the market, through the role of aggregators, is able to actively control the profile of the aggregate (all hypotheses that go in the direction of containing the increase in dispatching charges).
As far as the trajectory of general charges is concerned, the official indications of the SEN 2017 (National Energy strategy) are assumed (see the following figure): this presupposes that the system is able to continue the development of electricity production from renewable sources with technologies and tools capable of not further weighing down the foreseeable trajectory of system charges.[44].

[43] http://www.iea-pvps.org/
[44] https://www.sviluppoeconomico.gov.it/images/stories/documenti/Testo-integrale-SEN-2017.pdf



As far as electricity demand forecasts are concerned, a scenario of high penetration by the electricity carrier can be assumed, as indicated in Terna's forecast of demand trends.[45] which predict a potential growth in consumption, in this scenario, of 333 TWh (consumption net of network losses - see figure below).

FIGURA 4 - POSSIBILI EVOLUZIONI DELLA DOMANDA ELETTRICA IN ITALIA: LE 4 VISION TYNDP 2016



Source: ENTSO-E TYNDP 2016 ed elaborazioni Terna
Nota: stima 2016 su dati di preclosing declimattzzati

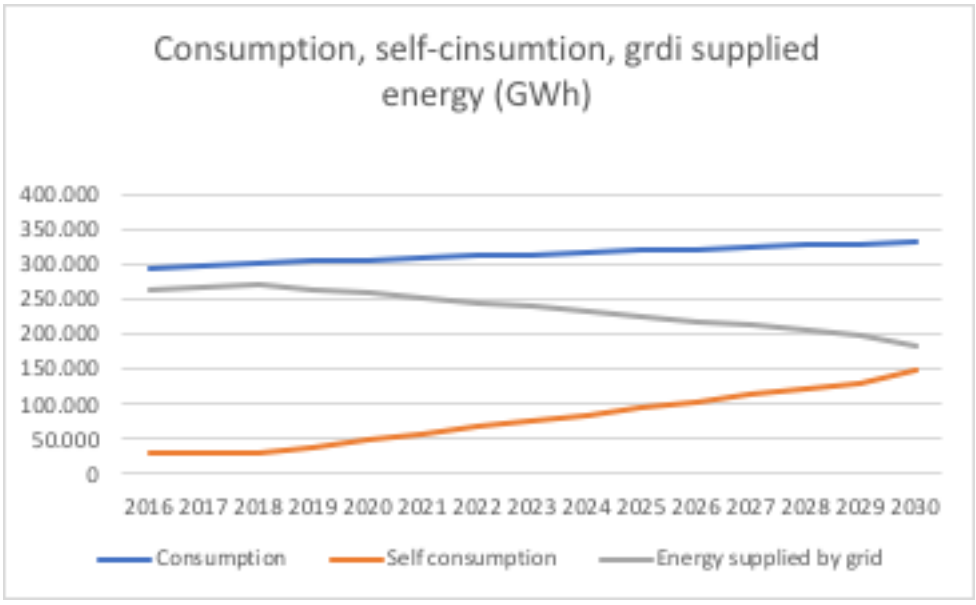
The basic problem lies in understanding whether, on the basis of all the above, it is possible to measure the redistributive effect between users in user systems and individual users of system charges in order to provide a tool for monitoring and managing the process of evolution of user systems. It is to be assumed that the general regime of application of network and system charges as established by the law of 27 February 2017 is maintained over time[46].

On the basis of the assumptions made, the trends in demand, autoconusm and consequently in the energy distributed, which is the one to which the charges would be applied, are as follows [47]:

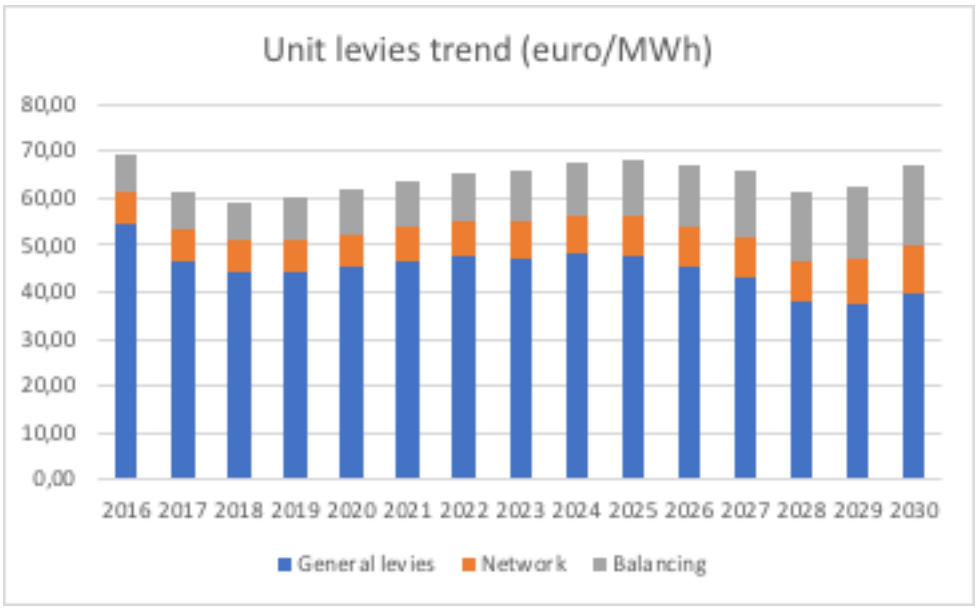
[45] https://www.terna.it/it-it/sistemaelettrico/statisticheeprevisioni/previsionidelladomandaelettrica.aspx

[46] At this stage, no hypothesis is considered of shifting system charges outside the electricity system, which, moreover, could have an effect to the detriment of the profitability of user systems.

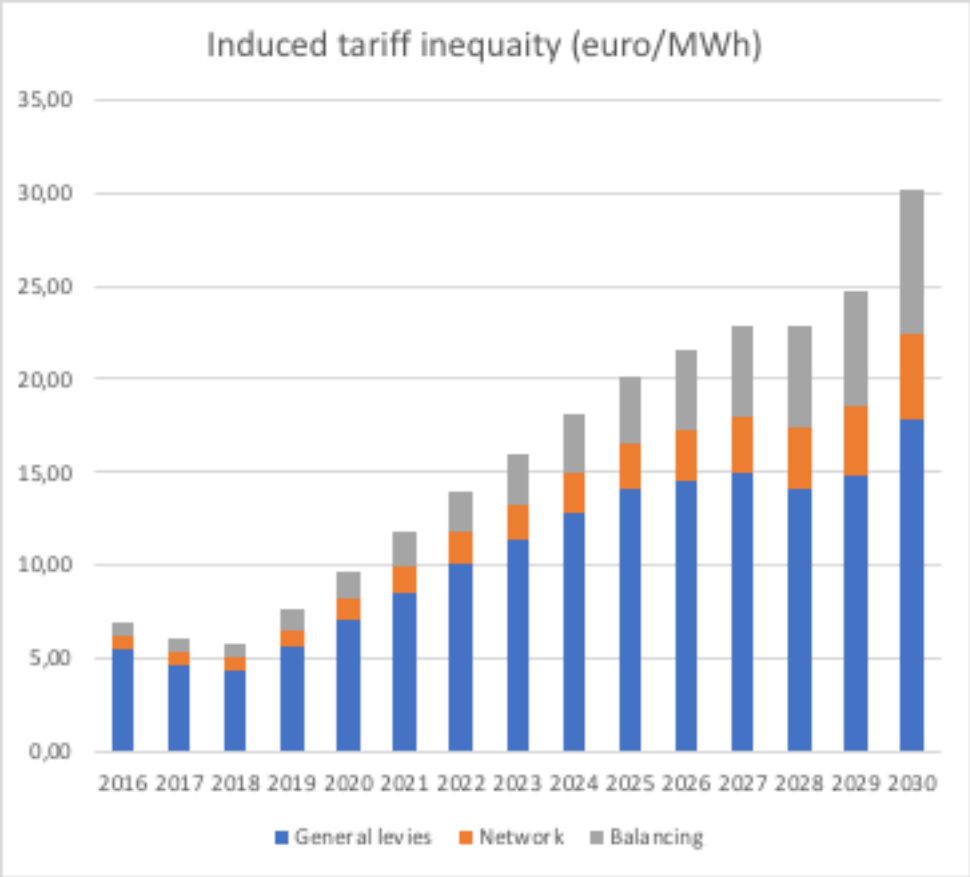
[47] First of all, the effects of reducing the pay base resulting from the manoeuvre to support energy-intensive businesses are neglected. Such effects must, however, be part of the general function of controlling tariff inequality.



The evolution of the charges in the three components general charges, transport and dispatching would be as follows:



Of which the inequality component induced by the increase in self-consumption systems would be as follows:

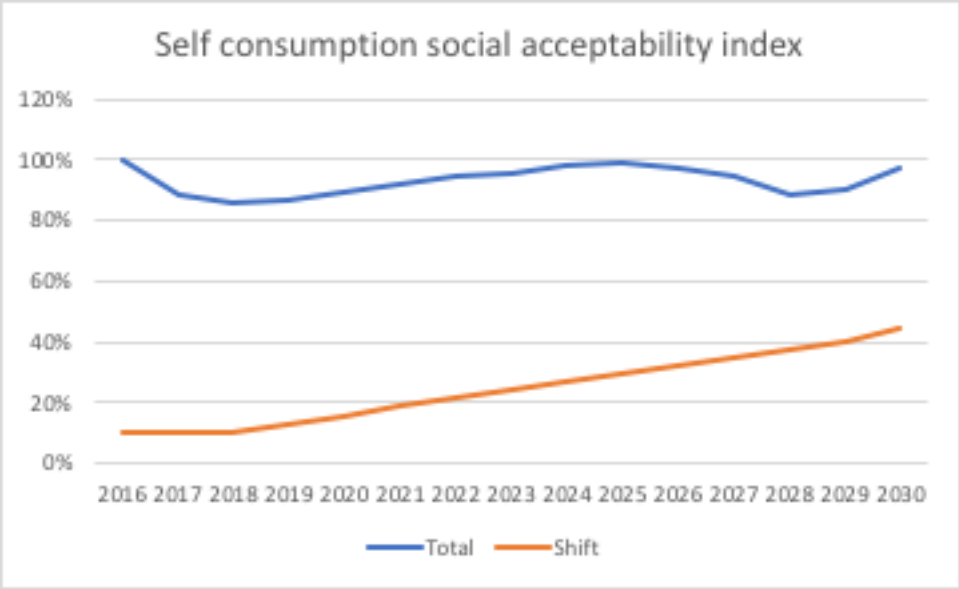


20. The function of controlling social acceptability

The control function that measures the social acceptability of self-consumption could be based on two components:

- the first, total, which measures the trend in unit costs which must never exceed the value of 100% assumed as such the value of the costs in an initial reference year (in this case, the year 2016)
- the second (shift), which will measure the component of the overall burden that goes to support the spread of self-consumption.

It is demonstrated that, under certain conditions, the current 30 TWh of own consumption can reach levels of about 150 TWh (given all the above assumptions) by 2030 without any increase in (unitary) charges for users compared to the current situation.



- The evaluations carried out, although of a general nature, have their value as conservative: it is assumed that all charges are paid with variable tariff component, which is not in the light of the current structure of the trinomial tariff, the hypothesized increase in electricity demand is entirely credible.

- The hypothesised path is feasible if active demand management components and mixed user systems are introduced into the system, if storage is adequately developed and if models of effectively manageable user systems are introduced.

- Despite the fact that it can be demonstrated that it is possible to sustain a significant increase in energy consumption without increasing the unit costs on the bill, a possible evolution could be that of relating the prospective trend of the costs in relation to their weight in the overall cost of supply: this constitutes a further important element of social acceptability of the manoeuvre.

20.1 Generalisation of the definition of user systems

The generalization of user systems could be based on existing variables so that the characterization of systems could be based on the following articulation.

- User systems with their own infrastructure, which includes:
- Simple user systems (current SEUs)
- Networked user systems (private networks and SDC)
- User systems without their own infrastructure

At this level, the anticipation of precise definitions is still immature and requires a broad consultation process with a view to establishing a medium and long-term regulatory framework. The development of definitions will be integrated into this study in the near future.

21. Regulation of user systems not equipped with their own network: the case of energy communities

The term "energy community" is now mentioned several times in the evolution of the electricity market and user systems. It is often used to imagine a collaborative future between users for the enhancement of the

territory and the diffuse energies. On closer inspection, in many respects the model underlying an energy community may not be so far from the cooperative model that already finds its place in the national legal system at both the legislative and regulatory levels. With this article we intend to carry out an exercise of transposition of the regulation of the historical cooperatives on new cooperative realities at the base of what could be an energy community.

Historical cooperatives

For the purposes of the exercise that is about to be carried out, the analysis of the cooperatives that are currently intercepted by the current report only in relation to those of a historical nature appears to be of particular interest (https://www.arera.it/allegati/docs/12/046-12ticoop_ti.pdf). More generally, the definition of a cooperative is that of a company established not for profit, but to guarantee its members greater economic equity than that of the market. For the purposes of regulation, the cooperative is a legal entity organized in a cooperative form, whose purpose is to produce electricity mainly intended for the supply of its members.
More specifically, the historical cooperative is a cooperative for the production and distribution of electricity as referred to in Article 4, number 8 of Law 1643/62, already existing at the date of entry into force of Legislative Decree 79/99 (therefore already existing at the date of the start of liberalization of the national electricity system). In the context of cooperatives there are two distinct cases:

- cooperativa storica concessionaria - a historic cooperative which has obtained the concession for the distribution of electricity;
- historical non-licensee cooperative - a historical cooperative operating in a territorial area for which the distribution concession is held by a third party company.

Historical cooperatives can have their own network as well as being without their own network: in particular, the cooperative without a network is a historical non-licensing cooperative that does not have a network for the distribution of electricity to its members.

Depending on the type of connection to the network of the cooperative, the members of the cooperative may be direct or indirect: the direct member customer is a person who owns a user directly connected to the electricity grid in the availability of the cooperative. On the other hand, the indirect member customer is a member customer with a user connected to the electricity grid of a party other than the cooperative.

It is quite clear that in the case in which the cooperative does not have its own network, all the member customers are of the indirect type, while it can be verified that, in the case in which the cooperative has its own network, there are also non-member customers, i.e. subjects other than the direct member customers who own a user directly connected to the cooperative's electricity network.

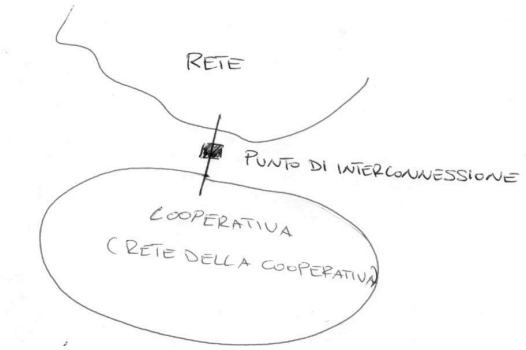
In the context of a cooperative, energy produced by the cooperative's production plants and intended for consumption by the cooperative's member customers is generally defined as energy produced by the cooperative itself:

- self-produced energy "on site" is the electricity produced by the direct production plants intended for consumption by the direct member customers of the same cooperative (this obviously assumes that the cooperative has its own network);
- self-produced "off-site" energy is the electricity produced by the direct production plants (always on the assumption that the cooperative has its own network).48) intended for consumption by member customers connected to a third network and electricity produced by production plants connected to a

[48] Direct production plant is an electricity production plant of the cooperative directly connected to the electricity grid of the same and intended for the supply of customers members.

third network and intended for consumption by member customers (this is the case where the cooperative does not have its own network).

Of particular interest for the prospective development of user systems is the analysis of the existing regulation for cooperatives not holding a distribution concession, but still having their own network. The electricity network of the cooperative will be connected to one or more electricity networks of the concessionaire in points that are called points of interconnection in relation to which the cooperative is seen as an impetus of underlying distribution. For the sake of simplicity, the regulations in force are applied only to the case in which the member customers (final customers or producers) of the cooperative are all direct customers and that is, connected to the electricity network of the cooperative.



Rete = Network

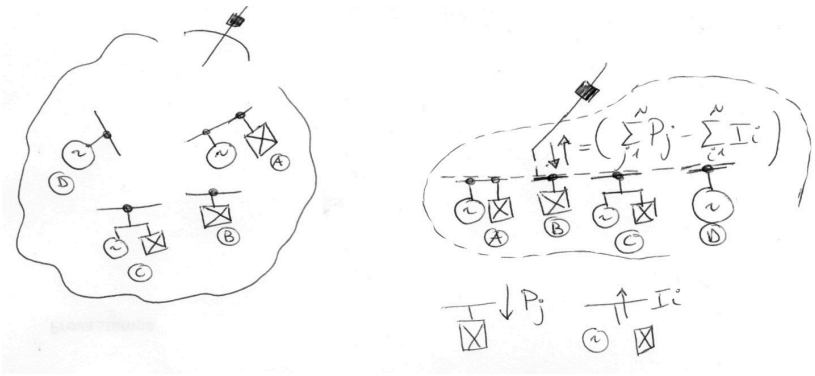
Punto di interconnesione = Connection point between two networks

Cooperativa = Cooperative

Rete della cooperativa = cooperative network

In this case it happens that:

- for the supply of electricity to its member customers, the historical non-licensing cooperative operates in the market on its own account or by granting a non-representational mandate to a wholesaler
- Inputs and withdrawals corresponding respectively to input points and withdrawal points corresponding to member customers or the cooperative (this is the case, for example, of a production facility in the ownership of the cooperative) are accounted for as if virtually connected to the point of interconnection between the cooperative's network and the distribution undertaking's network. It is obviously evident that the single member customers can also be mixed users, that is, besides the consumers they can also be subjects endowed with production plants). In practice the cooperative is as if it were treated as a hub in which the internal energy produced and consumed is exchanged directly between the customers members of the cooperative.



- the cooperative society regulates economically with a wholesaler the total balance (on an hourly basis) between entries and withdrawals thus determined

- the cooperative pays the system charges in respect of the energy share (euro/kWh) only and only in relation to the net withdrawal made by the hub, in respect of the fixed share (euro/point) and the power share (euro/kW) in relation to the data relating to the point of interconnection between the cooperative and the dealer's network. It will then be the cooperative's task to distribute the charges paid among its members (without, however, complying with the precise distribution rules as currently defined for closed distribution systems).

At present, according to the Authority, a new cooperative cannot have its own electricity transmission network for the supply of electricity to its members. According to the Authority, this activity would constitute a distribution activity and therefore cannot be carried out without a concession to carry out the public distribution service granted pursuant to Article 9 of Legislative Decree 79/99. However, the "ad hub" approach would be applicable to users connected to public networks (without prejudice to the need to properly account for the effect of the hub on the energy balance of the network on which it is inserted).