



European  
Workshops on  
Demand Response  
2022



**DR4EU**  
DEMAND RESPONSE FOR EUROPE

# **Demand Response in Italy**

*State of play, evolutions and perspectives*

*55 min to be  
Fit for 55!*

# Agenda

- Sabine CROME, DGENER, EC

- Paolo BERTOLDI, JRC

- Giuseppe CORRENTE

- Massimo RICCI

- Luca MARCHISIO

- Michele GOVERNATORI

- Q&A + questions on-going => in the chat box please





# **Demand response and the implementation of the Clean Energy Package**

**Sabine Crome**  
**European Commission – DG Energy**  
**Internal Energy Market**

16 June 2022

## Relevance of demand side flexibility

- *Developing demand response has lost none of its relevance, even in the current crisis*
- *With high energy prices, the participation of demand response in wholesale markets can be a crucial element to tackle the volatility of prices*
- *Demand side flexibility provides system flexibility. System flexibility is key because:*
  - *accelerated deployment of electricity from renewable sources*
  - *increased electrification of end uses*

## Key provisions of Electricity Directive 2019/944

- *Non-discriminatory access of demand response to all electricity markets, either directly or through aggregation (Art. 17)*
- *Full recognition of (independent) aggregators as market participants (Art. 17)*
- *Customer entitlement to contract with independent aggregator of their choice, without need for consent or prior agreement of their supplier (Art. 13)*
- *Strict limits to compensation payments (Art 17(4))*

## Transposition of Electricity Directive 2019/944

- *Key that Member States transpose these provisions into the national laws swiftly*
- *Deadline for transposition: 1 January 2020*
- *Transposition very uneven among Member States*
- *While progress has been made, significant number of important provisions have not been transposed in several Member States*

## Network Code on demand side flexibility

- *Article 59(1)(e) Electricity Regulation*

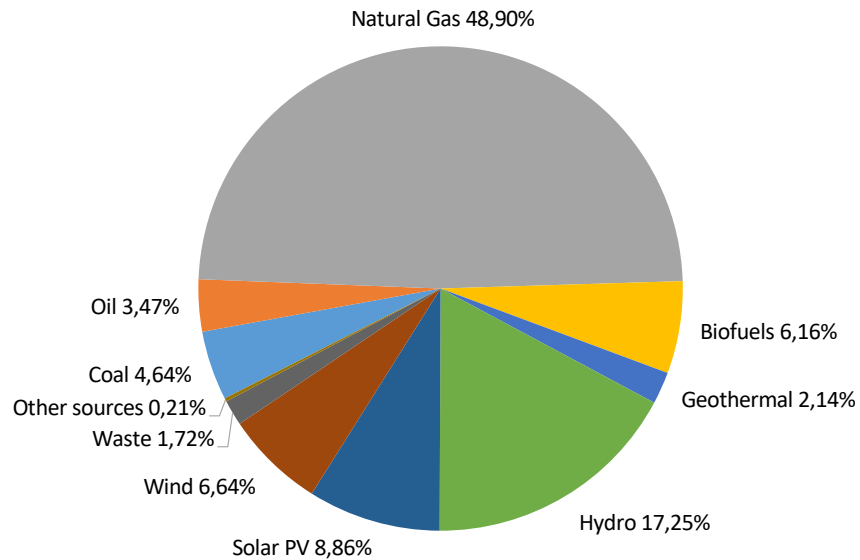
*The Commission is empowered to establish a **network code** on rules implementing Article 57 of the Regulation and Articles 17, 31, 32, 36, 40 and 54 of the Electricity Market Directive **in relation to demand response, including rules on aggregation, energy storage and demand curtailment.***

- *Potential scope*

- *Load, distributed storage, distributed generation*
- *Products and services, in particular to solve physical congestions (and balancing)*
- *Market and processes, SO coordination, market access and aggregation, information and data exchange*

- *COM request for framework guidelines to ACER on 1 June 2022; ACER launch of stakeholder consultation on 2 June*

Italy's Electricity Generation mix in 2020. Source: IEA, 2020



## DR & Independent Aggregators in Italy

- In July 2021, the European Commission adopted the "Fit for 55" climate package, which proposes legislative proposals to achieve the objectives of the Green Deal by 2030. In particular, the reduction of greenhouse gas emissions by 55% compared to 1990 levels, with the aim of reaching "carbon neutrality" by 2050.
- Italy has also been successful in market liberalization and infrastructure development, especially in the energy sector, with electricity prices converging across the country due to improved north-south transmission and market coupling.

### *Players and context*

- In Italy, the only TSO is Terna. The distribution network is instead divided between 127 DSOs as of 2019. The largest of these is E-Distribuzione (formerly Enel Distribuzione), which covers a major share of the Italian electricity demand. The most important local operators are A2A, ACEA, IREN, DEVAL, and HERA.
- The Italian Regulatory Authority for Energy, Networks and Environment (ARERA) carries out regulatory and supervisory activities in the sectors of electricity, natural gas, water services, waste cycle and district heating.
- Italy is currently divided seven bidding zones, with a commitment to reassess new once improved interconnection relieves the congestions between the existing bidding zones.



## Transposition of EU Directive 2019/944

- The EU Directive 2019/944 isn't transposed in Italy yet. However, the content of article 17 has been already applied in Italian regulation. Also, the right of each market participant involved in the aggregation to enter the ancillary services market without the need for consent by some other market participant will be guaranteed soon, removing the pre-existing obligation of consent by the balance responsible party.
- Technical modalities on the use of Demand Response are not developed in cooperation with the regulators, as specified in Article 31(8) of the Directive. Hence the technical modalities on the use of demand response are available only as far as global services provided to TSO are concerned: these modalities are proposed by TSO, after public consultation, and are finally discussed and approved by the regulator.
- Some residential customers have difficulties in participating in the ancillary services market as the hourly measures (necessary for participation in that market) are not yet available for all connection points. This problem will be solved when the new smart meter 2G is installed for all final customers and all measurement data will have an hourly treatment for settlement purposes.

## Prosumers and flexibility services

- Prosumers in Italy can use their flexibility in a variety of ways, but the options available are limited by their size. Even Notwithstanding, the financial incentives from the explicit use of their assets, along with the restricted number of items available, are insufficient to drive the industry forward.
- This is especially true for small prosumers, but industrial prosumers' generation loads and demand make participation easier: if a smart meter is present, households and small and medium businesses can choose among dynamic price contracts with hourly pricing.
- For what concerns large italian prosumers, like industry or commercial parks, the aggregator framework is undergoing a renovation to include the new provisions from the Electricity Market Directive. The markets currently available are a capacity market, an interruptible loads programme and the UVAM project. Prosumers must choose one and cannot participate to different markets with the same load
- Prosumers have limited capacity to explicitly monetize their flexibility. The Virtually Aggregated Mixed Units (UVAM) pilot project enables power generation and demand to provide balancing servicesThe role of the independent aggregator was introduced in 2017, but it still needs to be fully integrated.

## Enablers and Barriers for DR and Independent Aggregators

- The pilot programs in Italy (UVAM) have had a very promising start, especially when compared to other European nations, leading to the conclusion that the Italian flexibility market is mature and ready to expand consumer engagement. The pilot project's consistent results point to a bright future for adding more residential DR aggregators to the system. In this context, the adoption of electric vehicles and the planned implementation of smart meters in the next years must be viewed as enablers.
- The Draft Annual Law for Competition was approved by the Italian government in November 2021. As far as the energy sector is concerned, the bill ensures a strengthened infrastructure for EV charging stations.
- The failure to define the perimeters of action of this emerging market operator is currently the main impediment for independent aggregators in the Italian electricity market, together with the lack of correct calculation methods to estimate the imbalances that aggregation would generate for distribution companies. The institutional arrangements of the Italian energy sector are complex and need to be modernized and strengthened.
- In the national electrical industry, implicit and explicit Demand Response are anticipated, even if they will not be completely operational until the entire rollout of smart meters.

## Terna's Pilot Projects

- Terna has opened the ancillary services market to distributed resources through pilot projects.
- The UVA (virtually aggregated units) are composed of aggregations of consumption and/or generation points as well as storage systems (including e-mobility charging stations), connected to the grid at any voltage level, and falling within the scope of aggregation defined by Terna. Starting in 2017 from aggregating only consumption points (UVAC) and only production points (UVAP), the projects identified by Terna have “evolved” towards mixed aggregations (UVAM).
- The UVAM (Virtually Aggregated Mixed Units) project was launched in 2018 after concluding the UVAC and UVAP projects. It enables distributed resources (production and consumption units, including residential customers) as well as storage systems to participate as aggregates in the ancillary services market. The main participants are large commercial and industrial units that are remunerated both for the energy activated (Eur/ kWh) and for resource availability (Eur/kW). As of 1 August 2021, 272 UVAMs were enabled (41 more than the last year), which include 2327 units, of which 1106 units of consumption, 1193 units of non-relevant production units and 28 relevant production units.
- In Italy, UVAMs must have a modulation capacity of at least 1 MW and can aggregate mixed points. UVAM are currently able to provide services like congestion management, balancing, tertiary and secondary reserve in Italy.



MINISTERO DELLA  
TRANSIZIONE ECOLOGICA

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## **DEMAND RESPONSE IN ITALY: THE CURRENT LEGAL AND POLICY FRAMEWORKS**

*16 JUNE 2022*

## The legislative decree 102/2014 implementing the Directive (UE) 27/2012 (Efficiency Directive)

➡ Obligation on DSO to provide customers with 2<sup>nd</sup> generation smart meters (art. 9)

➡ Definition of a regulation by ARERA allowing the opening of the ancillary service market to the demand response and to other operators previously not enabled, while respecting the network operation constraints (art. 11)

- ✓ Decision ARERA 300/2017. Regulation of specific pilot projects submitted by the TSO
- ✓ From 2017 to today, several pilot projects were implemented, allowing figures referred to as aggregators to participate in the market by aggregating consumption units, non-relevant production units and other relevant production units previously not enabled to participate in the services market, also through mixed configurations (the so called UVAM: unabled mixed virtual units). Following the ministerial decree 30 January 2020, also electric charging stations can be included in the perimeters of UVAMs

## The National Integrated Plan for Climate and Energy (PNIEC)

The PNIEC sets, among the others, the national objectives with regard to increasing the flexibility of the national energy system

- ➡ Defining a legal and regulatory framework promoting investments in new flexibility resources, including demand response and storage capacity
- ➡ Strengthening the preconditions for the active role of customers
  - + Network digitalization, 2<sup>nd</sup> generation smart meters roll out speeding and development of remote control and data sharing systems
  - + Completion of the retail market liberalization process, started on the basis of the provisions of the Competition Law 124/2017
  - + Assessment of the phase out of the Single National Price
  - + Promoting self-consumption
- ➡ Updating the regulation on operators participation to the ancillary services market



*On the basis of the results of the pilot projects experience and in compliance the EU regulation, the ARERA is currently reviewing the overall regulatory framework for dispatching*

# The implementation of the Directive (UE) 944/2019 and of the Regulation (UE) 943/2019

Lastly, the legislative decree 210/2021 integrated the legal framework with regard to the rights of the customers to participate to electricity markets and to a more active role of DSOs

## Dynamic electricity price contracts (art. 8)

- **Customers with smart meter** are entitled to request a **dynamic price contract**
- Suppliers have to inform customers about the contractual conditions, the reference price, the opportunities and the risks of this type of contracts

## demand response through aggregation contracts (art. 12)

- Role and functions of aggregations of customers have been strengthened
- **Aggregations are entitled to participate to all electricity markets**, including the ancillary services market
- Customers can stipulate aggregation contracts independently of their supplier

## Phase out of the Single National Price (art. 13)

- **Definition of the timing and conditions for the phase out of the SNP**, while safeguarding the calculation of specific benchmark prices and the protection tools for the most vulnerable final customers

## Role and functions of the DSOs (art. 23)

- Regulation by ARERA of the **local ancillary services** to be procured by the DSO
- Piloting of new mechanisms **promoting the self balancing between consumption and production units**



## The implementation of the Directives (UE) 2001/2018 and 944/2019

The legislative decrees 199/2021 and 210/2021 also introduced within the legal framework provisions for the development of new customers' configurations

### Active customers and Energy communities (art. 14)

- Enabling regulation framework for **active customers and energy community**: legal status, responsibilities, rights and duties, participation to electricity markets.
- Criteria enabling **electricity sharing**, keeping into account the structure of the distribution network and the effective benefits for the system

## UVAM Project: Overview



**Objective:** increase and diversify the resources available on the ancillary service market (MSD) to ensure adequacy and security of the electricity system

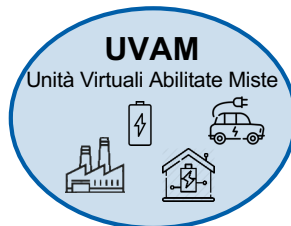
### Eligible participants



UVAM are aggregation of:

- Small-scale production units\*
- Relevant generation units, currently not eligible to participate to MSD (e.g., vRES)
- Consumption units
- **Stand-alone storage** and **storage coupled** with generators and/or consumers, including the Vehicle-to-Grid (**V2G**) systems

UVAM are allowed to participate in MSD (spot market) through the figure of the **Balancing Service Provider (BSP)** and receive remuneration for energy activation.



### Main features



**Provided services:** secondary reserve, tertiary reserve, congestion management and balancing with simplified technical requirements

**Minimum aggregation size:** 1 MW

**Measurement requirements:** each point of the UVAMs must be equipped with a monitoring unit to send real-time telemetry; measurements for settlement provided by DSO

**Baseline:** from the 17:00 in D-1 the BSP communicates to Terna the baseline referred to each quarter-hour in D. Ex-post Terna corrects the baseline considering the deviation in the quarter-hour before delivery and the accepted quantity.

**Compensation scheme:** Balancing Responsibility Party is compensated at Day-Ahead Market Price

### Forward contract



**Procurement mechanism:** annual/monthly competitive auctions with a pay-as-bid mechanism (**remuneration for availability**)

**Procured volume:** 1.000 MW

**Provided service:** balancing “upward” reserve from Monday to Friday and for a certain number of consecutive hours of the contracted product:

- an «afternoon» product, valid for 3-6 p.m. with a premium capped at **€ 22,500 MW/y** and strike price set at **€ 200/MWh**
- an «evening» product 1, valid for 6-10 p.m. with a premium capped at **€ 30,000/MW/y** and a strike price of **€ 400/MWh**
- an «evening» product 2, valid for 6-10 p.m. with a premium capped at **€ 30,000/MW/y** and a strike price of **€ 200/MWh**



### Reliability test

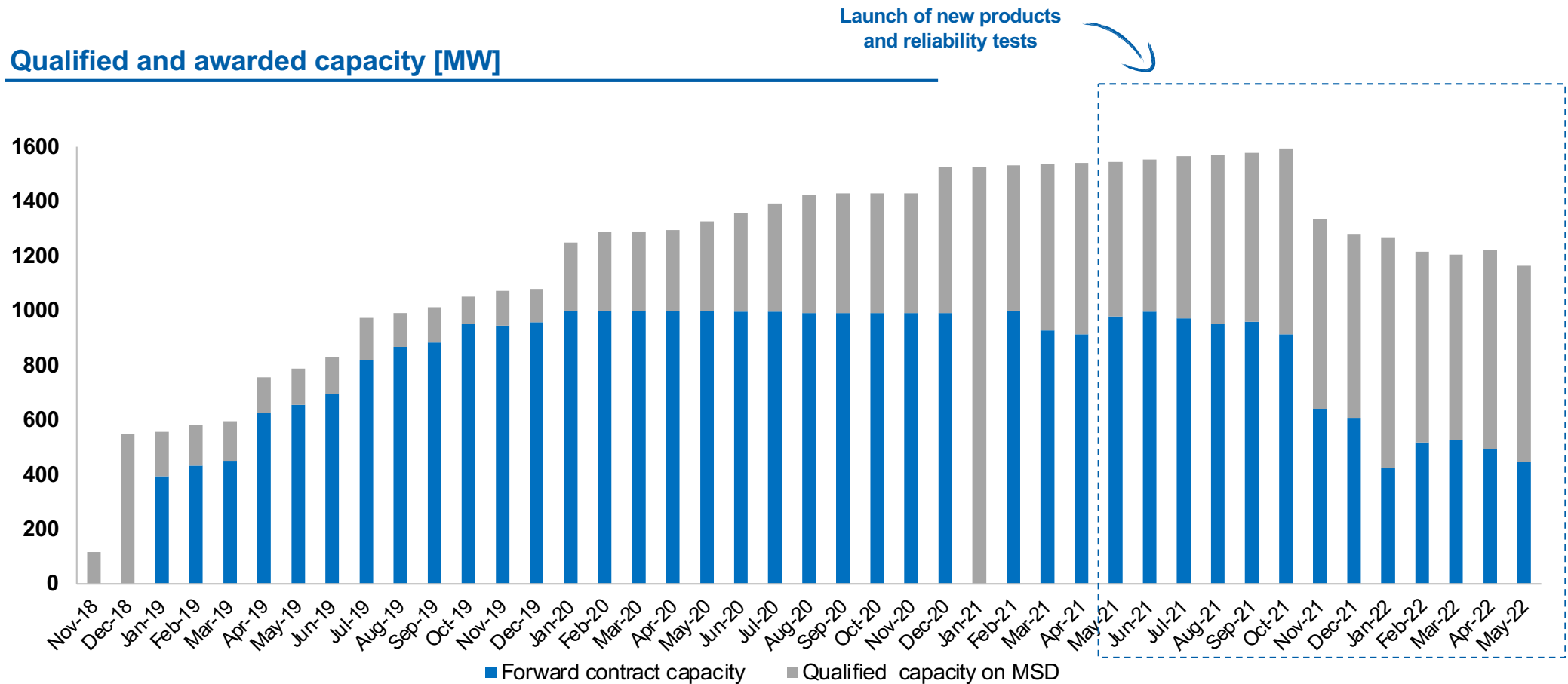


The **reliability tests** consist in balancing orders sent to the UVAMs, during their normal operation in the MSD, without notice and which are independent of the merit order.

The UVAMs, after the failure of 3rd reliability test during the year is sanctioned with:

- the contractual resolution of all assigned products
- the disqualification from the MSD

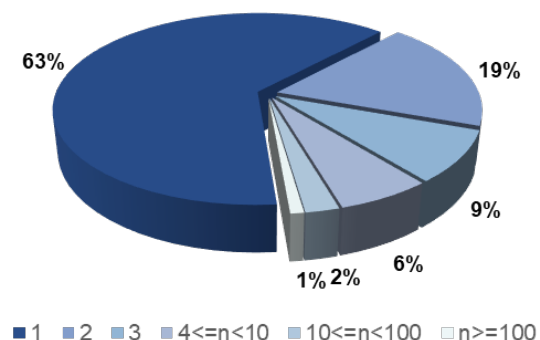
### Qualified and awarded capacity [MW]



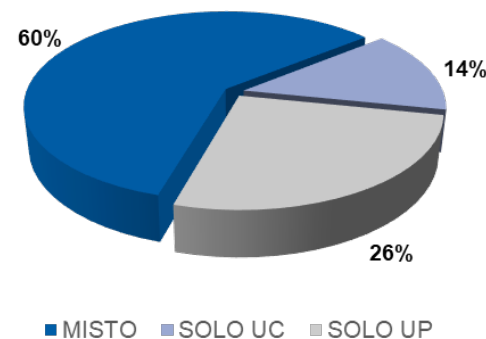
**As of today, 718 MW of UVAM participate in MSD. During 2021 the qualified capacity on MSD has started a downward path mainly due to the repeated failure in managing the reliability tests.**

### UVAM characteristics

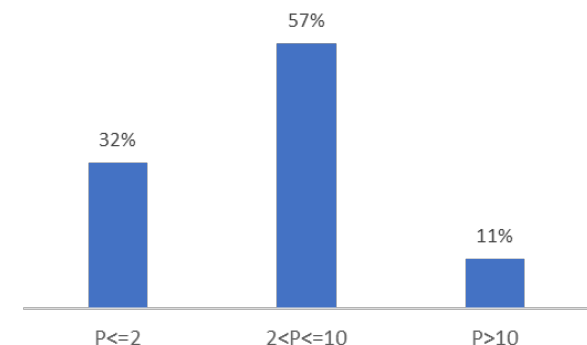
Number of PODs per UVAM



UVAM type



UVAM size



Currently the average size of UVAM is very limited in terms of number of PODs.

Most UVAMs consist of one single point of service delivery, mainly medium-large size (> 2MW) industrial production facilities or production plants.

86% of UVAMs are Production (UP) or mixed (Misto, demand + generation). 14% are pure DSR.

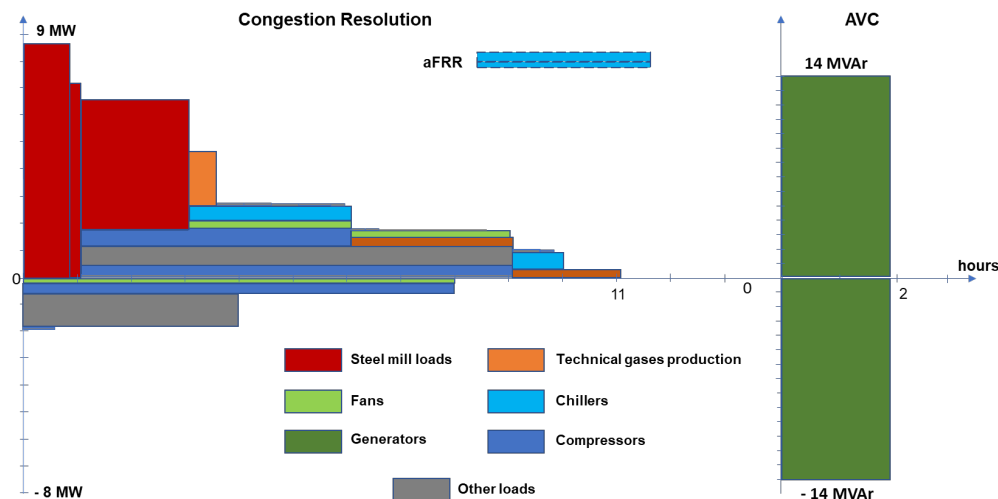
7 industrial loads took part in the OSMOSE project as third parties. 3 BSPs, partner of the project, performed in-depth flexibility analysis to assess the capability of each site. After some adjustment activities, congestion resolution and voltage regulation tests were carried out on 5 plants.

### Flexibility analysis



| Theoretical flexibility of the 5 tested plants |         |
|--|---------|
| Congestion Resolution                          | 79.3 MW |
| Automatic Voltage control (AVC)                | 14 MVar |
| Automatic Frequency Restoration Reserve (aFRR) | 0.4 MW  |

The energy analysis, performed by the 3 BSPs, showed a **high maximum theoretical flexibility** from the 5 tested plants.



### Evidence from the tests

| Real available flexibility                     |          |
|--|----------|
| Congestion Resolution                          | 12.3 MW  |
| Automatic Voltage control (AVC)                | 5.5 MVar |
| Automatic Frequency Restoration Reserve (aFRR) | 0 MW     |

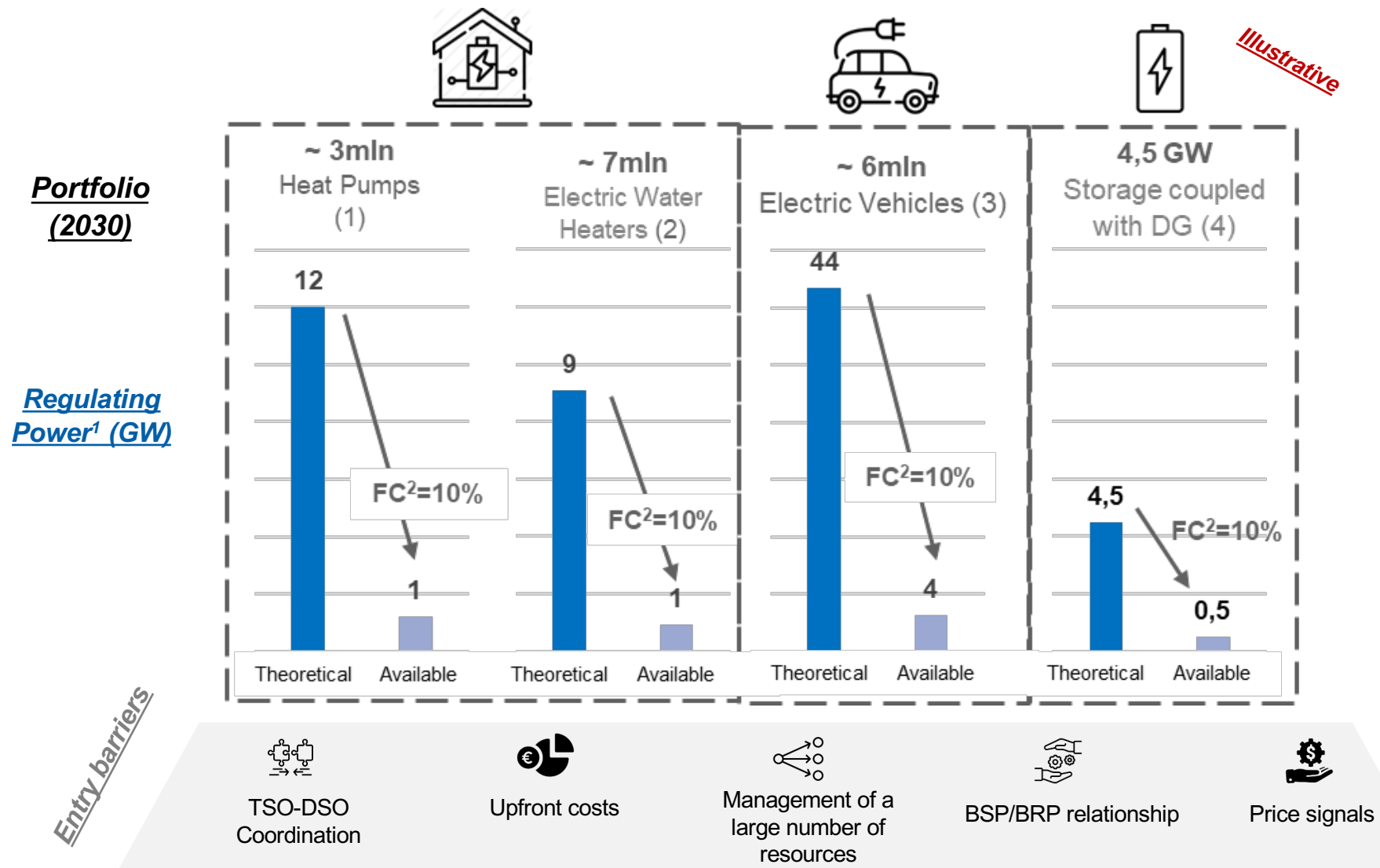
Test campaign showed that the **real achievable flexibility** was **significantly lower** than the initially identified.

- **Congestion resolution tests** were performed for **more than 60 hours and 114 MWh of regulating energy**. Despite the quite good response of some plants, there are **several constraints that limit the participation of these resources to the Italian dispatching market**.
- **Voltage regulation tests** were carried out locally only on two MV generators of one plant by changing their power factors. **Many constraints do not allow the provision AVC service as prescribed in the Italian grid code**.
- It was **not possible to test aFRR** on the chillers of a HVAC system of one plant because of the way they could have provided the service (set point in Temperature instead of Power).

**Energy assessments showed a high theoretical potential of flexibility from industrial loads. Nevertheless, the tests carried out have shown how challenging it is to actually make this flexibility available to the grid by plants already optimized to maximize their industrial production**

# Flexibility Resources

Potential from small-scale (distributed) flexibility resources

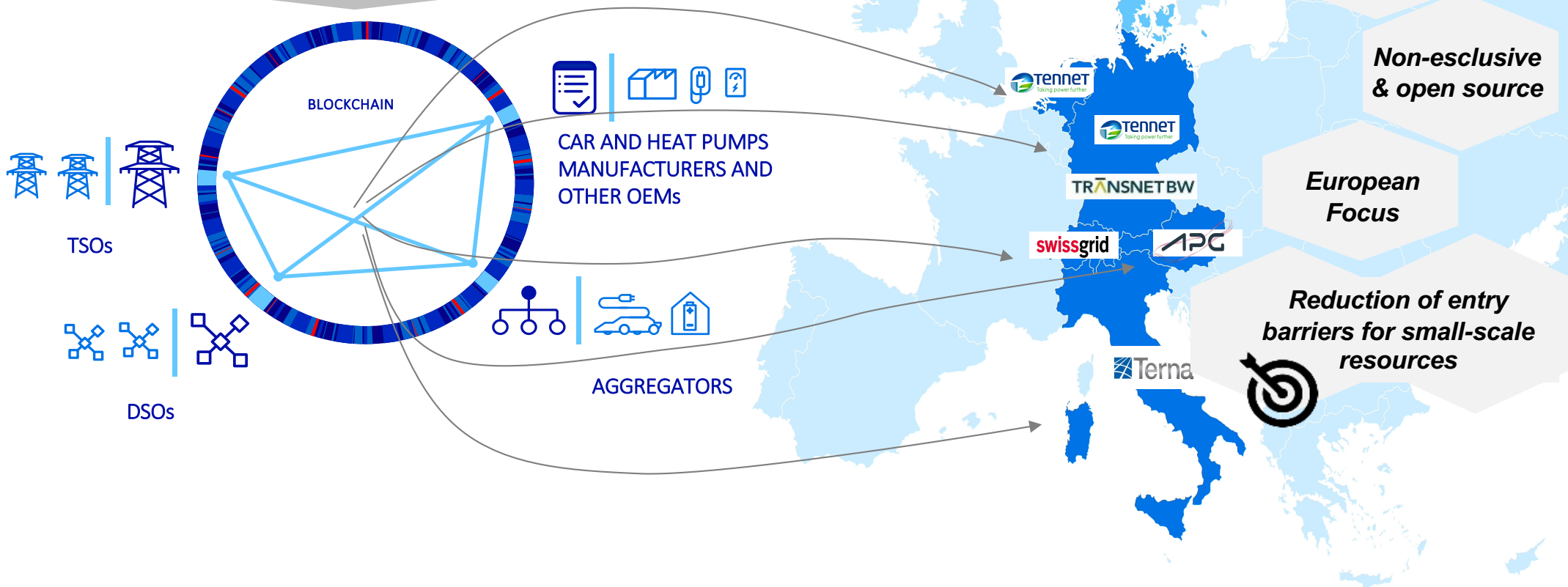


Small distributed resources have significant 'technical' potential for flexibility. The next challenge will be to unlock the significant potential of small distributed resources through a definition of a simple and top-down communication standard and a relaxation of technical requirements.

# EQUIGY - CBP

## The Crowd Balancing Platform initiative

Equigy creates a trusted data exchange to **facilitate aggregators to participate with smaller flexibility devices**, such as home batteries and electric vehicles, in electricity balancing markets, turning consumers into prosumers.



Equigy is a not-for-profit initiative led by TSOs and the Crowd Balancing Platform is the link between distributed assets and ancillary services markets without a competitive role towards OEMs and FSPs.

- The experience of the UVAM pilot project clearly shows **that spot market is not adequate to promote initial investments in new flexibility resources; yearly/mid-term contracts awarded with competitive tenders** provide the required visibility on revenues for aggregators to take the business risk.
- **Industrial DSR** has indeed a flexibility potential, as emerged also from OSMOSE H2020 project. But in practice this **flexibility potential is not easy at all to exploit and in any case is not a “low hanging fruit”**. Industrial processes are optimized to deliver a product and not to control electric power exchanged with the grid. Significant investments are needed both in the technology and in the organization, and in any case **industrial production needs are always at the first place**.
- Talking about flexibility from “new” resources, we believe that in the medium-term key resources to focus on are: **RES (mainly downward regulation), EVs (V1G, V2G) and electric Heat Pumps**.
- Considering the **very tight business model for aggregators of small distributed resources**, the key challenge is **minimizing observability and controllability costs at system level, so that entry barriers for aggregators will be as low as possible**
- For this reason, Terna and other TSOs have launched the **Equigy initiative** aimed at developing a European standard. But this will not be enough: what is needed is a clear technical standard, mandatory at EU level, defining minimum requirements in terms of **observability (measurements from the field) and controllability** as well as **standard minimum communication protocols** so that each BSP can aggregate any resources without technological entry barriers.
- Looking at recent public consultation on the Framework Guideline on Demand Response, the ACER’s proposal to **lower the minimum bid size from 1 MW to 0.1 MW** for all balancing capacity and energy products will not have any positive impact because **the problem is the economical sustainability of the business model**, which is directly related to the economies of scale.
- Regarding the proposal to **avoid (ex-ante) prequalification for some grid services** and simply rely on **ex-post verification of the asset performance**, we would like to remind everybody that ancillary services markets are designed to procure flexibility needed to guarantee the **security of the system** and **verification may be done ex-post but the black-out will not wait until then....**





THE ITALIAN INDEPENDENT ENERGY AND CLIMATE CHANGE THINK TANK

# Distributed Electricity Demand Response in Italy: why is it lagging behind?

16 June 22

Michele Governatori, Power&Gas lead, ECCO Think Tank



## Waiting for Distributed Demand Response in Italy

- We cannot afford giving up distributed demand response (DDR) if we want to accommodate the incoming renewables' capacity Italy needs to match its energy transition goals
- In Italy DDR is still undermined by the ancillary services market design. In order to integrate thousands of beyond-the-meter appliances in such market, their performance needs to be monitored through an indirect/statistical approach rather than with a direct monitoring by the TSO, the latter simply not being cost effective
- Implicit DR is also lagging behind in Italy. Dynamic pricing still scarcely applied to residential customers notwithstanding the good deployment of 2<sup>nd</sup> generation digital meters



THE ITALIAN INDEPENDENT ENERGY AND CLIMATE CHANGE THINK TANK

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