

AGREGATOR OF
DER



BARRIERS & RECOMMENDATIONS
FOR A COMPREHENSIVE MARKET
DEVELOPMENT IN SPAIN

<http://acco.gencat.cat/ca/detall/article/20180406-estudi-agregacio-DER>

Jornada

Agregació de recursos energètics distribuïts.

Barreres i recomenacions per a un ple desenvolupament del mercat

Barcelona, 9 de maig de 2018

THE PRESENTATION ANALYZES

- How **aggregation** of Distributed Energy Resources can **support** the **energy transition** scenarios?
 - ✓ Energy Trilema, Definition, Functions, Services Provided
- What are the **barriers** for a comprehensive development **of the aggregator** in the Spanish market?
- **Market Opportunities** and Case Study: self consumption
- **Easing the future:** Smart meter & DER data access
- What are the main **recommendations** to the policy makers and regulators to promote **competition** into the aggregation market?

1. ENERGY TRILEMMA

How Aggregation of DER supports energy transition

TOWARDS LOW CARBON ECONOMIES

- Aggregation **maximizes DER benefits** for consumers and electric systems
- Aggregation **reduces cost** of DER and **increases revenues**
- Through aggregation, DER becomes a reliable piece for energy transition

TRILEMMA		CENTRALISED RENEWABLES	DISTRIBUTED ENERGY RESOURCES	AGGREGATION OF DER
SECURITY OF SUPPLY	• Local resource	++	++	++
	• Resilience	+	+	++
	• Reliability	++	+	++
INTERNAL MARKET	• Energy Price (LCoE)	++	-	+
	• Consumer centric	-	+	++
	• Competition	++	-	++
ENVIRONMENTAL IMPACT	• Renewable Energy	++	++	++
	• CO ₂ Emissions	++	++	++
	• Energy Efficiency	-	+	++



2. DEFINITION

Function of Aggregation (what really matters)

LEGAL FRAMEWORK (what's coming?)

Clean Energy Package – Legislative (needs transposition to MS 2019-2020)

Balancing Guidelines (EB BG) – Network Code (direct to MS 2018-2019)

'AGGREGATOR' (Clean Energy Package): a market participant that combines multiple customer loads or generated electricity for sale, for purchase or production in any organised energy market. **'INDEPENDENT AGGREGATOR'** is an aggregator that is not affiliated to a supplier or any other market participant.

TYPE/PLAYER	Non-Independent Aggregator	Independent Aggregator
VIRTUAL Interacts in independent low voltage networks across the region)	<ul style="list-style-type: none"> ➤ “Representante” / Retailer ➤ BRP – Balancing Responsible Party 	<ul style="list-style-type: none"> ➤ Assets manufacture (eg. Batteries) ➤ IT developer (eg. Aggregation OS)
PHYSICAL Resources aggregated are connected at the low voltage network). E.g. Microgrids	<ul style="list-style-type: none"> ➤ Local System Operator (LV network) 	<ul style="list-style-type: none"> ➤ Local Energy Community ➤ ESCo

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3. FUNCTIONS

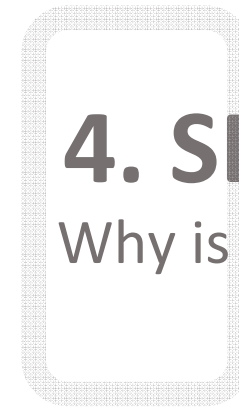
Why is aggregation so important?

SUPPORTING THE WHOLE SYSTEM

- DER Aggregation provides **value** both **to the consumer and the electric system**
- **Development of Balancing Guidelines** (network code) in Spanish market must enable different functions
- **Cost-Benefit Analysis** is necessary to prioritise

REGULATED MARKET	LIBERALISED MARKET	SOCIETY
<p>flexibility for voltage control and n management (reduction of peaks) investments in grid extension ion Management ating and controlling DERs</p>	<p>Consumer</p> <ul style="list-style-type: none"> - Participation in organized markets - reduction of energy bills (self-production, demand response) - consumer's empowerment - local energy communities - behaviour change 	<p>Economy</p> <ul style="list-style-type: none"> - New business models - Creation of local jobs - reduction of network charges - acceleration of urban development - Efficient DER support mechanisms - competition in balancing services
<p>ng (Primary regulating) ary Regulation Regulation ion Adequacy (peak demand) c Reserves ating information exchange between power markets</p>	<p>BRP/retailer</p> <ul style="list-style-type: none"> - Spot Market and Intra-day market - optimization of deviations in wholesale market - Self Balancing and Passive Balancing - Hedging and portfolio adequacy - Virtual Power Plants - Customer loyalty 	<p>Environment</p> <ul style="list-style-type: none"> - Reduce energy losses - Less GHG emissions - Healthy cities (less pollutants)

TYPE	DESCRIPTION
ECONOMIES OF SCALE	<ol style="list-style-type: none"> 1. Maximizing DER deployment 2. Provides marketable size 3. Offer resources to the market
ECONOMIES OF SCOPE	<ol style="list-style-type: none"> 1. Sharing knowledge 2. Reduction of transaction costs 3. Market participation cost 4. Increase the value for the consumer 5. Active consumer push
RISK MANAGEMENT	<ol style="list-style-type: none"> 1. Hedge price risks 2. Managing uncertainty of energy price
COMPETITION AND INNOVATION	<ol style="list-style-type: none"> 1. Microgrids and innovative distribution system Markets participation 2. New solutions to consumers 3. Boost innovation



4. SERVICES PROVIDED

Why is aggregation so important?

AGGREGATION OF DER

- **Reduces the cost and LCoE** (economies of Scale)
- **Increase the revenues** (enable market participation of DER)
- **Reduce Risk for all stakeholders** (technical and financial)

TYPE	DESCRIPTION
GENERATION	<ul style="list-style-type: none"> ➤ Shared Self consumption at building level (among neighbours) ➤ “Representante” aggregates renewable offers ➤ Balancing Secondary regulation – aggregation of generation 300MW (Zona de regulación) ➤ Renewables energy can offer Balancing Services
STORAGE	<ul style="list-style-type: none"> ➤ Batteries (peaks avoidance – not market participation, no balancing services)
DEMAND RESPONSE	<ul style="list-style-type: none"> ➤ Implicit (price driven) - PVPC (despite was not inspired by). ➤ Explicit – at R&D level (eg. AGREGA project) ➤ “Interrumpibilidad” (auction) for technical or economical needs ➤ R&D (Agrega)
DEMAND	<ul style="list-style-type: none"> ➤ “Representante” aggregates consumers ➤ High consumers go direct to market (eg. ICS) ➤ Common network access (discretionary)
PROGRIDS	<ul style="list-style-type: none"> ➤ R&D (Smart Rural – Estabanell) ➤ Off grid projects
EV	<ul style="list-style-type: none"> ➤ Gestor de Carga (can re-sell energy), “supervalley” hours, smart charging.



5. STATE OF THE ART

5.b. Market Opportunities in Spain

TODAY IN SPAIN

- The function of “**demand aggregation**” is not forbidden regulated in Spain.
- **Aggregated low voltage DER** can not participate into the energy and balancing market and ancillary services.
- **Demand flexibility (interrumpibility) will compete into adjustment markets in 2018 but aggregation of demand still not possible** (despite its development is pending - F strategic plan 2015-20).
- **Electricity Balancing Guidelines** (network code) approval regulatory framework will be develop 2018 in each Member States and market opportunities will emerge.
- **‘Representante’** could evolve to DER-A, but also Independent Aggregator must be recognised.

- Commercially active
- Partial opening
- Preliminary development
- Closed
- Not assessed



of explicit Demand Response development in Europe 2017. Source: SEDC

DR STATE OF THE ART

An European overview

TODAY IN EUROPE

- The most advanced countries (Ireland, UK) enable both **demand response and independent aggregation**. Belgium and France have both defined the roles and responsibilities of independent aggregator.
- Netherlands, Germany and Austria are in the process of **enabling Demand Response through the retailer only**
- While Demand Response may be 'legal', the rest of Member States **have not adjusted their regulatory structures to enable demand side resources to participate in the market**

Source: JRC

<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101191/Idna27998e>

<https://www.esios.ree.es/es/pagina/propuestas-de-procedimientos-de-operacion>

5. BARRIERS

For a comprehensive market development (1/2)

BARRIERS MITIGATION

- **Legal:**
 - ✓ Certainty for long term investments
 - ✓ Definition of real energy system costs
- **Market:**
 - ✓ Open the markets
 - ✓ Clear price signals to consumers
 - ✓ CBA of different flexibility mechanisms
 - ✓ Clarify incentives and fair-distribution
 - ✓ Reduce artificial market entrance barriers
- **Economic:**
 - ✓ Avoid price distortions
 - ✓ Long term signals
 - ✓ Simplification of procedures

BARRIER	DESCRIPTION
LEGAL	<ol style="list-style-type: none"> 1. LSE Financial stability principle → DER-A affects in of electric system as grid charges are defined today 2. Legal insecurity in energy sector (no incentives to in DER) 3. Lack of regulations flexibility to enable innovation
MARKET	<ol style="list-style-type: none"> 1. Limited access to flexibility markets: Balancing market and Demand Response market are closed to DER Capacity Market closed to demand 2. Wrong signals and incentives (penalise DG) 3. Market concentration: high entrance costs 4. Tariff (energy, charges) structure doesn't offer a Case at low voltage (hourly/location flexibility) 5. Pricing doesn't provide signals to prosumers to re through DER (Caps and Floors in spot market) 6. Promotion and support schemes to DG (in front of auctions)
ECONOMIC	<ol style="list-style-type: none"> 1. Overcapacity (potential of demand-side flexibility) 2. Transactional costs are too high (admin, tech, financial) 3. Cost of opportunity of DG Vs Centralised due to sunk costs (thermal power plants, network, ...) 4. Taxation does not support low carbon technologies (externalities) and final energy usages (gas, fuel) 5. Network charges supported by consumers and DER (transmission and Distribution is also used by generation)

5. BARRIERS

For a comprehensive market development (2/2)

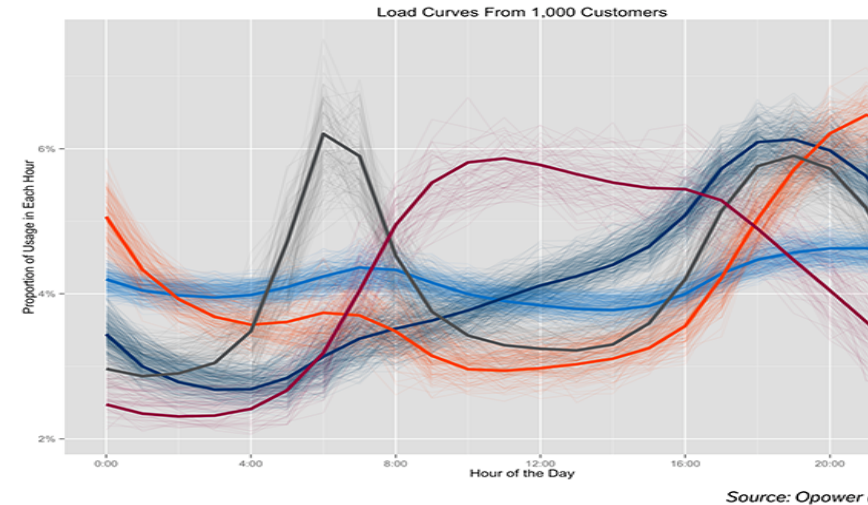
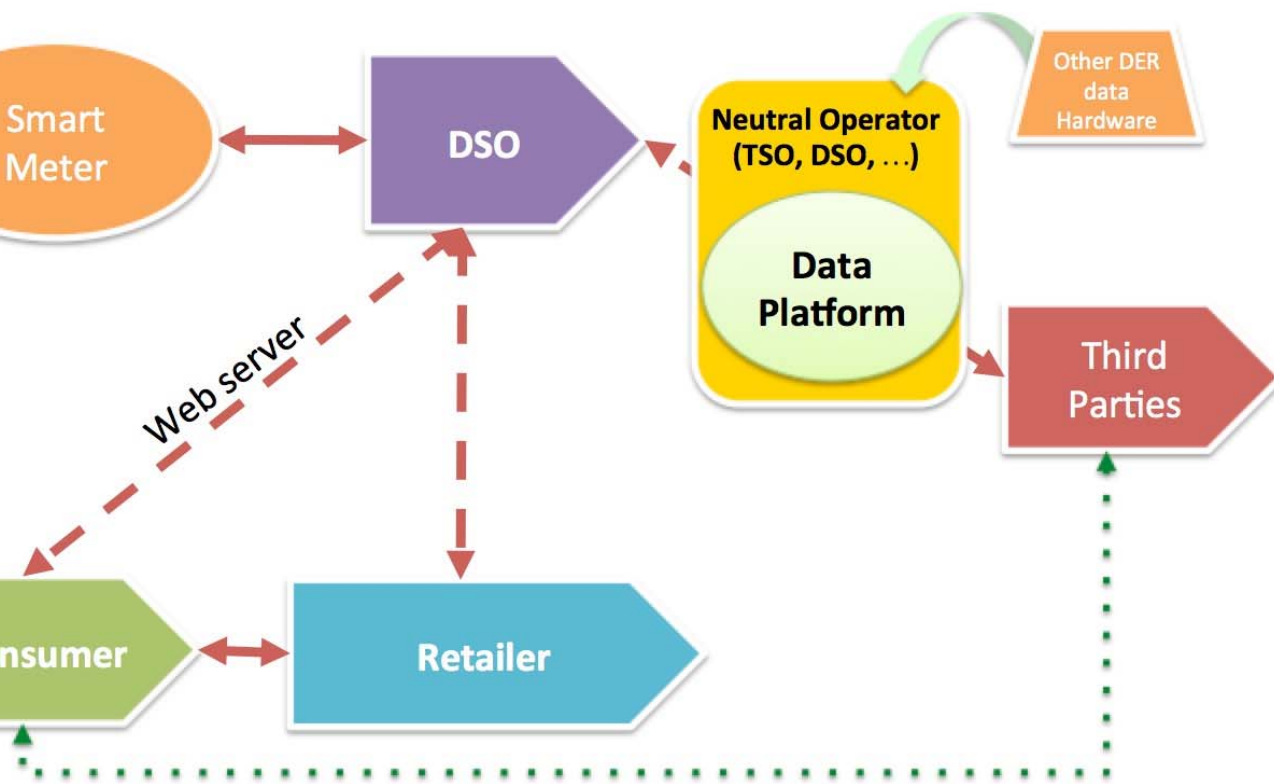
BARRIERS MITIGATION

- **Technical:**
 - ✓ Definition of POs (by REE-SO in collaboration with other stakeholders)
 - ✓ DER data platform
- **Political:**
 - ✓ Climate and Energy Law (DER Security of Supply)
 - ✓ Energy transition role of cities and regions
- **Social:**
 - ✓ prepare consumer (and society) to tackle price signals (time, location)
 - ✓ Make sector trustable

BARRIER	DESCRIPTION
TECHNICAL	<ol style="list-style-type: none">1. Overcapacity (thermoelectric generation, network)2. Interoperability of hardware (to allow future aggregation of DER)3. Cibersecurity4. Reliability (lack of PO – Operational Procedures)5. Smart meters technical specifications6. DER Data access to third parties not possible7. Low international interconnection (Energy Union)
POLITICAL	<ol style="list-style-type: none">1. Lack of vision and strategy (long term vision)2. Limited and unambitious transposition of European directives and reglamentation (network codes)3. Governance among administrations and stakeholders (e.g.#1 relation between government and regulators e.g.#2 regional energy transition plans and municipalities)
SOCIAL	<ol style="list-style-type: none">1. Lack of knowledge for changing the behaviour2. Opacity of energy market and lack of confidence3. Demand anaesthesia – reactive consumer

7. EASING THE FUTURE

Smart Meter & DER data access



AGGREGATION NEEDS DATA

- **DATA PLATFORMS:** enable DER data access to third parties (cities, companies, municipalities ...) with the consent of citizens to leverage new energy services
- **INTEGRATION and INTEROPERABILITY** of DER data for reliable management. E.g. DSP New York (integrated system planning, Grid operations, market layer)
- **QUALITY:** Provide System Data at the level of granularity and timeliness appropriate for the market
- **PRIVACY** data belongs to consumer and requires explicit permit to be transferred (consumer's right)



RECOMMENDATION

Open Market (Balancing, Capacity) to distributed energy resources and their aggregation

- residential, commercial and not only industrial loads and flexibility (evolve current situation)
- defining retribution schemes to compete
- aggregated loads and flexibility (redesign blocks, size, duration and time framework)
- independent aggregators (and its relationship with other stakeholders, such as retailers)

To plan future mix recognizing that DERs supports security of supply

- considering DER contribution to energy trilemma (LCoE, but also quantify other positive contributions)
- the more you integrate decentralized generation the higher the needs in de-centralized flexibility

Climate Change and Energy Transition Law

- include DER and its aggregation to achieve the energy scenarios
- coordinate goals and strategies among regions and municipalities

New 360 degrees initiative that open regulatory space for pilots



8. RECOMMENDATIONS

TO OPEN THE MARKET



RECOMMENDATION

Government , regulator and TSO REE should facilitate transparency

- relevant multi-stakeholders' input process for writing technical procedures and market and requirements definition
- establish fair market participation requirements for each technology to compete on an equal footing
- ensure that market design rules guarantee DER-A have direct access to wholesale and ancillary electricity markets
- providing product and services definition
- Intra-administration cooperation and inter-department coordination

Development of the Aggregation function

- allowing aggregator to sell consumer's flexibility without prior consent of consumer supplier/BRP.
- establishing legal provision (easy and cheap) for conflict between aggregator and supplier.
- avoiding any significant distortive impact to BRP/supplier from consumers flexibility. Compensation should be permitted
- streamline markets and offers: owners of flexibility could offer to different user: TSO, DSO and market parties
- allowing stacking : DER and its aggregations should be allowed to stack this service, when possible
- avoiding artificial costs to owners of DER to have access to the flexibility market

Interoperability - DER equipment should have an open interface to enable interoperability and provider switching

DER Data access (independent and neutral) to third parties to promote fair competition

8. RECOMMENDATIONS

TO THE MARKET WORK



RECOMMENDATION

Reduce risk

- enhancing and communicate legal certainty, long term vision
- designing long term economic signals
- clear technical rules

Fair business models and charges, pushing out energy-unrelated cost

- pushing for hourly prices to consumers (both energy as well as network charges)
- regulated costs supported by different users of transmission and distribution network (generators, consumers)
- regulated charges that are not directly related to the use of electricity networks should be separated
- spreading costs of energy transition among different final energy usages (gas, fuel). E.g. taxation of CO₂

Provide an ecosystem

- facilitating and incentivizing space and aligned funding for R&D, visionary companies, technology centres & industry
- promoting the active consumer and make possible its participation in market design
- allowing innovative financial schemes to consumers (e.g. crowdfunding, EuroPace)



8. RECOMMENDATIONS

TO ATTRACK INVESTMENT





9. CONCLUSIONS

For a comprehensive market development in Spain (1/2)

1. **On time:** Legal context is totally in favor of DER-A (CEP, Balancing Guidelines). It is time to **define new regulatory framework.**
2. Definition (Clean Energy Package) of **Independent Aggregator** (Virtual Vs Physical)
3. DER and Aggregation will not only support the consumer and the whole electricity sector, but electrification of transport, **pollution policies and environmental targets.**
4. **Consumer centric policies** are part of energy transition and Energy Union. DER-A empowers consumers.
5. The **function of “aggregation”** is what matters, consumers should decide who will provide the service.
6. The **function of aggregate DER** to provide **flexibility** is basic to allow **high penetration of REN** alongside with central renewables (as it brings economy of scale + increase of revenues). DER provides value across the **energy trilemma.**
7. Aggregation promotes and **scales up grid connected DER** since allows **direct market participation** (avoiding grid defection)



9. CONCLUSIONS



For a comprehensive market development in Spain (1/2)

3. Re-designing **price signals, tax policy and grid charges** are critical to move towards an energy transition that does not affect competitiveness of economy and consumers' energy cost.
9. Trend of aggregation of block of resources vs consumers resources (storage, EV, PV, DR). Therefore **interoperability** should be requested in all DER devices to provide resources scalability and reliability.
10. **Technical reliability in front the SO** is crucial to provide value to the system. Definition of POs are crucial.
11. **New business models in energy sector** to promote low carbon economy are enabled by **digitalization**.
12. **DER data access is key** to planning, operate the electric system and open markets.
13. **Long term vision** aligns all decisions related to energy transition and provide legal certainty.
14. **Regions and cities'** energy transition plans are key for the acceleration of DER.

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Presentation based on analysis commissioned by ACCO



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de la Competència**