

bridge

HORIZON 2020

Feedback on the Clean Energy Package proposals

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V1.1	2017-03-24	BRIDGE WGs	Proofreading and completion of the document
V1.2	2017-03-30	TECHNOFI and WG chairs/rapporteurs	Consolidation of the document, clarification of the role of each WG, distribution of the document to each WG with instructions
V1.3	2017-05-04	TECHNOFI	Reception of WG inputs, consolidation of the document
V1.4	2017-06-02	WG chairs & rapporteurs	Reformulation of comments under the umbrella of each WG
V1.5	2017-06-16	TECHNOFI	Harmonisation and consistency check

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1. Introduction

1.1 Background

At the BRIGE meetings in January 2017, BRIDGE working groups agreed to cooperate in order to analyse the Clean Energy Package proposals issued by the European Commission in November 2016.

The Clean Energy Package proposals are indeed of interest for the working groups on Business Models, Customer Engagement, Regulations and Data Management.

The European Commission representatives present at the BRIDGE meetings have shown a great interest in getting feedback on the Package from BRIDGE projects, since there is room for discussion and improvements before the Package is eventually adopted.

1.2 Purpose of the present document

The purpose of the present document is to present the feedback from BRIDGE working groups on the Clean Energy Package.

It has initially been elaborated by the Intensys4EU support team and nourished by feedback provided by BRIDGE projects.

Articles from the Clean Energy Package have been commented by BRIDGE projects as presented in the following table.

Table 1: List of BRIDGE projects involved in the Clean Energy Package comments

		Commented by:	
Electricity Directive	Chapter I: Subject Matter and Definitions	Article 1: Subject matter	RealValue, UPGRID
		Article 2: Definitions	Naiades, GOFLEX, EMPOWER, UPGRID and FLEXICIENCY, STORE&GO, WiseGrid, RealValue, Flex4Grid
	Chapter II: General Rules for the Organisation of the Sector	Article 3: Competitive, consumer-centered, flexible and non-discriminatory electricity market	RealValue, Naiades, WiseGrid
		Article 4: Free choice of electricity supplier	Naiades, P2P-SmarTest
		Article 8: Authorisation procedure for new capacity	RealValue, Naiades
		Article 9: Public service obligations	SmartNet
	Chapter III: Consumer Empowerment and Protection	Article 11: Entitlement to a dynamic price contract	RealValue, Naiades
		Article 12: Right to switch supplier and rules on switching-related fees	P2P-SmarTest
		Article 13: Contract with an aggregator	STORY, Naiades, NobelGrid, EMPOWER, RealValue
		Article 14: Comparison tools	STORY, Flex4Grid
		Article 15: Active customers	STORY, Naiades, INVADE, FLEXICIENCY, SmarterEMC2, WiseGRID, EMPOWER, NOBELGRID
		Article 16: Local energy communities	STORY, Naiades, TILOS, EMPOWER, WiseGRID, TILOS, NAIADES
		Article 17: Demand response	RealValue, STORY, Naiades
	Article 18: Billing and billing information	UPGRID	

		Article 19: Smart metering	RealValue, STORY UPGRID, STORY, TILOS, SmarterEMC2, NOBEL GRID49	
		Article 20: Smart metering functionalities	STORY, Naiades, UPGRID and FLEXICIENCY, WiseGrid NOBEL GRID, RealValue	
		Article 21: Entitlement to a smart meter	NOBELGRID	
		Article 22: Conventional metering	STORY, NOBELGRID	
		Article 23: Data management	UPGRID, SMARTEREMC2, FLEXICIENCY	
		Article 24: Data format	UPGRID, SMARTEREMC2, FLEXICIENCY	
	Chapter IV: Distribution System Operation	Article 31: Tasks of distribution system operators	STORY, Naiades, SmarterEMC2, InteGrid	
		Article 32: Tasks of distribution system operators in the use of flexibility	Naiades, Wisegrid, Flexiciency, INVADE, Integrid	
		Article 33: Integration of electro-mobility into the electricity network	Naiades, REALVALUE, NOBEL GRID, Flexiciency	
		Article 34: Tasks of distribution system operators in data management	UPGRID, FLEXICIENCY and SMARTEREMC2, SmartNet, Integrid	
		Article 36: Ownership of storage facilities	STORY, Naiades, STORE&GO, TILOS, Nobelgrid, Flexiciency, Integrid	
	Chapter V: General Rules Applicable to the Transmission System	Article 40: Tasks of transmission system operators	SmartNet	
	Chapter VI: Unbundling Of Transmission System Operators	Article 51: Network development and powers to make investment decisions	SmartNet	
		Article 54: Ownership of storage and provision of ancillary services by transmission system operators	STORE&GO, SmartNet	
	Chapter VII: National Regulatory Authorities	Article 58: General objectives of the regulatory authority	Naiades	
		Article 59: Duties and powers of the regulatory authority	Flexiciency	
	Electricity Regulation	Chapter II: General rules for the electricity market	Article 3: Principles regarding the operation of electricity markets	Nobel Grid, Naiades
			Article 4: Balancing responsibility	Nobel Grid, Naiades
Article 5: Balancing market			Netfficient, Naiades	
Article 6: Day-ahead and intraday markets			RealValue	
Article 7: Trade on day-ahead and intraday markets			Naiades, RealValue, TILOS	
Article 8: Forward markets			GridSol	
Article 9: Price Restrictions			RealValue, GRIDSOL	
Article 11: Dispatching of generation and demand response			SmartEMC2, Nobel Grid, Netfficient	
Article 12: Redispatching and curtailment		Nobel Grid		
Chapter III: Network access and congestion management		Article 14: General principles of capacity allocation and congestion management	Naiades, SmarterEMC2	
	Article 16: Charges for access to networks	Naiades		

Chapter V: Transmission system operation	Article 45: Ten-year network development plan	SmartNet	
	Chapter VI: Distribution system operation	Article 49: European entity for distribution system operators	FLEXICIENCY and SMARTEREMC2, SmartNet
	Article 51: Tasks of the EU DSO entity	FLEXICIENCY and UPGRID	
	Article 53: Cooperation between distribution system operators and transmission system operators	Data management, SmartNet	
Chapter VII: Network codes and guidelines	Article 55: Establishment of network codes	Naiades, FLEXICIENCY and UPGRID	
	Article 57: Guidelines	Naiades	
Energy Efficiency Directive	Article 4: Building renovation	inteGRIDY	
	Article 7: Energy efficiency obligation schemes	inteGRIDy	
	Article 9a: Metering, sub-metering and cost allocation for heating and cooling and domestic hot water	RealValue	
	Article 10a: Billing and consumption information for heating and cooling and domestic hot water	RealValue	
	Article 11a: Cost of access to metering and billing information for heating and cooling	Naiades	
Energy Performance of Buildings Directive	Article 2a: Long-term renovation strategy	Naiades, RealValue	
	Article 10	Flex4Grid	
	Article 14	RealValue	
	Article 15	RealValue	
Renewable Energy Directive	Article 2: Definitions	Nobel Grid	
	Article 4: Financial support for electricity from renewable sources	RealValue, Naiades	
	Article 5: Opening of support schemes for renewable electricity	RealValue, Naiades	
	Article 19: Guarantees of origin of electricity, heating and cooling produced from renewable energy sources	STORE&GO, EMPOWER	
	Article 20: Access to and operation of the grids	STORE&GO	
	Article 21: Renewable self-consumers	Nobel Grid, Netfficient INVADE, WiseGRID, EMPOWER	
	Article 22: Renewable energy communities	TILOS, WiseGRID	
	Article 25: Mainstreaming renewable energy in the transport sector	RealValue	

1.3 Organisation of the document

The document is structured as follows:

- In Chapter 2, the Clean Energy Package proposals are briefly explained, notably based on the EC Communication “Clean Energy For All Europeans”. The main texts included in the package (Directives and Regulation) are listed and their scope is explained.
- In Chapter 3, each subchapter corresponds to one of the Directives or Regulation. Amongst the new or modified articles proposed by the EC in the Package, the articles being the most relevant to BRIDGE working groups have been selected for comments and feedback from the BRIDGE projects.



2. The Clean Energy Package in short

2.1 Summary of the communication from the European Commission

The Energy Union is one of the ten priorities of the Juncker Commission and aims to modernise the EU's economy.

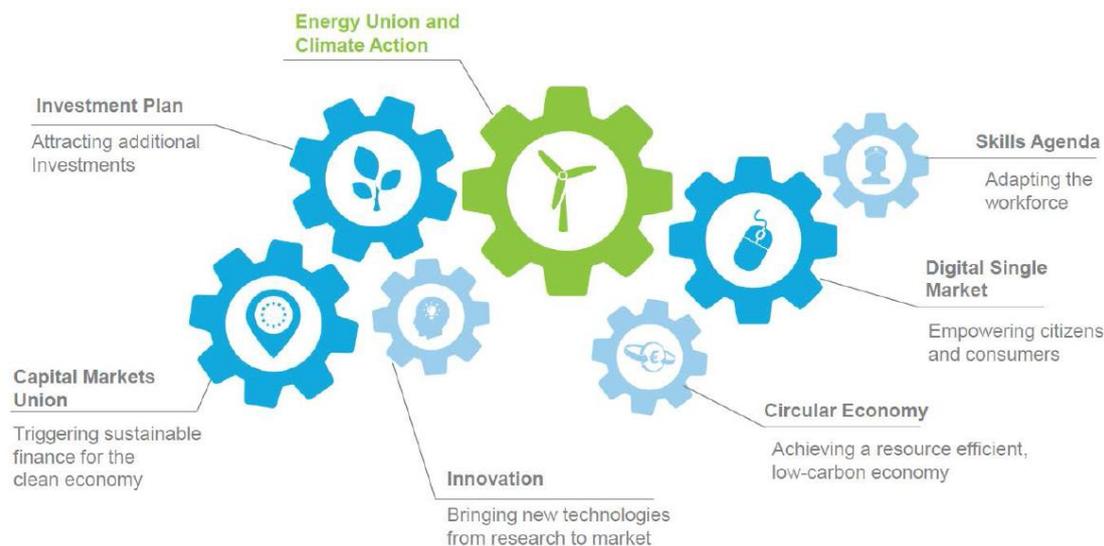


Figure 1: Modernisation of the economy – Role of the Energy Union and Climate Action

The Clean Energy Package presents an opportunity to speed both the clean energy transition and growth and job creation. The energy sector is important for the European economy: energy prices affect the competitiveness of the whole economy and represent on average 6% of annual household expenditure¹. Behind it stands a prosperous manufacturing industry delivering the necessary equipment and services, not only in Europe, but worldwide. The development of renewable energy sources and energy efficiency products and services has led to the creation of new businesses throughout Europe providing new sources of jobs and growth for Europeans. The employment impacts of the Energy Union go well beyond the energy supply industry. For instance, more than one million workers are employed, directly or indirectly, in renewable energy related sectors⁷ and around one million in the energy efficiency-related sector.

The Energy Union is the EU's major vector for and contribution to a global and comprehensive transition towards a low carbon economy. It is equally important to ensure that the transition to a clean energy system will benefit all Europeans. All consumers - not forgetting the vulnerable or energy poor - should feel involved and reap the tangible benefits of access to more secure, clean and competitive energy, which are the Energy Union's key objectives.

The presented regulatory proposals aim at modernising the economy and boosting investments in clean energy related sectors by accelerating, transforming and consolidating the EU economy's clean energy transition thereby creating jobs and growth in new economic sectors and business models.

The legislative proposals cover energy efficiency, renewable energy, the design of the electricity market, security of supply and governance rules for the Energy Union.

¹ COM (2016) 769, "Energy prices and costs in Europe"

The tabled package pursues three main goals:

- Putting energy efficiency first,
- Achieving global leadership in renewable energies,
- Providing a fair deal for consumers.

This package should be seen in the context of the EU leading the way towards a smarter and cleaner energy for all, to implement the Paris agreement, fuel economic growth, spur investment and technological leadership, create new employment opportunities and enhance citizen's welfare.

2.2 Texts included in the Package

The following texts are included in the Clean Energy Package and analysed in the present document: the Electricity Directive (ED), the Electricity Regulation (ER), the Energy Efficiency Directive (EED), the Energy Performance of Buildings Directive (EPBD) and the Renewable Energy Directive (RED).²

The first two texts are the most relevant to BRIDGE projects and are analysed in detail. The last three texts are partly relevant to BRIDGE projects.

2.2.1 Electricity Directive (Recast of the Directive 2009/72)

It sets the common rules for the internal market in electricity that should be developed by all Member States in their own legislation.

- **Chapter I** of the proposed Directive provides some clarifications to the scope and subject matter of the Directive, emphasising the **focus on consumers** and the importance of the internal market and its main principles. It provides also for an **update of the main definitions** used in the Directive.
- **Chapter II** of the proposed Directive lays down the general principle that Member States have to ensure that the EU electricity market is **competitive, consumer-centred, flexible** and **non-discriminatory**. It emphasises that national measures should not unduly hamper cross-border flows, consumer participation or investments. It further enshrines the principle that supply prices shall be **market-based**, subject to duly justified exceptions. The chapter also clarifies certain principles relating to the functioning of the EU electricity markets, such as the right to choose a supplier. It also provides for updated rules on possible public service obligations which may be imposed by Member States on energy undertakings under certain circumstances.
- **Chapter III** of the proposed Directive reinforces pre-existing consumer rights and introduces new rights that aim at **putting consumers at the heart of the energy markets** by ensuring that they are **empowered** and **better protected**. It sets rules on clearer billing information and on certified comparison tools. It contains provisions ensuring that consumers are able to freely choose and change suppliers or aggregators, are entitled to a **dynamic price contract** and are able to engage in **demand response, self-generation** and **self-consumption** of electricity. It entitles every consumer to request a smart meter equipped with a minimum set of functionalities. It also improves pre-existing rules on the consumers' possibility to **share their data** with suppliers and service providers by clarifying the role of the parties responsible

² The Clean Energy Package also includes other texts which are not analysed in the present document, because less relevant for BRIDGE topics.

for data management and by setting a common **European data format** to be developed by the Commission in an implementing act. It also aims to ensure that energy poverty is addressed by Member States. It further requires Member States to define frameworks for **independent aggregators** and for demand response along principles that enable their full participation in the market. It defines a framework for **local energy communities** which may engage in local energy generation, distribution, aggregation, storage, supply or energy efficiency services. It further provides some clarifications to pre-existing provisions on smart meters, single points of contacts, and rights to out-of-court settlement, universal service and vulnerable consumers.

- **Chapter IV** of the proposed Directive provides for some clarifications concerning the **tasks of DSOs**, notably relating to the activities of DSOs concerning the procurement of **network services** to ensure **flexibility**, the integration of **electrical vehicles** and **data management**. It also clarifies the role of DSOs with respect to storage and recharging points for electric vehicles.
- **Chapter V** of the proposed Directive summarises the general rules applicable to **TSOs**, largely based on existing text, providing only some clarifications concerning **ancillary services** and the **new Regional Operational Centres**.

2.2.2 Electricity Regulation (Recast of Regulation 714/2009)

It sets rules on the internal electricity market which should be directly applied.

- **Chapter I** of the proposed Regulation sets out the scope and subject matter and the definitions of terms used in it. It emphasises the importance of **undistorted market signals** to provide for **increased flexibility**, decarbonisation and innovation and updates and complements the main definitions used in the Regulation.
- **Chapter II** of the proposed Regulation introduces a new Article which sets out the key principles to be respected by national energy legislation in order to allow for a functioning internal electricity market. It also sets out the **main legal principles for electricity trading rules** within different trading timeframes (balancing, intraday, day-ahead and forward markets), including principles for price formation. It clarifies the principle of **balancing responsibility** and provides for a framework for more market compatible rules for the **dispatch** and **curtailment** of generation and demand response, including conditions for any exceptions thereof.
- **Chapter III** of the proposed Regulation describes the process to define **bidding zones** in a coordinated manner, in line with the review process created in Regulation 1222/2015 establishing a Guideline on Capacity Calculation and Congestion Management. In order to address the persisting problem of significant national **limitations to cross-border electricity flows**, the conditions for such exceptional limitations are clarified, notably by rules that shall ensure that electricity imports and exports are not restricted by national actors for economic reasons. This Chapter further contains amendments to pre-existing principles for transmission and distribution network tariffs and sets a procedure for fostering the **progressive convergence of transmission and distribution tariff methodologies**. It also sets out amended rules for the usage of **congestion rents**.
- **Chapter IV** of the proposed Regulation sets out new general principles for addressing **resource adequacy** concerns by Member States in a coordinated manner. It sets out principles and a procedure for the development of a European resource adequacy assessment to better determine the need for **capacity mechanisms** and, if appropriate, the setting of a

reliability standard by Member States. It clarifies how and under which conditions capacity mechanisms can be introduced in a market-compatible manner. It also clarifies market compatible **design principles for capacity mechanisms**, including rules for the participation of capacity located in another Member State and for interconnection usage. It sets out how Regional Operational Centres, national TSOs, the ENTSO for electricity and national regulators via ACER will be involved in the development of technical parameters for the **participation of capacities located in another Member State** as well as the operational rules for their participation.

- **Chapter V** of the proposed Regulation sets out the tasks and duties of the ENTSO for Electricity and the monitoring tasks of ACER in this regard whilst clarifying its duty to act independently and for the European good. It defines the mission of **Regional Operational Centres** and provides for criteria and a procedure for defining system operation regions covered by each Regional Operational Centre and the coordination functions that these centres perform. It also sets out working and organisational arrangements, consultation requirements, requirements and procedures for the adoption of decisions and recommendations and their revision, the composition and responsibilities of the management board and liability arrangements of Regional Operational Centres. The chapter also incorporates rules on the **connection of cogeneration units**, previously included in Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency. The rules on a ten-year network development plan, inter-transmission system operator compensation, information exchange and certification remain largely unchanged.
- **Chapter VI** of the proposed Regulation sets up a **European entity for DSOs**, defines a procedure for its establishment and its tasks including with regard to the consultation of stakeholders. It also provides detailed rules on the **cooperation between DSOs and TSOs** with regard to the planning and operation of their networks.
- **Chapter VII** of the proposed Regulation sets out pre-existing powers and rules for the Commission to adopt delegated acts in the form of network codes or guidelines. It provides for clarifications as to the legal nature and the adoption of network codes and guidelines and enlarges their possible content to areas such as **distribution tariff structures**; rules for the **provision of non-frequency ancillary services**; **demand response, energy storage and demand curtailment rules**; **cyber security rules**; **rules regarding to Regional Operational Centres**; and, the **curtailment of generation** and **redispatch of generation and demand**. It simplifies and streamlines the procedure for the elaboration of electricity network codes and gives national regulators the possibility to decide within ACER on issues concerning the implementation of network codes and guidelines. It also includes the European entity for DSOs and other stakeholders more closely in the procedure of the development of proposals for electricity network codes.
- **Chapter VIII** of the proposed Regulation sets out the final provisions of the proposed Regulation. It includes the pre-existing rules for the **exemption of new direct current interconnectors** from certain requirement of the Electricity Directive and Regulation whilst clarifying the procedure for subsequent amendments made by NRAs thereof.
- The **Annex** to the proposed Regulation defines in more detail the functions attributed to the **Regional Operational Centers** created by the Regulation.

2.2.3 Energy Efficiency Directive (amending Directive 2012/27/EU on energy efficiency)

The Directive is amended in order to update the 2020 target (20% energy efficiency) in the **2030 context** with **30% energy efficiency**.

Moreover, to further empower consumers as key players in the energy market, the Commission proposes to improve the provision of information on their **heating and cooling consumption** and strengthen their rights in metering and billing of thermal energy, in particular for people living in multi-apartment buildings. In order to improve frequency of information, an obligation for **heat meters** to be **remotely readable** is introduced.

Finally, the proposal strengthens the social aspects of energy efficiency by requiring that **energy poverty** must be taken into account in designing energy efficiency obligation schemes and alternative measures. The **decrease in energy bills** will also be of particular benefit to the most vulnerable consumers.

Other parts of the Directive are untouched.

2.2.4 Energy Performance of Buildings Directive (amending Directive 2010/31/EU)

The proposal introduces **building automation** and **control systems** as an alternative to physical inspections, encourages the **roll-out of the required infrastructure for e-mobility** (with a focus on large commercial buildings and excluding public buildings and SMEs), and introduces a **smartness indicator** to assess the technological readiness of the building to interact with their occupants and the grid and to manage themselves efficiently. This update of the EPBD will also strengthen the links between **public funding for building renovation** and **energy performance certificates** and will incentivise tackling energy poverty through building renovation.

Only those articles of the Directive which need to be updated to reflect the 2030 timeframe are included in this proposal.

2.2.5 Renewable Energy Directive (Recast of Directive 2009/28/EU)

It concerns the promotion of the use of energy from renewable sources. The Proposal lays down the principles according to which Member States can collectively and continuously ensure that the share of renewable energy in the EU final energy consumption reaches at least 27% by 2030 in a cost-effective manner across the three sectors of electricity (RES-E), heating and cooling (RES-H&C) and transport (RES-T), taking into account the following specific objectives:

- address investment uncertainty, along a path that takes account of medium and long term decarbonisation objectives;
- ensure cost-effective deployment and market integration of renewable electricity;
- ensure collective attainment of the EU-wide target for renewable energy in 2030, establishing a policy framework in coordination with the Energy Union Governance that avoids any potential gap;
- develop the decarbonisation potential of advanced biofuels and clarify role of food-based biofuels post 2020;
- develop renewable energy potential in the heating and cooling sector.



3. Selected articles in the Clean Energy Package for BRIDGE working groups' feedback

3.1 Electricity Directive

3.1.1 Chapter I: Subject Matter and Definitions

Article 1 in EC proposal: Subject matter

This Directive establishes common rules for the generation, transmission, distribution, storage and supply of electricity, together with consumer protection provisions, with a view to creating truly integrated competitive, consumer-centered and flexible electricity markets in the Union. Using the advantages of an integrated market, the Directive aims at ensuring affordable energy prices for consumers, a high degree of security of supply and a smooth transition towards a decarbonised energy system. It lays down key rules relating to the organisation and functioning of the European electricity sector, in particular rules on consumer empowerment and protection, on open access to the integrated market, on third party access to transmission and distribution infrastructure, unbundling rules, and on independent national energy regulators.

Comments from BRIDGE working groups:

Business Models:

The regulatory changes in the Clean Energy Package are often a change in degree rather than in kind. For example, the integration of electricity markets across Europe or their competitiveness have been on the EU's agenda for some time. The RealValue project may contribute to the analysis of the Clean Energy Package by scrutinizing similar methods implemented in the recent past.

Data management:

General reference to the ICTs (and data) relevance could be made.

Article 2 in EC proposal: Definitions

For the purpose of this Directive, the following definitions apply:

1. 'customer' means a wholesale or final customer of electricity;
2. 'wholesale customer' means a natural or legal person purchasing electricity for the purpose of resale inside or outside the system where he is established;
3. 'final customer' means a customer purchasing electricity for his own use;
4. 'household customer' means a customer purchasing electricity for his own household consumption, excluding commercial or professional activities;
5. 'non-household customer' means a natural or legal person purchasing electricity which is not for their own household use and includes producers industrial customers, small and medium sized enterprises, businesses and wholesale customers;
6. 'active customer' means a customer or a group of jointly acting customers who consume, store or sell electricity generated on their premises, including through aggregators, or participate in demand response or energy efficiency schemes provided that these activities do not constitute their primary commercial or professional activity;
7. 'local energy community' means: an association, a cooperative, a partnership, a non-profit organisation or other legal entity which is effectively controlled by local shareholders or members, generally value rather than profit-driven, involved in distributed generation and in performing

activities of a distribution system operator, supplier or aggregator at local level, including across borders;

8. 'supply' means the sale, including resale, of electricity to customers;

9. 'electricity supply contract' means a contract for the supply of electricity, but does not include an electricity derivative;

10. 'electricity derivative' means a financial instrument specified in points 5, 6 or 7 of Section C of Annex I to Directive 2004/39/EC of the European Parliament and of the Council, where that instrument relates to electricity;

11. 'dynamic electricity price contract' means an electricity supply contract between a supplier and a final customer that reflects the price at the spot market or at the day ahead market at intervals at least equal to the market settlement frequency;

12. 'contract termination fee' means any charge or penalty imposed on customers by suppliers or aggregators for withdrawing from an electricity supply or service contract;

13. 'switching related fee' means any charge or penalty imposed on customers by suppliers or system operators directly or indirectly for changing suppliers, including contract termination fees;

14. 'aggregator' means a market participant that combines multiple customer loads or generated electricity for sale, for purchase or auction in any organised energy market;

15. 'independent aggregator' means an aggregator that is not affiliated to a supplier or any other market participant;

16. 'demand response' means the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including time-variable electricity prices or incentive payments, or in response to acceptance of the final customer's

bid, alone or through aggregation, to sell demand reduction or increase at a price in organised markets as defined in Commission Implementing Regulation (EU) No 1348/2014

17. 'conventional meter' means an analogue meter or an electronic meter with no capability to both transmit and receive data;

18. 'smart metering system' means an electronic system that can measure energy consumption, providing more information than a conventional meter, and can transmit and receive data for information, monitoring and control purposes, using a form of electronic communication;

19. 'interoperability' means, in the context of smart metering, the ability of two or more energy or communication networks, systems, devices, applications or components to interwork, to exchange and use information in order to perform required functions;

20. 'near-real time' means, in the context of smart metering, the time, usually down to seconds, that elapses between data recording and their automated processing and transmission for use or information purposes;

21. 'best available techniques' means, in the context of data protection and security in a smart metering environment, the most effective and advanced stage in the development of activities and their methods of operation, which indicates the practical suitability of particular techniques, designed to prevent or mitigate risks on privacy, personal data and security, for providing in principle the basis for complying with the Union data protection framework;

22. 'distribution' means the transport of electricity on high-voltage, medium-voltage and low-voltage distribution systems with a view to its delivery to customers, but does not include supply;

23. 'distribution system operator' means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity;

24. 'energy efficiency' means the ratio of output of performance, service, goods or energy, to input of energy.

25. 'energy from renewable sources' means energy from renewable non-fossil sources, in particular wind, solar (solar thermal and solar photovoltaic), geothermal energy, ambient heat, hydropower and tide, ocean, wave energy, and combustible renewables: biofuels, bioliquids, biogas, solid biofuels and combustible wastes of renewable origin.
26. 'distributed generation' means generation plants connected to the distribution system; □ new
27. 'recharging point' means an interface that is capable of charging one electric vehicle at a time or exchanging a battery of one electric vehicle at a time;
28. 'transmission' means the transport of electricity on the extra high-voltage and high-voltage interconnected system with a view to its delivery to final customers or to distributors, but does not include supply;
29. 'transmission system operator' means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity;
30. 'system user' means a natural or legal person supplying to, or being supplied by, a transmission or distribution system;
31. 'generation' means the production of electricity;
32. 'producer' means a natural or legal person generating electricity;
33. 'interconnector' means a transmission line which crosses or spans a border between bidding zones, between Member States or, up to the border of EU jurisdiction, between Member States and third countries;
34. 'interconnected system' means a number of transmission and distribution systems linked together by means of one or more interconnectors;
35. 'direct line' means either an electricity line linking an isolated generation site with an isolated customer or an electricity line linking an electricity producer and an electricity supply undertaking to supply directly their own premises, subsidiaries and customers;
36. 'small isolated system' means any system with consumption of less than 3 000 GWh in the year 1996, where less than 5 % of annual consumption is obtained through interconnection with other systems;
37. 'micro isolated system' means any system with consumption less than 500 GWh in the year 1996, where there is no connection with other systems;
38. 'ancillary service' means a service necessary for the operation of a transmission or distribution system including balancing and non-frequency ancillary services but not congestion management;
39. 'non-frequency ancillary service' means a service used by a transmission or distribution system operator for steady state voltage control, fast reactive current injections, inertia and black start capability;
40. 'regional operational centre' means the regional operational centre as defined in Article 32 of the [recast of Regulation 714/2009 as proposed by COM(2016)861/2].
41. 'integrated electricity undertaking' means a vertically or horizontally integrated undertaking;
42. 'vertically integrated undertaking' means an electricity undertaking or a group of electricity undertakings where the same person or the same persons are entitled, directly or indirectly, to exercise control, and where the undertaking or group of undertakings perform at least one of the functions of transmission or distribution, and at least one of the functions of generation or supply of electricity;
43. 'related undertaking' means affiliated undertakings, within the meaning of Article 2(12) of Directive 2013/34/EU of the European Parliament and of the Council, and undertakings which belong to the same shareholders;

44. 'horizontally integrated undertaking' means an undertaking performing at least one of the functions of generation for sale, or transmission, or distribution, or supply of electricity, and another non-electricity activity;
45. 'control' means rights, contracts or any other means which, either separately or in combination and having regard to the considerations of fact or law involved, confer the possibility of exercising decisive influence on an undertaking, in particular by:
- (1) ownership or the right to use all or part of the assets of an undertaking;
 - (2) rights or contracts which confer decisive influence on the composition, voting or decisions of the organs of an undertaking;
46. 'electricity undertaking' means any natural or legal person carrying out at least one of the following functions: generation, transmission, distribution, supply, or purchase of electricity, which is responsible for the commercial, technical or maintenance tasks related to those functions, but does not include final customers;
47. 'security' means both security of supply and provision of electricity, and technical safety;
48. 'energy storage' means, in the electricity system, deferring an amount of the electricity that was generated to the moment of use, either as final energy or converted into another energy carrier.
49. 'balancing responsible party' means market participants financially responsible for imbalances who have not delegated their responsibility pursuant to Article 4(1) [recast of Regulation 714/2009 as proposed by COM(2016)861/2].

Comments from BRIDGE working groups

Business Models:

The term 'customer' (1.) means a wholesale or final (**retail**) customer of electricity

The term 'active customer' (6.) is not widely used. A more fitting term would be '**prosumer**' (**prosumers that are also consumers**) which means a customer or a group of jointly acting customers who consume, store or sell electricity generated on their premises, including through aggregators, utilities or other energy suppliers, or participate in demand response or energy efficiency schemes provided that these activities do not constitute their primary commercial or professional activity (see Smart Grid Library 2015)

Clarification is needed on what the term 'local' (7.) effectively means i.e. shareholders or members that are geographically based in the proximity of where the electricity is generated and where it is consumed. While the notion of the 'local energy community' is addressed here, the explicit notion of a 'local energy market' is missing. In the Empower project, for example, electricity-related services are a core element, related to the concept of a local electricity market; it is not only electricity that is sold in the market place, but also energy-related services, that are necessary to the operation of a local electricity market or that enhance the value proposition of a local electricity market. In relation to the term 'profit-driven', 'trading' should also be mentioned e.g. the Empower project is developing local electricity markets where electricity is traded at a local level between prosumers and consumers.

A more specific definition could be provided for 'generation plant' (26.) e.g. distributed generation means generation plants that are located at the point of consumption and connected to the distribution system.

The definition of 'producer' (32.) could be expanded to include the notion of 'prosumer'.

The term 'ancillary services (38.) does not mention ancillary services that are not necessarily related only to the operation of a transmission or distribution system. For example, a key aspect of the Empower project is ancillary services that enable the operation of local energy markets. As prosumers (or local energy communities) get the ability to sell electricity in the marketplace, the potential for energy-related services (to be sold to prosumers) becomes evident across the entire value chain,

from the procurement of equipment, to infrastructure financing solutions, installation/ commissioning, financing, operation/ maintenance, energy auditing, energy savings solutions, etc. All are solutions that may be a core element of the business models of “local energy communities” or “local energy market” providers.

The term ‘security’ (47.) seems too unprecise as it includes two items that have nothing to do with each other: security of supply, and technical safety.

Data Management

In Art.2.11 ‘dynamic electricity price contract’: dynamic pricing’ refers to retail electricity prices that pass through at least part of the wholesale price volatility to final end users. This can be achieved not only through real time pricing but also for instance with advanced forms of time-of-use or critical peak pricing, and therefore the definition should be adjusted according to different types of “pricing dynamism”. If not, the definition seems to admit only real time pricing at intervals (at least) equal to ISP, limiting the possibility to have different dynamic pricing solutions. The technical feasibility of such a strict linkage between dynamic pricing and the ISP granularity, possible only with very advanced forms of smart meters, should be explored.

In Art.2.20 ‘near-real time’: technically, it is not possible to read, to process and validate data in seconds. Usually, the whole process requires one day. For the validation of hourly data it is needed the value of the daily closure of energy from the meter, to estimate any possible hourly data missing. Therefore, there is the need to broaden up the definition of real time to the minimum technical time that elapses between data recording and automated processing and transmission;

Furthermore, additional definitions such as “Grid Data”, “Standardization”, “Data Privacy”, “Grid services externalization” would be welcome, providing more relevance to the data domain and the possibly derived activity and business around it.

Regulations

The definition 26 refers that ‘distributed generation’ (DG) means generation plants connected to the distribution system. According to CIGRE Working Group 37-23, DGs are defined as non-predictable, non-dispatchable small generation units (nominal power below 50MW), connected to distribution power systems.

The definition terms such as 16. ‘demand response’, 38. ‘ancillary service’ and 39. ‘non-frequency ancillary service’ should also describe who is responsible of sending the signals or giving the services.

The definition 47. should be divided in static and dynamic security. Furthermore, considering the installation of smart meters and the usage of their recording data by various recipients (e.g. aggregators, DSO, etc), it is critical to define data security as it is an essential foundation for managing privacy.

For the STORE&GO project, the question is whether the proposed definition of ‘Energy Storage’ (48) under the Electricity Directive refers exclusively to Power-to(-x-to)-Power storage technologies, or applies cross-sectorial to include technologies which convert (excess) electricity from renewable energy sources into other energy carriers such as gas.

Power-to-Gas technology, which converts (excess) electricity from renewable energy sources into green hydrogen (a zero carbon gas) and carbon neutral ‘substitute natural gas’, can be deployed both in a Power-to-Power context, as well as in a Power-to-hydrogen/SNG end-use context. In a Power-to-Power storage solution, the Power-to-Gas plant is combined with a fuel cell or (micro-) combined heat and power installation for re-electrification. This configuration allows Power-to-Gas facilities to provide similar up- and downward balancing and storage services to the electricity system as other energy storage technologies such as batteries, pumped hydro and compressed air energy storage.

The Commission Staff Working Document titled “Energy Storage-The Role of Electricity” (SWD(2017) 61 final), issued at the 1st of February of 2017, explicitly refers to such an option as falling under the definition of ‘energy storage’ in the Recast Electricity Directive. Section 4.1 on page 17 of the document reads:

“Storage within the electricity system covers all power-to-power solutions, including batteries, pumped hydro and compressed air energy storage. It also covers power-to-hydrogen when the produced hydrogen is used for re-electrification. These storage facilities should operate in the electricity markets on a competitive basis within the regulatory framework provided by the ‘Market Design Initiative’ proposal.”

Stakeholders such as the European Association for Storage of Energy (EASE), however, interpret the definition of energy storage in the Recast Electricity Directive in a broad sense by stating that the definition “does not limit energy storage to electricity-in/electricity-out; rather, it encompasses ‘power-to-x’ and thermal heat energy storage systems.”³ From such a reading, a Power-to-Gas installation which converts (excess) electricity into hydrogen, and optionally into substitute natural gas, for other purposes than re-electrification (e.g. heating, industry, or mobility), would also be brought under the definition of energy storage. By also applying to technologies which convert electricity into gas or heat, the definition is then of a cross-sectorial character.

The STORE&GO partners encourage legislative developments which promote sectorial integration and the role of energy storage therein. It needs however to be emphasised that further integration of the electricity and gas sector requires coordination between potentially overlapping electricity and gas legislation. As an example, the conversion of electricity into a gas, which is subsequently injected into the natural gas grid, could be considered both an energy storage activity under the Recast Electricity Directive, and a gas production activity under the 2009 Gas Directive (2009/73/EC).⁴ This could lead to overlapping and conflicting electricity and gas legislation regarding the ownership of Power-to-Gas facilities (See, STORE&GO comments on Articles 36 (Chapter IV: Distribution System Operation) and 54 (Chapter VI: Unbundling Of Transmission System Operators) on ownership of storage facilities in the Recast Electricity Directive).

Customer Engagement:

'demand response' (16) is defined as the change of electricity load by final customers from their normal or current consumption patterns in response to market signals, including time-variable electricity prices or incentive payments, or in response to acceptance of the final customer's bid, alone or through aggregation, to sell demand reduction or increase at a price in organised markets as defined in Commission Implementing Regulation (EU) No 1348/2014.

The definition for demand response is narrowly economic that seems based on an assumption that all electricity is grid electricity. It does not consider some physical realities of demand response, the possibility of response at different scales, or that people respond to signals other than market signals.

An alternative could be:

Article 2.6 and 2.7 define 'active customer', acknowledging all the activities consumers could potentially participate in, both individually and collectively (e.g. aggregation).

³ <http://ease-storage.eu/wp-content/uploads/2016/11/2016.11.30-EASE-Press-Release-on-EMD-Package.pdf>.

⁴ Power-to-Gas installations have two options for injecting produced gases into the natural gas grid. The first is to admix hydrogen to the natural gas grid up to the legally allowed maximum percentage of hydrogen as set under national gas quality regulations. The second option is to synthesis the hydrogen with an external CO₂ source to produce substitute natural gas, which is of a similar gas quality as natural gas.

The Recast Electricity Directive defines 'local energy community' (7), which is intended to empower co-operatives and other community energy business models to participate across the energy sector, including generation, distribution, supply or aggregation. Taken together with the criteria for renewable energy communities in the Renewable Energy Directive, there is a good differentiation and consistency between the two instruments - the definition in the Electricity Directive more broadly relating to different activities across the energy sector, and the Renewable Energy Directive being more specific to communities that focus mainly on renewable energy.

Importantly, local control and value-driven purposes – as opposed to solely profit-driven purposes – are highlighted as key features. Other than size, these are some of the significant differences between local energy communities and traditional commercial energy companies.

However, the definition of local energy community could be improved, specifically with additional references to storage and energy efficiency. This would provide a basis for giving an even more relevant role for local energy communities in rolling out smart grids.

Some useful definitions are missing. Specifically: Billing information, energy service provider/energy service company and energy poverty.

3.1.2 Chapter II: General Rules for the Organisation of the Sector

Article 3 in EC proposal: Competitive, consumer-centered, flexible and non-discriminatory electricity market

1. Member States shall ensure that their national legislation does not unduly hamper cross-border flows of electricity, consumer participation including through demand-side response, investments into flexible energy generation, energy storage, the deployment of electro-mobility or new interconnectors, and that electricity prices reflect actual demand and supply.
2. Members States shall ensure that no undue barriers exist for market entry and market exit of electricity generation and electricity supply undertakings.

Comments from BRIDGE working groups

Business Models:

The RealValue project revolves around power-to-heat storage (SETS). In Germany, the DSOs have the authority to disconnect certain groups of consumers to preserve or re-establish grid stability. This group is referred to as “controllable loads”. Electric storage heaters are included in this group. The owners of “controllable loads” are compensated for the possibility of being disconnected from the DSOs, irrespective of the prevalence of disconnects. The compensation takes the form of reduced transmission fees on the electricity tariff. In Berlin in 2017, regular residential customers pay transmission fees on the order of 6.37 Cents per kWh (after tax) while the rate for controllable loads is 2,17 Cents per kWh. Altogether, the existing regulation reflects that electricity used to be cheapest during night time and it incentivizes consumption at times of low electricity prices with reduced transmission fees. In the following, it is outlined why the existing regulation is a barrier for the use of smart electric-thermal storage heaters.

What is the benefit of smart storage heaters compared to conventional ones?

When aggregated, smart-electric thermal storage units can use the electricity price as a signal when to consume the electricity needed to satisfy the heat demand of the household. The idea to exploit times of cheap electricity prices is not new. What distinguishes smart from conventional electric storage heaters is that the smart heaters charge on the basis of price signals while the conventional type charges by time of day.

To understand this paradigm shift, it is necessary to have an understanding of electricity prices. When conventional electric storage heaters were introduced, nearly all electricity was produced by conventional fuel or by hydro-power. Nuclear, lignite, and hydro power plants were designed for uninterrupted power generation to cover baseload demand. Demand in excess of the baseload was generated first by hard coal. The peaks in demand, regularly occurring at noon of any work day was covered by gas power plants.

The combination of power plant characteristics and fuel costs leads to a supply curve, or merit order. Nuclear, lignite, and hydro power plants have the lowest production cost. The next cheapest method is the use of hard coal, while the combination of short-term availability and natural gas has high production cost. The Figure below presents a stylized merit order curve. The market clearing price exists where supply meets demand. Demand is highest at peak times (D1). This means that the customers' willingness to pay is higher compared to other times of day. In other words, at any given price level, consumers demand more compared to other times. At other times of the day, the willingness-to-pay is lower (D2). During the night, for example, the demand is lowest (D3).

Given the supply and the demand structure, the price occurs at times of high demand in point A. Decreases in demand shift the demand function to the left and lead to a reduction in the equilibrium market price and quantity (point B). At night, price and quantity are lowest in point C.

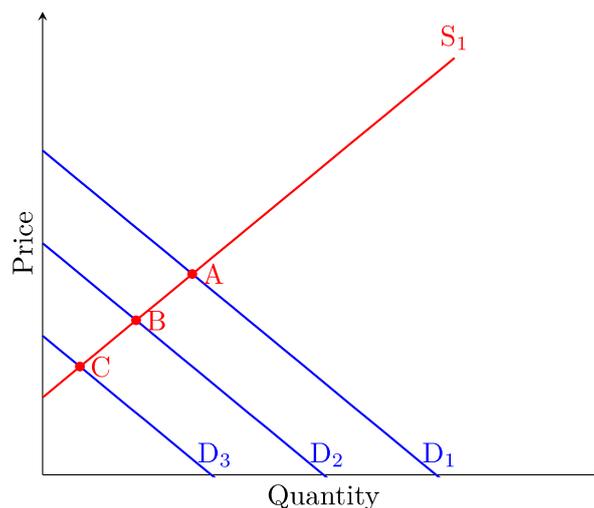


Figure 2 : Electricity market before introduction of renewables

Relying on conventional fuels and hydro power, the merit order curve was stable. At some time of the year, for example snowmelt, there would be more hydro power available compared to other times of the year. But these seasonal patterns followed regular patterns. There are also scheduled and non-scheduled maintenance requirements. In this market situation, the demand dominates the price setting.

Demand also followed regular patterns. It would steadily increase from a low level in the morning to a peak at around noon. Afterwards, demand would decrease again. The lowest consumption levels occurred at night. Consequently, electricity prices were highest at noon and cheapest at night. With a stable pattern of electricity prices, charging electric heat storage heaters at night was equivalent to charging at times of low electricity prices.

With the introduction of renewable energies into the energy mix, electricity production depends on intermittently available energy sources such as solar and wind. This increases the variability of the supply function. The Figure below presents a stylized picture of an electricity market that incorporates intermittent renewable energy sources. At times at which no intermittent renewable electricity is

available (S1), the supply stems from conventional fuels and hydro power. Hence, the supply function is identical compared to the first Figure above.

In case that solar and wind power are available, the supply curve shifts to the right (S2). At any market price, the available amount of electricity is now higher. While renewables such as solar or wind always shift the curve to the right, the magnitude by which the curve is shifted only has a theoretical upper bound when all intermittent renewable capacity is fully employed. Thus, the actual supply lies somewhere between. Altogether, the more electricity is produced from intermittent sources, the larger the shift in the supply curve.

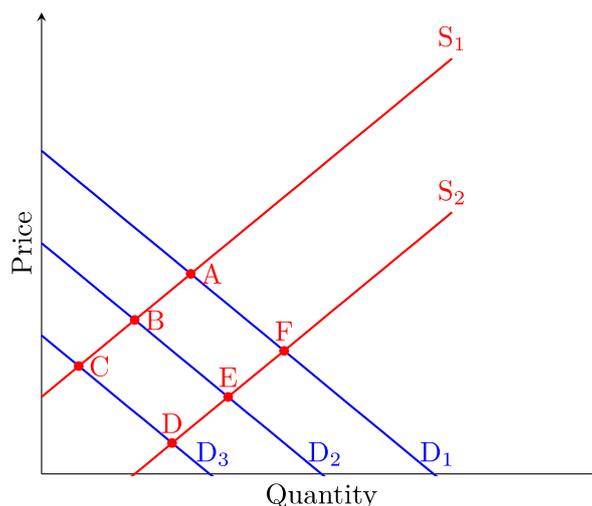


Figure 3 : Electricity market incorporating intermittent renewable energy sources

The shift in the electricity supply increases the equilibrium quantity, so that more electricity is being consumed. Moreover, the increase in supply has also decreased the price to the point where the prices during the day are lower compared to night time prices without renewables (compare for example the prices associated with market conditions C and E).

As long as electricity was only from conventional sources, demand was the price dominating factor that led to reliable patterns in the electricity price. With electricity production from intermittent renewable sources, these patterns become less reliable. Electricity is not necessarily cheapest at night times anymore. This is what drives the paradigm shift from time to price based charging.

The existing regulation to charge at night prevents the consumption of electricity for heating purposes when electricity is abundant and cheap.

There is also a risk that major (or monopolistic) energy actors will “take control” of part of this developing market and will limit or manipulate it.

Regulations:

In order to create a competitive energy market, the national legislation should provide motivations and incentives to consumers, such as tax and fee reductions, for entering in energy market. The motivations should be carefully examined and may adjusted to each Member State energy profile with the aim of a consumer-centred market.

More specific, the national legislation should precisely define the regulations for different types of storage technologies, hybrid systems and the criteria and requirements to be met for a consumer to be able to enter in energy market. For example, in case of an investment into energy storage systems, the necessary technical features of the system (e.g. provision of droop control services) should be

defined. Also, the demand respond schemes should be regulated, since this point is missing in most Member States.

Furthermore, the regulations regarding the participation of multiple players in the market should be clearly defined.

Article 4 in EC proposal: Free choice of electricity supplier

Member States shall ensure that all customers are free to purchase electricity from the supplier of their choice.

Comments from BRIDGE working groups

Business Models:

This should increase the competition and create opportunities for new entrants.

Customer Engagement:

To fulfil the general principle of ensuring that the EU electricity market is competitive, consumer-centred, flexible and non-discriminatory, any kind of limitation in the retail choice should be removed.

Article 8 in EC proposal: Authorisation procedure for new capacity

1. For the construction of new generating capacity, Member States shall adopt an authorisation procedure, which shall be conducted in accordance with objective, transparent and non-discriminatory criteria.

2. Member States shall lay down the criteria for the grant of authorisations for the construction of generating capacity in their territory. In determining appropriate criteria, Member States shall consider:

- (a) the safety and security of the electricity system, installations and associated equipment;
- (b) the protection of public health and safety;
- (c) the protection of the environment;
- (d) land use and siting;
- (e) the use of public ground;
- (f) energy efficiency;
- (g) the nature of the primary sources;
- (h) the characteristics particular to the applicant, such as technical, economic and financial capabilities;
- (i) the contribution of the generating capacity to meeting the overall Union target of at least a 20 % share of energy from renewable sources in the Union 's gross final consumption of energy in 2020 referred to in Article 3(1) of Directive 2009/28/EC of the European Parliament and of the Council; and
- (j) the contribution of generating capacity to reducing emissions.

3. Member States shall ensure that specific authorisation procedures exist for small decentralised and/or distributed generation, which take into account their limited size and potential impact. Member States may set guidelines for that specific authorisation procedure. National regulatory authorities or other competent national authorities including planning authorities shall review those guidelines and may recommend amendments thereto. Where Member States have established particular land use permit procedures applying to major new infrastructure projects in generation

capacity, Member States shall, where appropriate, include the construction of new generation capacity within the scope of those procedures and shall implement them in a non-discriminatory manner and within an appropriate time-frame.

4. The authorisation procedures and criteria shall be made public. Applicants shall be informed of the reasons for any refusal to grant an authorisation. Those reasons shall be objective, non-discriminatory, well-founded and duly substantiated. Appeal procedures shall be made available to the applicant.

Comments from BRIDGE working groups

Regulations:

Renewable sources such as solar have marginal costs of zero (or near zero). Analyses by Nolan Ritter and Sonja Rinne⁵ indicate that the availability of electricity from renewable sources causes reductions in the price on the day ahead market given the prevailing conditions on the German electricity market. The analyses combine data on the German electricity market with information on fuel, and CO₂ prices. Coarsened exact matching is used to generate a data to conduct a dose-response analysis. Essentially, two groups of observations are formed that are identical in every aspect with exception of the availability of renewable electricity. Unconditional quantile regression is applied to examine whether the causal effect of renewables varies with the level of the outcome variable: the price.

The Figure below indicates the effect of renewables on the electricity price. The effect is indicated in terms of Euro per MWh on the vertical axis per 1,000 MWh of additional solar generation. The horizontal axis indicates the electricity price observed at the European Energy Exchange (EPEX). The higher the percentile, the higher the price.

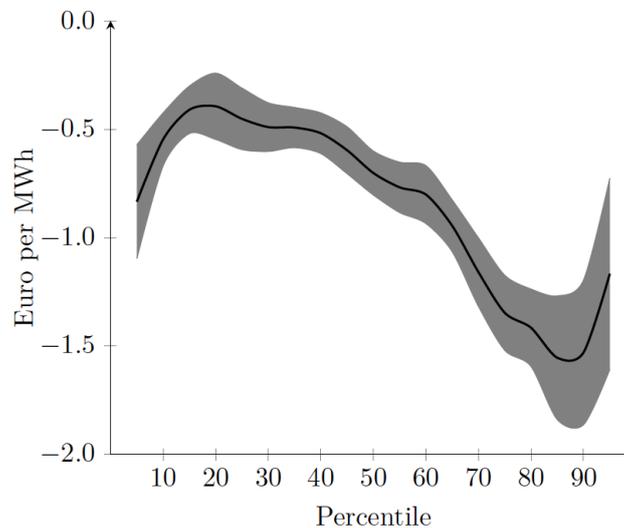


Figure 4: Unconditional quantile treatment effects

⁵ Nolan Ritter, Sonja Rinne (June 2016). "The causal impact of solar electricity generation on the electricity price".

The 95% confidence interval indicated in grey informs about the treatment effect. The black line indicates the point estimate. While prices are low, each 1,000 MWh of solar generation lowers the price by about 0.5 Euro per MWh. When the price is high, the effect size can be up to three times higher. In case of solar energy, the estimated price reduction conveys a benefit that covers about 50% of the support costs assumed in the form of feed-in tariffs. With additional benefits in the form of reductions in emissions that are detrimental to health and climate or reduced import dependence on fossil fuels, the support may be cost-effective. Given that the support costs are covered by fees on household electricity prices, it is the industry that collects all the benefits from reduced electricity prices.

It is renewables that drive the paradigm change from charging smart-electric thermal storage from time of day to price based charging. Measures that decrease the rate at which renewables are integrated into the fuel mix, therefore, decreases the changes for successful business models based on smart-electric thermal storage.

Article 8 is very high level and does not suggest any regulations that are harmful for the deployment of renewables.

Business Models:

Implementation of storage and new production capacity should be taken into account simultaneously, within the same authorization procedures. Auto-consumption should also be included.

Article 9 in EC proposal: Public service obligations

1. Member States shall ensure, on the basis of their institutional organisation and with due regard to the principle of subsidiarity, that, without prejudice to paragraph 2, electricity undertakings are operated in accordance with the principles of this Directive with a view to achieving a competitive, secure and environmentally sustainable market in electricity, and shall not discriminate between those undertakings as regards either rights or obligations.
2. Having full regard to the relevant provisions of the Treaty, in particular Article 106 thereof, Member States may impose on undertakings operating in the electricity sector, in the general economic interest, public service obligations which may relate to security, including security of supply, regularity, quality and price of supplies and environmental protection, including energy efficiency, energy from renewable sources and climate protection. Such obligations shall be clearly defined, transparent, non-discriminatory, verifiable and shall guarantee equality of access for electricity undertakings of the Union to national consumers.
3. Where financial compensation, other forms of compensation and exclusive rights which a Member State grants for the fulfilment of the obligations set out in paragraphs 2 or for the provision of universal service as set out in Article 27 are provided, this shall be done in a non-discriminatory and transparent way.
4. Member States shall, upon implementation of this Directive, inform the Commission of all measures adopted to fulfil universal service and public service obligations, including consumer protection and environmental protection, and their possible effect on national and international competition, whether or not such measures require a derogation from this Directive. They shall inform the Commission subsequently every two years of any changes to such measures, whether or not they require a derogation from this Directive.
5. Member States may decide not to apply the provisions of Articles 6, 7 and 8 insofar as their application would obstruct the performance, in law or in fact, of the obligations imposed on electricity undertakings in the general economic interest and insofar as the development of trade would not be affected to such an extent as would be contrary to the interests of the Union. The interests of

the Union include, inter alia, competition with regard to eligible customers in accordance with this Directive and Article 106 of the Treaty.

Comments from BRIDGE working groups

Regulations:

Obviously, regulated entities such as transmission and distribution system operators are potentially impacted by such public service obligations. Such obligations should consequently take into account business interactions between TSOs and DSOs.

3.1.3 Chapter III: Consumer Empowerment and Protection

Article 11 in EC proposal: Entitlement to a dynamic price contract

1. Member States shall ensure that every final customer is entitled, on request, to a dynamic electricity price contract by his supplier.

Member States shall ensure that every final customer is entitled, on request, to a dynamic electricity price contract by his supplier.

2. Member States shall ensure that final customers are fully informed by the suppliers of the opportunities and risks of such dynamic electricity price contract.

3. Member States, through their National Regulatory Authorities, shall monitor and report annually, for at least a ten-year period after such contracts become available, on the main developments of such contracts including market offers, the impact on consumers' bills and specifically the level of price volatility, and on consumers' sensitivity to the level of financial risk.

Comments from BRIDGE working groups

Regulations:

On first sight, providing a dynamic price signal to final customers seems a straightforward idea to convey a signal regarding the scarcity of electricity. However, it is unclear what price shall be presented to consumers. Consider, for example, the price at the European Power Exchange (EPEX).

At the time when the day-ahead auction closes and the price is determined, those who have not participated in the auction or those whose bids were not considered cannot purchase any electricity at the price determined by the auction. In the period following the auction, market participants can contract electricity on the continuous market, but it is unclear how the price in the continuous market is related to that of the auction. Alternatively, one could choose to base the price signal on the continuous market. But the continuous market is considerably less liquid compared to the auctions which makes price manipulations more likely.

Moreover, a large share of electricity is not traded at the auction. Rather, these long-term contracts are negotiated bilaterally. This raises the question whether the price at the exchange reflects the cost of generating electricity accurately. Another alternative would be to use the price that the end user's contractor was able to contract. But contractors who are also generators not necessarily trade electricity.

From the end user's perspective, the benefit from dynamic prices is unclear. Many residential end users cannot shift their electricity consumption. Most appliances only contribute marginally to overall electricity demand. Some, like the washing machine, could potentially be used at any time of day. But insurance only pays for damages resulting from their operation while an occupant was present providing supervision. In such a case, the benefits are small and the potential risks high.

For smart electric-thermal storage heaters, a price signal to end users might not be necessary. The contractor may offer households flat tariffs. Charging is triggered remotely by the contractor at times at which the contractor was able to procure cheap electricity.

Business Models:

Dynamic pricing will greatly help with the integration of all kinds of storage into the energy system. It is also crucial for customers to have access to simulation, comparison and forecasting tools.

Customer engagement:

As defined above, ‘dynamic electricity price contract’ means an electricity supply contract between a supplier and a final customer that reflects the price at the spot market or at the day ahead market at intervals at least equal to the market settlement frequency.’

This is an ambitious goal in terms of the current state of metering, billing and settlement. It will clearly take some time to reach the stage at which dynamic contracts are widely available. In the meantime, a primary demand response goal (peak load containment) could arguably be reached much more easily and cheaply by capacity-related tariffs.

Article 12 in EC proposal: Right to switch supplier and rules on switching-related fees

1. Member States shall ensure that a customer wishing to change supplier, while respecting contractual conditions, is entitled to such change within three weeks.
2. Member States shall ensure that customers are not charged any switching-related fees.
3. By way of derogation from paragraph 2, Member States may choose to permit suppliers to charge contract termination fees to customers willingly terminating fixed term supply contracts before their maturity. Such fees may only be charged if customers receive a demonstrable advantage from these contracts. In addition, such fees shall not exceed the direct economic loss to the supplier of the customer terminating the contract, including the cost of any bundled investments or services already provided to the customer as part of the contract.
4. Member States shall ensure that the right to switch suppliers is granted to customers in a non-discriminatory manner as regards cost, effort or time.

Comments from BRIDGE working groups

Customer Engagement:

Instead of imposing a requirement of “demonstrable advantage” to allow the inclusion of a switching-related fee for fixed term supply contracts, we propose to force that those fees to be charged in case of an early contract termination should be clearly specified in the contractual conditions. Therefore, the customer will be clearly aware of the costs and can evaluate, by himself, the benefit, versus the risk, of this type of contract.

The supplier’s direct economic loss derived from a customer switching decision could be difficult to calculate in a transparent way. We think that point 4 “. Member States shall ensure that the right to switch suppliers is granted to customers in a non-discriminatory manner with regards to cost, effort or time” is enough to protect customers from abusive fees.

Article 13 in EC proposal: Contract with an aggregator

1. Member States shall ensure that, where a final customer wishes to conclude a contract with an aggregator, such engagement shall not require the consent of the final customer's supplier.
2. Member States shall ensure that a final customer wishing to terminate the contract with an aggregator, while respecting contractual conditions, is entitled to such termination within three weeks.
3. Member States shall ensure that final customers terminating a fixed term contract with an aggregator before its maturity are not charged any termination fee that exceeds the direct economic loss to the aggregator, including the cost of any bundled investments or services already provided to the final customer as part of the contract.
4. Member States shall ensure that final customers are entitled to receive all relevant demand response data or data on supplied and sold electricity at least once per year.
5. Member States shall ensure that the rights referred to in paragraphs 1, 2, 3 and 4 are granted to final customers in a non-discriminatory manner as regards cost, effort or time.

Comments from BRIDGE working groups

Business Models:

Point 1. is essential to promote the development of independent aggregators and to promote competition.

In relation to point 3., the BM WG comments that the direct economic loss for the aggregator is not observable to the consumer, therefore the methodology to calculate it needs to be defined.

The once per year frequency outlined in point 4. is not often enough; ideally customer should receive data close to real-time (10-15 min intervals). Additional clarification is needed on the scope of the data to be provided by the aggregator as currently it is too broad i.e. details should be given on what specific data will be provided and its status (validated/not validated). The WG would question who is responsible for validation of the meter measurements, as it is important that demand response accesses the automatic responses of individual appliances rather than aggregated homes. If a single measurement point (e.g. a residential single-family home) has a combination of flexible demand, storage and generation, and the owner wants to store energy for a neighbour, how can third-party energy storage be enabled? Independent and trustworthy measurement of consumption, and generation before injection into the grid is needed, and details need to be provided on how this is regulated.

Regulations:

Data sharing between final customers and aggregators exposed in section 13.4 should happen more often, at least once each three months. This data is crucial for end customer engagement to explain to end customers, for example, when their water heater has been switched off producing a benefit for the system. Information will increase customer engagement.

Regarding the article 13.2, why is within three weeks precisely? Each aggregator could set the time margin as it is connected with the quality of services to their customers and should be agreed by both parties during the contract sign. Maybe consider the phrase 'at least three months'

Depending on the kind of contract between the aggregator and the final customer and the type of final customer (e.g. storage device owner, participant in demand response services) the period time of 13.2 should be different.

In order to ensure the privacy and the security of final customer data, the contracts between the final customer and the aggregator should clearly define which data of the final customer is accessible by

the aggregator and how the data could be handled and passed through the different players of the market, e.g. DSOs, ESCOs, etc. During the piloting of the project, the consumers have signed letter of consenting in their data usage by players such as aggregators and DSOs whereas anonymization process was followed.

Customer Engagement:

Once a year is very infrequent for electricity data: the evidence from feedback studies points to bimonthly or (ideally) monthly, so that final customers can remember something of their activities during the billing period.

Article 14 in EC proposal: Comparison tools

1. Member States shall ensure that customers have access, free of charge, to at least one tool comparing the offers of suppliers that meets the certification criteria set out in Annex I. The comparison tools may be operated by any entity, including private companies and public authorities or bodies. Customers should be informed of the availability of such tools.
2. Member States shall appoint an independent competent authority responsible for certifying comparison tools and ensuring that certified comparison tools continue to meet the criteria set out in Annex I.
3. Member States may require the comparison tools referred to in paragraph 1 to include comparative determinants relating to the nature of the services offered by the suppliers.
4. Any tool comparing the offers of suppliers shall be eligible to apply for certification in accordance with this Article on a voluntary and non-discriminatory basis.

Comments from BRIDGE working groups

Customer Engagement:

Comparison should not be limited to suppliers but shall include aggregators and their services as well.

Article 15 in EC proposal: Active customers

1. Member States shall ensure that final customers:
 - (a) are entitled to generate, store, consume and sell self-generated electricity in all organised markets either individually or through aggregators without being subject to disproportionately burdensome procedures and charges that are not cost reflective;
 - (b) are subject to cost reflective, transparent and non-discriminatory network charges, accounting separately for the electricity fed into the grid and the electricity consumed from the grid, in line with Article 59.
- 1.1 The energy installation required for the activities of the active customer may be managed by a third party for installation, operation, including metering and maintenance.

Comments from BRIDGE working groups

Business Models:

Point 1.(a) is important as it enables the final consumers to own storage and self-consume, alleviating some national restrictions (e.g. Spain), and it allows the consumers to access markets. Point 1.(b) does not favour Microgrids unless they are defined as Local Energy Communities; as in Microgrid operation, a network charge needs to be paid for each transaction within it.

The BM WG believes that point 1.1 will be of great importance for the future development of storage businesses, and points out that the question of network charges is critical and must be addressed when storage or curtailment or DR are used to ensure grid services; relevant business models will depend upon such charges.

In terms of point 1.1, 'third party management of installation' also enables a supplier or an aggregator to operate the measurements. It also makes a difference whether the measurements and other activities are performed behind the meter or in front of the meter, which is currently typically a DSO operation. Does this mean that a DSO can **sell** measurement services to aggregators or suppliers?

- What are the main issues that need to be considered regarding Active Consumers:
 - Distinguish prosumers and non-prosumers, in particular customers who do not want to become Prosumers: Will they pay more for the same level of security of supply?
 - The Active customers would only become such if this makes financial sense to them. By becoming AC, their costs would increase, including bureaucratic costs (lawyer, accountant...).
 - They would also incur extra costs + effort for new meters (differ in countries)
- Do Active Customers require additional protection?
 - Knowledge gaps exist: not all know what they can do; awareness campaigns are needed.
 - National and Regional Entities (e.g. ombudsman) should be able to help Customers and Prosumers.

As a whole, this article is crucial for the development and application of new business models in the energy market, as it alone requires the following:

1. Business models **must** include the customer domain.
2. The "customer domain" will consist of several components like the customer, but will also include other components influencing the business models like energy centric IoT-devices (EV chargers, EVs, inverters, batteries etc. all equipped with connectivity and Software) and customer agents representing the customer (typically SW-agent).
3. Roles of a component in the BM must be able to change. As an example, a customer component can have the role consumer, or have the role as producer (even both at the same time). Another example can be the role of storage service provider. This role can reside in different components like the DSO-component or the customer-component. (a component can have different roles in a business model).

Data management:

Article 15.1.1: energy installation (beyond the meter) for active customers may be provided and managed by a third party other than the metering operator (the DSO in the majority of the Member States). However, metering activity should still be a responsibility of the metering operator in each Member State.

Regulations:

There are thoughts about different types of final customers. For example, electric vehicles should participate only through aggregators in the energy market.

How “the cost for feeding electricity into the grid” is defined in case of a customer participating in energy market individually and how through an aggregator. Is it affected by the assigned contract between an aggregator and the customer?

How the “is cost reflective” defined? Does it depend on customer participation on real time or on scheduled response? Furthermore, does it depend on customer participation on emergency situation or on preventive and corrective controls? In case of participation in congestion avoidance in the distribution grid, does it depend only on the amount of produced/consumed energy or on other factors too, such as the location of the customer?

Non-discriminatory network charges especially with different technology enablers. Batteries and Hybrid stations needs a solid regulation framework that avoid double charges and exhaustive guarantees.

Customer Engagement:

Providing citizens with the right to participate in demand response, (self) production, storage, consumption and sale of renewable energy – individually and collectively will help encourage participation of consumers in innovative smart grid solutions.

However, it is unclear to what extent the proposed language will enable consumers to be incentivised and remunerated for their self-consumption, including in their tariffs. Article 15 needs to ensure compensation models reward ‘smart’ behaviour and incentivize investments from citizens and their communities that benefit both themselves, the distribution grid and the energy system in the long term. It must also prohibit tariffs and other charges that penalise customers’ active participation. Lastly, it must not ban net energy metering.

Interestingly, there is a link between Article 15 and the development of transparent methodologies and underlying costs for the calculation of network tariffs. This should provide a basis for national regulators to conduct an objective and transparent long-term cost benefit analysis that considers the wide range of benefits – not just of self-consumption but other ‘distributed energy resources’ such as demand response, storage, electric vehicles and community networks – to the energy system, society (e.g. public health) and the environment (e.g. avoided CO2 emissions).

Article 15.1.a is essential, in order, to accelerate distributed generation of renewable energy and can be an important part in the green shift required to reverse the current impact on climate. 15.1.a and 15.1.b are both based on good and necessary intentions, but the formulation is not precise enough to yield practical value.

The term “individually” can be controversial as it suggests a very liberal regime that could turn very costly for the grid owner and the society. However, if individuals sign some kind of “code of conduct” which licence them and oblige them to operate within certain limits using the public grid then that can be supported. If individuals can operate freely, especially within a local market, a significant room for gaming is created too.

“Burdensome procedures” and charges that are not “cost reflective” are relative terms that must be carefully defined. What might appear as burdensome for an end-user might be considered essential and straightforward seen from the grid owner or the regulator. Some crisp criteria should be introduced instead. How do you deal with cost reflectiveness? How much of the non-direct costs can be attributed to the use of the grid or entry into the market?

A professional third party is good and often necessary, but not all maintenance can be done by such a party.

Member States are not currently at the same point for self-generation to be sold. Given this fact, are there going to be “guidelines” or any other political recommendations to standardize consumers’ access to the market in similar and fair conditions?

The WG wonders the following question: are there any pre-defined requirements envisaged for aggregators to act as such? A definition can be considered to answer this.

Also, are there any pre-defined requirements envisaged for third parties to act as such? Again, a definition can be considered.

Finally, it is recommended that tariffs and other charges that penalise customers' active participation must be prohibited.

Also, methodologies and cost calculations should be objective, transparent and should provide a basis for a long term cost benefit analysis.

Non-discriminatory network charges are needed, especially with different technology enablers. Batteries and Hybrid stations needs a solid regulation framework that avoid double charges and exhaustive guarantees.

Article 16 in EC proposal: Local energy communities

1. Member States shall ensure that local energy communities:

- (a) are entitled to own, establish, or lease community networks and to autonomously manage them;
- (b) can access all organised markets either directly or through aggregators or suppliers in a non-discriminatory manner;
- (c) benefit from a non-discriminatory treatment with regard to their activities, rights and obligations as final customers, generators, distribution system operators or aggregators;
- (d) are subject to fair, proportionate and transparent procedures and cost reflective charges;
- (e) where relevant, may conclude agreements with the distribution system operator to which their network is connected on the operation of the community network

2. Member States shall provide an enabling regulatory framework that ensures that:

- (a) participation in a local energy community is voluntary;
- (b) shareholders or members of a local energy community shall not lose their rights as household customers or active customers;
- (c) shareholders or members are allowed to leave a local energy community; in such cases Article 12 shall apply;
- (d) Article 8 paragraph 3 applies to generating capacity installed by local energy communities as long as such capacity can be considered small decentralised or distributed generation;
- (e) provisions of Chapter IV apply to local energy communities that perform activities of a distribution system operator;
- (f) where relevant, a local energy community may conclude an agreement with a distribution system operator to which their network is connected on the operation of the local energy community's network;
- (g) where relevant system users that are not shareholders or members of the local energy community connected to the distribution network operated by a local energy community shall be subject to fair and cost-reflective network charges. If such system users and local energy communities cannot reach an agreement on network charges, both parties may request the regulatory authority to determine the level of network charges in a relevant decision;
- (h) where relevant local energy communities are subject to appropriate network charges at the connection points between the community network and the distribution network outside the energy community. Such network charges shall account separately for the electricity fed into distribution network and the electricity consumed from the distribution network outside the local energy community in line with Article 59 paragraph 8.

Comments from BRIDGE working groups

Business Models:

The BM WG asks the following questions: What is the economic relation between LEC and DSO regarding operational issues and responsibilities in case of failure? What are the network access costs? How are they defined? Are they only charged at the Point of Common Coupling? A major issue that needs to be considered is the definition of community. Communities organize to share resources, beyond market-provided commodities. Due to proximity and a physical link (family, house, village, region, social group) individuals in a community receive added value from sharing physical resources at a lower price. In order to operate efficiently, a Local Energy Community needs to have a trusted contact point i.e. an entity or an individual to organize (may have special technology and knowledge - cost to share, and knowledge of these costs needs to be public and known); rules of operation and an admin process; possibility to join/leave. The costs of joining and leaving need to be manageable so that forming of LEC is possible. The community business model must be transparent. The LEC must have bankruptcy and security of supply protection in LEC. As regards whether customer require additional protection, the BM WG believes that large communities need a process to show fair, safe and secure service operation.

According to Naiades, point 1.(a) will cause a stir in France, where the electric grid management is a monopoly, but it opens the door to aggregators and many other services business. Overall Article 16. implies that citizens will be able to choose between integrated in any local communities or not.

Regulations:

Where relevant, a local energy community may conclude an agreement with a distribution system operator to which their network is connected on the operation of the local energy community's network;

Regarding 16.1.e and 16.2.f, the sentences are a bit difficult to understand and could create confusions as they are very similar.

Question: Local communities should provide the same power quality to non-community members as DSO are providing? Shall this article mention this situation and conditions?

Question: Can Local energy communities operate on island mode (disconnected from the DSO grid)? Should the text include such possibility? For instance, the EMPOWER project is implementing the island mode capability in a pilot and they have had difficulties with the DSO allowing them to disconnect from the main grid.

It is to highlight that in Greece, the local government is close to bringing new legislation on energy cooperatives / local energy communities which also aligns with the aim of TILOS project. In Tilos Island, this project creates a microgrid that will interact with a macrogrid (in this case the island of Kos that currently supplies the island of Tilos with electricity via an undersea cable). Technical challenges refer to the coupling and decoupling of the microgrid to the macrogrid (i.e. switch from stand-alone to interconnected mode without blacking out).

In Greece there is also the prospective for support mechanisms towards such communities. Will this be linked to the RES shares they achieve? - not yet known / Will they allow net metering/virtual net metering schemes?

Customer Engagement:

Because local energy communities are not well known in many Member States, they are often overlooked in energy regulation. The acknowledgment of their right to participate across the energy system is therefore seen as a positive development. This may provide a basis for stronger recognition of local energy communities at national level. However, for the provisions to have significant effect,

the package needs to provide national energy regulators with a stronger duty to oversee such provisions, and to guarantee the rights of active customers more generally.

Local energy communities have a key role to play in helping DSOs operate their grid more effectively, even as they encourage higher penetration of distributed renewables. New rules that would guarantee that local energy communities can establish and/or operate community networks (i.e. micro-grids) and connect them to the general grid are therefore positive. Local energy communities should be entitled to become micro-grid operators, and DSOs should be required to allow them to offer flexibility services on a level playing field and without discrimination. More clarity and guidance is perhaps needed, however, to enable local energy communities to conclude all relevant agreements with the existing DSO, including on the assumption of roles and responsibilities.

Proper remuneration of services local energy communities provided through micro-grids, according to an objective and transparent long-term cost benefit analysis overseen by an independent regulator, also needs clarification. Moreover, it should be clear that local energy communities can assume DSO responsibilities, assuming they meet national competency requirements.

The Greek Government is close to bringing new legislation on energy cooperatives and local energy communities. In Greece there is also the prospective for support mechanisms towards such communities. Will this be linked to the RES shares they achieve? - not yet known / Will they allow net metering/virtual net metering schemes?

Opening the debate about the Energy Communities, the Winter Package will break the traditional structure of the electrical networks, requiring new technologies and a brand new mind-set for the Distribution System Operators.

We understand that this article is talking about microgrids that can work in isolated mode as well as Connected to the network, but this is a debate which is taking place within the sector.

Reading the article, we consider that some sentences are clearly defining connected microgrids, as it will be commented in the following paragraphs:

1. (a) To pay attention: “own, establish or lease” + “manage”, means that any option is open, and it seems to be non-linked to the strict regulation applying to the DSOs.
1. (b) When saying “access all organized markets”, means retail activity. In a) it was referring to an activity similar to a DSO, and in b) is talking about retail activity.
1. (c) Really new in the sector, a new entity that can play several roles at the same time. This will open the door to the figure of the aggregator.
2. (a) When it is voluntary, it means that the new entity will run with different rules than the existing ones, since being in the network of a distribution company is not voluntary.
2. (b) So, the relationship between the member of an energy community and the area DSO and retailer can be kept, even belonging to an Energy Community.
2. (c) & (d) Article 8 (3) This is to simplify the management of Distributed Generation by such Communities. Once again, we read that they are talking about microgrids.
2. e) & f) One more time, the article makes the difference between a DSO and an Energy Community, being more specific than in the previous articles: “agreement with a distribution system operator to which their network is connected”.

In conclusion, the WG thinks that this article is launching the sector to the future, emphasizing the implication of the consumers within the electricity business in a very active way.

Last but not least, the following comments should be taken into account:

1 (e): It should be considered the clarification about the specific conditions envisaged for these agreements.

2 (g): It should be considered the harmonization of the conditions or an independent EU regulatory body.

Article 17 in EC proposal: Demand response

1. Member States shall ensure that national regulatory authorities encourage final customers, including those offering demand response through aggregators, to participate alongside generators in a non-discriminatory manner in all organised markets.

2. Member States shall ensure that transmission system operators and distribution system operators when procuring ancillary services, treat demand response providers, including independent aggregators, in a non-discriminatory manner, on the basis of their technical capabilities.

3. Member States shall ensure that their regulatory framework encourages the participation of aggregators in the retail market and that it contains at least the following elements:

(a) the right for each aggregator to enter the market without consent from other market participants;

(b) transparent rules clearly assigning roles and responsibilities to all market participants;

(c) transparent rules and procedures for data exchange between market participants that ensure easy access to data on equal and non-discriminatory terms while fully protecting commercial data;

(d) aggregators shall not be required to pay compensation to suppliers or generators;

(e) a conflict resolution mechanism between market participants.

4. In order to ensure that balancing costs and benefits induced by aggregators are fairly assigned to market participants, Member States may exceptionally allow compensation payments between aggregators and balancing responsible parties. Such compensation payments must be limited to situations where one market participant induces imbalances to another market participant resulting in a financial cost.

Such exceptional compensation payments shall be subject to approval by the national regulatory authorities and monitored by the Agency.

5. Member States shall ensure access to and foster participation of demand response, including through independent aggregators in all organised markets. Member States shall ensure that national regulatory authorities or, where their national legal system so requires, transmission system operators and distribution system operators in close cooperation with demand service providers and final customers define technical modalities for participation of demand response in these markets on the basis of the technical requirements of these markets and the capabilities of demand response. Such specifications shall include the participation of aggregators.

Comments from BRIDGE working groups

Business Models:

Point 3.(d) on compensation for aggregators needs to be clarified. Consumer comfort and reliability of service should be a priority for DR. The end consumers are not fully aware of the benefits that they can receive from DR provision, therefore, clear service definitions and business models are needed. A single point of contact for consumers would be the most efficient from their point of view. Consumers need to be protected from the contract risk through clear conditions of termination, duration, price and switching, and from the risk of aggregator default or mishandling. Consumer organisations should be in a position to analyse the DR mechanisms in detail as the Aggregators may not have capacity or motivation to do it themselves.

Finding a clear and common definition of consumption is challenging, but essential; clear indicators must be found to ensure that DR is really DR and not normal consumption (or interruption in energy use). A priority may need to be set as to some extent DR might come in competition with storage.

In depth analysis from the RealValue project can be found under Article 3 above.

Regulations:

A number of comments for aggregators follows:

- Aggregators may take business from suppliers or generators – this needs to be better specified;
- Relationship with aggregator?
- Duration of contract? Can he switch to another aggregator?
- Retailers are already licensed; maybe not doing aggregation role per se ;they should have defined responsibilities when they want to be aggregator;
- Consumers need to be protected from the contract risk through clear conditions of termination, duration, price and switching. Final consumers need to be protected from the risk of the aggregator default or mishandling.

Customer Engagement:

While reasonable – especially the requirement for demand response to participate on an equal footing with generation – there is no mention here of storage which can act as both supply and demand (although the net effect is one of demand). The relationship between demand response and storage is not always clear in the texts.

Article 18 in EC proposal: Billing and billing information

1. Member States shall ensure that bills fulfil the minimum requirements for billing and billing information as set out in Annex II. The information contained in bills shall be correct, clear, concise and presented in a manner that facilitates comparison by consumers.

2. Member States ensure that final customers receive all their bills and billing information for energy consumption free of charge and that bills are clear, accurate and easy to understand.

3. Billing shall take place on the basis of actual consumption at least once a year. Billing information shall be made available at least once every three months, upon request or where the final customers have opted to receive electronic billing or else twice a year.

This obligation may be fulfilled by a system of regular self-reading by the final customers whereby they communicate readings from their meter to the supplier.

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Only when the final customer has not been provided a meter reading for a given billing interval may billing be based on estimated consumption or a flat rate.

4. Where final customers have meters that allow remote reading by the operator, accurate billing information based on actual consumption shall be provided at least once a month.

5. Member States shall require that, to the extent that information on the energy billing and historical consumption is available, it is made available, at the request of the final customer, to a supplier or service provider designated by the consumer in accordance with point 3 of Annex II.

6. Member States shall ensure that final customers are offered the option of electronic billing information and bills and that they receive, on request, a clear and understandable explanation of how their bill was derived, especially where bills are not based on actual consumption.
7. Member States may lay down that, at the request of the final customers, the information contained in these bills shall not be considered to constitute a request for payment. In such cases, Member States shall ensure that suppliers offer flexible arrangements for payments.
8. Member States shall require that information and estimates for energy costs are provided to final customers on demand in a timely manner and in an easily understandable format.

Comments from BRIDGE working groups

Data management:

Bills should be subject to minimum essential information requirements and therefore a more principle-based and less prescriptive approach would be welcome to avoid that bills are overloaded with information not necessarily useful (or even confusing) to the consumer. A prescriptive approach has the unintentional effect of preventing innovative forms of communication leveraging the potential of digital technologies nowadays. A clearer distinction between billing (that contains the essential elements on costs and consumptions) and billing information (additional information, often “static” during the year) should be introduced.

Added value information about billing could be considered (for instance bill explanation, detection and information about anomalous consumption/ generation patterns, energy saving advice, etc.).

Customer Engagement:

For Paragraph 2: "shall" is missing, i.e. "Member States shall ensure...". The Paragraph 3 is unclear/confusing, therefore the WG has the following questions:

- How does "billing information" differ from "meter reading"?
- Shall billing information be provided once every three months or twice a year? If both, under which conditions?
- Why billing based on actual consumption is allowed once a year, when billing data shall be provided every three/six months?
- Self-reading is allowed for billing based on actual consumption, but supplier can still use estimate/flat rate billing, because final customer has not "been provided with meter reading" (by external party, i.e. supplier/operator)?

The Paragraph 5 is confusing: are "final customer" and "consumer" the same entity?

Monitoring some types of ancillary service can be difficult or impossible to carry out, when demand response is provided for very short periods of time. This will translate into a challenge for billing that takes into account any such services provided by customers, individually or aggregated.

Article 19 in EC proposal: Smart metering

1. In order to promote energy efficiency and empower customers, Member States or, where a Member State has so provided, the regulatory authority shall strongly recommend that electricity undertakings and aggregators optimise the use of electricity, inter alia by providing energy management services, developing innovative pricing formulas, or introducing interoperable smart metering systems or smart grids, where appropriate.
2. Member States shall ensure the implementation of smart metering systems in their territories that shall assist the active participation of customers in the electricity market. Such implementation may be subject to a cost-benefit assessment which shall be undertaken according to the principles laid down in Annex III.
3. Member States that proceed with deployment shall adopt and publish the minimum functional and technical requirements for the smart metering systems to be rolled out in their territories in line with the provisions laid down in Article 20 and Annex III. Member States shall ensure the interoperability of these smart metering systems as well as their connectivity with consumer energy management platforms. To this respect, Member States shall have due regard to the use of relevant available standards including those enabling interoperability, best practices and the importance of the development of the internal market in electricity.
4. Member States that proceed with smart metering deployment shall ensure that final customers contribute to the associated costs of the roll-out in a transparent and non-discriminatory manner. Member States shall regularly monitor this deployment in their territories to track the evolution of costs and benefits for the whole value chain, including the delivery of net benefits to consumers.
5. When the deployment of smart metering is negatively assessed as a result of cost benefit assessment referred to in paragraph 2, Member States shall ensure that this assessment is revised periodically in response to changes in the underlying assumptions and to technology and market developments. Member States shall notify to the responsible Commission services the outcome of their updated economic assessment as it becomes available.

Comments from BRIDGE working groups

Business Models:

Based on the experience of RealValue, depending on the business model, smart-meters may be a necessary condition for business model analysis. In order to benefit from load shifting to times of low electricity prices, it may be necessary to record the amount consumed and the price at which it was consumed.

Ritter and Reinert (2016 mimeo) and Ritter and Kaunitz (2017 mimeo) present evidence that the additional information provided by smart-meters has no significant effect on residential electricity consumption. Exogenous price increases from 20 to about 40 Cents / kWh also had no significant effect on consumption levels. The data underlying the analyses is from the Irish Smart-metering Trials conducted in 2010. The data is available to scientists upon request from the Irish Social Science Archive.

While frequentist results return insignificant coefficients, Bayesian statistics provide more useful information. Bayes factors inform about the probability of the data given that smart-meters or prices have an effect (alternative hypothesis) compared to the probability of the data when there is no effect on the consumption level (null hypothesis).

Analysing electricity consumption at the annual level, the Bayes factor for the mean regression result indicates that the alternative hypothesis is about 0.06 times as likely as the null. This is considered strong evidence that smart-meters do not reduce consumption. When analysing consumption at the level of the 30-minute metering interval, so that the number of observations is between 3.0 and 7.9

million, the probability of the data under the alternative hypothesis is between $6.4 \cdot 10^{-6}$ and $5.9 \cdot 10^{-10}$ compared to the null hypothesis.

The findings indicate that households either do not use smart-meters if available, do not understand the information or find that acting upon the information is not worthwhile. These findings should be taken into consideration when conducting cost-benefit analyses. Moreover, these findings support the notion that it takes aggregators to generate value from the flexibility in residential electricity consumption. Aggregators are systematically better informed and have a better understanding than residential.

The BM WG sees interoperability as a key factor for every kind business development (storage, production or DR aggregation). Within the STORY project, for example, there are many Interoperability issues in the demos, therefore, regulation of these issues is crucial, especially due to different national regulatory frameworks.

Data management:

Art 19.1: The actions and services considered in the article would need implicitly the analysis of the metering data with the required levels of standardization, confidentiality and privacy restrictions for each application. The relevance of proper data availability and processing in these applications could be mentioned.

Regulations:

All the smart meters installed within the EU must be compatible with Measuring Instruments (MID – Directive 2014/32/EU). The necessary data for the cost benefit analysis should be defined and their acquisition must be ensured. Also, the time recording of data must be reliable and accurate to be able to conduct a combined analysis of multiple data. Some demos (i.e. from STORY and TILOS projects) identified a lack of a clear legal framework for smart metering a problem expecting to overcome with this article. In the transition phase (roll-out in a 3-5 years period) the challenge is to integrate them in the central SCADA of smart grids and control the loads to respond to RES fluctuations. There is scepticism concerning controllability and the cost-benefit of applying load control vs e.g. oversizing a bit the RES-storage part at the distribution grid level. At the same time, control of loads could be crucial in cases of emergency, such as in the black start of the island grid. Still, the cost-benefit part should indeed be stressed.

Customer Engagement:

In TILOS we roll out around 150 smart meter & DSM devices in local households of the island (more than 50%). The challenge is to integrate them in the central SCADA of our smart grid and control the loads to respond to RES fluctuations. There is scepticism concerning controllability and the cost-benefit of applying load control vs e.g. oversizing a bit the RES-storage part at the distribution grid level. At the same time, control of loads could be crucial in cases of emergency, such as in the black start of the island grid. Still, the cost-benefit part should indeed be stressed.

At the same time, at the national level, Greece is faced with annual electricity theft of around 80M€. Deployment of smart meters should first address problematic consumers/areas.

Article 20 in EC proposal: Smart metering functionalities

Where smart metering is positively assessed as a result of cost-benefit assessment referred to in Article 19(2), or systematically rolled out, Member States shall implement smart metering systems in accordance with European standards, the provisions in Annex III, and in line with the following principles:

(a) the metering systems accurately measure actual electricity consumption and provide to final customers information on actual time of use. That information shall be made easily available and visualised to final customers at no additional cost and at nearreal time in order to support automated energy efficiency programmes, demand response and other services;

(b) the security of the smart metering systems and data communication is ensured in compliance with relevant European Union security legislation having due regard of the best available techniques for ensuring the highest level of cybersecurity protection;

(c) the privacy and data protection of final customers is ensured in compliance with relevant Union data protection and privacy legislation;

(d) meter operators shall ensure that the meter or meters of active customers who selfgenerate electricity can account for electricity put into the grid from the active customers' premises;

(e) if final customers request it, metering data on their electricity input and off-take shall be made available to them, via a local standardised communication interface and/or remote access, or to a third party acting on their behalf, in an easily understandable format as provided for in Article 24, allowing them to compare deals on a like-forlike basis;

(f) appropriate advice and information shall be given to final customers at the time of installation of smart meters, in particular about their full potential with regard to meter reading management and the monitoring of energy consumption, and on the collection and processing of personal data in accordance with the applicable Union data protection legislation;

(g) smart metering systems shall enable final customers to be metered and settled at the same time resolution as the imbalance period in the national market.

Comments from BRIDGE working groups

Business Models:

Availability of real-time information is essential for DR business development and for grid services businesses in general; accurate and reliable measurements of power consumed, produced and stored and other parameters are needed in front and behind the meter.

Data management:

Smart meters deployment will be completed in some MS by the time the Electricity Directive enters force. Therefore, if already deployed smart meters were obliged to comply with all the minimum functionalities, a robust cost-benefit analysis should be performed by national regulations to offset the cost of upgrading/replacing metering equipment.

To give transparent and easily available information to customers is indeed supported. However, developing near-real time visualisation needs to be provided in a cost-efficient way, so that, especially in case of already existing smart meters, costs do not outweigh benefits.

Art. 20 (a): It is useful to specify that information on actual consumption given to the customer close to real time is the raw consumption data and not the validated data for billing and balance settlement purposes, which require a longer time to be available as it passes through the data management process. Such raw data can be made available to customers through different options (e.g. meter display, web, in-home device, etc.) close to real time (see also definition). Furthermore, as general principle, it should be considered that depending on the status of the rollout in the different Member

States, it is likely that retrofitting/upgrading of the metering system will be necessary, so that additional costs cannot be avoided.

Art. 20 (g): This requirement could imply, depending on the functionalities already implemented in smart metering national rollouts, significant retrofitting/upgrading investments. In order to avoid inefficient costs, a preliminary cost-benefit analysis should be performed at Country level.

Regulations:

The visualization of the data recorded by the smart meters is critical in order to permit the customer to participate actively in energy market through demand respond services. Data should be presented to all the customers in an understandable way. Also, a basic data analysis is necessary to be presented to the customers to motivate them to have an active role. It is not clear which data analysis would be the most appropriate. Most useful indicators to customers that would motivate them to participate in demand response services are savings. Furthermore, the reliability and the security of the data must be ensured to make the customer feel safe having an active role in energy market. In (e), third party accessing the customer data, must be certified to protect and secure the data.

Customer Engagement:

Work to date supports research elsewhere that demonstrates the value of a good installation experience for customers when they are adopting new technology. 'Fit and forget' risks poor understanding and engagement, with poorer outcomes for both system and customer. Installers trained to communicate the nature and purpose of a smart meter, backed by a customer support system, can improve outcomes.

Article 21 in EC proposal: Entitlement to a smart meter

1. Where smart metering is negatively assessed as a result of cost-benefit assessment referred to in Article 19(2), nor systematically rolled out, Member States shall ensure that every final customer is entitled to have installed or, where applicable, to have upgraded, on request and under fair and reasonable conditions, a smart meter that complies with the following requirements:

(a) is equipped where technically feasible with functionalities referred to in Article 20, or with a minimum set of functionalities to be defined and published by Member States at national level and in line with the provisions in Annex III,

(b) is interoperable and able to deliver the desired connectivity of the metering infrastructure with consumer energy management systems in near-real time.

2. In the context of a customer request for a smart meter pursuant to paragraph 1, Member States or, where a Member State has so provided, the designated competent authorities shall:

(a) ensure that the offer to the final customer requesting the installation of a smart meter explicitly states and clearly describes:

– the functions and interoperability that can be supported by the smart meter and the services that are feasible as well as the benefits that can be realistically attained by having that smart meter at that moment in time;

– any associated costs to be borne by the final customer;

(b) ensure that it is installed within a reasonable time and no later than three months after the customer's request;

(c) regularly, and at least every two years, review and make publicly available the associated costs, and trace their evolution as a result of technology developments and potential metering system upgrades.

Comments from BRIDGE working groups

Customer Engagement:

The WG has a comment regarding section d, not included in this document since it has not been updated:

- 1.d) Consider clarification regarding consumers being able to choose their preferred tariff model.

Article 22 in EC proposal: Conventional metering

1. Where final customers do not have smart meters, Member States shall ensure that they are provided with individual conventional meters that accurately measure their actual consumption.
2. Member States shall ensure that final customers are able to easily read their conventional meters, either directly or indirectly through an on-line interface or through another appropriate interface.

Comments from BRIDGE working groups

Data Management:

Conventional metering affects the business case of a storage owner because of the way the network charges are applied. Bidirectional metering is necessary to ensure that the network costs are recovered.

Customer Engagement:

22.1 It seems unclear how these can be ensured, while maintaining each MS specific regulations (considering that some countries do not still fully comply with this requirements). Harmonization among EU should be encouraged e.g. through a set of guidelines/political recommendations.

Article 23 in EC proposal: Data management

1. When setting up the rules regarding the management and exchange of data, Member States or, where a Member State has so provided, the designated competent authorities shall specify the eligible parties which may have access to data of the final customer with their explicit consent in accordance with Regulation (EU) 2016/679. For the purpose of this Directive, data shall include metering and consumption data as well as data required for consumer switching. Eligible parties shall include at least customers, suppliers, transmission and distribution system operators, aggregators, energy service companies, and other parties which provide energy or other services to customers.
2. Member States shall organise the management of data in order to ensure efficient data access and exchange. Independently of the data management model applied in each Member State, the party or parties responsible for data management shall provide to any eligible party with the explicit consent of the final customer, access to the data of the final customer. Eligible parties should have at their disposal in a nondiscriminatory manner and simultaneously the requested data. Access to data shall be easy, while relevant procedures shall be made publicly available.
3. Member States or, where a Member State has so provided, the designated competent authorities shall authorise and certify the parties which are managing data in order to ensure that these parties comply with the requirements of this Directive. Without prejudice to the tasks of the data protection officers under Regulation (EU) 2016/679, Member States may decide to require from parties managing data the appointment of compliance officers who shall be responsible for monitoring the

implementation of measures taken by the relevant parties for ensuring non-discriminatory access to data and compliance with the requirements of this Directive. Compliance officers or bodies designated pursuant Article 35(2)(d) may be required to fulfil the obligations of this paragraph.

4. No additional costs shall be charged to final customers for access to their data. Member States shall be responsible for setting the relevant costs for access to data by eligible parties. Regulated entities, which provide data services shall not profit from that activity.

Comments from BRIDGE working groups

Data management:

The article succinctly describes the framework for ensuring transparent and non-discriminatory access to data from eligible parties, clarifying the role of the parties responsible for data management and ensuring the protection of the consumers.

The article should consider also the generation jointly the consumption and, additionally, a statement on standards conformance and interoperability could be foreseen. Consent process, due to its complexity and legal connotations could need additional development.

Under a more specific analysis, in accordance with Article 23, customers' consent should be sought after when making data available to third parties. However, this should not prevent the DSOs from accessing necessary data not only for a safe grid operation, but also for continuing to promote real market facilitation. Accordingly, DSOs should be allowed to access all data needed to fulfil their grid obligations.

Data needs to be made available in a timely manner, and access to grid and metering data is in fact critical for fulfilling DSOs' core tasks in ensuring system stability and security of supply. Therefore, data collection and handling constitutes a critical tool to fulfilling DSOs' regulated tasks, most crucially for maintaining security and quality of supply, and for neutral market facilitation.

Art 23.4: Further clarification on "data services" definition is needed. It should be clarified that a DSO that makes available data to its customers through the metering infrastructure (in compliance with art. 20 (a)) faces investments and operational costs that should be treated like investments and operational costs in other network activities.

Article 24 in EC proposal: Data format

1. Member States shall define a common data format and a transparent procedure for eligible parties to have access to the data listed under paragraph 1 of Article 23, in order to promote competition in the retail market and avoid excessive administrative costs for the eligible parties.

2. The Commission, by means of implementing acts adopted in accordance with the advisory procedure referred to in Article 68, shall determine a common European data format and non-discriminatory and transparent procedures for accessing the data, listed under paragraph 1 of Article 23, that will replace national data format and procedure adopted by Member States in accordance with paragraph 1. Member States shall ensure that market participants apply a common European data format.

3. No additional costs shall be charged to final customers for access to their data. Member States shall be responsible for setting the relevant costs for access to data by eligible parties. Regulated entities which provide data services shall not profit from that activity.

Comments from BRIDGE working groups

Data management:

The article clearly promotes the establishment and use of a common data format at European level, which will facilitate interoperability and promote competition, as well as addresses the cost mechanisms for accessing data. One significant aspect of the latter is the safeguarding of accessing to one's own data as a no cost service.

Under a more specific analysis of Article 24, an EU-wide retail market for electricity should develop in harmony with existing national data models, whereas harmonisation of data management at EU level could prove a costly endeavour. Different data hubs and formats have been, and are currently being implemented across MS. The setting-up of a common EU data format, replacing national data formats and procedures adopted by Member States, as set in Article 24, could be very costly to implement given the heterogeneous national frameworks, standards and market processes, and its costs should be assessed according to its net benefits. Alternatively, evaluate whether the common data format should be limited to a 'minimum content'³.

It is worth mentioning some projects activities. For instance, the UPGRID project adopted CIM as the reference data model providing guidance and extensions on how to apply it to the grid management systems. It could be expected that this process of defining and adopting a common data format will follow some kind of standardization process coordinating industrial entities and regulation and standardization bodies conforming a these data format standards and the related certification framework.

Additionally, the project FLEXICIENCY is investigating the definition of a data modelling for exchange of data across EU countries, also based on CIM.

3.1.1 Chapter IV: Distribution System Operation

Article 31 in EC proposal: Tasks of distribution system operators

1. The distribution system operator shall be responsible for ensuring the long-term ability of the system to meet reasonable demands for the distribution of electricity, for operating, maintaining and developing under economic conditions a secure, reliable and efficient electricity distribution system in its area with due regard for the environment and energy efficiency.
2. In any event, it must not discriminate between system users or classes of system users, particularly in favour of its related undertakings.
3. The distribution system operator shall provide system users with the information they need for efficient access to, including use of, the system.
4. A Member State may require the distribution system operator, when dispatching generating installations, to give priority to generating installations using renewable energy sources or producing combined heat and power, in accordance with Article 11 [recast of Regulation 714/2009 as proposed by COM(2016)861/2].
5. Each distribution system operator shall procure the energy it uses to cover energy losses and the non-frequency ancillary services in its system according to transparent, non-discriminatory and market based procedures, whenever it has such a function. Unless justified by a cost-benefit analysis, the procurement of non-frequency ancillary services by a distribution system operator shall be transparent, non-discriminatory and market-based ensuring effective participation of all market participants including renewable energy sources, demand response, energy storage facilities and aggregators, in particular by requiring regulatory authorities or distribution system operators in close cooperation with all market participants, to define technical modalities for

participation in these markets on the basis of the technical requirements of these markets and the capabilities of all market participants.

Comments from BRIDGE working groups

Business Models:

This Article is essential for protecting all the new businesses that will be created for DR, production, aggregation or storage, which sometimes face a very powerful or monopolistic DSO. However the BM WG comments that the division of tasks and responsibilities between the LEC and DSO is not clear.

Regulations:

Market-based: If the market does not offer a solution for an identified need, DSO may, under regulated conditions, develop storage facilities at local network level if this approach is more economical and faster than traditional network reinforcement solutions. Also, distributed resources should be market-based as first priority. Under regulated conditions, the DSO might activate DER as an alternative or substitute for network assets (see “CEER Advice on Ensuring Market and Regulatory Arrangements help deliver Demand-Side Flexibility”, Jun. 2014.).

DSO needs to be facilitator and neutral market facilitators while continuing to ensure security and quality of supply. DSO’s are enablers of new services and markets, including the development of energy data provision, flexibility, electromobility and prosumers.

DSO needs to secure the users data and apply certain fuzzy processes to insensitize data and protect consumers and users private data.

Is priority in connection processes a discrimination?

ESCO’s, hybrid plants and electric vehicles should be identified as players in the market, whereas the regulations should clearly define the quality of non-frequency ancillary services that each technology can provide.

Article 32 in EC proposal: Tasks of distribution system operators in the use of flexibility

1. Member States shall provide the necessary regulatory framework to allow and incentivise distribution system operators to procure services in order to improve efficiencies in the operation and development of the distribution system, including local congestion management. In particular, regulatory frameworks shall enable distribution system operators to procure services from resources such as distributed generation, demand response or storage and consider energy efficiency measures, which may supplant the need to upgrade or replace electricity capacity and which support the efficient and secure operation of the distribution system. Distribution system operators shall procure these services according to transparent, non-discriminatory and market based procedures.

Distribution system operators shall define standardised market products for the services procured ensuring effective participation of all market participants including renewable energy sources, demand response, and aggregators. Distribution system operators shall exchange all necessary information and coordinate with transmission system operators in order to ensure the optimal utilisation of resources, ensure the secure and efficient operation of the system and facilitate market development.

Distribution system operators shall be adequately remunerated for the procurement of such services in order to recover at least the corresponding expenses, including the necessary

information and communication technologies expenses, including expenses which correspond to the necessary information and communication infrastructure.

2. The development of a distribution system shall be based on a transparent network development plan that distribution system operators shall submit every two years to the regulatory authority. The network development plan shall contain the planned investments for the next five to ten years, with particular emphasis on the main distribution infrastructure which is required in order to connect new generation capacity and new loads including re-charging points for electric vehicles. The network development plan shall also demonstrate the use of demand response, energy efficiency, energy storage facilities or other resources that distribution system operator is using as an alternative to system expansion.

The regulatory authority shall consult all current or potential system users on the network development plan. The regulatory authority shall publish the result of the consultation process on the proposed investments.

Member States may decide not to apply this obligation to integrated undertakings serving less than 100 000 connected consumers, or serving isolated systems.

Comments from BRIDGE working groups

Business Models:

The BM WG comments that transparent access to grid and energy data are necessary to enable local communities to discuss and plan investments with the DSO in a transparent way. These data will also enable the development of services for communities (simulation, investment advices, studies etc.) for further investments either in power or local heat generation, storage, networks developments or reinforcement. Storage facilities owned by the DSO should not be a source of earning that would come in competition with other storage developers (as evoked in Article 36).

Besides a flexibility potential user, DSOs should also conduct act as a technical validator of activation programs submitted by the market operator for distributed resources connected to the distribution network (generation, DR). In this context, DSO should assess in advance if the requested programs (e.g. flexibility activations) are technically viable or if they create local constraints in the distribution network (e.g. overcurrent, voltage limits). In the latter case DSO should assess if there are control actions in the resources of the DSO (e.g. transformer taps) that can solve the problems identified, and, if not, proposes modifications to the program. This validation service will be provided to the market or other relevant stakeholders (e.g. TSO that may or not be a same entity) in the timeframe compatible with flexibility market

Regulations:

The new DSOs' roles as envisaged in the package are closely interlinked with their needs for increased use of flexibility. The provision that national regulatory authorities should incentivise DSOs to procure system flexibility services is crucial to improve the efficiency of distribution system operation (Article 32). However, regulatory frameworks should give sufficient leeway for different forms of network regulation and flexible contracts. DSOs should be able to procure flexibility through market-based solutions or use other direct flexibility alternatives, including grid reinforcements, if needed to ensure security and quality of supply.

Therefore, the Electricity Directive should be changed to include several options that the DSOs can use to procure flexibility services, including both contracting local flexibility directly or from market players through either flexible tariffs and/or contractual agreements.

The 'procurement' of such flexibility directly contracted with customers who are physically close to the distribution grid can be achieved through network charges or other flexible contracts. DSOs must be allowed to procure system flexibility services in all timescales, and to recover their costs in an appropriate manner.

Also, Article 32 should ensure that standardization of market products does not preclude a dynamic product development by market players. Moreover, networks development plans for all voltage levels are unnecessary and would result in onerous costs and administrative burden of little additional value, overlapping with current regulations ensuring quality of supply.

It is recommended limiting the obligation for network development plans to high-voltage networks only, where grid planning timeframes match development plans and their costs might be appropriate in relation to the benefits⁶.

The conflicts between DSO-Aggregator when a grid asset gets damage could be problematic if there is not a clear definition of what is flexibility and how can we measure the flexibility activated. For instance, a grid asset damage could be due to a flexibility deficit requested by the DSO or provided by the aggregator or others. We are unaware if this consideration should be included in this article or it could require a new one but this issue should be addressed in order to deploy flexibility markets.

The flexibility provider should have access to end customer smart meter data at least every hour.

The following questions are open and described as: “Distribution system operators shall be adequately remunerated for the procurement of such services in order to recover at least the corresponding expenses”: In which way? Through energy bills? Or as a reward by RA?

Article 33 in EC proposal: Integration of electro-mobility into the electricity network

1. Member States shall provide the necessary regulatory framework to facilitate the connection of publicly accessible and private recharging points to the distribution networks. Member States shall ensure that distribution system operators cooperate on a non-discriminatory basis with any undertaking that owns, develops, operates or manages recharging points for electric vehicles, including with regard to connection to the grid.
2. Member States may allow distribution system operators to own, develop, manage or operate recharging points for electric vehicles only if the following conditions are fulfilled:
 - (a) other parties, following an open and transparent tendering procedure, have not expressed their interest to own, develop, manage or operate recharging points for electric vehicles;
 - (b) the regulatory authority has granted its approval.
3. Articles 35 and 56 shall apply to distribution system operators engaged in ownership, development, operation or management of recharging points.
4. Member States shall perform at regular intervals or at least every five years a public consultation in order to re-assess the potential interest of market parties to own, develop, operate or manage recharging points for electric vehicles. In case the public consultation indicates that third parties are able to own, develop, operate or manage such points, Member States shall ensure that distribution system operators' activities in this regard are phased-out.

Comments from BRIDGE working groups

Business Models:

In member states where DSOs are monopolistic, point 2. means that they will have total freedom over their tariffs, especially since it might be difficult for new entrants to introduce recharging points for the EV market. Interestingly, the EV charging market could also be an interesting opportunity for the

⁶ See http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

development of stationary batteries to locally help the network in providing the requested power (either positive or negative).

Regulations:

Integration of electric mobility should also support the distribution network using Vehicle-to-grid. The operation of public charging stations for electric vehicles is generally seen as a market activity. DSOs should however be able to own and operate under certain circumstances, and stranded DSO costs should be avoided in any way. Any regulation on electro-mobility should reflect DSOs' needs to take part in the development and the planning of public recharging stations, including smart charging capabilities. This should also allow DSOs to deploy and operate infrastructure in those member states where it is so desired by national or local authorities. (Article 33, Electricity Directive).

As for the provisions given in the Buildings Directive (Article 8), it is suggested including that member states shall ensure that all new buildings and buildings undergoing major renovations include interoperable infrastructure supported by open technical standards for recharging points for electric vehicles for every parking space without re-intervention on the building⁷.

In addition to electricity market regulation and market integration that influence how electricity is generated and distributed, the European Union and its member states also implement changes that impact the demand for electricity. One major change is the demand to reduce the transport sectors reliance on fossil fuels. The means to do so is to considerably increase the number of electric vehicles. The rationale is that the transport sector accounts for a large share of total energy consumption, and therefore, also contributes significantly to greenhouse gas emissions.

Electric vehicles and SETS are direct competitors for cheap electricity. Electric vehicles may charge at any time, but the availability of charging stations may pose a considerable constraint. Moreover, most households use their vehicles to commute in the morning and the evening. As a result, electric vehicles will presumably be charged during night time. Altogether, electric vehicles increase electricity demand and put upward pressure on electricity prices (Figure below). Let S_1 describe the supply of electricity to the day-ahead market and let D_1 describe the electricity demand in the absence of electric vehicles, the market equilibrium is characterized by an equilibrium at price p_A and quantity q_A .

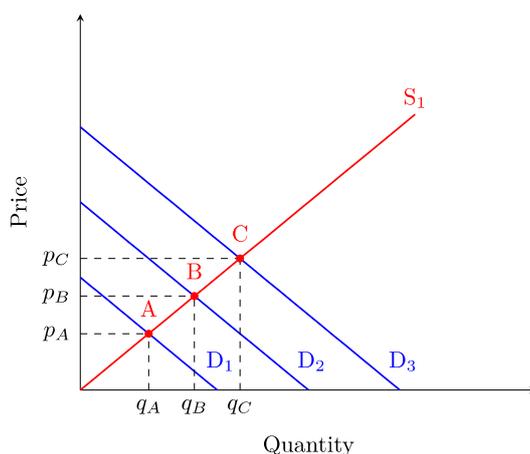


Figure 5: Impact of electric vehicles on the electricity price

⁷ See http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

The magnitude of the price effect of electric vehicles will depend on the success of the support schemes. In case that there is a moderate increase in the number of electric vehicles, the demand curve shifts to the right. The new demand function (D2) indicates that at any given price the demand is now increased. Accordingly, the market equilibrium shifts from point A to point B, so that the new market equilibrium occurs at price p_B with a corresponding equilibrium quantity q_B . In case of a strong increase in the number of electric vehicles, the demand curve shifts further to the right (D3). Again, this raises the market price to p_C and increases the equilibrium quantity to q_C .

Higher electricity costs make electric heating less favourable. Moreover, the difference in prices between times of low compared to high prices will presumably decrease. This makes load-shifting less profitable, which is at the core of using smart electric-thermal storage heaters.

Article 34 in EC proposal: Tasks of distribution system operators in data management

Member States shall ensure that all eligible parties have non-discriminatory access to data under clear and equal terms. In Member States where smart metering systems have been implemented according to Article 19 and distribution system operators are involved in data management, compliance programmes as set in Article 35(2)(d) shall include specific measures in order to exclude discriminatory access to data from eligible parties as provided for in Article 23. Where distribution system operators are not subject to Article 35(1), (2) and (3), Member States shall take all necessary measures to ensure that the vertically integrated undertaking do not have privileged access to data for the conduct of its supply activity.

Comments from BRIDGE working groups

Data management:

The article details on measures to be taken in order to ensure non-discriminatory access to data, given the different cases of the role of the DSO in data management, establishing no privileged access for cases of vertically integrated undertakings nor discriminatory access for eligible parties.

A central part of the DSOs' neutral market facilitator role is data management. DSOs are major providers of grid and metering data and are trusted, neutral and regulated parties that are fully responsible for all the actions that relate to data collection, processing and delivery. In majority of MS, they provide the data in a secure, cost effective and neutral way to authorised market parties either through data hubs or other means⁸.

Within the Data management WG, some projects are developing new platforms / systems to enhance access to data. For instance, in the project FLEXICIENCY, data are made available by DSOs to third parties having the customer consent in a non-discriminatory way and across Europe. Additionally, a Neutral Market Hub is a specific initiative in the project UPGRID with possibility of other actors, different to the DSO, to access grid data in a non-discriminatory way. Customer consumption and production data is processed for the characterization of customers, a process that can be of interest of other market actors, like retailers and aggregators, to adapt their offers the best to their present and potential customers. Perhaps, with respect to the article, apart from the rights it is considering, the possible duties could be also stated, e.g. how the possible constraints of the accessed data (confidentiality, privacy, cyphering, etc.) could be kept.

Business Models:

DSO as market facilitator should ensure a non-discriminatory access to anonymized for network purposes and other processes (e.g. billing). In the case of a request by suppliers or ESCOS about a

⁸ http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

more granular data information (e.g. from specific customers) in order to promote new data driven services, DSO should only send that information with an explicit consent from customers (acting also as authorization manager)

Regulations:

The future way TSOs and DSOs will interact with each other (coordination scheme) will co-determine the most efficient way for data management. SmartNet analyses different potential current and future TSO-DSO coordination schemes in different contexts, including ICT requirements. Since some years, the data management responsibilities on different levels (distribution, transmission) as well as in different areas (metering data, contractual data, network data) and for different objectives (e.g. flexibility) are subject for heavy debate on European and national level, in particular the role and responsibilities of system operators. This discussion should take into account the envisioned targets of policy makers (innovation, cost, level of regulation, role of prosumer), as well as envisioned future market design and the path towards this transition (including the way TSOs-DSOs interact) as currently these roles and responsibilities are not necessarily clearly defined in the current regulatory framework.

Article 36 in EC proposal: Ownership of storage facilities

1. Distribution system operators shall not be allowed to own, develop, manage or operate energy storage facilities.
2. By way of derogation from paragraph 1, Member States may allow distribution system operators to own, develop, manage or operate storage facilities only if the following conditions are fulfilled:
 - (a) other parties, following an open and transparent tendering procedure, have not expressed their interest to own, develop, manage or operate storage facilities;
 - (b) such facilities are necessary for the distribution system operators to fulfil its obligations under this regulation for the efficient, reliable and secure operation of the distribution system; and
 - (c) the regulatory authority has assessed the necessity of such derogation taking into account the conditions under points (a) and (b) of this paragraph and has granted its approval.
3. Articles 35 and Article 56 shall apply to distribution system operators engaged in ownership, development, operation or management of energy storage facilities.
4. Regulatory authorities shall perform at regular intervals or at least every five years a public consultation in order to re-assess the potential interest of market parties to invest, develop, operate or manage energy storage facilities. In case the public consultation indicates that third parties are able to own, develop, operate or manage such facilities, Member States shall ensure that distribution system operators' activities in this regard are phased-out.

Comments from BRIDGE working groups

Business Models:

As regards point 2.(b), the DSO shouldn't get remuneration for this service as investment is already included in the DSO's tariff.

The DSO in a STORY demo is concerned about having control over the operation of a medium-scale battery installed in his network because it is a new technology they have not tested before. They need to have control until they can ascertain it does not cause any problems in the network.

Regulations:

Special attention should be given in case of DSO storage ownership. DSOs should be excluded of participating in any way in the market through the storage and secure that no conflict of them being

market facilitator exist and secure its non-discriminatory role. The rules on storage ownership and operation, while we agree that the market must be involved, the Commission's proposal (Article 36, Electricity Directive) should seek the right balance between promoting a market-based approach and not excluding DSOs' rights to storage ownership and operation. The latter includes the use of storage for technical purposes, including emergency situations, maintenance, voltage limits, and reactive power control.

DSOs, who must ensure security of supply and quality of service at the least societal cost, must be able to own and operate storage facilities whenever this proves efficient.

DSOs' rights to deploy and operate their own grid-scale network storage assets as an important grid management is too crucial for an efficient network operation. This should be used for network management purposes only, and not to engage in providing commercial storage services, which is clearly a market activity.

Excluding the situation of grid-scale storage installations at the DSO level, storage should in principle remain a market-based activity⁹.

With most energy storage technologies, the charging, storage, and discharging occur within one location. With Power-to-Gas this may not always be the case, for example when natural gas infrastructure is used for the transportation and storage of energy. The advantages of using existing gas infrastructure is the capacity thereof to store large amounts of energy in pipelines and underground storage facilities¹⁰, and the usage of gas transportation infrastructure as an alternative means for transporting electricity over longer distances. Question is what will be considered the 'energy storage facility' in the context of the newly proposed Article 36 and 54 of the Recast Electricity Directive when the Power-to-Gas plant, the gas storage facility, and the re-electrification unit are located at dispersed locations.

On the matter of ownership of energy storage facilities, there is the potential for Power-to-Gas facilities which produce substitute natural gas for injection into the natural gas grid, of overlapping and conflicting ownership regimes in the Electricity and Gas Directives. Where such Power-to-Gas facilities may be considered energy storage under the Electricity Directive, the actual conversion of electrons into molecules for subsequent injection into the natural gas grid may also be considered a form of gas production under the 2009 Gas Directive. Ownership of gas production facilities is prohibited under the 2009 Gas Directive in Article 9, 14 and 18 for TSOs, and 26 for DSOs. However, for ownership of energy storage facilities, Articles 36 and 54 of the Recast Electricity Directive allow for the conditional ownership of such facilities by DSOs and TSOs. This potential overlap of ownership regimes may lead to conflicting views on whether TSOs are allowed to operate a Power-to-Gas facility in some configuration.

⁹ See http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

¹⁰ In 2016 there were 149 underground gas storage facilities operational within the EU, with a combined gas storage capacity of 1182 TWh.

3.1.2 Chapter V: General Rules Applicable to the Transmission System

Article 40 in EC proposal: Tasks of transmission system operators

1. Each transmission system operator shall be responsible for:
 - (a) ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity, operating, maintaining and developing under economic conditions secure, reliable and efficient transmission systems with due regard to the environment, in close cooperation with neighbouring transmission system operators and distribution system operators and transparency;
[...]
 - (d) managing electricity flows on the system, taking into account exchanges with other interconnected systems. To that end, the transmission system operator shall be responsible for ensuring a secure, reliable and efficient electricity system and, in that context, for ensuring the availability of all necessary ancillary services, including those provided by demand response and energy storage, insofar as such availability is independent from any other transmission system with which its system is interconnected;
[...]
 - (i) procuring ancillary services from market participants to ensure operational security.
 - (j) adopting a framework for the cooperation and coordination between regional operational centres.
2. Member States may provide that one or several responsibilities listed under points (a) to (j) of paragraph 1 be assigned to a transmission system operator other than the one which owns the transmission system to which the concerned responsibilities would otherwise be applicable. The transmission system operator to which the tasks are assigned shall be certified as ownership unbundled and fulfil the requirements provided for in Article 43, but does not have to own the transmission system it is responsible for. The transmission system operator which owns the transmission system shall fulfil the requirements provided for in Chapter IV and be certified in accordance with 43.
3. In performing the tasks listed in paragraph 1, the transmission system operator shall take into account the functions performed by the regional operational centres and cooperate as necessary with neighbouring transmission system operators.
4. In performing the task described in paragraph 1(i), the transmission system operator shall ensure that the procurement of balancing services and, unless justified by a cost-benefit analysis, non-frequency ancillary services, is:
 - (a) transparent, non-discriminatory and market-based;
 - (b) ensures effective participation of all market participants including renewable energy sources, demand response, energy storage facilities and aggregators, in particular by requiring regulatory authorities or transmission system operators in close cooperation with all market participants, to define technical modalities for participation in these markets on the basis of the technical requirements of these markets and the capabilities of all market participants.
5. Transmission system operators shall not own assets that provide ancillary services save under the conditions set out in Article 54.

Comments from BRIDGE working groups

Regulations:

The entire SmartNet project focusses on different ways of coordination between TSOs and DSOs in order to procure ancillary services coming from resources (demand response, storage, distributed generation) connected to the distribution grid level. Five different core coordination schemes have been defined and analysed on their benefits and attention points. The five different coordination schemes range from a deeply centralized market design philosophy (today), to a very decentralized

approach with local ancillary service markets. At the end of the SmartNet projects, the qualitative analysis of benefits and attention points for different coordination schemes (for different ancillary services) will be accompanied by a more quantitative analysis based on simulations and demonstration.

3.1.3 Chapter VI: Unbundling Of Transmission System Operators

Article 51 in EC proposal: Network development and powers to make investment decisions

1. At least every two years, transmission system operators shall submit to the regulatory authority a ten-year network development plan based on existing and forecast supply and demand after having consulted all the relevant stakeholders. That network development plan shall contain efficient measures in order to guarantee the adequacy of the system and the security of supply.
2. The ten-year network development plan shall in particular:
 - (a) indicate to market participants the main transmission infrastructure that needs to be built or upgraded over the next ten years;
 - (b) contain all the investments already decided and identify new investments which have to be executed in the next three years; and
 - (c) provide for a time frame for all investment projects.
3. When elaborating the ten-year network development plan, the transmission system operator shall make reasonable assumptions about the evolution of the generation, supply, energy storage, consumption and exchanges with other countries, taking into account investment plans for regional and Union wide networks.
4. The regulatory authority shall consult all actual or potential system users on the ten year network development plan in an open and transparent manner. Persons or undertakings claiming to be potential system users may be required to substantiate such claims. The regulatory authority shall publish the result of the consultation process, in particular possible needs for investments.
5. The regulatory authority shall examine whether the ten-year network development plan covers all investment needs identified during the consultation process, and whether it is consistent with the non-binding Union wide ten year network development plan (Union wide network development plan) referred to in [Article 27(b) of recast of Regulation 714/2009 as proposed by COM(2016)861/2]. If any doubt arises as to the consistency with the Union wide network development plan, the regulatory authority shall consult the Agency. The regulatory authority may require the transmission system operator to amend its ten-year network development plan.
6. The regulatory authority shall monitor and evaluate the implementation of the ten year network development plan.
7. In circumstances where the transmission system operator, other than for overriding reasons beyond its control, does not execute an investment, which, under the ten-year network development plan, was to be executed in the following three years, Member States shall ensure that the regulatory authority is required to take at least one of the following measures to ensure that the investment in question is made if such investment is still relevant on the basis of the most recent ten-year network development plan:
 - (a) to require the transmission system operator to execute the investments in question;
 - (b) to organise a tender procedure open to any investors for the investment in question; or
 - (c) to oblige the transmission system operator to accept a capital increase to finance the necessary investments and allow independent investors to participate in the capital. Where the regulatory authority has made use of its powers under point (b) of the first subparagraph, it may oblige the transmission system operator to agree to one or more of the following:

- (d) financing by any third party;
 - (e) construction by any third party;
 - (f) building the new assets concerned itself;
 - (g) operating the new asset concerned itself. The transmission system operator shall provide the investors with all information needed to realise the investment, shall connect new assets to the transmission network and shall generally make its best efforts to facilitate the implementation of the investment project.
- The relevant financial arrangements shall be subject to approval by the regulatory authority.
8. Where the regulatory authority has made use of its powers under the first subparagraph of paragraph 7, the relevant tariff regulations shall cover the costs of the investments in question.

Comments from BRIDGE projects

Regulations:

The development plans of system operators (not only transmission system operators) should be built in close cooperation as the challenges and requirements for the power system should be analysed from a holistic perspective under uncertain future scenarios. To do so, system operators will probably have to invest in new or adapted tools for optimal investment planning, taking into account the possible availability of flexibility coming from demand side management, storage and/or flexible (distributed) generation. Moreover, regulatory frameworks should be adapted in order to give the right signals to regulated system operators in order not to create a bias into purely CAPEX-oriented solutions but rather take into account potential (intermediate or structural) innovative OPEX-oriented solutions under uncertainty.

Article 54 in EC proposal: Ownership of storage and provision of ancillary services by transmission system operators

1. Transmission system operators shall not be allowed to own, manage or operate energy storage facilities and shall not own directly or indirectly control assets that provide ancillary services.
2. By way of derogation from paragraph 1, Member States may allow transmission system operators to own, manage or operate storage facilities and provide non-frequency ancillary services if the following conditions are fulfilled:
 - (a) other parties, following an open and transparent tendering procedure, have not expressed their interest to own, control, manage or operate such facilities offering storage and/or non-frequency ancillary services to the transmission system operator;
 - (b) such facilities or non-frequency ancillary services are necessary for the transmission system operators to fulfil its obligations under this regulation for the efficient, reliable and secure operation of the transmission system and they are not used to sell electricity to the market; and
 - (c) the regulatory authority has assessed the necessity of such derogation taking into account the conditions under points (a) and (b) of this paragraph and has granted its approval.
3. The decision to grant derogation shall be notified to the Agency and the Commission along with relevant information about the request and the reasons for granting the derogation.
4. The transmission system operator shall perform at regular intervals or at least every five years a public consultation for the required storage services in order to assess the potential interest of market parties to invest in such facilities and terminate its own storage activities in case third parties can provide the service in a cost-effective manner.

Comments from BRIDGE working groups

Regulations:

In order to create access for TSOs to ancillary services, non-discriminatory products should be defined and a sound and liquid market environment need to be designed. In case these conditions can be fulfilled, market players could offer a number of ancillary services originating from different possible sources such as demand, storage or flexible generation. Nowadays, certain market rules (DAM but also ancillary services) allow the participation of storage, not owned by system operators, for different services.

With most energy storage technologies, the charging, storage, and uncharging occur within one location. With Power-to-Gas this may not always be the case, for example when natural gas infrastructure is used for the transportation and storage of energy. The advantages of using existing gas infrastructure is the capacity thereof to store large amounts of energy in pipelines and underground storage facilities¹¹, and the usage of gas transportation infrastructure as an alternative means for transporting electricity over longer distances. Question is what will be considered the 'energy storage facility' in the context of the newly proposed Article 36 and 54 of the Recast Electricity Directive when the Power-to-Gas plant, the gas storage facility, and the re-electrification unit are located at dispersed locations.

On the matter of ownership of energy storage facilities, there is the potential for Power-to-Gas facilities which produce substitute natural gas for injection into the natural gas grid, of overlapping and conflicting ownership regimes in the Electricity and Gas Directives. Where such Power-to-Gas facilities may be considered energy storage under the Electricity Directive, the actual conversion of electrons into molecules for subsequent injection into the natural gas grid may also be considered a form of gas production under the 2009 Gas Directive. Ownership of gas production facilities is prohibited under the 2009 Gas Directive in Article 9, 14 and 18 for TSOs, and 26 for DSOs. However, for ownership of energy storage facilities, Articles 36 and 54 of the Recast Electricity Directive allow for the conditional ownership of such facilities by DSOs and TSOs. This potential overlap of ownership regimes may lead to conflicting views on whether TSOs are allowed to operate a Power-to-Gas facility in a configuration as within the STORE&GO project context.

3.1.4 Chapter VII: National Regulatory Authorities

Article 58 in EC proposal: General objectives of the regulatory authority

In carrying out the regulatory tasks specified in this Directive, the regulatory authority shall take all reasonable measures in pursuit of the following objectives within the framework of their duties and powers as laid down in Article 59, in close consultation with other relevant national authorities including competition authorities and authorities from neighbouring countries, including third countries as appropriate, and without prejudice to their competencies:

(a) promoting, in close cooperation with the Agency, regulatory authorities of other Member States and the Commission, a competitive, flexible, secure and environmentally sustainable internal market in electricity within the Union, and effective market opening for all customers and suppliers in the Union and ensuring appropriate conditions for the effective and reliable operation of electricity networks, taking into account long-term objectives;

(b) developing competitive and properly functioning regional cross-border, markets within the Union in view of the achievement of the objectives referred to in point (a);

¹¹ In 2016 there were 149 underground gas storage facilities operational within the EU, with a combined gas storage capacity of 1182 TWh.

- (c) eliminating restrictions on trade in electricity between Member States, including developing appropriate cross-border transmission capacities to meet demand and enhancing the integration of national markets which may facilitate electricity flows across the Union ;
- (d) helping to achieve, in the most cost-effective way, the development of secure, reliable and efficient non-discriminatory systems that are consumer oriented, and promoting system adequacy and, in line with general energy policy objectives, energy efficiency as well as the integration of large and small-scale production of electricity from renewable energy sources and distributed generation in both transmission and distribution networks and in facilitating their operation in relation to other energy networks of gas or heat ;
- (e) facilitating access to the network for new generation capacity and energy storage facilities , in particular removing barriers that could prevent access for new market entrants and of electricity from renewable energy sources;
- (f) ensuring that system operators and system users are granted appropriate incentives, in both the short and the long term, to increase efficiencies, especially energy efficiency, in system performance and foster market integration;
- (g) ensuring that customers benefit through the efficient functioning of their national market, promoting effective competition and helping to ensure consumer protection;
- (h) helping to achieve high standards of universal and public service in electricity supply, contributing to the protection of vulnerable customers and contributing to the compatibility of necessary data exchange processes for customer switching.

Comments from BRIDGE working groups

Business Models:

Point (b) might become important with the local development of new cross borders grids (avoiding the “end of line” situation of most villages close to borders) where storage applications might find their use.

Article 59 in EC proposal: Duties and powers of the regulatory authority

1. The regulatory authority shall have the following duties:
 - (a) fixing or approving, in accordance with transparent criteria transmission or distribution tariffs and their methodologies;
 - (b) ensuring compliance of transmission and distribution system operators and, where relevant, system owners, as well as of any electricity undertakings and other market participants, with their obligations under this Directive, the [recast of Regulation 714/2009 as proposed by COM(2016)861/2], the network codes adopted pursuant to Article 55 [recast of Regulation 714/2009 as proposed by COM(2016)861/2], and the guidelines adopted pursuant to Article 57 of [recast of Regulation 714/2009 as proposed by COM(2016)861/2 and other relevant Union legislation, including as regards cross-border issues;
 - (c) approving products and procurement process for non-frequency ancillary services;
 - (d) implementing the network codes and Guidelines adopted pursuant to Article 55 to 57 of the [recast of Regulation 714/2009 as proposed by COM(2016)861/2] through national measures or, where so required, coordinated regional or Union-wide measures ;
 - (e) cooperating in regard to cross-border issues with the regulatory authority or authorities of the Member States concerned and with the Agency, in particular through participation in the work of the Agency's Board of Regulators pursuant to Article 20 of [recast of Regulation 713/2009 as proposed by COM(2016)863/2] ;

- (f) complying with, and implementing, any relevant legally binding decisions of the Agency and of the Commission;
- (g) ensuring that interconnector capacities are made available to the utmost extent pursuant to Article 14 of [recast of Regulation 714/2009 as proposed by COM(2016)861/2];
- (h) reporting annually on its activity and the fulfilment of its duties to the relevant authorities of the Member States, the Agency and the Commission. Such reports shall cover the steps taken and the results obtained as regards each of the tasks listed in this Article;
- (i) ensuring that there are no cross-subsidies between transmission, distribution, and supply activities;
- (j) monitoring investment plans of the transmission system operators, and providing in its annual report an assessment of the investment plans of the transmission system operators as regards their consistency with the Union wide network development plan referred to in Article 27(1)(b) of the [recast of Regulation 714/2009 as proposed by COM(2016)861/2]; such assessment may include recommendations to amend those investment plans;
- (k) measuring the performance of the TSOs and DSOs in relation to the development of a smart grid that promotes energy efficiency and the integration of RES based on a limited set of Union-wide indicators, and publish a national report every 2 years, including recommendations for improvement where necessary;
- (l) setting or approving standards and requirements for quality of service and supply or contributing thereto together with other competent authorities and monitoring compliance with and reviewing the past performance of network security and reliability rules;
- (m) monitoring the level of transparency, including of wholesale prices, and ensuring compliance of electricity undertakings with transparency obligations;
- (n) monitoring the level and effectiveness of market opening and competition at wholesale and retail levels, including on electricity exchanges, prices for household customers including prepayment systems, switching rates, disconnection rates, charges for and the execution of maintenance services, and complaints by household customers, as well as any distortion or restriction of competition, including providing any relevant information, and bringing any relevant cases to the relevant competition authorities;
- (o) monitoring the occurrence of restrictive contractual practices, including exclusivity clauses which may prevent large non-household customers from contracting simultaneously with more than one supplier or restrict their choice to do so, and, where appropriate, informing the national competition authorities of such practices;
- (q) monitoring the time taken by transmission and distribution system operators to make connections and repairs;
- (r) helping to ensure, together with other relevant authorities, that the consumer protection measures, are effective and enforced;
- (s) publishing recommendations, at least annually, in relation to compliance of supply prices with Article 5, and providing these to the competition authorities, where appropriate;
- (t) ensuring access to customer consumption data, the provision, for optional use, of an easily understandable harmonised format at national level for consumption data, and prompt access for all customers to such data pursuant to Article 24 and Article 35;
- (u) monitoring the implementation of rules relating to the roles and responsibilities of transmission system operators, distribution system operators, suppliers and customers and other market parties pursuant to [recast of Regulation 714/2009 as proposed by COM(2016)861/2];
- (v) monitoring investment in generation and storage capacities in relation to security of supply;
- (w) monitoring technical cooperation between Union and third country transmission system operators;

(y) contributing to the compatibility of data exchange processes for the most important market processes at regional level.

(z) monitoring the availability of comparison websites, including comparison tools that fulfil the criteria in Article 14.

2. Where a Member State has so provided, the monitoring duties set out in paragraph 1 may be carried out by other authorities than the regulatory authority. In such a case, the information resulting from such monitoring shall be made available to the regulatory authority as soon as possible. While preserving their independence, without prejudice to their own specific competencies and consistent with the principles of better regulation, the regulatory authority shall, as appropriate, consult transmission system operators and, as appropriate, closely cooperate with other relevant national authorities when carrying out the duties set out in paragraph 1. Any approvals given by a regulatory authority or the Agency under this Directive are without prejudice to any duly justified future use of its powers by the regulatory authority under this Article or to any penalties imposed by other relevant authorities or the Commission.

3. Member States shall ensure that regulatory authorities are granted the powers enabling them to carry out the duties referred to in this Article in an efficient and expeditious manner. For this purpose, the regulatory authority shall have at least the following powers:

(a) to issue binding decisions on electricity undertakings;

(b) to carry out investigations into the functioning of the electricity markets, and to decide upon and impose any necessary and proportionate measures to promote effective competition and ensure the proper functioning of the market. Where appropriate, the regulatory authority shall also have the power to cooperate with the national competition authority and the financial market regulators or the Commission in conducting an investigation relating to competition law;

(c) to require any information from electricity undertakings relevant for the fulfilment of its tasks, including the justification for any refusal to grant third-party access, and any information on measures necessary to reinforce the network;

(d) to impose effective, proportionate and dissuasive penalties on electricity undertakings not complying with their obligations under this Directive or any relevant legally binding decisions of the regulatory authority or of the Agency, or to propose that a competent court impose such penalties. This shall include the power to impose or propose the imposition of penalties of up to 10 % of the annual turnover of the transmission system operator on the transmission system operator or of up to 10 % of the annual turnover of the vertically integrated undertaking on the vertically integrated undertaking, as the case may be, for non-compliance with their respective obligations pursuant to this Directive; and

(e) appropriate rights of investigations and relevant powers of instructions for dispute settlement under paragraphs 11 and 12.

4. In addition to the duties conferred upon it under paragraph 1 and 3 of this Article, when an independent system operator has been designated under Article 44 13, the regulatory authority shall: (a) monitor the transmission system owner's and the independent system operator's compliance with their obligations under this Article, and issue penalties for noncompliance in accordance with paragraph 3 4(d);

(b) monitor the relations and communications between the independent system operator and the transmission system owner so as to ensure compliance of the independent system operator with its obligations, and in particular approve contracts and act as a dispute settlement authority between the independent system operator and the transmission system owner in respect of any complaint submitted by either party pursuant to paragraph 11; (c) without prejudice to the procedure under Article 4413(2)

(c), for the first ten-year network development plan, approve the investments planning and the multi-annual network development plan presented at least every two years by the independent system operator;

(d) ensure that network access tariffs collected by the independent system operator include remuneration for the network owner or network owners, which provides for adequate remuneration of the network assets and of any new investments made therein, provided they are economically and efficiently incurred;

(e) have the powers to carry out inspections, including unannounced inspections, at the premises of transmission system owner and independent system operator; and

(f) monitor the use of congestion charges collected by the independent system operator in accordance with [Article 17(2) of recast of Regulation 714/2009 as proposed by COM(2016)861/2].

5. In addition to the duties and powers conferred on it under paragraphs 1 and 3 of this Article, when a transmission system operator has been designated in accordance with Chapter X, the regulatory authority shall be granted at least the following duties and powers:

(a) to issue penalties in accordance with paragraph 4(d) for discriminatory behaviour in favour of the vertically integrated undertaking;

(b) to monitor communications between the transmission system operator and the vertically integrated undertaking so as to ensure compliance of the transmission system operator with its obligations;

(c) to act as dispute settlement authority between the vertically integrated undertaking and the transmission system operator in respect of any complaint submitted pursuant to paragraph 11;

(d) to monitor commercial and financial relations including loans between the vertically integrated undertaking and the transmission system operator;

(e) to approve all commercial and financial agreements between the vertically integrated undertaking and the transmission system operator on the condition that they comply with market conditions;

(f) to request justification from the vertically integrated undertaking when notified by the compliance officer in accordance with Article 50(4). Such justification shall, in particular, include evidence to the end that no discriminatory behaviour to the advantage of the vertically integrated undertaking has occurred;

(g) to carry out inspections, including unannounced ones, on the premises of the vertically integrated undertaking and the transmission system operator; and

(h) to assign all or specific tasks of the transmission system operator to an independent system operator appointed in accordance with Article 44 in case of a persistent breach by the transmission system operator of its obligations under this Directive, in particular in case of repeated discriminatory behaviour to the benefit of the vertically integrated undertaking.

6. The regulatory authorities shall, except in cases where the Agency is competent to fix and approve the terms and conditions or methodologies for the implementation of network codes and guidelines under Chapter VII of [recast of Regulation 714/2009 as proposed by COM(2016)861/2] pursuant to Article 5(2) of [recast of Regulation 713/2009 as proposed by COM(2016)863/2] because of their coordinated nature, be responsible for fixing or approving sufficiently in advance of their entry into force at least the national methodologies used to calculate or establish the terms and conditions for:

(a) connection and access to national networks, including transmission and distribution tariffs or their methodologies. Those tariffs or methodologies shall allow the necessary investments in the networks to be carried out in a manner allowing those investments to ensure the viability of the networks;

(b) the provision of ancillary services which shall be performed in the most economic manner possible and provide appropriate incentives for network users to balance their input and off-takes. The ancillary services shall be provided in a fair and non-discriminatory manner and be based on objective criteria; and

(c) access to cross-border infrastructures, including the procedures for the allocation of capacity and congestion management.

7. The methodologies or the terms and conditions referred to in paragraph 6 shall be published.

8. With a view to increasing transparency in the market and provide to all interested parties all necessary information, decisions or proposals for a decision concerning transmission and distribution tariffs as referred in Article 60(12), regulatory authorities shall make available to market parties the detailed methodology and underlying costs used for the calculation of the relevant network tariffs.

9. The regulatory authorities shall monitor congestion management of national electricity systems including interconnectors, and the implementation of congestion management rules. To that end, transmission system operators or market operators shall submit their congestion management rules, including capacity allocation, to the national regulatory authorities. National regulatory authorities may request amendments to those rules.

Comments from BRIDGE working groups

Regulations:

Both the proposed Electricity Directive's Article 59 and the proposed Regulation's Article 16 should encourage national regulators to include mechanisms to foster innovation in general, and to encourage DSOs to comply in the best possible way. Regulators should consider the trade-off between OPEX/CAPEX when incentivising innovation¹².

3.2 Electricity Regulation

3.2.1 Chapter II: General rules for the electricity market

Article 3 in EC proposal: Principles regarding the operation of electricity markets

1. Member States, national regulatory authorities, transmission system operators, distribution system operators, and market operators shall ensure that electricity markets are operated in accordance with the following principles:

(a) prices shall be formed based on demand and supply;

(b) actions which prevent price formation on the basis of demand and supply or constitute a disincentive to the development of more flexible generation, low carbon generation, or more flexible demand shall be avoided;

(c) customers shall be enabled to benefit from market opportunities and increased competition on retail markets;

(d) market participation of consumers and small businesses shall be enabled by aggregation of generation from multiple generation facilities or load from multiple demand facilities to provide joint offers on the electricity market and be jointly operated in the electricity system, subject to compliance with EU treaty rules on competition;

(e) market rules shall support the decarbonisation of the economy by enabling the integration of electricity from renewable energy sources and providing incentives for energy efficiency;

12 See http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

- (f) market rules shall deliver appropriate investment incentives for generation, storage, energy efficiency and demand response to meet market needs and thus ensure security of supply;
- (g) barriers to cross-border electricity flows and cross-border transactions on electricity markets and related services markets shall be avoided;
- (h) market rules shall provide for regional cooperation where effective;
- (i) all generation, storage and demand resources shall participate on equal footing in the market;
- (j) all producers shall be directly or indirectly responsible for selling the electricity they generate;
- (k) market rules shall allow for progress in research and development to be realised and used to the benefit of society;
- (l) market rules shall enable the efficient dispatch of generation assets and demand response;
- (m) market rules shall allow for entry and exit of electricity generation and electricity supply undertakings based on their assessment of the economic and financial viability of their operations;
- (n) long-term hedging opportunities, which allow market participants to hedge against price volatility risks on a market basis, and eliminate uncertainty on future returns on investment shall be tradable on exchanges in a transparent manner subject to compliance with EU treaty rules on competition.

Comments from BRIDGE working groups

Business Models:

It is important that market prices are undistorted, e.g. no caps are in place allowing the emergence of price spikes in both directions as this increased price variance can provide the appropriate signals to the market, enhance the role of aggregators in both supply and demand, and trigger the development of financial products for dealing with the increased risk. Storage should be included in the aggregation possibilities. All the items in this Article are essentials, but it would be interesting to know how they will be interpreted in Europe and by each Member State.

Article 4 in EC proposal: Balancing responsibility

1. All market participants shall aim for system balance and shall be financially responsible for imbalances they cause in the system. They shall either be balance responsible parties or delegate their responsibility to a balance responsible party of their choice.
2. Member States may provide for derogation from balance responsibility in respect of:
 - (a) demonstration projects;
 - (b) generating installations using renewable energy sources or high-efficiency cogeneration with an installed electricity capacity of less than 500 kW;
 - (c) installations benefitting from support approved by the Commission under Union State aid rules pursuant to Articles 107 to 109 TFEU, and commissioned prior to [OP: entry into force]. Member States may, subject to Union state aid rules, incentivize market participants which are fully or partly exempted from balancing responsibility to accept full balancing responsibility against appropriate compensation.
3. From 1 January 2026, point (b) of paragraph 2 shall apply only to generating installations using renewable energy sources or high-efficiency cogeneration with an installed electricity capacity of less than 250 kW.

Comments from BRIDGE working groups

Business Models:

This article is highly valuable for the development and market uptake of storage. Due to the fact that in some countries the role does not exist, clarification is required on what actors can act as a balance responsible party. Furthermore, a detailed list of market participants who bear balancing responsibilities should be provided. If Producers based on RES are subject to this responsibility then failing to meet a Power Purchase Agreement should be excluded from the imbalance calculation since the producer may have to compensate the buyer according to the terms of the contract. In other cases, these producers, or their delegated BRP, may suffer from increased balancing costs due to forecasting errors that stem from the unpredictable nature of renewable resources. This error could be reduced, and thus reduce this disadvantage compared to traditional generators, by extending the closure period for a transition period, so that mature RES forecasting tools are available. Similar concerns also apply to Aggregators since they rely heavily on the accuracy of flexibility forecasting tools. Guidance on how Member States can retrieve the costs from those market participants excepted from balancing responsibilities should be provided.

Article 5 in EC proposal: Balancing market

1. All market participants shall have access to the balancing market, be it individually or through aggregation. Balancing market rules and products shall respect the need to accommodate increasing shares of variable generation as well as increased demand responsiveness and the advent of new technologies.
2. Balancing markets shall be organised in such a way as to ensure effective non-discrimination between market participants taking account of the different technical capability of generation from variable renewable sources and demand side response and storage.
3. Balancing energy shall be procured separately from balancing capacity. Procurement processes shall be transparent while at the same time respecting confidentiality.
4. Balancing markets shall ensure operational security whilst allowing for maximum use and efficient allocation of cross-zonal capacity across timeframes in accordance with Article 15.
5. Marginal pricing shall be used for the settlement of balancing energy. Market participants shall be allowed to bid as close to real time as possible, and at least after the intraday cross-zonal gate closure time determined in accordance with Article 29 of Commission Regulation (EU) 2015/1222.
6. The imbalances shall be settled at a price that reflects the real time value of energy.
7. The dimensioning of reserve capacity and the amount of balancing capacity that needs to be procured shall be carried out on a regional level in accordance with points 7 and 8 of Annex I.
8. The procurement of balancing capacity shall be performed on a regional level in accordance with point 8 of Annex 1. The procurement shall be based on a primary market and organised in such a way as to be non-discriminatory between market participants in the prequalification process individually or through aggregation.
9. The procurement of upward balancing capacity and downward balancing capacity shall be carried out separately. The contracting should be performed for not longer than one day before the provision of the balancing capacity and the contracting period shall have a maximum period of one day.
10. Transmission system operators shall publish close to real-time information on the current balancing state of their control areas, the imbalance price and the balancing energy price.

Comments from BRIDGE working groups

Business Models:

Balancing market participation rules should also be adapted to suits various types of storage based power plants as they have a limited lifespan.

The BM WG questions whether marginal pricing is the best option i.e. will it covers the capital costs (either for storage or any other balancing means)?.

The Netfficient project which analyses the participation of storage in the Balancing Market has found three main challenges:

- For non-discriminatory market integration, performance (in the form of response speed and precision) should be considered in the remuneration of services. For example, Frequency Containment Reserve (FCR) has to be provided as fast as technically possible. A faster and more accurate response eliminates delays in provision or overshoots; both negatively affect frequency stability. Also, since batteries are much faster than conventional power plants, they have to provide more energy due to their faster reaction.
- A short Minimum Activation Period (e.g. 15 minutes of full offered power for FCR) is crucial for an economically feasible participation. This period has a considerable impact in the dimensioning and operation of energy storage units in the balancing market.
- Storage technologies participating in the balancing market are demanded payments in the case of negative balancing (when storage is charging). Therefore, in many cases grid fees or other surcharges have to be paid for the “consumed” electricity. This is a significant disadvantage to conventional power plants, which just reduce power output in case of negative balancing and do not have the costs for grid fees.

To ease market analysis for research and business, Netfficient suggests that a common data platform for price and activation data with an API (application programming interface) would be very helpful as in Germany, for example, only manual data collection is possible.

Article 6 in EC proposal: Day-ahead and intraday markets

1. Transmission system operators and nominated electricity market operators shall jointly organise the management of the integrated day-ahead and intraday markets based on market coupling as set out in Regulation (EU) 2015/1222. Transmission system operators and nominated electricity market operators shall cooperate at Union level or, where more appropriate, on a regional basis in order to maximise the efficiency and effectiveness of Union electricity day-ahead and intraday trading. The obligation to cooperate shall be without prejudice to the application of the provisions of Union competition law. In their functions relating to electricity trading, Transmission system operators and nominated market operators shall be subject to regulatory oversight by regulators and the Agency pursuant to Article 59 of [recast of Directive 2009/72/EC as proposed by COM(2016) 864/2] and Articles 3 to 16 of [recast of Regulation (EC) No 713/2009 as proposed by COM(2016) 863/2].

2. Day-ahead and intraday markets shall

- (a) be organised in such a way as to be non-discriminatory;
- (b) maximise the ability of market participants to contribute to avoid system imbalances;
- (c) maximise the opportunities for market participants to participate in cross-border trade as close as possible to real time across all bidding zones;

- (d) provide prices that reflect market fundamentals and that market participants can rely on when agreeing on longer-term hedging products;
 - (e) ensure operational security whilst allowing for maximum use of transmission capacity;
 - (f) be transparent while at the same time respecting confidentiality;
 - (g) ensure trades are anonymous; and
 - (h) make no distinction between trades made within a bidding zone and across bidding zones.
3. Market operators shall be free to develop products and trading opportunities that suit market participants' demand and needs and ensure that all market participants are able to access the market individually or through aggregation. They shall respect the need to accommodate increasing shares of variable generation as well as increased demand responsiveness and the advent of new technologies.

Comments from BRIDGE working groups

Business Models:

The RealValue project analyses how the market structure of the day-ahead market impacts trading. The rationale is that load shifting can only be conducted in liquid markets that allow for the reliable contracting of electricity. Preliminary analyses indicate that the additional auction that European Power Exchange (EPEX) implemented for 15 minute products has led to a significant increase in overall trading volume. The auction provides for a clear price signal which might be used for the purpose of hedging.

In 2015, the EPEX introduced a second auction in the day-ahead market. Before, 15 minute products could only be traded bi-laterally in the continuous market. The figure below indicates the trading volumes before and after the introduction of the new day-ahead auction.

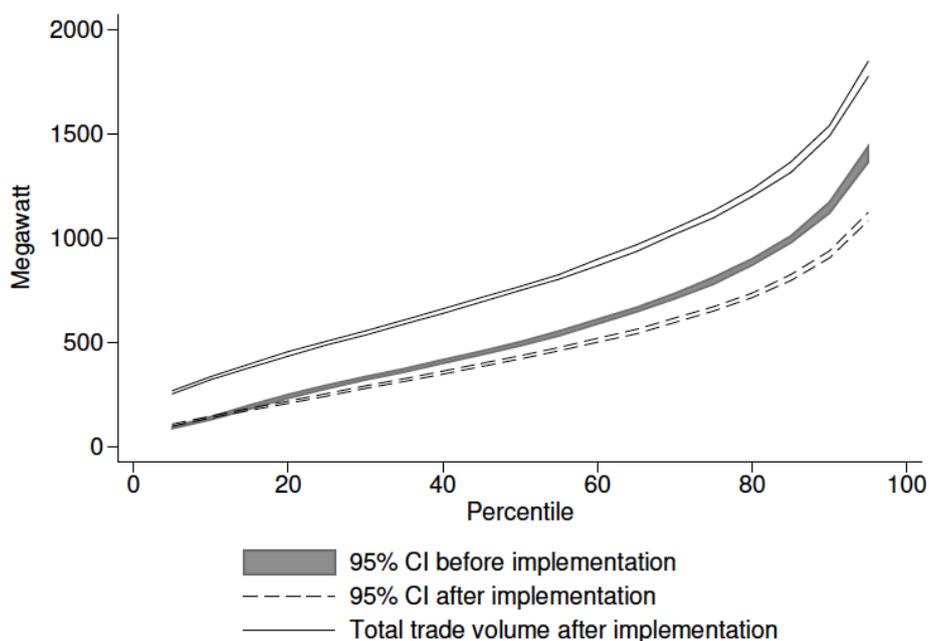


Figure 6: Trading volumes

Relying on coarsened exact matching, observations with similar market conditions before and after the implementation of the auction were selected. With all relevant determinants of electricity trading

identical and the only systematic difference being the availability of the new auction, the new auction must cause the observed difference in trading volume.

The next figure indicates that the trading volume in the continuous market has remained unchanged by the additional auction (the 95% confidence interval straddles zero). For the night time, the additional auction has reduced the trading volume in the continuous market for moderate to high trading volumes. At the same time, the total trading volume (graphs c and d) of auction and continuous trading has increased since the auction was implemented.

This indicates that the market design determines the outcomes in the day-ahead market. In the case at hand, the additional auction potentially benefits the use of smart-electric storage heaters for load shifting because the market has become more liquid.

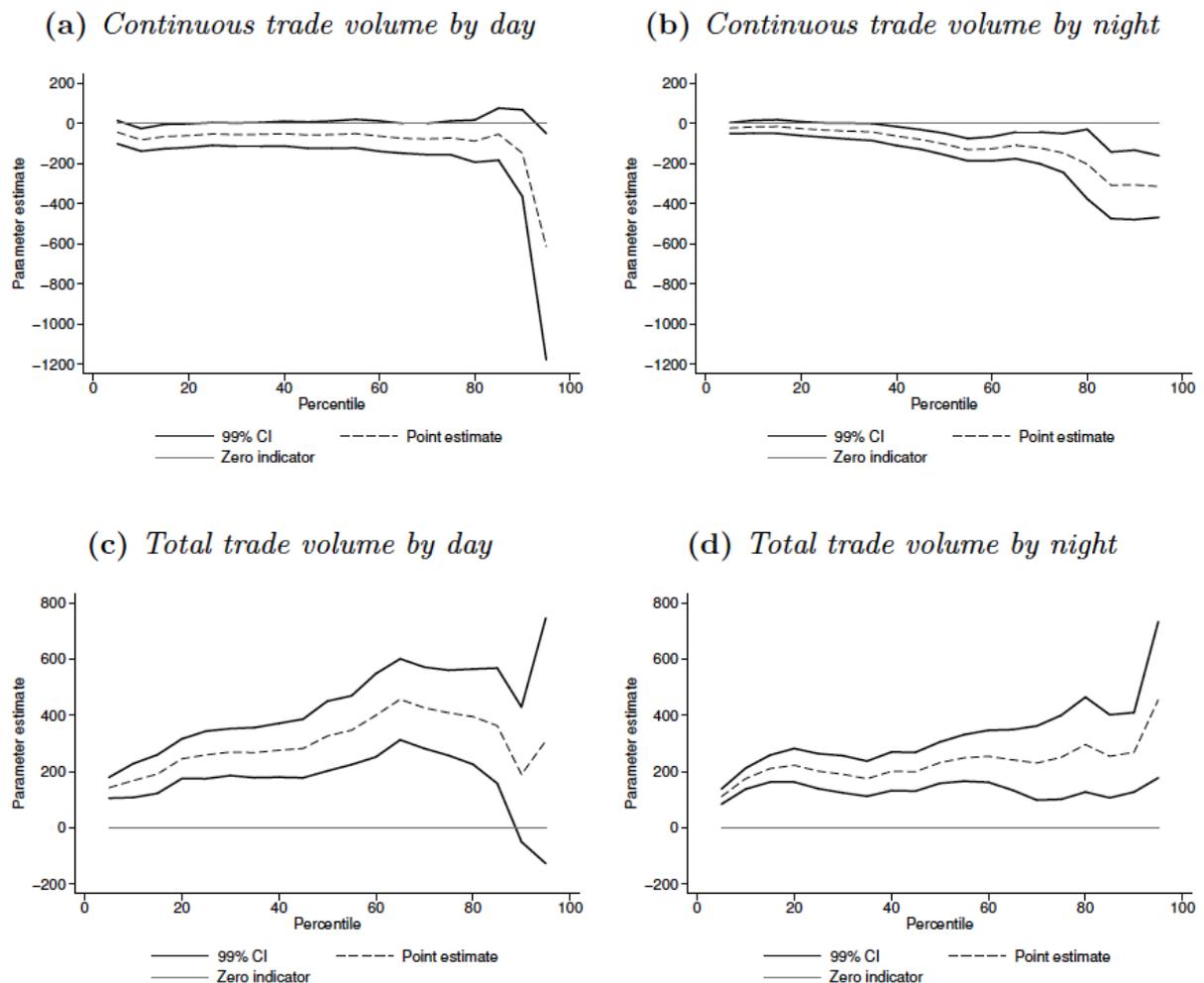


Figure 7: Unconditional quantile treatment effects

Article 7 in EC proposal: Trade on day-ahead and intraday markets

1. Market operators shall allow market participants to trade energy as close to real time as possible and at least to the intraday cross-zonal gate closure time determined in accordance with Article 59 of Regulation (EU) 2015/1222.
2. Market operators shall provide market participants with the opportunity to trade in energy in time intervals at least as short as the imbalance settlement period in both day-ahead and intraday markets.
3. Market operators shall provide products for trading in day-ahead and intraday markets which are sufficiently small in size, with minimum bid sizes of 1 Megawatt or less, to allow for the effective participation of demand-side response, energy storage and small-scale renewables.
4. By 1 January 2025, the imbalance settlement period shall be 15 minutes in all control areas.

Comments from BRIDGE working groups

Business Models:

Point 2. May lead to excessive “financial gaming” of the market, disconnected from the real economy of the electricity market.

Regulations:

Regulation for island-based hybrid power systems (RES+storage) in Greece introduces a day-ahead dispatch schedule under which the producer gives energy offers 24hours ahead, but not on an hourly basis. This restricts smaller-capacity storage facilities and favours pumped hydro storage. Hourly clearance is required to this end.

Article 8 in EC proposal: Forward markets

1. In line with regulation (EU) 2016/1719, transmission system operators shall issue long-term transmission rights or have equivalent measures in place to allow for market participants, in particular owners of generation facilities using renewable energies, to hedge price risks across bidding zone borders.
2. Long-term transmission rights shall be allocated in a transparent, market based and non-discriminatory manner through a single allocation platform. Long-term transmission rights shall be firm and be transferable between market participants.
3. Subject to compliance with treaty rules on competition, market operators shall be free to develop forward hedging products including for the long -term to provide market participants, in particular owners of generation facilities using renewable energies, with appropriate possibilities to hedge financial risks from price fluctuations. Member States shall not restrict such hedging activity to trades within a Member State or bidding zone.

Comments from BRIDGE working groups

Business Models:

Bidding zone borders can decrease generators’ incomes, therefore, TSOs and regulators must ensure fair and reasonable conditions for owners of generation facilities. The future electricity market must strength the competitiveness of renewable energy technologies fostering a decarbonising economy through a consistent carbon footprint cost. Interconnections are a solution but not the only one. A special focus must be put in place for the regulatory harmonisation of member states in continental Europe. Point 3. makes it clear how long-term transmission rights work at a national level, e.g. in Spain, power is exchanged with France and Portugal. However, the issue of how a lower power

exchange or a lower price in Spain can impact other non-interconnected EU countries such as Germany or Italy, is not addressed sufficiently here.



Figure 8: European map

Article 9 in EC proposal: Price Restrictions

1. There shall be no maximum limit of the wholesale electricity price unless it is set at the value of lost load as determined in accordance with Article 10. There shall be no minimum limit of the wholesale electricity price unless it is set at a value of minus 2000 € or less and, in the event that it is or anticipated to be reached, set at a lower value for the following day. This provision shall apply, inter alia, to bidding and clearing in all timeframes and include balancing energy and imbalance prices.
2. By way of derogation from paragraph 1, until [OP: two years after entry into force] market operators may apply limits on maximum clearing prices for day-ahead and intraday timeframes in accordance with Articles 41 and 54 of Regulation (EU) 2015/1222. In the event that limits are, or are anticipated to be, reached, they shall be raised for the following day.
3. Transmission system operators shall not take any measures with the aim of changing the wholesale prices. All dispatch orders shall be reported to the national regulatory authority within one day.
4. Member States shall identify policies and measures applied within their territory that could contribute to indirectly restrict price formation, including limiting bids relating to the activation of balancing energy, capacity mechanisms, measures by the transmission system operators, measures intended to challenge market results or to prevent abuse of dominant positions or inefficiently defined bidding zones.
5. Where a Member State has identified a policy or measure which could serve to restrict price formation they shall take all appropriate actions to eliminate or, if not possible, mitigate the impact on bidding behaviour. Member States shall provide a report to the Commission by [OP: six months after entry into force] detailing the measures and actions they have taken or intend to take.

Comments from BRIDGE working groups

Business Models:

There is a high risk that market participants (traders) might act unfairly due to strategic bidding to increase market profits; national regulators must monitor this. Price signals should include the added-value of some flexibility services (energy storage for renewable capacity firming and renewable energy time shifting, ramp control, frequency and voltage regulation, inertia, black start capability, etc.) to avoid high wholesale electricity prices at certain periods due to costly and polluted peaking units.

Currently price caps at EPEX for auctions are at -3000 and +3000 Euro per MWh. In the data available to the RealValue project, day ahead auction outcomes are not anywhere near these caps. Negative prices are also relatively rare, therefore this regulation only impacts RealValue hypothetically.

Article 11 in EC proposal: Dispatching of generation and demand response

1. Dispatching of power generation facilities and demand response shall be non-discriminatory and market based unless otherwise provided under paragraphs 2 to 4.
2. When dispatching electricity generating installations, transmission system operators shall give priority to generating installations using renewable energy sources or high-efficiency cogeneration from small generating installations or generating installations using emerging technologies to the following extent:
 - (a) generating installations using renewable energy sources or high-efficiency cogeneration with an installed electricity capacity of less than 500 kW; or
 - (b) demonstration projects for innovative technologies.
3. Where the total capacity of generating installations subject to priority dispatch under paragraph 2 is higher than 15 % of the total installed generating capacity in a Member State, point (a) of paragraph 2 shall apply only to additional generating installations using renewable energy sources or high-efficiency cogeneration with an installed electricity capacity of less than 250 kW.
From 1 January 2026, point (a) of paragraph 2 shall apply only to generating installations using renewable energy sources or high-efficiency cogeneration with an installed electricity capacity of less than 250 kW or, if the threshold under the first sentence of this paragraph has been reached, of less than 125 kW.
4. Generating installations using renewable energy sources or high-efficiency cogeneration which have been commissioned prior to [OP: entry into force] and have, when commissioned, been subject to priority dispatch under Article 15 (5) of Directive 2012/27/EU of the European Parliament and of the Council or Article 16 (2) Directive 2009/28/EC of the European Parliament and of the Council³⁹ shall remain subject to priority dispatch. Priority dispatch shall no longer be applicable from the date where the generating installation is subject to significant modifications, which shall be the case at least where a new connection agreement is required or the generation capacity is increased.
5. Priority dispatch shall not endanger the secure operation of the electricity system, shall not be used as a justification for curtailment of cross-border capacities beyond what is provided for in Article 14 and shall be based on transparent and non-discriminatory criteria.

Comments from BRIDGE working groups

Business Models:

This Article describes the conditions for priority dispatch, but here, and in other parts of the document, the terms 'demonstration projects' and 'emerging technologies' are used without any explicit definition being provided.

Even though renewable energy is in many cases already competitive compared to traditional resources, the market price of the latter technologies should reflect the environmental costs to the society. Furthermore, non-market based curtailment should be used in the case of insufficient market competition. However, particular attention should be paid to how to carefully and transparently define how to measure the correct level of competition.

Priority should be given to generating installations using storage tied to renewable sources (point 2.).

Article 12 in EC proposal: Redispatching and curtailment

1. Curtailment or redispatching of generation and redispatching of demand response shall be based on objective, transparent and non-discriminatory criteria.
2. The resources curtailed or redispatched shall be selected amongst generation or demand facilities submitting offers for curtailment or redispatching using market-based mechanisms and be financially compensated. Non-market-based curtailment or redispatching of generation or redispatching of demand response shall only be used where no market-based alternative is available, where all available market-based resources have been used, or where the number of generation or demand facilities available in the area where suitable generation or demand facilities for the provision of the service are located is too low to ensure effective competition. The provision of market-based resources shall be open to all generation technologies, storage and demand response, including operators located in other Member States unless technically not feasible.
3. The responsible system operators shall report at least once per year to the competent regulatory authority on curtailment or downward redispatching of generating installations using renewable energy sources or high-efficiency cogeneration and on measures taken to reduce the need for such curtailment or downward redispatching in the future. Curtailment or redispatching of generating installations using renewable energy sources or high-efficiency cogeneration shall be subject to compensation pursuant to paragraph 6.
4. Subject to requirements relating to the maintenance of the reliability and safety of the grid, based on transparent and non-discriminatory criteria defined by the competent national authorities, transmission system operators and distribution system operators shall:
 - (a) guarantee the capability of transmission and distribution networks to transmit electricity produced from renewable energy sources or high-efficiency cogeneration with minimum possible curtailment or redispatching. That shall not prevent network planning from taking into account limited curtailment or redispatching where this is shown to be more economically efficient and does not exceed 5 % of installed capacities using renewable energy sources or high-efficiency cogeneration in their area;
 - (b) take appropriate grid and market-related operational measures in order to minimise the curtailment or downward redispatching of electricity produced from renewable energy sources or high-efficiency cogeneration.
5. Where non-market-based downward redispatching or curtailment is used, the following principles shall apply:

- (a) generating installations using renewable energy sources shall only be subject to downward redispatching or curtailment if no other alternative exists or if other solutions would result in disproportionate costs or risks to network security;
- (b) generating installations using high-efficiency cogeneration shall only be subject to downward redispatching or curtailment if, other than curtailment or downward redispatching of generating installations using renewable energy sources, no other alternative exists or if other solutions would result in disproportionate costs or risks to network security;
- (c) self-generated electricity from generating installations using renewable energy sources or high-efficiency cogeneration which is not fed into the transmission or distribution network shall not be curtailed unless no other solution would resolve network security issues;
- (d) downward redispatching or curtailment under letters a to c shall be duly and transparently justified. The justification shall be included in the report under paragraph 3.
6. Where non-market based curtailment or redispatching is used, it shall be subject to financial compensation by the system operator requesting the curtailment or redispatching to the owner of the curtailed or redispatched generation or demand facility. Financial compensation shall at least be equal to the highest of the following elements:
- (a) additional operating cost caused by the curtailment or redispatching, such as additional fuel costs in case of upward redispatching, or backup heat provision in case of downward redispatching or curtailment of generating installations using high-efficiency cogeneration;
- (b) 90 % of the net revenues from the sale of electricity on the day-ahead market that the generating or demand facility would have generated without the curtailment or redispatching request. Where financial support is granted to generating or demand facilities based on the electricity volume generated or consumed, lost financial support shall be deemed part of the net revenues.

Comments from BRIDGE working groups

Business Models:

The BM WG questions how compensation to owners of curtailed or redispatched generation or demand flexibility will be funded. Point 3. restricts compensation to owners of renewables or high-efficiency cogeneration, but is not clear if point 6. applies to traditional generators as well.

3.2.2 Chapter III: Network access and congestion management

Article 14 in EC proposal: General principles of capacity allocation and congestion management

1. Network congestion problems shall be addressed with non-discriminatory market-based solutions which give efficient economic signals to the market participants and transmission system operators involved. Network congestion problems shall be solved with non-transaction based methods, i.e. methods that do not involve a selection between the contracts of individual market participants. When taking operational measures to ensure that its transmission system remains in the normal state, the transmission system operator shall take into account the effect of those measures on neighbouring control areas and coordinate such measures with other affected transmission system operators as provided for in Regulation (EU) 1222/2015.
2. Transaction curtailment procedures shall only be used in emergency situations where the transmission system operator must act in an expeditious manner and re-dispatching or countertrading is not possible. Any such procedure shall be applied in a non-discriminatory manner. Except in cases of force majeure, market participants who have been allocated capacity shall be compensated for any curtailment.
3. The maximum capacity of the interconnections and/or the transmission networks affecting cross-border flows shall be made available to market participants, complying with safety standards of

secure network operation. Counter-trading and redispatch, including cross-border redispatch, shall be used to maximise available capacities unless it is demonstrated that it is not beneficial to economic efficiency at Union level.

Comments from BRIDGE working groups

Business Models:

Network congestion and the associated market as an obvious opportunity for storage solutions localized in strategic points.

Regulations:

Special approach to the relation between DSO's and TSOs should be addressed for congestion management.

Article 16 in EC proposal: Charges for access to networks

1. Charges applied by network operators for access to networks, including charges for connection to the networks, charges for use of networks, and, where applicable, charges for related network reinforcements, shall be transparent, take into account the need for network security and flexibility and reflect actual costs incurred insofar as they correspond to those of an efficient and structurally comparable network operator and are applied in a non-discriminatory manner. In particular, they shall be applied in a way which does not discriminate between production connected at the distribution level and production connected at the transmission level, either positively or negatively. They shall not discriminate against energy storage and shall not create disincentives for participation in demand response. Without prejudice to paragraph 3, those charges shall not be distance-related.
2. Tariffs shall grant appropriate incentives to transmission and distribution system operators, over both the short and long term, to increase efficiencies, including energy efficiency, foster market integration and security of supply, and support investments and the related research activities.
3. Where appropriate, the level of the tariffs applied to producers and/or consumers shall provide locational signals at Union level, and take into account the amount of network losses and congestion caused, and investment costs for infrastructure.
4. When setting the charges for network access, the following shall be taken into account:
 - (a) payments and receipts resulting from the inter-transmission system operator compensation mechanism;
 - (b) actual payments made and received as well as payments expected for future periods of time, estimated on the basis of past periods.
5. Setting the charges for network access under this Article shall be without prejudice to charges resulting from congestion management referred to in Article 16.
6. There shall be no specific network charge on individual transactions for cross-border trade of electricity.
7. Distribution tariffs shall reflect the cost of use of the distribution network by system users including active customers, and may be differentiated based on system users' consumption or generation profiles. Where Member States have implemented the deployment of smart metering systems, regulatory authorities may introduce time differentiated network tariffs, reflecting the use of the network, in a transparent and foreseeable way for the consumer.
8. Regulatory authorities shall provide incentives to distribution system operators to procure services for the operation and development of their networks and integrate innovative solutions in the distribution systems. For that purpose regulatory authorities shall recognise as eligible and

include all relevant costs in distribution tariffs and introduce performance targets in order to incentivise distribution system operators to raise efficiencies, including energy efficiency, in their networks.

9. By [OP: please add specific date – three months after entry into force] the Agency shall provide a recommendation addressed to regulatory authorities on the progressive convergence of transmission and distribution tariff methodologies. That recommendation shall address at least:

- (a) the ratio of tariffs applied to producers and to consumers;
- (b) the costs to be recovered by tariffs;
- (c) time differentiated network tariffs;
- (d) locational signals;
- (e) the relationship between transmission and distribution tariffs, including principles relating to non-discrimination;
- (f) methods to ensure transparency in the setting and structure of tariffs;
- (g) groups of network users subject to tariffs, including tariff exemptions.

10. Without prejudice to further harmonisation by way of delegated acts pursuant to Article 55 (1)(k), regulatory authorities shall take the Agency's recommendation duly into consideration when approving or fixing transmission tariffs or their methodologies in accordance with Article 59(6)(a) of [recast of Directive 2009/72/EC as proposed by COM(2016) 864/2].

11. The Agency shall monitor the implementation of its recommendation and provide a report to the Commission by 31st January each year. It shall update the recommendation at least once every two years.

Comments from BRIDGE working groups

Business Models:

The BRIDGE projects should assess the implication of points 7. and 8., particularly in relation to storage. Time and locally differentiated tariffs should pave the way for storage solutions (batteries or other). This might be an objective for the BM WG for the next years.

3.2.3 Chapter V: Transmission system operation

Article 45 in EC proposal: Ten-year network development plan

1. The Union wide network development plan referred to under Article 27 (1) (b) shall include the modelling of the integrated network, scenario development, and an assessment of the resilience of the system. The Union wide network development plan shall, in particular:

- (a) build on national investment plans, taking into account regional investment plans as referred to in Article 12(1), and, if appropriate, Union aspects of network planning as set out in Regulation (EU) No 347/2013 of the European Parliament and of the Council; it shall be subject to a cost-benefit analysis using the methodology established as set out in Article 11 of that Regulation;
- (b) regarding cross-border interconnections, also build on the reasonable needs of different system users and integrate long-term commitments from investors referred to in Articles 44 and 51 of [recast of Directive 2009/72/EC as proposed by COM(2016) 864/2]; and
- (c) identify investment gaps, notably with respect to cross-border capacities

In regard to point (c) a review of barriers to the increase of crossborder capacity of the network arising from different approval procedures or practices may be annexed to the Union wide network development plan.

2. The Agency shall provide an opinion on the national ten-year network development plans to assess their consistency with the Union wide network development plan. If the Agency identifies inconsistencies between a national ten-year network development plan and the Union wide network development plan, it shall recommend amending the national ten-year network development plan or the Union wide network development plan as appropriate. If such national ten-year network development plan is elaborated in accordance with Article 51 of [recast of Directive 2009/72/EC as proposed by COM(2016) 864/2], the Agency shall recommend that the competent national regulatory authority amend the national ten-year network development plan in accordance with Article 51(7) of that Directive and inform the Commission thereof.

Comments from BRIDGE projects

Regulations:

The interactions should be considered not only between TSOs but also between TSOs and DSOs.

3.2.4 Chapter VI: Distribution system operation

Article 49 in EC proposal: European entity for distribution system operators

Distribution system operators which are not part of a vertically integrated undertaking or which are unbundled according to the provisions of Article 35 [recast of Directive 2009/72/EC as proposed by COM(2016) 864/2], shall cooperate at Union level through a European Entity for Distribution system operators ("EU DSO entity"), in order to promote the completion and functioning of the internal market in electricity, and to promote optimal management and a coordinated operation of distribution and transmission systems. Distribution system operators who wish to participate in the EU DSO entity shall become registered members of the entity.

Comments from BRIDGE working groups

Data management:

The creation of an EU DSO entity representing the electricity distribution industry is welcome. Its exact structure, statutes and rules of procedures should fully involve all the DSOs concerned. The new entity should initially focus on proposing new technical rules on grid management, on enhancing EU-level cooperation between TSOs and DSO, as well as on clarifying roles with the emerging new market actors while ensuring a level playing field with stakeholders on system design, operation and governance. Later, regulatory issues could be addressed. A central task of the DSO entity should be to propose and decide on new network codes.¹³

Regulations:

The creation of such entity would be favourable for the ongoing discussions for current and future TSO-DSO coordination, as TSOs are already represented by ENTSO-E. For DSOs, establishing such entity to represent all DSOs might be more challenging given the fact that there are way more DSOs than TSOs (e.g. Germany: >800).

¹³ http://www.edsoforsmartgrids.eu/wp-content/uploads/14032017-EDSO-reaction-to-CEPackage_final_clean_version.pdf

Article 51 in EC proposal: Tasks of the EU DSO entity

1. The tasks of the EU DSO entity shall be the following:
 - (a) coordinated operation and planning of transmission and distribution networks;
 - (b) integration of renewable energy resources, distributed generation and other resources embedded in the distribution network such as energy storage;
 - (c) development of demand response;
 - (d) digitalisation of distribution networks including deployment of smart grids and intelligent metering systems;
 - (e) data management, cyber security and data protection;
 - (f) participation in the elaboration of network codes pursuant to Article 56.

2. In addition the EU DSO entity shall:

- (a) cooperate with ENTSO for electricity on the monitoring of implementation of the network codes and guidelines which are relevant to the operation and planning of distribution grids and the coordinated operation of the transmission and distribution networks and which are adopted pursuant to this Regulation;
- (b) cooperate with ENTSO for electricity and adopt best practices on the coordinated operation and planning of transmission and distribution systems including issues such as exchange of data between operators and coordination of distributed energy resources;
- (c) work on identifying best practices on the areas identified in paragraph 1 and for the introduction of energy efficiency improvements in the distribution network;
- (d) adopt an annual work programme and an annual report;
- (e) operate in full compliance with competition rules.

Comments from BRIDGE working groups

Data management:

Responsibilities and activities on data management are very generically defined yet.

Article 53 in EC proposal: Cooperation between distribution system operators and transmission system operators

1. Distribution system operators shall cooperate with transmission system operators in planning and operating their networks. In particular, transmission and distribution system operators shall exchange all necessary information and data regarding, the performance of generation assets and demand side response, the daily operation of their networks and the long-term planning of network investments, with the view to ensure the cost-efficient development and operation and the secure and reliable operation of their networks.
2. Transmission and distribution system operators shall cooperate in order to achieve coordinated access to resources such as distributed generation, energy storage or demand response that may support particular needs of both the distribution system and the transmission system.

Comments from BRIDGE working groups

Data management:

The article is quite generic. Preliminary requirements or conditions could be stated on data exchange (data integrity, security, privacy, auditability, standardization, etc.).

Regulations:

The entire SmartNet project is focussing on the TSO-DSO coordination. Deliverable D1.3, publicly available, summarizes the current findings of the conceptual analysis. SmartNet focusses rather on the operational timeframe; however the need for coordination on all timeframes was highlighted as well. From this respect, some preliminary findings can be found in D1.3 and D1.4 of the evolved DSO project. In the coming 1,5 years SmartNet will turn certain coordination schemes into simulation environment and test some of them in demonstration. A particular point of attention with respect to locality is the limitation for creating a real market environment in case one or several solutions for a need are very location-specific. In any case, from social welfare and society point of view, intense exchange of information between TSOs and DSOs is a minimum requirement to manage the entire power system on different levels (transmission and distribution) at lowest cost: one piece of flexibility in a certain location might serve several needs at the same time and have this way a higher value than a similar piece of flexibility in another location.

3.2.5 Chapter VII: Network codes and guidelines

Article 55 in EC proposal: Establishment of network codes

The Commission is empowered to adopt delegated acts in accordance with Article 63 concerning the establishment of network codes in the following areas

- (a) network security and reliability rules including rules for technical transmission reserve capacity for operational network security;
- (b) network connection rules;
- (c) third-party access rules;
- (d) data exchange and settlement rules;
- (e) interoperability rules;
- (f) operational procedures in an emergency;
- (g) capacity-allocation and congestion-management rules including curtailment of generation and redispatch of generation and demand ;
- (h) rules for trading related to technical and operational provision of network access services and system balancing;
- (i) transparency rules;
- (j) balancing rules including network-related reserve power rules;
- (k) rules regarding harmonised transmission and distribution tariff structures and connection charges including locational signals and inter-transmission system operator compensation rules; and
- (l) energy efficiency regarding electricity network;
- (g) capacity-allocation and congestion-management rules including curtailment of generation and redispatch of generation and demand;
- (k) rules regarding harmonised transmission and distribution tariff structures and connection charges including locational signals and inter-transmission system operator compensation rules;
- (l) energy efficiency regarding electricity networks;
- (m) rules for non-discriminatory, transparent provision of non-frequency ancillary services; including steady state voltage control, inertia, fast reactive current injection, black-start capability;
- (n) demand response, including aggregation, energy storage, and demand curtailment rules;
- (o) cyber security rules; and

(p) rules concerning regional operational centres.

2. The Commission shall, after consulting the Agency, the ENTSO for Electricity and the other relevant stakeholders, establish priority list every three years, identifying the areas set out in paragraph 1 Article 8(6) to be included in the development of network codes. If the subject-matter of the network code is directly related to the operation of the distribution system and less relevant for the transmission system, the Commission may require the EU DSO entity for electricity instead of the ENTSO for Electricity to convene a drafting committee and submit a proposal for a network code to the agency.

3. The Commission shall request the Agency to submit to it within a reasonable period of time not exceeding six months a non-binding framework guideline (framework guideline) setting out clear and objective principles, for the development of network codes relating to the areas identified in the priority list. The request of the Commission may include conditions which the framework guideline shall address. Each framework guideline shall contribute to market integration, non-discrimination, effective competition, and the efficient functioning of the market. Upon a reasoned request from the Agency, the Commission may extend that period.

4. The Agency shall formally consult the ENTSO for Electricity, the EU DSO entity, and the other relevant stakeholders in regard to the framework guideline, during a period of no less than two months, in an open and transparent manner.

5. The Agency shall submit a non-binding framework guideline to the Commission where requested to do so under paragraph 3. The Agency shall review the nonbinding framework guideline and re-submit it to the Commission where requested to do so under paragraph 6.

6. If the Commission considers that the framework guideline does not contribute to market integration, non-discrimination, effective competition and the efficient functioning of the market, it may request the Agency to review the framework guideline within a reasonable period of time and re-submit it to the Commission.

7. If the Agency fails to submit or re-submit a framework guideline within the period set by the Commission under paragraphs 3 or 6, the Commission shall elaborate the framework guideline in question.

8. The Commission shall request the ENTSO for Electricity or, where so decided in the priority list pursuant to paragraph 2, the EU DSO entity for Electricity, to submit a proposal for a network code which is in line with the relevant framework guideline, to the Agency within a reasonable period of time not exceeding 12 months.

9. The ENTSO for Electricity, or where so decided in the priority list pursuant to paragraph 2 the EU DSO entity, shall convene a drafting committee to support it in the network code development process. The drafting committee shall consist of representatives of the ENTSO for Electricity, the Agency, the EU DSO entity, where appropriate of nominated electricity market operators and a limited number of the main affected stakeholders. The ENTSO for Electricity or where so decided in the priority list pursuant to paragraph 2 the EU DSO entity, shall elaborate proposals for network codes in the areas referred to paragraph 1 upon a request addressed to it by the Commission in accordance with paragraph 8.

10. The Agency shall revise the network code and ensure that the network code is in line with the relevant framework guideline and contributes to market integration, non-discrimination, effective competition, and the efficient functioning of the market and, submit the revised network code to the Commission within six months of the day of the receipt of the proposal. In the proposal submitted to the Commission, the Agency shall take into account the views provided by all involved parties during the drafting of the proposal led by the ENTSO for Electricity or the EU DSO entity and shall formally consult the relevant stakeholders on the version to be submitted to the Commission.

11. Where the ENTSO for Electricity or the EU DSO entity have failed to develop a network code within the period of time set by the Commission under paragraph 8, the Commission may request the Agency to prepare a draft network code on the basis of the relevant framework guideline. The

Agency may launch a further consultation in the course of preparing a draft network code under this paragraph. The Agency shall submit a draft network code prepared under this paragraph to the Commission and may recommend that it be adopted.

12. The Commission may adopt, on its own initiative, where the ENTSO for Electricity or the EU DSO entity have failed to develop a network code, or the Agency has failed to develop a draft network code as referred to in paragraph 11 of this Article, or upon recommendation of the Agency under paragraph 10 of this Article, one or more network codes in the areas listed in paragraph 1.

13. Where the Commission proposes to adopt a network code on its own initiative, the Commission shall consult the Agency, the ENTSO for Electricity and all relevant stakeholders in regard to the draft network code during a period of no less than two months.

14. This Article shall be without prejudice to the Commission's right to adopt and amend the guidelines as laid down in Article 57. It shall be without prejudice to the possibility for the ENTSO for Electricity to develop non-binding guidance in the areas set out in paragraph 1 where this does not relate to areas covered by a request addressed to it by the Commission. This guidance shall be submitted to the Agency for an opinion. This opinion shall be taken duly into account by the ENTSO for Electricity.

Comments from BRIDGE working groups

Business Models:

This should include entitlement for the EC to propose specific rules to improve inclusion of different types of storage in the reserve and balancing markets, taking into consideration their specificities (some only available to balance both demand and curtailment of power such as batteries, others only for power curtailment such as power to X) . This would help the development of storage technologies and enterprises in a harmonized European market.

Article 57 in EC proposal: Guidelines

1. The Commission may adopt binding guidelines in the areas listed below.

2. The Commission may adopt a delegated act as a Guideline in the areas where such acts could also be developed under the network code procedure pursuant to Article 55 (1).

3. Guidelines may be adopted relating to the inter-transmission system operator compensation mechanism. They shall specify, in accordance with the principles set out in Articles 46 and 16:

(a) details of the procedure for determining which transmission system operators are liable to pay compensation for cross-border flows including as regards the split between the operators of national transmission systems from which cross-border flows originate and the systems where those flows end, in accordance with Article 46(2);

(b) details of the payment procedure to be followed, including the determination of the first period for which compensation is to be paid, in accordance with the second subparagraph of Article 46(3);

(c) details of methodologies for determining the cross-border flows hosted for which compensation is to be paid under Article 46, in terms of both quantity and type of flows, and the designation of the magnitudes of such flows as originating and/or ending in transmission systems of individual Member States, in accordance with Article 46(5);

(d) details of the methodology for determining the costs and benefits incurred as a result of hosting cross-border flows, in accordance with Article 46(6);

(e) details of the treatment in the context of the inter-transmission system operator compensation mechanism of electricity flows originating or ending in countries outside the European Economic Area; and

(f) the participation of national systems which are interconnected through direct current lines, in accordance with Article 46.

4. Guidelines may also determine appropriate rules relating to charges applied to producers, energy storage and consumers (load) under national distribution and transmission tariff systems and connection regimes, including the reflection of the inter-transmission system operator compensation mechanism in national network charges and the provision of appropriate and efficient locational signals, in accordance with the principles set out in Article 16.

The guidelines may make provision for appropriate and efficient harmonised locational signals at Union level.

Any such harmonisation shall not prevent Member States from applying mechanisms to ensure that network access charges borne by customers (load) are comparable throughout their territory.

5. Where appropriate, guidelines providing the minimum degree of harmonisation required to achieve the aim of this Regulation may also specify:

(a) details of rules for the trading of electricity;

(b) details of investment incentive rules for interconnector capacity including locational signals;

6. The Commission may adopt guidelines on the implementation of operational coordination between transmission system operators at Union level. Those guidelines shall be consistent with and build upon the network codes referred to in Article 55 of this Regulation and build upon the adopted specifications and the Agency opinion referred to in Article 27(1) of this Regulation. When adopting those guidelines, the Commission shall take into account differing regional and national operational requirements. Those guidelines shall be adopted in accordance with the examination procedure referred to in Article 62 (2).

7. When adopting or amending Guidelines, the Commission shall: consult the Agency, the ENTSO for Electricity and other stakeholders where relevant.

Comments from BRIDGE working groups

Business Models:

This Article is of major importance for the development of all kinds of storage solutions with the harmonization of the network access tariffs throughout Europe.

3.3 Energy Efficiency Directive

Article 4: Building renovation

Member States shall establish a long-term strategy for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private. This strategy shall encompass:

(a) an overview of the national building stock based, as appropriate, on statistical sampling;

(b) identification of cost-effective approaches to renovations relevant to the building type and climatic zone;

(c) policies and measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations;

(d) a forward-looking perspective to guide investment decisions of individuals, the construction industry and financial institutions;

(e) an evidence-based estimate of expected energy savings and wider benefits.

A first version of the strategy shall be published by 30 April 2014 and updated every three years thereafter and submitted to the Commission as part of the National Energy Efficiency Action Plans.

Comments from BRIDGE working groups

Business Models

According to the JRC assessment of the long-term renovation strategies of national building stocks, 74% of the strategies satisfactorily address Art4 EED main elements.

Article 7: Energy efficiency obligation schemes

1. Each Member State shall set up an energy efficiency obligation scheme. That scheme shall ensure that energy distributors and/or retail energy sales companies that are designated as obligated parties under paragraph 4 operating in each Member State's territory achieve a cumulative end-use energy savings target by 31 December 2020, without prejudice to paragraph 2.

That target shall be at least equivalent to achieving new savings each year from 1 January 2014 to 31 December 2020 of 1,5 % of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three- year period prior to 1 January 2013. The sales of energy, by volume, used in transport may be partially or fully excluded from this calculation.

Member States shall decide how the calculated quantity of new savings referred to in the second subparagraph is to be phased over the period.

2. Subject to paragraph 3, each Member State may:

(a) carry out the calculation required by the second subparagraph of paragraph 1 using values of 1 % in 2014 and 2015; 1,25 % in 2016 and 2017; and 1,5 % in 2018, 2019 and 2020;

(b) exclude from the calculation all or part of the sales, by volume, of energy used in industrial activities listed in Annex I to Directive 2003/87/EC;

(c) allow energy savings achieved in the energy transformation, distribution and transmission sectors, including efficient district heating and cooling infrastructure, as a result of the implementation of the requirements set out in Article 14(4), point (b) of Article 14(5) and Article 15(1) to (6) and (9) to be counted towards the amount of energy savings required under paragraph 1; and

(d) count energy savings resulting from individual actions newly implemented since 31 December 2008 that continue to have an impact in 2020 and that can be measured and verified, towards the amount of energy savings referred to in paragraph 1.

3. The application of paragraph 2 shall not lead to a reduction of more than 25 % of the amount of energy savings referred to in paragraph 1. Member States making use of paragraph 2 shall notify that fact to the Commission by 5 June 2014, including the elements listed under paragraph 2 to be applied and a calculation showing their impact on the amount of energy savings referred to in paragraph 1.

4. Without prejudice to the calculation of energy savings for the target in accordance with the second subparagraph of paragraph 1, each Member State shall, for the purposes of the first subparagraph of paragraph 1, designate, on the basis of objective and non-discriminatory criteria, obligated parties amongst energy distributors and/or retail energy sales companies operating in its territory and may include transport fuel distributors or transport fuel retailers operating in its territory. The amount of energy savings to fulfil the obligation shall be achieved by the obligated parties among final customers, designated, as appropriate, by the Member State, independently of the calculation made pursuant to paragraph 1, or, if Member States so decide, through certified savings stemming from other parties as described in point (b) of paragraph 7.

5. Member States shall express the amount of energy savings required of each obligated party in terms of either final or primary energy consumption. The method chosen for expressing the required

amount of energy savings shall also be used for calculating the savings claimed by obligated parties. The conversion factors set out in Annex IV shall apply.

6. Member States shall ensure that the savings stemming from paragraphs 1, 2 and 9 of this Article and Article 20(6) are calculated in accordance with points (1) and (2) of Annex V. They shall put in place measurement, control and verification systems under which at least a statistically significant proportion and representative sample of the energy efficiency improvement measures put in place by the obligated parties is verified. That measurement, control and verification shall be conducted independently of the obligated parties.

7. Within the energy efficiency obligation scheme, Member States may:

(a) include requirements with a social aim in the saving obligations they impose, including by requiring a share of energy efficiency measures to be implemented as a priority in households affected by energy poverty or in social housing;

(b) permit obligated parties to count towards their obligation certified energy savings achieved by energy service providers or other third parties, including when obligated parties promote measures through other State-approved bodies or through public authorities that may or may not involve formal partnerships and may be in combination with other sources of finance. Where Member States so permit, they shall ensure that an approval process is in place which is clear, transparent and open to all market actors, and which aims at minimising the costs of certification;

(c) allow obligated parties to count savings obtained in a given year as if they had instead been obtained in any of the four previous or three following years.

8. Once a year, Member States shall publish the energy savings achieved by each obligated party, or each sub-category of obligated party, and in total under the scheme.

Member States shall ensure that obligated parties provide on request:

(a) aggregated statistical information on their final customers (identifying significant changes to previously submitted information); and

(b) current information on final customers' consumption, including, where applicable, load profiles, customer segmentation and geographical location of customers, while preserving the integrity and confidentiality of private or commercially sensitive information in compliance with applicable Union law.

Such a request shall be made not more than once a year.

9. As an alternative to setting up an energy efficiency obligation scheme under paragraph 1, Member States may opt to take other policy measures to achieve energy savings among final customers, provided those policy measures meet the criteria set out in paragraphs 10 and 11. The annual amount of new energy savings achieved through this approach shall be equivalent to the amount of new energy savings required by paragraphs 1, 2 and 3. Provided that equivalence is maintained, Member States may combine obligation schemes with alternative policy measures, including national energy efficiency programmes.

The policy measures referred to in the first subparagraph may include, but are not restricted to, the following policy measures or combinations thereof:

(a) energy or CO₂ taxes that have the effect of reducing end-use energy consumption;

(b) financing schemes and instruments or fiscal incentives that lead to the application of energy-efficient technology or techniques and have the effect of reducing end-use energy consumption;

(c) regulations or voluntary agreements that lead to the application of energy-efficient technology or techniques and have the effect of reducing end-use energy consumption;

(d) standards and norms that aim at improving the energy efficiency of products and services, including buildings and vehicles, except where these are mandatory and applicable in Member States under Union law;

(e) energy labelling schemes, with the exception of those that are mandatory and applicable in the Member States under Union law;

(f) training and education, including energy advisory programmes, that lead to the application of energy-efficient technology or techniques and have the effect of reducing end-use energy consumption.

Member States shall notify to the Commission, by 5 December 2013, the policy measures that they plan to adopt for the purposes of the first subparagraph and Article 20(6), following the framework provided in point 4 of Annex V, and showing how they would achieve the required amount of savings. In the case of the policy measures referred to in the second subparagraph and in Article 20(6), this notification shall demonstrate how the criteria in paragraph 10 are met. In the case of policy measures other than those referred to in the second subparagraph or in Article 20(6), Member States shall explain how an equivalent level of savings, monitoring and verification is achieved. The Commission may make suggestions for modifications in the three months following notification.

10. Without prejudice to paragraph 11, the criteria for the policy measures taken pursuant to the second subparagraph of paragraph 9 and Article 20(6) shall be as follows:

- (a) the policy measures provide for at least two intermediate periods by 31 December 2020 and lead to the achievement of the level of ambition set out in paragraph 1;
- (b) the responsibility of each entrusted party, participating party or implementing public authority, whichever is relevant, is defined;
- (c) the energy savings that are to be achieved are determined in a transparent manner;
- (d) the amount of energy savings required or to be achieved by the policy measure are expressed in either final or primary energy consumption, using the conversion factors set out in Annex IV;
- (e) energy savings are calculated using the methods and principles provided in points (1) and (2) of Annex V;
- (f) energy savings are calculated using the methods and principles provided in point 3 of Annex V;
- (g) an annual report of the energy savings achieved is provided by participating parties unless not feasible and made publicly available;
- (h) monitoring of the results is ensured and appropriate measures are envisaged if the progress is not satisfactory;
- (i) a control system is put in place that also includes independent verification of a statistically significant proportion of the energy efficiency improvement measures; and
- (j) data on the annual trend of energy savings are published annually.

11. Member States shall ensure that the taxes referred to in point (a) of the second subparagraph of paragraph 9 comply with the criteria listed in points (a), (b), (c), (d), (f), (h) and (j) of paragraph 10.

Member States shall ensure that the regulations and voluntary agreements referred to in point (c) of the second subparagraph of paragraph 9 comply with the criteria listed in points (a), (b), (c), (d), (e), (g), (h), (i) and (j) of paragraph 10.

Member States shall ensure that the other policy measures referred to in the second subparagraph of paragraph 9 and the Energy Efficiency National Funds referred to in Article 20(6) comply with the criteria listed in points (a), (b), (c), (d), (e), (h), (i) and (j) of paragraph 10.

12. Member States shall ensure that when the impact of policy measures or individual actions overlaps, no double counting of energy savings is made.

Comments from BRIDGE working groups

Business Models:

Demonstrations allowing technical, environmental and economic analysis are key to DSOs, retailers and, generally, to all market participants in order to clarify current and new value propositions within the smart grid context and demonstrate which business models that can potentiate further energy

savings. Policy driven incentives should not pick the technologies that are expected to be the winners, but rather rely on the competitiveness market forces.

Article 9a in EC proposal: Metering, sub-metering and cost allocation for heating and cooling and domestic hot water

1. Member States shall ensure that final customers for district heating, district cooling and domestic hot water are provided with competitively priced meters that accurately reflect the final customer's actual energy consumption.

Where heating and cooling or hot water are supplied to a building from a central source servicing multiple buildings or from district heating and cooling network, a heat or hot water meter shall always be installed at the heat exchanger or point of delivery.

2. In multi-apartment and multi-purpose buildings with a central heating or cooling source or supplied from district heating and cooling systems, individual meters shall be installed to measure the consumption of heat or cooling or hot water for each building unit.

Where the use of individual meters is not technically feasible or where it is not cost-efficient to measure heating or cooling in each building unit, individual heat cost allocators shall be used to measure heat consumption at each radiator unless it is shown by the Member State in question that the installation of such heat cost allocators would not be cost efficient. In those cases, alternative cost-efficient methods of heat consumption measurement may be considered. The conditions of technical non-feasibility and non-cost effectiveness shall be clearly set out and published by each Member State.

In new buildings of the kind referred to in the first sub-paragraph or when such a building undergoes major renovation, as set out in Directive 2010/31/EU, individual meters shall always be provided.

3. Where multi-apartment and multi-purpose buildings are supplied from district heating or cooling, or where own common heating or cooling systems for such buildings are prevalent, Member States shall introduce transparent rules on the allocation of the cost of heating, cooling and hot water consumption in such buildings to ensure transparency and accuracy of accounting for individual consumption including:

- (a) hot water for domestic needs;
- (b) heat radiated from the building installation and for the purpose of heating the common areas (where staircases and corridors are equipped with radiators);
- (c) for the purpose of heating or cooling apartments.

4. For the purposes of this Article, as of 1 January 2020 meters and cost allocators installed shall be remotely readable devices.

Meters and cost allocators that have already been installed but which are not remotely readable shall be provided with this capability or be replaced with remotely readable devices by 1 January 2027, except where the Member State in question shows that this is not cost-efficient.';

Comments from BRIDGE working groups

Customer Engagement:

It may need noting that there are instances of district heating being 'topped up' by supplementary heating, something that needs to be borne in mind when evaluating effectiveness and efficiency.

Article 10a in EC proposal: Billing and consumption information for heating and cooling and domestic hot water

1. Member States shall ensure that billing and consumption information is accurate and based on actual consumption, in accordance with points 1 and 2 of Annex VIIa for all final users where meters or cost allocators are installed.

This obligation may, except in the case of sub-metered consumption under Article 9a(2), be fulfilled by a system of regular self-reading by the final customer whereby they communicate readings from their meter to the energy supplier. Only in cases where the final customer has not provided a meter reading for a given billing interval shall billing be based on estimated consumption or a flat rate.

2. Member States:

(a) shall require that, if information on the energy billing and historical consumption of final users is available, it be made available, to an energy service provider designated by the final user;

(b) shall ensure that final customers are offered the option of electronic billing information and bills and that they receive, on request, a clear and understandable explanation of how their bill was drawn up, especially where bills are not based on actual consumption;

(c) shall ensure that appropriate information is provided with the bill based on actual consumption to all final users in accordance with point 3 of Annex VII;

(d) may provide that, at the request of the final customer, the provision of billing information shall not be considered to constitute a request for payment. In such cases, Member States shall ensure flexible arrangements for actual payment are offered.

Comments from BRIDGE working groups

Customer Engagement:

Where customers are providing demand response through their own load-curtailement, shifting, storage or generation, the contribution they make should be acknowledged explicitly in billing, to support/ encourage their participation in system operation.

Article 11a in EC proposal: Cost of access to metering and billing information for heating and cooling

1. Member States shall ensure that final customers receive all their bills and billing information for energy consumption free of charge and that final customers also have access to their consumption data in an appropriate way and free of charge.

2. Notwithstanding paragraph 1, the distribution of costs of billing information for the individual consumption of heating, cooling and hot water in multi-apartment buildings pursuant to Article 9a(2) shall be carried out on a non-profit basis. Costs resulting from the assignment of this task to a third party, such as a service provider or the local energy supplier, covering the measuring, allocation and accounting for actual individual consumption in such buildings, may be passed onto the final users to the extent that such costs are reasonable.

Comments from BRIDGE working groups

Business Models:

This proposal is of major importance and should apply to every form of energy we use. However, it should also take into account the metering of heat which is produced/stored locally, especially by some kind of renewable energy (solar, biomass) and sold through district heating or cooling.

3.4 Energy Performance of Buildings Directive

Article 2a in EC proposal: Long-term renovation strategy

2. In their long-term renovation strategy referred to in paragraph 1, Member States shall set out a roadmap with clear milestones and measures to deliver on the long-term 2050 goal to decarbonise their national building stock, with specific milestones for 2030.

In addition, the long term renovation strategy shall contribute to the alleviation of energy poverty.

3. To guide investment decisions as referred to in point (d) in paragraph 1, Member States shall introduce mechanisms for:

(a) the aggregation of projects, to make it easier for investors to fund the renovations referred to in points (b) and (c) in paragraph 1;

(b) de-risking energy efficiency operations for investors and the private sector; and

(c) the use of public funding to leverage additional private-sector investment or address specific market failures.

Comments from BRIDGE working groups

Business Models:

The idea of aggregation of projects is interesting as it may as well aggregate and open a market to new innovative renovation technologies, including the integration of REN (solar PV or thermal) and potential storage capacity.

Regulations:

Smart electric-thermal storage (SETS) units cater to the demand for heat in private households. Any measure that influences the energy performance of buildings has an impact on the business case for SETS. With increasingly energy efficient homes, the demand for heat is likely to decrease. DIW is currently preparing a first analysis on how the market potential of SETS depends on the thermal quality of the housing stock.

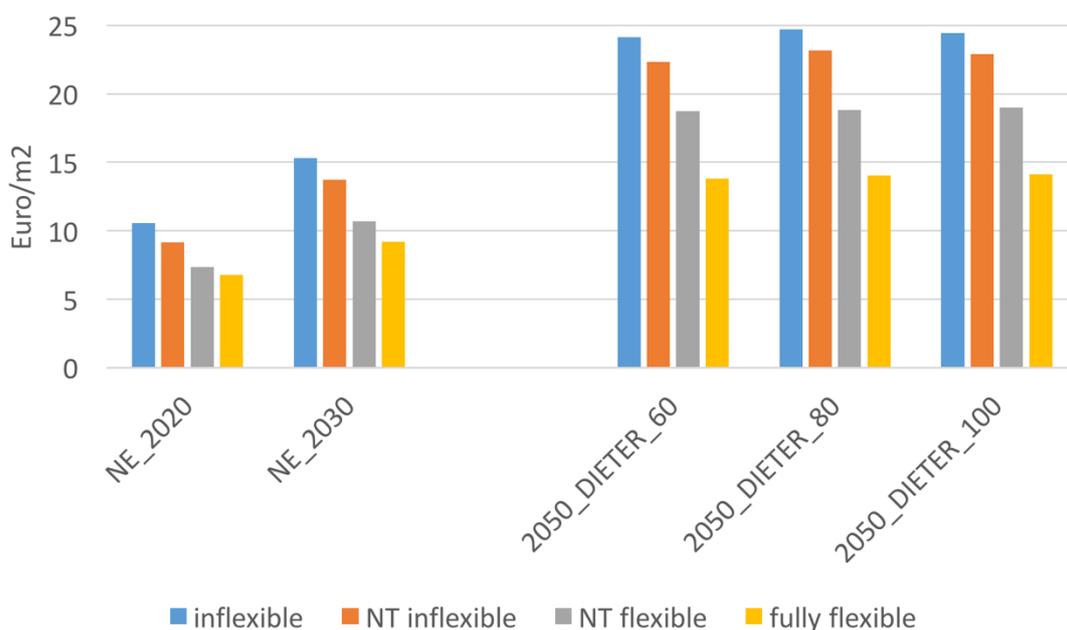


Figure 9: Present and future heating costs in inefficient housing

Preliminary results indicate that smart-electric thermal storage heaters have the largest potential in inefficient housing. The first scenario is for 2020. The blue bar indicates the cost of electricity using electric resistance heaters (Figure above). Taxes and fees are not included. The orange bar indicates the costs when charging at night time using conventional storage heaters. The grey bar indicates the costs when charging at night time using SETS that charge when prices are lowest. Finally, the yellow bar indicates the costs when charging is possible at any time so that SETS can capitalize on cheap electricity irrespective of the time it occurs.

While renewables currently lower the electricity price, the models assume that electricity prices increase in the future because parts of the present stock of conventional power will be decommissioned. With rising electricity prices and increasing shares of renewable energy (see DIETER scenarios with 60%, 80%, and 100% renewables) the value of flexibility increases. The value of flexibility is the difference in the height of the bars. The difference between the orange and the yellow bar reflects the potential of smart-electric storage heaters.

In inefficient housing, the flexibility provided by SETS is considerably larger compared to efficient housing. Because of the high efficiency, the cost of heating is only a fraction compared to the inefficient housing. The value of flexibility diminishes, too and becomes too small for commercial purposes.

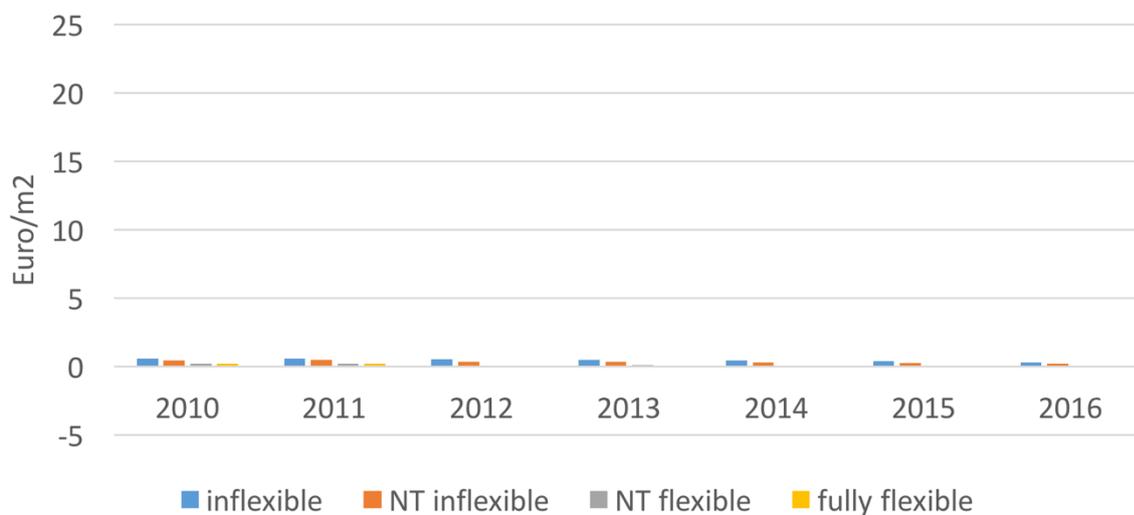


Figure 10: Yearly heating costs -passive house

Any improvement in the efficiency of buildings contributes to the climate and energy goals of the EU, by reducing energy consumption. However, it probably has a detrimental effect on the business case of SETS. Of course, the quality of the building stock is characterized by a high degree of inertia so that an overall efficient housing stock will not exist for the foreseeable future.

Article 10 in EC proposal:

6. Member States shall link their financial measures for energy efficiency improvements in the renovation of buildings to the energy savings achieved due to such renovation. These savings shall be determined by comparing energy performance certificates issued before and after renovation.
(a) When Member States put in place a database for registering EPCs it shall allow tracking the actual energy consumption of the buildings covered, regardless of their size and category. The

database shall contain the actual energy consumption data of buildings frequently visited by the public with useful floor area of over 250 m² which shall be regularly updated.

(b) Aggregated anonymised data compliant with EU data protection requirements shall be made available on request, at least for the public authorities for statistical and research purposes.

Comments from BRIDGE working groups

Customer Engagement:

The term "regularly updated" in section 6.a should be quantified, e.g. "updated at least once a year".

Article 14 in EC proposal:

1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of systems used for heating buildings, such as the heat generator, control system and circulation pump(s) for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a centralised technical building system of a cumulated effective rated output of over 100 kW. That inspection shall include an assessment of the boiler efficiency and the boiler sizing compared with the heating requirements of the building. The assessment of the boiler sizing does not have to be repeated as long as no changes were made to the heating system or as regards the heating requirements of the building in the meantime.

2. As an alternative to paragraph 1 Member States may set requirements to ensure that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems. These systems shall be capable of:

(a) continuously monitoring, analysing and adjusting energy usage;

(b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;

(c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.

3. As an alternative to paragraph 1 Member States may set requirements to ensure that residential buildings with centralised technical building systems of a cumulated effective rated output of over 100 kW are equipped:

(a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when system servicing is necessary, and

(b) with effective control functionalities to ensure optimum generation, distribution and use of energy.

Comments from BRIDGE working groups

Customer Engagement:

Point 2 is based on the very questionable assumption that BACS will lead to better energy (and social?) outcomes than manual control. It would only be justified in the light of overwhelming empirical evidence that this is the case.

Article 15 in EC proposal:

1. Member States shall lay down the necessary measures to establish a regular inspection of the accessible parts of air-conditioning systems for non-residential buildings with total primary energy use of over 250MWh and for residential buildings with a centralised technical building system of a

cumulated effective rated output of over 100 kW. The inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. The assessment of the sizing does not have to be repeated as long as no changes were made to this air-conditioning system or as regards the cooling requirements of the building in the meantime.

2. As an alternative to paragraph 1 Member States may set requirements to ensure that non-residential buildings with total primary energy use of over 250 MWh per year are equipped with building automation and control systems. These systems shall be capable of:

- (a) continuously monitoring, analysing and adjusting energy usage;
- (b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;
- (c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers.

3. As an alternative to paragraph 1 Member States may set requirements to ensure that residential buildings with centralised technical building systems of a cumulated effective rated output of over 100 kW

- (a) with continuous electronic monitoring that measures systems' efficiency and inform building owners or managers when it has fallen significantly and when system servicing is necessary, and
- (b) with effective control functionalities to ensure optimum generation, distribution and use of energy.

Comments from BRIDGE working groups

Customer Engagement:

Again, the assumption that BACS are the primary answer for buildings with total primary energy use of >250MWh/year, when the priority surely needs to be an assessment of options such as passive cooling/lighting/heating/shading; altering working practices and dress codes.

3.5 Renewable Energy Directive

Article 2 in EC proposal: Definitions

For the purposes of this Directive, the definitions in Directive 2009/72/EC of the European Parliament and of the Council¹⁴ apply.

The following definitions also apply:

- (a) 'energy from renewable sources' means energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and, geothermal energy, ambient heat, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases;
- (b) 'ambient heat' means heat energy at a useful temperature level which is extracted or captured by means of heat pumps that need electricity or other auxiliary energy to function, and which can be stored in the ambient air, beneath the surface of solid earth or in surface water. The reported values shall be established on the basis of the same methodology used for the reporting of heat energy extracted or captured by heat pumps;

¹⁴ Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14.8.2009, p. 55).

(c) 'biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture including vegetal and animal substances, forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin;

(d) 'gross final consumption of energy' means the energy commodities delivered for energy purposes to industry, transport, households, services including public services, agriculture, forestry and fisheries, including the consumption of electricity and heat by the energy branch for electricity and heat production and including losses of electricity and heat in distribution and transmission;

(e) 'district heating' or 'district cooling' means the distribution of thermal energy in the form of steam, hot water or chilled liquids, from a central source of production through a network to multiple buildings or sites, for the use of space or process heating or cooling;

(f) 'bioliquids' means liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass;

(g) 'biofuels' means liquid fuel for transport produced from biomass;

(h) 'guarantee of origin' means an electronic document which has the sole function of providing proof to a final customer that a given share or quantity of energy was produced from renewable sources;

(i) 'support scheme' means any instrument, scheme or mechanism applied by a Member State or a group of Member States, that promotes the use of energy from renewable sources by reducing the cost of that energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased. This includes, but is not restricted to, investment aid, tax exemptions or reductions, tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and premium payments;

(j) 'renewable energy obligation' means a support scheme requiring energy producers to include a given proportion of energy from renewable sources in their production, requiring energy suppliers to include a given proportion of energy from renewable sources in their supply, or requiring energy consumers to include a given proportion of energy from renewable sources in their consumption. This includes schemes under which such requirements may be fulfilled by using green certificates;

(k) 'actual value' means the greenhouse gas emission saving for some or all of the steps of a specific biofuel production process calculated in accordance with the methodology laid down in part C of Annex V;

(l) 'typical value' means an estimate of the greenhouse gas emissions and emission saving for a particular biofuel, bioliquid or biomass fuel production pathway, which is representative of the Union consumption;

(m) 'default value' means a value derived from a typical value by the application of pre-determined factors and that may, in circumstances specified in this Directive, be used in place of an actual value;

(n) 'waste' shall be defined as in Article 3(1) of Directive 2008/98/EC; substances that have been intentionally modified or contaminated to meet that definition are not covered by this definition;

(o) 'starch-rich crops' means crops comprising mainly cereals (regardless of whether only the grains are used, or the whole plant, such as in the case of green maize, is used), tubers and root crops (such as potatoes, Jerusalem artichokes, sweet potatoes, cassava and yams), and corm crops (such as taro and cocoyam);

(p) 'ligno-cellulosic material' means material composed of lignin, cellulose and hemicellulose such as biomass sourced from forests, woody energy crops and forest-based industries' residues and wastes;

(q) 'non-food cellulosic material' means feedstocks mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material; it includes food and feed crop residues (such as straw, stover, husks and shells), grassy energy crops with a low starch

content (such as ryegrass, switchgrass, miscanthus, giant cane and cover crops before and after main crops), industrial residues (including from food and feed crops after vegetal oils, sugars, starches and protein have been extracted), and material from biowaste;

(r) 'residue' means a substance that is not the end product(s) that a production process directly seeks to produce; it is not a primary aim of the production process and the process has not been deliberately modified to produce it;

(s) 'renewable liquid and gaseous transport fuels of non-biological origin' means liquid or gaseous fuels other than biofuels whose energy content comes from renewable energy sources other than biomass, and which are used in transport;

(t) 'agricultural, aquaculture, fisheries and forestry residues' means residues that are directly generated by agriculture, aquaculture, fisheries and forestry; they do not include residues from related industries or processing;

(u) 'low indirect land-use change-risk biofuels and bioliquids' means biofuels and bioliquids, the feedstocks of which were produced within schemes which reduce the displacement of production for purposes other than for making biofuels and bioliquids and which were produced in accordance with the sustainability criteria for biofuels and bioliquids set out in Article 26;

(x) 'distribution system operator' means an operator as defined in Article 2(6) of Directive 2009/72/EC;

(y) 'waste heat or cold' means heat or cold which is generated as by-product in industrial or power generation installations and which would be dissipated unused in air or water without access to a district heating or cooling system;

(z) 'repowering' means renewing power plants producing renewable energy, including the full or partial replacement of installations or operation systems and equipment, in order to replace capacity or increase efficiency;

(aa) 'renewable self-consumer' means an active customer as defined in Directive [MDI Directive] who consumes and may store and sell renewable electricity which is generated within his or its premises, including a multi-apartment block, a commercial or shared services site or a closed distribution system, provided that, for non-household renewable self-consumers, those activities do not constitute their primary commercial or professional activity;

(bb) 'renewable self-consumption' means the generation and consumption, and, where applicable, storage, of renewable electricity by renewable self-consumers;

(cc) 'power purchase agreement' means a contract under which a legal person agrees to purchase renewable electricity directly from an energy generator;

(dd) 'food and feed crops' means starch-rich crops, sugars and oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material;

(ee) 'advanced biofuels' means biofuels that are produced from feedstocks listed in part A of Annex IX;

(ff) 'waste-based fossil fuels' means liquid and gaseous fuels produced from waste streams of non-renewable origin, including waste processing gases and exhaust gases;

(gg) 'fuel supplier' means the entity supplying fuel to the market responsible for passing fuel or energy through an excise duty point or, where no excise is due, any other relevant entity designated by a Member State;

(hh) 'agricultural biomass' means biomass produced from agriculture;

(ii) 'forest biomass' means biomass produced from forestry;

(jj) 'harvesting permit' means an official document giving the right to harvest the forest biomass;

- (kk) 'SME' means a micro, small or medium sized enterprise as defined in Commission Recommendation 2003/361/EC¹⁵;
- (ll) 'forest regeneration' means the re-establishment of a forest stand by natural or artificial means following the removal of the previous stand by felling or as a result of natural causes, including fire or storm;
- (mm) 'forest holding' means one or more parcels of forest and other wooded land which constitute a single unit from the point of view of management or utilisation;
- (nn) 'biowaste' means biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from the food processing industry;
- (oo) 'residual energy mix' means the total annual energy mix for a Member State, excluding the share covered by the cancelled guarantees of origin;
- (pp) 'biomass fuels' means gaseous and solid fuels produced from biomass;
- (qq) 'biogas' means gaseous fuels produced from biomass;
- (rr) 'opened tender' means a tender procedure for the installation of renewable energy plants organised by a Member State and opened for bids from projects located in one or several other Member States;
- (ss) 'joint tender' means a tender procedure for the installation of renewable energy plants jointly designed and organised by two or more Member States, that is open to projects located in all Member States involved;
- (tt) 'opened certificate scheme' means a certificate scheme implemented by a Member State, that is open to installations located in one or several other Member States;
- (uu) 'financial instruments' means financial instruments as defined in Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council¹⁶.

Comments from BRIDGE working groups

Business Models:

The definition of “renewable self-consumer” should clarify whether an entity can own assets at different locations and, for example, be billed using virtual net metering.

Article 4 in EC proposal: Financial support for electricity from renewable sources

1. Subject to State aid rules, in order to reach the Union target set in Article 3(1), Member States may apply support schemes. Support schemes for electricity from renewable sources shall be designed so as to avoid unnecessary distortions of electricity markets and ensure that producers take into account the supply and demand of electricity as well as possible grid constraints.
2. Support for electricity from renewable sources shall be designed so as to integrate electricity from renewable sources in the electricity market and ensure that renewable energy producers are responding to market price signals and maximise their market revenues.
3. Member States shall ensure that support for renewable electricity is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner.

¹⁵ Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium sized enterprises (OJ L 124, 20.5.2003, p. 36).

¹⁶ Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298, 26.10.2012, p. 1).

4. Member States shall assess the effectiveness of their support for electricity from renewable sources at least every four years. Decisions on the continuation or prolongation of support and design of new support shall be based on the results of the assessments.

Comments from BRIDGE working groups

Business Models:

As regards specific aid rules and integration of renewables in the electricity market, the Commission should ensure that the electricity market is designed so as to allow the different renewable energy sources to cover their Capex costs even though their marginal costs are close to zero.

As indicated by RealValue previously under the framework of the Regulations WG (Article 2a in the Energy Performance of Buildings Directive), DIW Berlin (partner of RealValue's consortium) analyses the impact of renewables on the electricity price. The analysis comprises an assessment of the cost effectiveness.

Article 5 in EC proposal: Opening of support schemes for renewable electricity

1. Member States shall open support for electricity generated from renewable sources to generators located in other Member States under the conditions laid down in this Article.
2. Member States shall ensure that support for at least 10% of the newly-supported capacity in each year between 2021 and 2025 and at least 15% of the newly-supported capacity in each year between 2026 and 2030 is open to installations located in other Member States.
3. Support schemes may be opened to cross-border participation through, inter alia, opened tenders, joint tenders, opened certificate schemes or joint support schemes. The allocation of renewable electricity benefiting from support under opened tenders, joint tenders or opened certificate schemes towards Member States respective contributions shall be subject to a cooperation agreement setting out rules for the cross-border disbursement of funding, following the principle that energy should be counted towards the Member State funding the installation.
4. The Commission shall assess by 2025 the benefits on the cost-effective deployment of renewable electricity in the Union of provisions set out in this Article. On the basis of this assessment, the Commission may propose to increase the percentages set out in paragraph 2.

Comments from BRIDGE working groups

Business Models:

This Article implies that support for renewable electricity sources must be harmonized in Europe. See also the comment on Article 4 (Renewable Energy Directive) regarding cost-effectiveness provided by the RealValue project in the Business Models WG.

Article 19 in EC proposal: Guarantees of origin of electricity, heating and cooling produced from renewable energy sources

1. For the purposes of proving to final customers the share or quantity of energy from renewable sources in an energy supplier's energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources Member States shall ensure that the origin of energy produced from renewable energy sources can be guaranteed as such within the meaning of this Directive, in accordance with objective, transparent and non-discriminatory criteria.

2. To that end, Member States shall ensure that a guarantee of origin is issued in response to a request from a producer of energy from renewable sources. Member States may arrange for guarantees of origin to be issued for non-renewable energy sources. Issuance of guarantees of origin may be made subject to a minimum capacity limit. A guarantee of origin shall be of the standard size of 1 MWh. No more than one guarantee of origin shall be issued in respect of each unit of energy produced. Member States shall ensure that the same unit of energy from renewable sources is taken into account only once.

Member States shall ensure that no guarantees of origin are issued to a producer that receives financial support from a support scheme for the same production of energy from renewable sources. Member States shall issue such guarantees of origin and transfer them to the market by auctioning them. The revenues raised as a result of the auctioning shall be used to offset the costs of renewables support.

The guarantee of origin shall have no function in terms of a Member State's compliance with Article 3. Transfers of guarantees of origin, separately or together with the physical transfer of energy, shall have no effect on the decision of Member States to use statistical transfers, joint projects or joint support schemes for target compliance or on the calculation of the gross final consumption of energy from renewable sources in accordance with Article 7.

3. For the purposes of paragraph 1, guarantees of origin shall be valid with respect to the calendar year in which the energy unit is produced. Six months after the end of each calendar year, Member States shall ensure that all guarantees of origin from the previous calendar year that have not been cancelled shall expire. Expired guarantees of origin shall be included by Member States in the calculation of the residual energy mix.

4. For the purposes of disclosure referred to in paragraphs 8 and 13, Member States shall ensure that guarantees of origin are cancelled by energy companies by 30 June of the year following the calendar year in relation to which the guarantees of origin are issued.

5. Member States or designated competent bodies shall supervise the issuance, transfer and cancellation of guarantees of origin. The designated competent bodies shall have non-overlapping geographical responsibilities, and be independent of production, trade and supply activities.

6. Member States or the designated competent bodies shall put in place appropriate mechanisms to ensure that guarantees of origin shall be issued, transferred and cancelled electronically and are accurate, reliable and fraud-resistant. Member States and designated competent bodies shall ensure that the requirements they impose are compliant with the standard CEN - EN 16325.

7. A guarantee of origin shall specify at least:

(a) the energy source from which the energy was produced and the start and end dates of production;

(b) whether it relates to:

(i) electricity; or

(ii) gas, or

(iii) heating or cooling;

(c) the identity, location, type and capacity of the installation where the energy was produced;

(d) whether the installation has benefited from investment support, and whether the unit of energy has benefited in any other way from a national support scheme, and the type of support scheme;

(e) the date on which the installation became operational; and

(f) the date and country of issue and a unique identification number.

Simplified information may be specified on guarantees of origin from small scale installations.

8. Where an electricity supplier is required to prove the share or quantity of energy from renewable sources in its energy mix for the purposes of Article 3 of Directive 2009/72/EC, it shall do so by using guarantees of origin. Likewise, guarantees of origin created pursuant to Article 14(10) of Directive 2012/27/EC shall be used to substantiate any requirement to prove the quantity of

electricity produced from high-efficiency cogeneration. Member States shall ensure that transmission losses are fully taken into account when guarantees of origin are used to demonstrate consumption of renewable energy or electricity from high efficiency cogeneration.

9. Member States shall recognise guarantees of origin issued by other Member States in accordance with this Directive exclusively as proof of the elements referred to in paragraph 1 and paragraph 7 (a) to (f). A Member State may refuse to recognise a guarantee of origin only when it has well-founded doubts about its accuracy, reliability or veracity. The Member State shall notify the Commission of such a refusal and its justification.

10. If the Commission finds that a refusal to recognise a guarantee of origin is unfounded, the Commission may adopt a decision requiring the Member State in question to recognise it.

11. Member States shall not recognise guarantees of origins issued by a third country except where the Commission has signed an agreement with that third country on mutual recognition of guarantees of origin issued in the Union and compatible guarantees of origin systems established in that country, where there is direct import or export of energy. The Commission is empowered to adopt delegated acts in accordance with Article 32 to enforce these agreements.

12. A Member State may introduce, in conformity with Union law, objective, transparent and non-discriminatory criteria for the use of guarantees of origin in complying with the obligations laid down in Article 3 of Directive 2009/72/EC.

13. Where energy suppliers market energy from renewable sources or high-efficiency cogeneration customers with a reference to environmental or other benefits of energy from renewable sources or from high-efficiency cogeneration, Member States shall require those energy supplier to use guarantees of origin to disclose the amount or share of energy from renewable sources or from high efficiency cogeneration.

14. The Commission is empowered to adopt delegated acts in accordance with Article 32 establishing the rules to monitor the functioning of the system set out in this Article.

Comments from BRIDGE working groups

Regulations:

The design of a new market for local and renewable energy certificates which could be not allowed according to article 19.2. Local meaning your neighbourhood, town or city. Assuming that there is only one certification mechanism, the minimum size of 1 MWh could kill the market access for distributed energy generators. We propose that the minimum size of certificates within the same local zone (neighbourhood, town or city) could be smaller (e.g. 10 kWh) to enable small producers getting benefits from certificates trading.

Maybe the local specification is not the scope of this article and our comment do not apply to this one, even though the generator location is included in the certificate according to 19.7.c, but a similar certification mechanism could be considered for distributed energy generators in further regulations to have a unique understanding about local certificates. This certificate could be traded between neighbours for supporting the local producers.

The partners in the STORE&GO project welcome the inclusion of renewable gases, in addition to electricity, heating and cooling, in Article 19 of the Recast Renewable Energy Directive (hereafter 'Recast RED') on guarantees of origin. The project partners also welcome the explicit mentioning of the possibility to establish a guarantees of origin scheme for hydrogen as a renewable gas in recital 47. For conversion and storage technologies such as Power-to-Gas, it is important that besides the physical conversion of energy from one energy carrier to another, the renewable origin of the energy flow can still be identified at the point of end-use. Guarantees of origin thereby play a crucial role in

the functioning of markets for carbon free and carbon neutral gases such as green hydrogen and substitute natural gas.

A concern for long-term storage technologies is however the period of validity of issued guarantees of origin as stated in paragraph 3. The shortening of the validity (remaining calendar months after issuing + 6 months) of the guarantees of origin could form a barrier for long-term storage of energy from renewable energy sources.¹⁷ This is especially the case where it concerns the storage of energy which is produced or verified near the end of the calendar year. The consequence may be that the 'shelf life' of the guarantee of origin limits the duration of the storage cycle.

Article 20 in EC proposal: Access to and operation of the grids

1. Where relevant, Member States shall assess the need to extend existing gas network infrastructure to facilitate the integration of gas from renewable energy sources.
2. Where relevant, Member States shall require transmission system operators and distribution system operators in their territory to publish technical rules in line with Article 6 of Directive 2003/55/EC of the European Parliament and of the Council, in particular regarding network connection rules that include gas quality, gas odoration and gas pressure requirements. Member States shall also require transmission and distribution system operators to publish the connection tariffs to connect renewable gas sources based on transparent and non-discriminatory criteria.
3. Subject to their assessment, included in the integrated national energy and climate plans in accordance with Annex I of Regulation [Governance], on the necessity to build new infrastructure for district heating and cooling produced from renewable energy sources in order to achieve the Union target referred to in Article 3(1) of this Directive, Member States shall, where relevant, take steps with a view to developing a district heating infrastructure to accommodate the development of heating and cooling production from large biomass, solar and geothermal facilities.

Comments from BRIDGE working groups

Regulations:

Besides offering balancing and storage functions within the electricity sector, the gases produced through Power-to-Gas from electricity from renewable energy sources and recycled carbon dioxide contribute to the decarbonisation of the gas sector and connected end-uses. The partners within the STORE&GO project are therefore appreciative of the fact that the provisions related to the integration of renewable gases are maintained in Article 20 of the Recast RED. For the injection of renewable gases, a physical connection is however not sufficient. Regulations prescribing the standards on gas quality need to contain sufficient lenient bandwidths for the injection of new gases, while ensuring the safe functioning of the grid and correct functioning of end-user appliances.

Gas quality standards can constitute barriers for the injection of new gases such as hydrogen and substitute natural gas. Although the initial plan for the STORE&GO pilot project in Italy (Troia) was to inject the produced substitute natural gas into the regional distribution grid, the costs involved with the purification of the gas to be in compliance with the maximum level of hydrogen made injection too costly. Annex 11/A of the network code of grid operator Snam Rete Gas S.P.A. (approved by Directive 204/2016/R/GAS of the Italian Regulatory Authority for Electricity, gas and Water (AEEGSI)) sets the

¹⁷ The validity under Article 15(3) of the current RED is limited at 12 months after production of the corresponding energy unit.

maximum volume of hydrogen at 0,5%. In Germany this maximum is set at 5%, which provides for more flexibility for the injection of gases of a more sustainable character than natural gas.

In line with the ambitions of the European Union under the Recast RED and the Energy Union in general, the benefits of alternative gases such as hydrogen and substitute natural gas for security of supply and decarbonisation, need to be given consideration under current gas quality harmonization efforts which are mandated to the European Committee for Standardisation (CEN).

Article 21 in EC proposal: Renewable self-consumers

1. Member States shall ensure that renewable self-consumers, individually or through aggregators:
 - (a) are entitled to carry out self-consumption and sell, including through power purchase agreements, their excess production of renewable electricity without being subject to disproportionate procedures and charges that are not cost-reflective;
 - (b) maintain their rights as consumers;
 - (c) are not considered as energy suppliers according to Union or national legislation in relation to the renewable electricity they feed into the grid not exceeding 10 MWh for households and 500 MWh for legal persons on an annual basis; and
 - (d) receive a remuneration for the self-generated renewable electricity they feed into the grid which reflects the market value of the electricity fed in.

Member States may set a higher threshold than the one set out in point (c).

2. Member States shall ensure that renewable self-consumers living in the same multi-apartment block, or located in the same commercial, or shared services, site or closed distribution system, are allowed to jointly engage in self-consumption as if they were an individual renewable self-consumer. In this case, the threshold set out in paragraph 1(c) shall apply to each renewable self-consumer concerned.

3. The renewable self-consumer's installation may be managed by a third party for installation, operation, including metering, and maintenance.

Comments from BRIDGE working groups

Business Models:

In addition to the comments under Article 15 above (Electricity Directive-Chapter III: Consumer Empowerment and Protection), Article 21 introduces a new component and a new challenge that also must be able to fit into a new business model framework. This article introduces the concept of sharing energy resources between households (end-customer) or energy neighbourhoods, so a new business model framework must be able to support the concept of sharing economy. This component could be called a “multi-customer” which acts as a customer collector, but also as a standalone component; the term “Multi-consumer” is not used as the role may change between producer and consumer.

In point 1.(a), charges should be cost-reflective as well as consider the benefits that self-generation can provide to the grid, which should be explicitly mentioned.

In point 1.(c), the term “energy suppliers” should be replaced with “energy producers”. The BM WG questions why the threshold is applied to “renewable electricity they feed into the grid” and not the renewable energy that is consumed locally; a limitation to 10 MWh of PV generation potentially limits the installed capacity on a house, even if feed-in remuneration would make a bigger PV plant feasible.

As regards point 1.(d), market-driven remuneration for the energy that prosumers feed in to the grid provides the appropriate signals, but requires a clear and binding decision on the future energy mix

and network planning for the return on investment to be estimated with high confidence. Furthermore, prosumers should be given enough flexibility on how to use the electricity produced, by allowing nanogrids and microgrids to be formed, independent aggregators to sell their excess production, etc.

Point 2. is very important for motivating renewable generator installation within urban areas. Netfficient points out that in Germany, for example, a simplified measurement concept, the so-called Summenzaehlermodell, enables economic implementation of such projects. Still, individual costumers changing suppliers etc. can be challenging for billing etc. Improved, standardised processes between multi-self-consumption project operators, grid operators and meter operators are necessary. Furthermore, in Germany the reduced EEG apportionment only applies to small PV plants but should rather be applied to small consumption per self-consumer. This would avoid discrimination of such concepts as compared to individual households.

Peer to Peer energy trade between renewable self-consumers pertaining to the same community or aggregator could be considered.

Customer Engagement:

Proposals to exempt shared apartment buildings from having to obtain a supplier's license to engage in renewables self-consumption will provide new opportunities for citizens in urban areas to develop local energy communities, and provide innovative space for new models such as Mieterstrom in Germany and collective self-consumption in France, to develop throughout Europe.

However, there are no provisions on encouraging households that rent or are experiencing fuel poverty to participate. Article 21 should be strengthened to encourage national level action that promotes self-consumption schemes and local energy communities that enable tenants and households experiencing fuel poverty to participate.

Furthermore, there is an open question to what extent the proposed language will enable consumers to be incentivised and remunerated for their self-consumption, including in their network tariffs. This must be addressed in a way that ensures compensation models reward smart behaviour and incentivize investments from citizens and their communities that benefit both themselves and the system in the long term. It must also prohibit tariffs and other charges that penalise customers' active participation.

Section 21.1.b is a little fuzzy. First of all, consumer rights across Europe varies. Some of them have little or no choice of supplier. Under some regimes the regular consumer pays for the benefits of the prosumer. Is this a right? Should state that Article 21 should help to improve their position as consumers too. For instance, to allow them to purchase energy from their neighbour.

The WG finds the statement 21.1.c very clear.

For instance, 21.1.d should consider clarification regarding consumers being able to choose their preferred tariff model.

Some questions arose about section 21.2, for example, about the establishment of virtual power plants and a cluster of the self-consumers that are not physically closed. Some more explanations are required about these subjects.

Considering 21.3. statement, it is true as long as this party holds the necessary certifications and can also obtain licenses to orchestrate multiple self-producers as one body and therefore also sell flexibility.

Article 22 in EC proposal: Renewable energy communities

1. Member States shall ensure that renewable energy communities are entitled to generate, consume, store and sell renewable energy, including through power purchase agreements, without being subject to disproportionate procedures and charges that are not cost-reflective.

For the purposes of this Directive, a renewable energy community shall be an SME or a not-for-profit organisation, the shareholders or members of which cooperate in the generation, distribution, storage or supply of energy from renewable sources, fulfilling at least four out of the following criteria:

(a) shareholders or members are natural persons, local authorities, including municipalities, or SMEs operating in the fields or renewable energy;

(b) at least 51% of the shareholders or members with voting rights of the entity are natural persons;

(c) at least 51% of the shares or participation rights of the entity are owned by local members, i.e. representatives of local public and local private socio-economic interests or citizen having a direct interest in the community activity and its impacts;

(d) at least 51% of the seats in the board of directors or managing bodies of the entity are reserved to local members, i.e. representatives of local public and local private socio-economic interests or citizens having a direct interest in the community activity and its impacts;

(e) the community has not installed more than 18 MW of renewable capacity for electricity, heating and cooling and transport as a yearly average in the previous 5 year.

2. Without prejudice to State aid rules, when designing support schemes, Member States shall take into account the specificities of renewable energy communities.

Comments from BRIDGE working groups

Regulations:

It will be important to achieve minimum RES shares in the local fuel mix.

Customer Engagement:

As expressed by the Regulations WG, it would be important to consider achieving minimum RES shares in the local fuel mix.

The first step in providing a supportive legal framework for renewable energy communities is identifying 'who' they are and how they are different from traditional players. The development of focused criteria for 'renewable energy communities' in the Recast Renewable Energy Directive is therefore a positive development.

However, the criteria need several improvements if they are going to serve as the basis of an effective framework to encourage the development of renewable energy communities. As drafted, the criteria could potentially allow larger energy companies to game the system, which could undermine trust of local citizens. To prevent abuse the criteria should be narrowed, while additional criteria of 'open' local participation should be added to ensure inclusiveness. Furthermore, the criteria need to be more strongly linked with the definition of local energy communities provided in the Electricity Directive.

Provisions on consideration for renewable energy communities in the development of support schemes is also a positive development. It is well known that auctions/tenders pose significant barriers to participation from smaller players.

However, while the proposals would require 'consideration' of renewable energy communities in the development of tenders this would only amount to a requirement of process, not result. Furthermore, there is no acknowledgement of local acceptance or local economic and environmental benefits of local participation in tenders/auctions. As such, Article 22 should be strengthened to ensure

renewable energy communities can participate in available support schemes, and to guarantee recognition of the value of local participation.

Regarding the section 22.1, as stated before, it seems unclear how these can be ensured, while maintaining each MS specific regulations (considering the fact that some countries do not still fully comply with this requirements). Harmonization among EU should be encouraged e.g. through a set of guidelines/political recommendations.

In 22.1.e, statements the WG wonders if 18MW would include also storage capacity and more information should be given about hybrid systems capacity.

Article 25 in EC proposal: Mainstreaming renewable energy in the transport sector

1. With effect from 1 January 2021, Member States shall require fuel suppliers to include a minimum share of energy from advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX, from renewable liquid and gaseous transport fuels of non-biological origin, from waste-based fossil fuels and from renewable electricity in the total amount of transport fuels they supply for consumption or use on the market in the course of a calendar year.

The minimum share shall be at least equal to 1.5% in 2021, increasing up to at least 6.8% in 2030, following the trajectory set out in part B of Annex X. Within this total share, the contribution of advanced biofuels and biogas produced from feedstock listed in part A of Annex IX shall be at least 0.5% of the transport fuels supplied for consumption or use on the market as of 1 January 2021, increasing up to at least 3.6% by 2030, following the trajectory set out in part C of Annex X.

The greenhouse gas emission savings from the use of advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX shall be at least 70% as of 1 January 2021.

For the calculation of the shares referred to in the second sub-paragraph, the following provisions shall apply:

a) for the calculation of the denominator, that is the energy content of road and rail transport fuels supplied for consumption or use on the market, petrol, diesel, natural gas, biofuels, biogas, renewable liquid and gaseous transport fuels of non-biological origin, waste-based fossil fuels and electricity, shall be taken into account;

b) for the calculation of the numerator, the energy content of advanced biofuels and other biofuels and biogas produced from feedstock listed in Annex IX, renewable liquid and gaseous transport fuels of non-biological origin, waste based fossil fuels supplied to all transport sectors, and renewable electricity supplied to road vehicles, shall be taken into account.

For the calculation of the numerator, the contribution from biofuels and biogas produced from feedstock included in part B of Annex IX shall be limited to 1.7% of the energy content of transport fuels supplied for consumption or use on the market and the contribution of fuels supplied in the aviation and maritime sector shall be considered to be 1.2 times their energy content.

c) For the calculation of both numerator and denominator, the values regarding the energy content of transport fuels, as set out in Annex III, shall be used. For the determination of the energy content of transport fuels not included in Annex III, the Member States shall use the respective ESOs standards for determination of calorific values of fuels. Where no ESOs standard has been adopted for this purpose, the respective ISO standards shall be used.

2. For the purpose of paragraph 1, Member States shall set up a system allowing fuel suppliers to transfer the obligation set out in paragraph 1 to other fuel suppliers and ensure that all transfers are documented in the national databases referred to in paragraph 4.

3. To determine the share of renewable electricity for the purposes of paragraph 1 either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in the Member State where the electricity is supplied, as measured

two years before the year in question may be used. In both cases, an equivalent amount of guarantees of origin issued in accordance with Article 19 shall be cancelled.

The share of renewable energy in liquid and gaseous transport fuels shall be determined on the basis of the share of renewable energy in the total energy input used for the production of the fuel.

For the purposes of this paragraph, the following provisions shall apply:

(a) When electricity is used for the production of renewable liquid and gaseous transport fuels of non-biological origin, either directly or for the production of intermediate products, either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in the country of production, as measured two years before the year in question, may be used to determine the share of renewable energy. In both cases, an equivalent amount of guarantees of origin issued in accordance with Article 19 shall be cancelled.

However, electricity obtained from direct connection to an installation generating renewable electricity (i) that comes into operation after or at the same time as the installation producing the renewable liquid and gaseous transport fuel of non-biological origin and (ii) is not connected to the grid, can be fully counted as renewable electricity for the production of that renewable liquid and gaseous transport fuel of non-biological origin.

(b) When biomass is processed with fossil fuels in a common process, the amount of biofuel in the product shall be established applying adequate conversion factors to the biomass input. In case the process yields more than one product, all products stemming from the process shall be assumed to contain the same share of biofuel. The same rules shall apply for the purposes of Article 27(1).

4. Member States shall put in place a database enabling tracing of transport fuels that are eligible for counting towards the numerator set out in paragraph 1, point b, and require the relevant economic operators to enter information on the transactions made and the sustainability characteristics of the eligible fuels, including their life cycle greenhouse gas emissions, starting from their point of production to the fuel supplier that places the fuel on the market.

The database shall include information on the requirement placed on fuel suppliers described in paragraph 1 and how the requirement is fulfilled.

The national databases shall be interlinked so as to allow transactions of fuels between Member States to be traced. In order to ensure the compatibility of national databases, the Commission shall set out technical specifications of their content and use by means of implementing acts adopted in accordance with the examination procedure referred to in Article 31.

5. Member States shall report on the aggregated information from the national databases, including fuels' life cycle greenhouse gas emissions, in accordance with Annex VII of Regulation [Governance].

6. The Commission is empowered to adopt delegated acts in accordance with Article 32 to further specify the methodology referred to in paragraph 3(b) of this Article to determine the share of biofuel resulting from biomass being processed with fossil fuels in a common process, to specify the methodology for assessing greenhouse gas emission savings from renewable liquid and gaseous transport fuels of non-biological origin and waste-based fossil fuels and to determine minimum greenhouse gas emission savings required for these fuels for the purpose of paragraph 1.

7. By 31 December 2025, in the context of the biennial assessment of progress made pursuant to the Regulation [Governance], the Commission shall assess whether the obligation laid down in paragraph 1 effectively stimulates innovation and promotes greenhouse gas savings in the transport sector, and whether the applicable greenhouse gas savings requirements for biofuels and biogas are appropriate. The Commission shall, if appropriate, present a proposal to modify the obligation laid down in paragraph 1.



Comments from BRIDGE working groups

Business Models:

As indicated in the comments from the RealValue project previously mentioned, electric vehicles are competitors of SETS (Smart Electric Thermal Storage) in terms of procuring electricity. All other equal, additional demand for electricity will increase electricity prices, which has a direct impact on business models that generate profits by charging storages at times of cheap electricity.



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