FLORENCE SCHOOL OF REGULATION

ROBERT SCHUMAN CENTRE

Electricity metering and consumption data management

13th December 2024

Renewables Grid Initiative training
'**Connecting Consumers: Introduction to electricity metering and pricing**'

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www.eui.eu

Agenda

- Distribution System Operators and the metering activity
- Benefits of the digitalisation of the energy system
- Smart meters: what are they and smart meters rollout
- Metering and consumption data management and sharing

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DSO definition and metering activities

- The **Distribution System Operator** (DSO) is '*a natural or legal person who is responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area […]'* (art. 2(29))
- Natural monopolies → regulated and unbundled companies
- Might act as multi-utility network operators

- **Metering** is the measurement of the amount of electric energy consumed by a residence, a business, or an electrically powered device over a time interval
- Metering allows accurate **billing** from electricity retailers

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Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (Text with EEA relevance.)

Benefits of the digitalisation of the energy system

- **More efficient retail markets** as smart grids facilitate supplier switching, frequent meter readings and more accurate billing;
- **Consumers** can be **more aware of their energy consumption** and can receive incentives to better manage their energy usage;
- **Consumers** can **invest in decentralized energy resources** and produce their own renewable energy;
- **Consumers** get the possibility to **actively participate in energy communities** and energy-sharing schemes, to valorise demand response services;
- **Network operators** get **better insight into their network**, allowing for better network investments and operations, reducing network tariffs for consumers.

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Why smart meters?

Conventional electro-mechanical meters

Smart meters

Source https://www.e-distribuzione.it/open-meter.html

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Rollout of smart meters under the Third Energy Package (2009)

14.8.2009 EN Official Journal of the European Union L 211/55

DIRECTIVES

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
(Text with EEA relevance)

Member States shall ensure the implementation of intelligent metering systems that shall assist the active participation of consumers in the electricity supply market. The implementation of those metering systems may be subject to an economic assessment of all the long-term costs and benefits to the market and the individual consumer or which form of intelligent metering is economically reasonable and cost-effective and which timeframe is feasible for their distribution.

Such assessment shall take place by 3 September 2012.

Subject to that assessment, Member States or any competent authority they designate shall prepare a timetable with a target of up to 10 years for the implementation of intelligent metering systems.

Where roll-out of smart meters is assessed positively, at least 80 % of consumers shall be equipped with intelligent metering systems by 2020.

The Member States, or any competent authority they designate, shall ensure the interoperability of those metering systems to be implemented within their territories and shall have due regard to the use of appropriate standards and best practice and the importance of the development of the internal market in electricity.

Annex I 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

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New requirements under the Clean Energy Package (2019)

Article 19

Smart metering systems

3. Member States that proceed with the deployment of smart metering systems shall adopt and publish the minimum functional and technical requirements for the smart metering systems to be deployed in their territories, in accordance with Article 20 and Annex II. Member States shall ensure the interoperability of those smart metering systems, as well as their ability to provide output for consumer energy management systems. In that respect, Member States shall have due regard to the use of the relevant available standards, including those enabling interoperability, to best practices and to the importance of the development of smart grids and the development of the internal market for electricity.

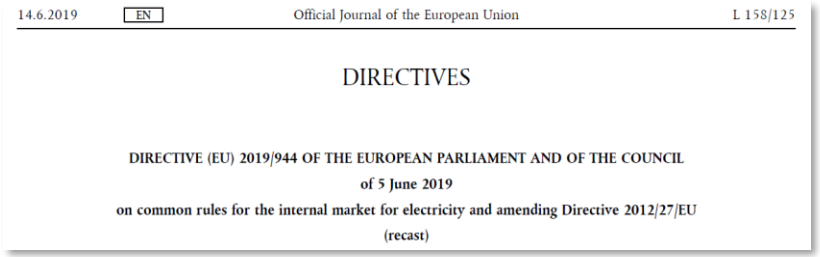
4. Member States that proceed with the deployment of smart metering systems shall ensure that final customers contribute to the associated costs of the deployment in a transparent and non-discriminatory manner, while taking into account the long-term benefits to the whole value chain. Member States or, where a Member State has so provided, the designated competent authorities, shall regularly monitor such deployment in their territories to track the delivery of benefits to consumers.

5. Where the deployment of smart metering systems has been negatively assessed as a result of the cost-benefit assessment referred to in paragraph 2, Member States shall ensure that this assessment is revised at least every four years, or more frequently, in response to significant changes in the underlying assumptions and in response to technological and market developments. Member States shall notify to the Commission the outcome of their updated cost-benefit assessment as it becomes available.

Article 21

Entitlement to a smart meter

1. Where the deployment of smart metering systems has been negatively assessed as a result of the cost-benefit assessment referred to in Article 19(2) and where smart metering systems are not systematically deployed, Member States shall ensure that every final customer is entitled on request, while bearing the associated costs, to have installed or, where applicable, to have upgraded, under fair, reasonable and cost-effective conditions, a smart meter that:



14.6.2019 EN Official Journal of the European Union L 158/125

DIRECTIVES

DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 5 June 2019
on common rules for the internal market for electricity and amending Directive 2012/27/EU
(recast)

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (Text with EEA relevance.)

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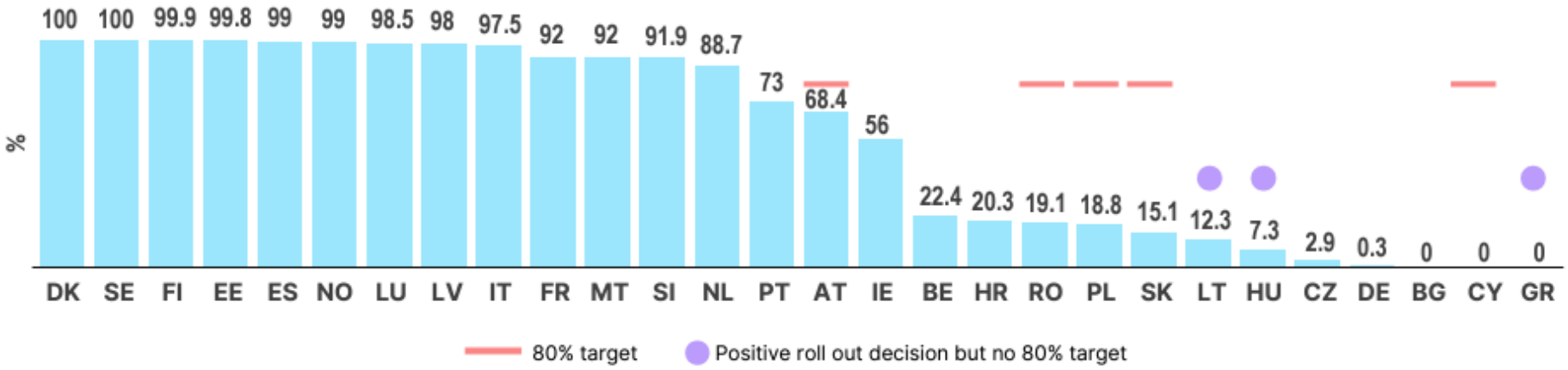
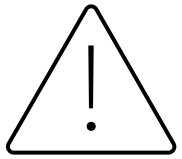
Rollout of smart meters (2022)

Figure 13: Roll out rate of smart meters per Member State – 2022 (%)



Source: ACER based on NRA data.
Note: (1) Data for the Czech Republic, Croatia, Germany, and Poland is updated compared to ACER's 2023 Market Monitoring Report on Energy Retail and Consumer Protection.



Different roll-out rates impact uniform data accessibility across the EU

Source: ACER (2023), p. 20

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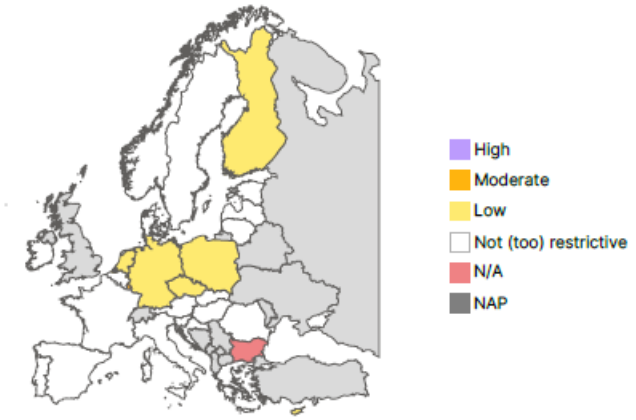
Figure 8: Lack of a proper legal framework to allow market access. Overview of the barrier (top) and underlying indicators (bottom) per Member State – 2022



Main roles and responsibilities of new actors not defined																									
BG	FI	LU	NL	NO	PL	SE	AT	CZ	DE	ES	CY	DK	GR	HU	LT	LV	SK	BE	EE	FR	HR	IE	IT	MT	PT	RO	SI
Market access restricted due to lack of legal eligibility																									
BG	CY	DK	PL	SK	HU	PT	CZ	EE	ES	GR	IT	AT	BE	DE	FI	FR	HR	IE	LT	LU	LV	MT	NL	NO	RO	SE	SI
Lack of a proper legal framework on aggregation models																									
CY	DE	DK	LU	NL	PT	SK	FI	HR	PL	EE	ES	IT	LT	LV	AT	BE	BG	CZ	FR	GR	HU	IE	NO	RO	SE	SI	MT
Lack of access to final customer data																									
CZ	IT	NL	AT	BE	CY	DK	EE	ES	FI	FR	GR	HR	HU	IE	LT	LU	LT	MT	NO	PL	PT	RO	SE	SI	SK	BG	DE
Ownership of recharging points for electric vehicles by DSOs																									
CZ	FI	LU	AT	BE	CY	DE	DK	EE	ES	FR	GR	HR	HU	IE	IT	LT	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	BG
Ownership of energy storage facilities by TSOs and DSOs																									
FI	LU	LV	PL	DE	AT	BE	CY	CZ	DK	EE	ES	FR	GR	HR	HU	IE	IT	LT	MT	NL	NO	PT	RO	SE	SI	SK	BG
Restrictions on trade on day-ahead and intraday markets																									
SI	AT	BE	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	NL	NO	PL	PT	RO	SE	SK	BG	CY	MT

Source: ACER.

Source: ACER (2023), p. 20

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Sharing metering and consumption data with third parties

Article 23

Data management

1. When laying down 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 rules on the access to data of the final customer by eligible parties in accordance with this Article and the applicable Union legal framework. For the purpose of this Directive, data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services.

Eligible party
an entity offering energy-related services to final customers, such as suppliers, transmission and distribution system operators, delegated operators and other third parties, aggregators, energy service companies, renewable energy communities, citizen energy communities and balancing service providers [...].

Obligations on Member States to make the data sharing effective and secure

'Data management model' *refers to the framework of roles and responsibilities assigned to any party within the electricity system and market and the subsequent duties related to data collection, processing, delivery, exchanges, publishing and access'*

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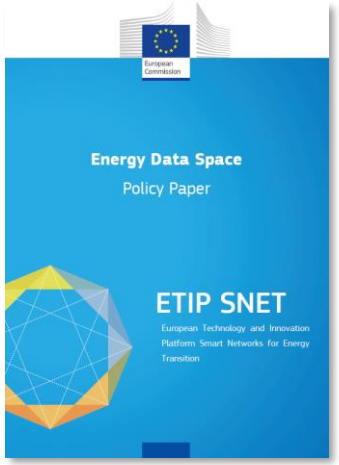
Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (Text with EEA relevance.)

Guiding principles for metering and consumption data management

- Privacy and security
- Transparency
- Accuracy
- Accessibility
- Non discrimination
- Cost and cost-efficiency as guiding principle

Source: CEER, 2015

Classification of data management models



Centralized model

- All data is stored in a central data hub
- The data hub is typically operated and developed by one specific party
- All processes run on the hub and all market parties interact through the hub

Hybrid model

- A combination of the two other models
- All market participants can communicate in a decentralized way, eg, through a communication interface

Decentralized model

- Data stays where it is captured at the meter and at the specific DSO
- Market actors work together to develop standardized market communication and exchange data processes while maintaining individual models

https://op.europa.eu/en/publication-detail/-/publication/21b0260e-a2d5-11ee-b164-01aa75ed71a1/language-en
https://www.entsoe.eu/Documents/Publications/Position%20papers%20and%20reports/entsoe_TSO-DSO_DMR_web.pdf

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Centralised v decentralised data management models

Centralised	Decentralised
- Very expensive to set up a data hub and high transaction costs to make all relevant parties to agree on a centralised solution	- Complexity when considering the number of actors, formats, interfaces and diversity in general
- Security concerns when having all data handled in one single platform	- Less efficient solution, lack of exploitation of economies of scale
+ Removal of barriers for new market entrants	+ Less efforts for a complete harmonisation of processes and roles

The Implementing Act on Interoperability: introducing a reference model

Article 24

Interoperability requirements and procedures for access to data

1. In order to promote competition in the retail market and to avoid excessive administrative costs for the eligible parties, Member States shall facilitate the full interoperability of energy services within the Union.

2. The Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data referred to in Article 23(1). Those implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 68(2).

*"**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.'* Art. 2(24)

Commission adopts new implementing act to improve access to metering and consumption data

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https://energy.ec.europa.eu/news/commission-adopts-new-implementing-act-improve-access-metering-and-consumption-data-2023-06-06_en

Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast)

Example of a reference model

Procedure 1

Procedure name		Access to validated historical metering and consumption data by the final customer			
Step No	*Step*	*Step description*	*Information producer*	*Information receiver*	*Information exchanged (IDs)*
1.1	Identify data access provider	Final customers identify the data access provider that is responsible for their metering points under consideration.	Competent authority	Final customer	[not relevant]
1.2	Authenticate final customer	Final customers identify themselves to the data access provider.	Final customer	Data access provider	[not relevant]
1.3	Check credentials	Data access provider transfers authentication information to identity service provider.	Data access provider	Identity service provider	[not relevant]
1.4	Inform final customer of credential check results	Data access provider communicates validation result and provides a meaningful indication in case of an invalid request.	Data access provider	Final customer	[not relevant]
1.5	Link final customer and metering point	Final customer finds out metering point id to request data for.	Data access provider	Final customer	A – Metering point identification
1.6	Request data	Final customer specifies the requested data.	Final customer	Data access provider	C - Metered data request

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Commission Implementing Regulation (EU) 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data (Text with EEA relevance)

Data management models: national examples

https://www.eda.at/wie-funktioniert-eda?lang=en
https://www.elering.ee/en/data-hub-information-systems
https://datadis.es/home

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Thank you for the attention!

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