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Review of Current and Future Data Management Models

CEER report

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Abstract

This document (C16-RMF-89-03) reviews the status of 8 countries concerning guiding principles and recommendations outlined in the Council of European Regulators' (CEER) Advice on Customer Data Management for Better Retail Market Functioning (electricity and gas) (C14-RMF-68-03). It is a detailed update of the Benchmarking Report on Meter Data Management – Case Studies (C12-RMF-46-05).
It intends to enrich discussions on the organisation of data management in retail energy markets, as raised by the European Commission in the Clean Energy for All Europeans package. It is based on practical cases of current and future data management models and may exemplify how CEER members can solve current and future data management issues.

Target Audience

EU/EEA Member States, European Commission, gas/electricity customers, consumer representative groups, network operators, suppliers, academics and other interested parties.

Keywords

Customer information; metering data; data formats; transparency; data exchange; unbundling; DSO neutrality; consumer rights; consumer protection; consumer empowerment; prices; time-of-use metering; smart metering; smart grids; energy efficiency; contracts; tariffs; affordability; reliability; simplicity; supplier switching; 2020 Vision; energy consumers.

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Related Documents

CEER/ACER documents

- CEER Benchmarking report on removing barriers to entry for energy suppliers in EU retail energy markets, Ref: C15-RMF-70-03, April 2016
- CEER 2016 Work Programme, January 2016, Ref: C15-WPDC-27-06
- CEER Position Paper on well-functioning retail energy markets, October 2015, Ref: C15-SC-36-03
- CEER Statement on Delivering a New Deal for Energy Consumers, July 2015
- The Future Role of DSOs: A CEER Conclusions Paper, July 2015, Ref: C15-DSO-16-03
- CEER Advice on Customer Data Management for Better Retail Market Functioning, March 2015, Ref: C14-RMF-68-03
- CEER Report on the Implementation of the 2020 Vision for Europe's energy customers by its supporters, October 2014, Ref: C14-SC-30-03
- ACER Energy Regulation: A Bridge to 2025 - Conclusions paper, September 2014
- A 2020 Vision for Europe's energy customers: CEER-BEUC Joint Statement, November 2012 (updated June 2014)
- Benchmarking Report on Meter Data Management - Case Studies, Ref. C12-RMF-46-05, November 2012

External documents

- Commission Clean Energy for All Europeans, November 2016, 2016/0380 (COD)
- Communication from the Commission to the European Parliament, the Council, the European Social and Economic Committee, and the Committee of the Regions on Delivering a New Deal for Energy Consumers, July 2015, COM(2015)339
- 7th Citizens' Energy Forum Conclusions, London, 12-13 March 2015
- Commission Recommendation on the Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems, October 2014, 2014/724/EU
- Report from the Commission: Benchmarking smart metering deployment in the EU-27 with a focus on electricity, COM/2014/0356
- Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency, October 2012

- Commission Recommendation on preparations for the roll-out of smart metering systems, March 2012, 2012/148/EU

- Directive 2009/72/EC of the European Parliament and of the Council concerning common rules for the internal market in electricity, July 2009

- Directive 2009/73/EC of the European Parliament and of the Council concerning common rules for the internal market in natural gas, July 2009

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EXECUTIVE SUMMARY

The management and exchange of customer and metering data is key to well-functioning retail energy markets. CEER sees inadequate data management as a barrier to entry and growth in retail markets, and a barrier to ensuring the appropriate privacy and integrity of customers. CEER has previously highlighted that there are current limitations in European gas and electricity markets on the type of data available, and on the ability of market participants and consumers to access this data. Consequently, inadequate data management may be considered as a barrier to competition.

CEER believes that an appropriately designed data management model should enable the efficient, safe and secure exchange of customer and metering data. This should in turn facilitate retail market competition and ensure adequate customer protection. Data must be available for competitive market actors in a standardised format, enabling them to easily perform market operations, such as commencing a supply contract, billing etc. At the same time, the data management model should provide consumers with full ownership over their data and control over who has access to it.

This review of national data management models aims to contribute to discussions on the organisation of data management in retail markets in Europe, by exemplifying and reviewing how data management models are organised in different markets. Both current and future data management models in eight countries are reviewed in detail. The participating regulators are from Belgium, Denmark, Germany, Great Britain, Italy, Norway, Spain and the Netherlands.

The review follows up the CEER Advice on Customer Data Management for Better Retail Market Functioning (electricity and gas) (C14-RMF-68-03), published in 2015. The Advice made key definitions and established five guiding principles and seven recommendations for the management of customer data. These definitions, principles and recommendations provide the backdrop for this review, enabling the assessment of various aspects of the data management models of countries participating in the review.

The approach of this review is somewhat atypical compared to traditional status reviews. As data management models are highly complex and can involve various roles, legal frameworks and technical standards alike, it was considered that focusing on a few countries in detail was the best approach to provide a thorough review of these models. Therefore, only eight different data management models are considered in this review. The regulators contributing information to this review have done this on a voluntary basis.

Information for the review was gathered through a structured qualitative survey, designed to grasp the roles, responsibilities, legislation, technical aspects and informal rules that make up a data management model. The participating regulators were asked to report detailed information about both their current and future data management models, enabling CEER to review the future direction of data management where this is relevant.

In the review we observe that the participating countries now and in the future will have a variety of different data management models, which vary not only in terms of technical functionalities, but through different constellations of legal frameworks, responsibilities and regulations. As a general trend, the review has observed all but two countries will

have a full roll-out of smart metering. All but one country are making changes in their data management models, moving to centralised or partially centralised models.

Country	Current model	Future model
Norway (NO)	Decentralised	Centralised data hub
Italy (IT)	Decentralised	Centralised data hub
Germany (DE)	Decentralised	Decentralised
Denmark (DK)	Centralised data hub	Centralised data hub
Netherlands (NL)	Centralised communications hub with partially centralised storage	Centralised communications hub with partially centralised storage
Spain (ES)	Decentralised	Centralised communications hub with decentralised storage
Great Britain (GB)	Decentralised	Centralised communications hub with decentralised storage
Belgium (BE)	Partially centralised	Centralised data hub

When assessing the fulfilment of the guiding principles and recommendations of the Advice, the review has found that recommendations on privacy and security, customer rights and information, customer confidence, cases of data inaccuracies and non-discrimination overall have relatively high degrees of fulfilment. The way in which these recommendations are considered to be fulfilled are not necessarily uniform, however, but are achieved through different rights and measures.

The degree to which customers have technical access to data in the data management models, either to historical consumption data at a centralised platform and/or to real-time consumption data through an interoperable smart meter, is observed to be quite low. Few countries have reported on the ability of consumers to have direct technical access to their data in the data management model.

In terms of the recommendation of considering the harmonisation of data management standards in a regional or European perspective, the review has also found a low degree of fulfilment. This supports the need for the European Commission to continue the focus on data management as a cross border barrier, as it has in the *New Deal for Energy Consumers* and in the Clean Energy for All Europeans.

The review has also sought for the participating regulators to share the perceived strengths of their future data management models, and the experiences and lessons learned from developing and implementing them. This may serve as useful information for interested parties seeking to better understand best practices and requirements in terms of future proofing data management models.

Background

When addressing the issue of data management, this paper will refer to the model of data management within a country. By this we mean the technical model through which data is sourced, validated, stored, protected and processed, and through which it can be accessed. The following review of data management models follows up on the CEER Advice on Customer Data Management for Better Retail Market Functioning (electricity and gas) (C14-RMF-68-03) and the Benchmarking Report on Meter Data Management – Case Studies (C12-RMF-46-05).

The roll-out of smart metering will dramatically increase the amounts and granularity of metering data generated by consumers. Smart meters should provide consumers with access to consumption data through an interoperable interface. It is important that the solutions in the data management model for retrieving, processing, protecting and distributing data are sufficient to enable the best possible use of smart metering data. CEER does not, however, prescribe preference to one model over another. We must recognise, however, that different models will impact on market entry barriers and market functioning differently.

In the 3rd Package, the European Commission (EC) has included measures for consumer protection. EU Member States (MSs), or a competent designated authority, shall ensure the interoperability of those metering systems that are to be implemented within their territories and they shall have due regard of best practice and the importance of developing the internal market for electricity. The 3rd Package also includes requirements for data management, which are complementary to CEERs Advice on Customer Data Management.

Specifically, Annex 1 of the 3rd Package states that consumers shall “have at their disposal their consumption data, and shall be able to, by explicit agreement and free of charge, give any registered supply undertaking access to its metering data. The party responsible for data management shall be obliged to give those data to the undertaking. Member States shall define a format for the data and a procedure for suppliers and consumers to have access to the data. No additional costs shall be charged to the consumers for that service.”

There are risks and opportunities with regards to both current and future data management models. Some are already clear today, whereas others will emerge with the roll-out of smart metering and future data management models, as mentioned above. One key issue is the costs and technical means by which customers and authorised market participants, including third parties, have access to data. This may be applicable to both historical customer and metering data, and real-time data from smart meters. Generally, access to data, as well as solutions to other key issues, should not only be ensured *de jure*, but also *de facto* in the data management model.

1 Introduction

In 2015, CEER published its Advice on Customer Data Management for Better Retail Market Functioning (electricity and gas) (C14-RMF-68-03) (hereafter, the Advice). The Advice outlines five guiding principles to form a basis for all data management models (DMMs) in Europe: Privacy and Security; Transparency; Accuracy; Accessibility; and Non-Discrimination. Complementary to these principles, CEER made seven concrete recommendations to facilitate the development of customer data management in European retail energy markets. The recommendations complement the existing legislative requirements under the 3rd Package.

The Advice is grounded in a vision of European energy retail markets that work in the best interest of consumers. It is supportive of the ambitions in the CEER/BEUC *2020 Vision for Europe's Energy Consumers* and the *ACER Energy Regulation: Bridge to 2025* document. The 2020 Vision puts retail energy market competition at its heart, setting out a vision for an energy sector that puts the interests of smaller consumers first. The Bridge to 2025 foresees the development of a Roadmap aimed at competitive, reliable and innovative retail energy markets by 2025.

In 2016, the European Commission highlighted data management as a market entry barrier in its Clean Energy for All Europeans package. This followed the special attention given to data management and protection by the European Commission in 2015, in its communication on *Delivering a New Deal for Energy Consumers*. The communication emphasised that access to data should be effective and non-discriminatory, that data handling can follow different models, and that neutrality of the entities handling data is of utmost importance. With the increasing digitalisation of the energy sector, the sector must also be at the forefront of security, privacy and data protection for consumers. The CEER Position Paper on Well-Functioning Retail Energy Markets (C15-SC-36-03) and the CEER Benchmarking report on removing barriers to entry for energy suppliers in EU retail energy market (C15-RMF-70-03) also highlighted inadequate data management as a barrier to market entry and growth.

The 2015 Citizens' Energy Forum asked CEER to follow the Advice's guiding principles and recommendations for customer data management in their regulatory activities and report to the Forum on their use. Specifically, the Forum wanted to know whether consumers have access to relevant information and whether or not authorised third parties have access to relevant information. With this review, CEER seeks to follow up on the request of the Citizens' Energy Forum and be supportive of the special attention placed by the European Commission on the topic of data management.

The review presents practical examples of current and future data management models in eight CEER Member States. It reviews their data management models in relation to the recommendations made by CEER in the Advice. The review also addresses the questions on the Citizens' Energy Forum directly in its conclusions.

The participating regulators from Belgium, Denmark, Germany, Great Britain, Italy, Norway, Spain, and the Netherlands, have been asked to answer detailed questions about their data management models, including questions about technical functionalities, processes, roles and regulations. Some questions were framed directly based on the guiding principles and recommendations of the Advice. The review does not intend to judge the quality or merit of the presented models, but will review some aspects of the models against the recommendations of the Advice. The main goal of the paper is to enhance experience

sharing and serve as an example for interested parties of how various models of data management work and how they are planned to develop in the future.

The same eight regulators also participated in the CEER Benchmarking Report on Meter Data Management in 2012. The benchmarking report described existing and, in some cases, future data management models. Denmark, Italy, Norway and Great Britain reported on their future data management models in this report. The following status review shows that these four countries have made progress according to the models that were prescribed back in 2012. The future models in these countries are now either in operation or in advanced development and implementation phases.

1.1 CEER's Advice on Customer Data Management for Better Retail Market Functioning

CEER's Advice on Customer Data Management for Better Retail Market Functioning (the Advice) has provided the background and scope for this review. Within the Advice, the issue of data management and its implications are discussed at length. To provide an introduction to these issues, the following section will outline key definitions, principles and recommendations established by the Advice. The Advice also reviewed the legal context of the issue of data management in European retail markets. For information about the legal context enveloping the issue of data management, see p. 9 and p. 10 of the Advice.[1]

In the Advice, the scope of data management is described as encompassing the processes by which data is sourced, validated, stored, protected and processed, and by which it can be accessed.[2] The data falling under the term "customer meter data" is further identified.[3] This review will follow the same scope:

Point of delivery identification data	Data used to identify the meter itself and the point where the meter is installed.
User and contract data	Data on the user of the meter (name and address of the user) and the user's contract data (e.g. supplier identification data, first day of supply for each supplier serving that user/point of delivery).
Consumption data	Data on the usage associated with the meter. Among the forms of data collected can be: real-time energy usage, current and historic consumption and the energy efficiency information when available, and micro-generated input data. Smart meters will allow a more granular breakdown of consumption data, possibly including consumption by individual home appliances.

Table 1 - Defining Customer Meter Data

Based on this scope, the Advice established five guiding principles and seven recommendations for customer data management (Table 2). The guiding principles and

[1] P. 9 CEER Advice on Customer Data Management for Better Retail Market Functioning (electricity and gas) (Ref: C14-RMF-68-03)

[2] Idem, p. 10.

[3] Idem p. 11.

recommendations are summarised in the table below. These are based on the customer's view of the energy market and are universally applicable; hence they are equally relevant for both current and future data management models. In the following review, Chapter 3 is explicitly based on reviewing the seven recommendations of the Advice.

Guiding principle	Number	Recommendation
Privacy and Security	1	Customer meter data should be protected by the application of appropriate security and privacy measures. Customers should control access to their customer meter data, with the exception of data required to fulfil regulated duties and within the national market model. The principle should be that the party shall state what information they will collect, with what frequency and for how long.
Transparency	2	The relevant body in each MS (DSO/metering operator/other) shall make the following general information on meter data management publically available, as a minimum: (a) the customer's rights with regard to customer data management; (b) what type of customer meter data exists and what it is used for; (c) how customer meter data is stored and for how long; (d) how the customer and market participants authorised by the customer get access to that data; and (e) within what time period the customer and market participants authorised by the customer have to wait to get disaggregated data. This should be ensured by the NRA. The above general information on meter data management should, as a minimum, be published on the website of the relevant body (DSO/metering operator/other) and must be presented in a customer-friendly way.
	3	In order to achieve energy efficiency benefits and other potential benefits, the relevant bodies in each country should take active steps to build customer confidence in sharing customer meter data. Those bodies could be the NRAs, the DSO/metering operator, public authorities and consumer organisations. Active steps to be taken might include information campaigns.
	4	Beyond current requirements for a national common standard for data format and exchange, we recommend MSs, or any competent authority they designate, explore the costs and benefits of harmonising these standards at a broader geographical area, namely at regional and/or European level.
Accuracy	5	The relevant body (DSO/metering operator/other) should communicate to the customer any inaccuracies that might have taken place in relation with customer meter data and how these inaccuracies have been addressed (e.g. loss of meter data leading to an estimation of consumption in the bill). The NRA should ensure that measures for addressing these inaccuracies are established in legislation/regulation.

Accessibility	6	The customer (or a market participant acting on behalf of the customer) should have easy access to customer meter data. This information should, where reasonable, be made available through an adequate channel of the customer's choosing (e.g. an in-home system or by means of a gateway).
Non-discrimination	7	To support an effective and competitive market, the DMM should not give undue preference to one stakeholder over another. This is especially important in relation to DSO-led smart meters roll-outs; there should be non-discriminatory access to information when and where such meters are installed.

Table 2 – CEER's Guiding Principles and Recommendations for Data Management

1.2 Distinguishing Between Centralised and Decentralised Models

In terms of defining data management models, it is common to attempt to distinguish between centralised and decentralised models of data management. However, this is not necessarily an exercise that is straight forward, as only some aspects of a model may be centralised or decentralised. As a starting point, data management models include the key aspects of sourcing, validating, storing, protecting, processing and distributing or providing access to data. Any of these processes may individually be centralised or decentralised, depending on the model. Hence, this review addresses models that are either centralised, partially centralised or decentralised.

A fully centralised model should comprise a centralisation of all key aspects related to data management. A typical centralised model would be a data hub, where all data is retrieved, validated, stored, protected, processed, distributed and accessed. This model is essentially a 'one stop shop' for data, where DSOs, market actors and all consumers only have one actor, the data hub, which they relate to.

A partially centralised model involves centralisation of one of the key aspects of data management, typically distribution and access to data. A typical partially centralised model would not include sourcing, storage, validation and protection of data, but rather be a communications hub that provides a common access point for data that could be stored in several databases, at DSOs or at metering points i.e. the model could enable centralised access to data stored at decentralised locations. However, this is not uniformly applicable and may vary depending on the model and which key aspects are centralised.

A decentralised model would typically mean that all the key aspects of data management are decentralised, meaning that they are the responsibility of the DSO. A typical decentralised model would be a standardised message exchange system or another more crude way of connecting market actors with DSOs, such as the use of PDF-files for updated network tariffs. This does not typically include a common access point, but rather a standardised or non-standardised format through which market actors can communicate with DSOs and request the data they require. The customer does not typically have access to data in a decentralised model, but will have to contact the DSO for access to data.

1.3 Smart Meter Relevance for Real-Time Access to Consumption Data

The Advice distinguishes between point of delivery identification data, user and contract data and consumption data, as different types of data. We may further distinguish between historical consumption data and real-time consumption data. This is relevant for explaining how access to different types of data is solved in data management models, and why the roll-out of smart metering is relevant in terms of access to real-time consumption data.

An interoperable smart meter with an in-home display, gateway or another technical solution is considered as a prerequisite for access to real-time data. In some countries, the ability of consumers to access and control metering data in the data management model may exclusively be based on their ability to access and control real-time consumption data through smart meters. In other countries, access and control over real-time consumption data may be complementary to access and control over historical consumption data in a centralised or partially centralised data management model. In other countries, the goal of customer access and control may exclusively be achieved through the latter.

In the following review of data management models, we consciously attempt to avoid using the term consumption data interchangeably for both types of data. Instead, the paper will clarify where it is referring to real-time consumption data and where it is referring to historical consumption data.

1.4 Objectives and Purpose

The 2015 Citizens' Energy Forum asked NRAs to follow CEER's guiding principles and recommendations for customer data management in their regulatory activities and report to the Forum on their use. This review will fulfil this objective set out by the Forum, by reviewing the customer data management in European markets in light of the guiding principles and recommendations in the Advice. Specifically, the Forum asked to review whether or not the customer has access to relevant information, and whether or not an authorised third party has access to relevant information. These questions are answered in the conclusions.

The paper is one of CEER's first comprehensive reviews of data management models in European retail energy markets and all data was collected specifically for this purpose. Data was collected from eight regulators, to form part of structured case studies to outline the features of current and future data management models. When gathering data for the review, special attention was devoted to the guiding principles and recommendations of the Advice and the questions of the Citizens' Energy Forum.

The purpose of the review is to exemplify for interested parties how customer data management in retail energy markets may be organised. The review may inform discussions on how to best put the customer at the centre of the retail energy market through adequate and purposeful customer data management. The paper also seeks to exemplify how data management models can contribute to empowering and protecting consumers, encourage their active involvement in the market and enhance competition.

In light of the options on data management presented by the European Commission in the Impact Assessment on the Market Design Initiative, the review will also attempt to provide an overview of how the models stand in relation to these options.

1.5 Methodology and Questionnaire

In order to gather knowledge on how different data management models are relating to the CEER Advice on customer data management, CEER members were asked to contribute information on certain aspects of their DMMs. Eight regulators responded with detailed information about their data management models. These are henceforth referred to as the participating countries.

The participating regulators were asked to contribute with cases and to describe them according to a predefined structured made up of a mix of closed and open ended questions. The eight participants have, with very few exceptions, provided thorough and well-rounded answers. This provides a basis for describing their respective data management models, as well as allowing for a direct comparison with the recommendations provided in the Advice.

The questions were formulated to obtain information on how the data management models of the participating countries function, and how they fulfil the recommendations of the Advice. The participating countries were also asked to describe the model they will have in the future, in order to capture the direction where these countries are heading. Some questions were very detailed regarding certain features of the models, whereas others were more conceptual.

The questions were made up of three main categories. The first category included questions regarding the current and future data management models and about the roles played by the NRA and other relevant actors. The second category was made up of questions derived from the Advice's recommendations. The third category was made up of questions that aimed to highlight experiences and lessons learned. The eight participating countries were made aware of which questions concerned the Advice's guiding principles and recommendations, and which were formulated for other purposes.

Type	Question about
Descriptive questions	Regulation of DMM
	Role of the NRA
	Role of other entities
	Description of DMM
	Planned changes to DMM
	Purpose of changes
	Future DMM
	Metering process, frequency and storage
Advice-related questions	Ownership of data (Recommendation 1)
	Customer rights and information (Recommendation 2)
	Customer confidence (Recommendation 3)
	Harmonisation (Recommendation 4)
	In case of data inaccuracies (Recommendation 5)
	Practicalities of access to data (Recommendation 6)
	Formalities of access to data (Recommendation 6)
	Non-discriminatory access (Recommendation 7)

Barriers to entry and consumer empowerment	Strengths of DMM
	Valuable experiences and lessons learned
	Available studies on presented DMM and other resources

Table 3 - Questions on Data Management

1.6 Participating Regulators

CEER strived to ensure that the participants would provide a variety of examples of data management models. Individual regulators decided whether to participate or not, however the drafting team worked to ensure geographical variety among the respondents. There are obvious differences in answers and between the models themselves. Some models are centralised, some are partially centralised and some are decentralised. Some are designed to handle smart meters, while others have been in use for traditional metering. This variety provides a heterogeneous basis for the review.

Figure 1 - Participating Regulators

2 Options for Data Management Models in the European Commission's Impact Assessment on the Market Design Initiative

CEER has noted with great interest the special attention given by the European Commission to data management in the communication on a *New Deal for Energy Consumers*, and the assessment by the Commission that differences in data management models may represent market entry barriers. This was also recognised by the CEER Advice on Customer Meter Data Management: Recommendation 4 of the Advice encourages MSs to "explore the costs and benefits of harmonising data standards at regional and/or European level". In 2016, the European Commission published its Impact Assessment for the Market Design Initiative,

outlining initiatives highlighted in the *New Deal*. In the Impact Assessment, the Commission follows up by providing concrete descriptions of relevant issues in data management and potential legislative measures to tackle these.

> *Data management comprises the processes by which data is sourced, validated, stored, protected and processed and by which it can be accessed by suppliers or customers.*
> *The necessity to adapt to different data management models for each market can have an impact on the resources of the potential market newcomers. Non-discriminatory and smooth accessibility of data is naturally most important during the pre-contractual phase as well as for running contractual situations. The fact that not all countries have rolled out smart meters yet also creates significant differences in the availability and accessibility of data.*
> *A standardised approach to the provision and exchange of data creates a level playing field among stakeholders and helps to encourage new challenging market actors to enter.*

Box 1 – Data management as a market entry barrier (European Commission Impact Assessment for the Market Design Initiative, 2016)

According to the Impact Assessment, the objective of the European Commission is to ensure a level playing field in terms of access to data in retail energy markets. To achieve this objective, the Commission lists two options where EU legislative measures are envisaged and one status quo option.

Option #	Description
O: No Action	Member States are primarily responsible for deciding roles and responsibilities in data handling.
1: Criteria and principles	Define responsibilities in data handling based on appropriate definitions in the EU legislation. Define criteria and set principles in order to ensure the impartiality and non-discriminatory behaviour of entities involved in data handling, as well as timely and transparent access to data. Ensure that Member States implement a standardised data format at national level.
2: Common EU model	Impose a specific EU data management model (e.g. an independent central data hub). Define specific procedures and roles for the operation of such model.

The Commission has listed option 1 as the most suitable option. Option 1 envisages the definition of common responsibilities, criteria, set principles and standards for data management. The Commission expects this to benefit service providers and consumers, and for it to increase competition in retail markets.

In the following review, CEER will attempt to provide some input on where the participating countries stand as a whole, in relation to the options provided by the Commission, and particularly option 1. For example, we may be able to observe where there are similarities in roles, responsibilities, criteria or principles across all the participating countries.

3 Review of Data Management Models

The participating countries were asked to report on several detailed questions regarding their current and future data management models. Specifically, they were asked about the regulation of data management in their country, the role of the NRA in data management and the role of other entities. In addition, they were asked to describe the current data management model as a whole, any planned changes to this model, the purpose of any planned changes and details about the metering process, frequency of data reporting and storage. The following table provides an overview of the current and future data management models in the participating countries, and the advantages they see in a future model, if relevant.

Country	Current model	Future model	Mentioned advantages of future model
Norway (NO)	DSO-centred decentralised data storage and access*	Centralised data hub and smart meter roll out, Elhub*	Increased efficiency, further ensures fair competition, easier to access data for customers and all authorised parties.
Italy (IT)	DSO-centred decentralised data storage and access*	Centralised hub (SII) and 2nd generation smart meters roll out *	Fostering competition and transparency, while enhancing consistency and effectiveness in cross-operators' data communication. Increasing customers' awareness in their energy consumption and improving their engagement through giving them smart devices to monitor their metering data in near real time.
Germany (DE)	DSO-centred decentralised data storage and access*	Same model, with added selective roll out of smart meters and smart meter gateway will distribute data*	Essentially the same model.
Denmark (DK)	TSO-operated centralised hub storing and managing data*	Updated version of current model*	Increase amount of data that can be handled, support new market roles and greater consumer engagement.
Netherlands (NL)	DSO-owned centralised model data storage** and access.*	Same model, updated*	Enable direct access to data for customers, simplify DSO data collection.
Spain (ES)	DSO-centred decentralised model data storage and access*	Centralised platform for access, with storage at DSO. Added roll out of smart meters, SIMEL	Improve customer engagement, encourage demand response, set grounds for innovation. Simplify access to DSOs databases, with a single contact point with a standard access procedure and a common format database.

Great Britain (GB)	Decentralised model with data only stored at metering point until retrieved by supplier/DSO*	Same decentralised model, with added central communication router, DCC*	Facilitate smart meter roll out, enhance data protection, while increasing data availability.
Belgium (BE)	Partially centralised model with 4 DSO-owned "clearing houses" storing data*	Fully centralised model operated by DSO-owned organisation, CMS	Facilitate smart meter roll out, increase opportunities consumers, prosumers and third parties, customer empowerment.

**Model was described in CEER Benchmarking Report on Meter Data Management (C12-RMF-46-05)*
*** Centralised storage of point of delivery data, user and contract data and historical consumption data. Decentralised storage in smart metering device: real-time and 15 minutes granularity consumption data*

Table 4 - Overview over Data Management Models in Participating Countries

Among the participating countries, 3 (4*) out of 8 have reported to currently have automatic meter reading in their data management models. This is set to change in the future model, where 6 (7*) out of 8 will have automatic meter readings. Metering data will be reported to DSOs in the current and future model of 5 countries, the exceptions being Norway and Denmark, where the data is reported to data hubs, and Great Britain where the data is reported directly to users of the central communication router (DCC). The frequency at which meter data is reported varies greatly, however 3 (6**) out of 8 countries report that meter readings will be reported daily in the future. The granularity of meter readings currently varies greatly, however 4 (6***) out of 8 countries report that they will have hourly granularity in the future. The entity storing the data is currently the DSO in 5 out of 8 countries. In Denmark, the data is stored by the data hub, and the same applies to the reported future model in Norway. In Great Britain, data is stored by users of the central communication router (DCC).

*Germany has reported to have either manual or automatic. **Germany has reported either yearly or daily frequency. Belgium, Great Britain and the Netherlands have reported to have daily frequency (even hourly GB) with smart meters in place. ***Germany has reported to have either yearly or 15 minutes granularity. Also the Netherlands has reported that the granularity of meter data varies from yearly to 15 minutes with smart meter.

	NO	IT	DE	DK	NL	ES	GB	BE
Manual / automatic metering	Manual (Automatic)*	Automatic for smart meters, Manual for metering points without smart meters	SLP: Manual** RLM: Automatic***	Automatic	Manual, Automatic with smart meter*	Manual (Automatic)*	Manual (Automatic)*	Manual
Data is reported to	DSO (DSO and Elhub)*	DSO (SII)*	DSO	DataHub, owned by TSO	Supplier, DSO with smart meter	DSO	Supplier (DCC)*	DSO
Frequency of meter data reporting	Minimum yearly (Daily)*	For electricity: monthly (1st generation of meters) and daily (in case of 2nd generation	SLP: yearly** RLM: daily***	Daily, but can vary	Yearly, two-monthly up to daily with smart meter	Monthly	Various (Monthly /daily/half hourly with smart meter)*	Monthly, daily with Smart meter

		of meters); for gas: various frequencies depending on consumption						
Granularity of meter data	Monthly (Hourly)*	Various****	SLP: yearly** RLM: 15 minutes***	Hourly, but can vary	Various: Yearly, 15 minutes with smart meter	Daily (Hourly)*	Various (daily/half hourly with smart meter)*	Yearly
Entity storing data	DSO (Elhub)*	DSO	DSO	DataHub	Collected by DSO, and passed to supplier	TSO and DSO	Customer/data user (DSO, DCC)	DSO

*Future model (in brackets). ** Standard load profile (SLP). *** Registered consumption metering (RLM). **** For electricity (1st generation of meters): 3 time bands for small customers (< 55kW rated capacity), 15 minutes for mid-size customers (> 55kW); for the future, in case of 2nd generation of smart meters: 15 minutes for all customer; for gas: daily with smart meter >= G10

Table 5 – Metering Frequency, Process and Storage

3.1 Regulation and roles

All participating countries have reported that the NRA is fully or partially responsible for regulating and monitoring data management in retail energy markets, commonly with some assistance by data protection agencies. In some countries, only parts of the legal framework relevant for data management may be placed under energy legislation. Relevant regulations can also be found under generic data protection laws. As there are often different entities with legal competency under different laws, agencies like data protection agencies, metrology services and others can play a role in data management for retail energy markets.

Among the participating countries, the role of the NRA includes the ability to draft, approve, adopt or comment on new regulations regarding data management. However, the extent of the powers granted to NRAs differs. In Germany, Italy and Norway, the NRA has the authority by law to draft and adopt certain new low level regulation. The Danish NRA approves low level regulation suggested by the TSO, while the Dutch NRA approves the suggested rules by suppliers, DSOs or metering companies. In Spain, the Ministry of Industry regulates the rules regarding data management on advice from the NRA and TSO. In Great Britain, the NRA enforces relevant license conditions and works together with the Department for Business, Energy and Industrial Strategy (BEIS) when new regulation is being developed. In Belgium, the Regional Energy Regulators (RER) is in charge of business processes, while the NRA provides advice to policy makers on the roll out of smart meters.

Other actors are also reported to have significant roles with regards to the data management model in the participating countries. This may include DSOs, TSOs or other organisations. In Denmark, Norway and Spain, the central TSOs have a central role in organising the data management model. In Italy, the company that will operate the centralised data management model is independent from both DSOs and other energy companies. In Belgium and the Netherlands, DSO-owned bodies have a similar role. In Great Britain, a private company, owned neither by DSOs nor state, will be operating the central platform for data exchange between actors.

3.2 Current data management models

The participating countries currently have data management models that vary between being decentralised, partially centralised or fully centralised. Denmark is the only country that currently operates a centralised data hub with storage. The Netherlands has a partially centralised model, with centralised communications with multiple databases. Great Britain operates a decentralised model with data typically only stored at metering point until retrieved by the supplier. Norway, Italy, Germany, Spain and Belgium have decentralised models with DSO-centred data storage and access models.

Norway
The current Ediel message exchange model is a standardised but decentralised system for information exchange, meaning that all DSOs are responsible for handling data despite the existence of a communications portal and common standard. This results in complex business processes, as market participants have to speak with each individual DSO to gain access to data. The NRA regulates the exchanging of information in Ediel regarding supplier switching, moving, metering values and customer information. Metering values have to be reported manually, minimum on a yearly basis, from the customer to the DSO, although monthly meter readings are common. Metering values and customer data are stored at the DSO.

Italy
The current model is a decentralised communications model. The data exchange occurs between DSOs and suppliers through a decentralised communications model consisting of direct and standardised exchanges of metering data. The DSO is responsible for meter readings and technical activities, collecting and storing metering data, meter data validation and making them available for market participants on a non-discriminatory basis. Commercial data is held in the SII-system. DSOs and suppliers have to keep to the Privacy Code and other rules on privacy. Metering values are reported automatically on a monthly basis from the customer to the DSO for both hourly and time band meters (whose power is less than 55 kW). For single hourly rate meters (a small percentage of the meters installed), values are manually reported (the frequency depends on the meter power). The metering values, together with customer information data, are stored at the DSO.

Germany
The current model has decentralised data storage and access. DSOs receive the data from the customer and check for plausibility. After the correction of data, if necessary, the DSOs distribute the data to other stakeholders. With the exception of the DSO, only those stakeholders that need data to fulfil their market functions get access to the necessary data. Metering values are reported manually on a yearly basis for Standard load profile (SLP) customers, and automatically on a monthly basis (if remote control is possible) for Registered Consumption Metering (RLM) customers to the DSOs. The granularity from RLM-customers is 15 minutes, whereas the annual consumption is scaled via load shape for SLP-customers. Metering values and customer data are stored at the DSO.

Denmark
The Danish DataHub is a central market platform facilitating all information exchange and market processes between market parties. The DataHub was launched in 2013. Generation 2.0 of the DataHub (owned and operated by the TSO) was introduced on the 1st of April 2016, when the supplier centric model was launched in Denmark. The core of this new market model is to put the consumers at the centre of the market. The supplier is the only

contact point for consumers to the electricity market. Consumers receive only one combined bill for electricity which the supplier generates based on data and price information from the DataHub. The supplier is responsible for paying tariffs and taxes as wholesale services to the DSOs and TSOs. DSOs are responsible for paying taxes to the tax authorities. All market players must sign and agree to the terms and conditions for participation in the DataHub. All metering values are collected by the DSOs and reported to the DataHub from which the information is made available for authorised market actors, end customers and relevant third parties. Consumers can access their own information in the DataHub by using a digital signature (eID/NemID) as unique identification. The suppliers are free to choose how to visualise consumption data to their consumers, though the suppliers shall meet some minimum requirements to make it easy for consumers to have an overview of their metering point. Consumers can fully control how and when energy advisors, service providers and other third parties can get access to their consumption data. The granularity varies between 15 minutes and one hour, and for some metering points quarterly or annual values are reported.

The Netherlands
EDSN, an ICT-organisation owned by all DSOs, maintains several databases. DSOs, suppliers, metering operators and other parties like balance responsible parties have their own access permissions to each of these databases. Both web based real-time interface for humans and nearly-real-time interface for batch commands. Supplier access to for example, consumer metering data, is allowed when the supplier has received explicit informed consent from that specific consumer. If the consumer allows for remote access to their metering device, the supplier has the obligation to remotely collect the metering data (via the DSO) at least every two months. Metering values from traditional meters are reported on a yearly basis from the customer to the supplier into the DSO maintained database. The metering values have a yearly granularity, and are together with customer data stored at the DSO central database maintained by EDSN.

Spain
SIMEL, a DSO-centred model with decentralised data storage and access, is an intelligent system that receives, directly or through other utilities, the hourly energy data which is registered in all meters installed in Spain. That is data from generation facilities, connections between distribution and transmission networks and the supply points of all types of consumers, from large to small consumer industries. Metering values are reported on a monthly basis from the customer to the DSO. With the full deployment of smart metering by the end of 2018, the reporting will be automatic. The metering values from smart meters have an hourly granularity, and are together with customer data stored at the DSO and the TSO.

Great Britain
The current data management model is decentralised, with data typically only stored at metering points until it is retrieved by the supplier. Customers control their own data. For residential customers, most conventional meters keep a running total of the energy supplied and readings are manually taken by a meter reader. The frequency of these meter readings reflect the needs of the consumer or the supplier, which may be monthly. Readings can also be provided manually by consumers. Most conventional meters are not connected to a communication system.

Belgium
The Ediel system for market data exchange is a decentralised model with each DSO having its own data centre. Legally, the data centres are DSO-working companies, which facilitate

several DSOs with common shareholders. Access to the data for market participants is operated through a 'Value Added Network' interface ensuring standardisation. There is also a low-tech access by a web portal with limited functionalities, e.g. for smaller suppliers. Metering values are reported on a yearly basis from the customer to the DSO. The metering values have a monthly granularity. Metering values and customer data are stored at the DSO.

3.3 Future data management models

The future trend among the participating countries is towards increasing centralisation in their data management models, combined with the roll-out of smart metering. Norway and Italy are moving to centralised data hubs, with storage, combined with smart metering. Belgium and Spain are moving to partially centralised communication hubs with storage at DSOs. Great Britain is adding a central communication router (DCC) with smart metering, to its existing decentralised model. Germany is adding smart meter gateways to distribute data within the existing decentralised model.

Norway
The future Elhub data hub is a centralised model for storing historical metering values and customer data, among other functionalities. The prospective go-live date for Elhub is in 2017. The implementation of Elhub will mean that all market participants only have to speak with one data management entity, rather than each individual DSO. DSOs will provide metering and meter point data to Elhub, while suppliers provide customer data for each metering point. The new model improves the communication of business processes, and makes the retail market structure more efficient. With a centralised data hub it will be possible for DSOs to reduce their costs in terms of customer management considerably, and the market will benefit from a single market operator with high ITC competence. With a single market interface, third party access to historical consumption data will effectively be standardised. The NRA (NVE) has required bundled DSOs to split customer data bases by 1 January 2019, meaning that vertically integrated companies will access data through Elhub similarly to non-vertically integrated companies. Customer empowerment through ownership and control over historical metering values is also implemented into the design of Elhub. By accessing Elhub online, using their national ID number for identification, customers will have an overview of stored historical consumption data and be able to manage access, including third party access. When the roll-out of smart metering for 100% of metering points is complete by 1 January 2019, consumers and authorised market actors, including third parties will also be able to access real-time data directly at the smart meter through a standardised interface developed by the Norwegian Electronic Committee (NEK), on initiative from NVE. In the future model, metering values will be automatically reported on a daily basis to the DSOs and Elhub. The metering values will have an hourly granularity, but the system is designed to support 15 minutes granularity if necessary (new market design).

Italy
The integrated information system (SII) will become a central hub for customer consumption data, although some processes such as activation, deactivation and meter reading will still be carried out by DSOs. The SII is bound to operate both for the electricity sector and for the gas sector, even though its implementation is at a more advanced stage with reference to the electricity sector. Moreover, in the electricity market, the NRA is developing a new communication infrastructure to enable the full potential of the 2nd generation of smart meters, which are ready to be installed by most DSOs. The new communication infrastructure encompasses 2 communication chains: the former one, called “chain 1”, will work between the smart meters and the DSO, responsible for collecting metering data and

their validation (the DSOs will then make them available to other operators through the SII with a 24/48 hour delay), whereas the latter, called “chain 2”, will convey non validated metering data from meters directly to the customers thanks to the so called In-Home Devices in near real time. Chain 1 provides metering data with a granularity up to 15 minutes, which is 96 metering values per day, while chain 2 is able to inform customers within few seconds about their consumption. Energy curves collected through chain 1 are made available by DSOs, through the SII, on a daily basis.

Germany
The future data management model will only change in a few small aspects. The basic idea of the German model stays the same as before. Stakeholders, who must get the data in order to fulfil their market functions, are defined by metering point operation law and have the authority to access data. Because of the new technological aspects of smart meters and smart meter gateways, the distributer of the data will change. The result of the German cost-benefit analysis is that Germany will not have a 100% roll-out of smart meters. The meter operators are only obliged to provide smart meters to customers consuming more than 6 000 kWh annually and suppliers (prosumers/producers who feed into the grid) with an installed capacity above 7 kW. For other customers the meter operator has the choice to install a smart meter. The customers and suppliers for which the smart meters are not obligatory will get a modern measuring system in case of a new construction or major renovation. The modern measuring system is not able to send data to the different stakeholders automatically, but has to be able to be connected to a communication system if necessary. In this case the operator of the measuring system will distribute the data to the stakeholders. The metering values for smart meters will have a granularity of at least 15 minutes, and will, together with customer data, be stored at the Smart Meter Gateway or in the meantime, until 2019, with the authorised stakeholders who need the data for their function. The digitalisation law has just entered into force in September 2016. Parts of it will only be effective from 2017 onwards therefore there is no timeline yet. The data distributor for customers or suppliers with a smart meter will be the smart meter gateway (administrator).

Denmark
The regulatory and technological aspects of the DataHub will be continuously improved and developed to meet new requirements from e.g. European Legislation, technological development and changes to the market model etc. Settlement of small consumers based on hourly values will be implemented gradually from 2017 to 2020, which will increase the incentives for end-users to actively take part in the market. The current DataHub ensures a level playing field for all suppliers through standardised processes for registration and distribution of market data, low entry barriers for new market participants, one point of entry for change of supplier and a clear definition of DSO and suppliers and separation of roles.

The Netherlands
Based on the Energy Law, DSOs are obliged to roll-out smart metering devices for the consumer market by 2020. The smart metering devices offer consumers the ability to read their own real-time metering data directly, and offer DSOs the ability to collect metering data (via remote access) on behalf of a supplier or other party. The NRA is responsible for monitoring compliance. For traditional meters, metering values are reported on a yearly basis from the customer to the DSO. The metering values have a yearly granularity, and will, together with customer data, be stored at the DSO central database maintained by EDSN. The structure of the model itself will not be affected.

Spain

The future model will have a centralised platform for access, with data storage at the DSO. Smart meters will be fully deployed by 31st December 2018, and from that date the consumption data corresponding to all customers in Spain will be hourly based. In early 2016 the remote single contact point to access the supply point database was already operational. Currently, new technical improvements for the remote access are being developed and some technical issues that have been detected are being solved. Also, the NRA is currently implementing a system, by which suppliers can download the DSOs databases through a single contact point at the NRA. The DSOs send their databases to the NRA monthly, and the NRA puts them together in a common format.

Great Britain

A centralised data and communications company, DCC, has been set up to provide the communications, data transfer and management for smart metering. DCC will provide access to smart meter data for its users (suppliers, DSOs, energy service companies or other third parties), subject to consumer consent (with certain exceptions, largely where that data is to be used for regulated purposes). The DCC is subject to the requirements of the The Data Protection Act 1998 (DPA), and under its licence, must be a party to the Smart Energy Code (SEC) which details specific data protection measures. All messages containing energy consumption data will be encrypted. DCC does not store, analyse or have access to consumer data. The main regulatory provisions of the Data Access and Privacy Framework (DAPF) came into effect in June 2013, and the DCC is expected to go live during the latter part of 2016.

Belgium

A decision has been made to move to a truly centralised 'hub'-type model, called Central Market System (CMS), as per 1 January 2018. The CMS is financed by all Belgian DSOs to take up the market data facilitation role and will be operated by a company called Atrias, jointly founded and owned by the DSOs. The CMS will be a true hub-interface, connecting the databases of the DSOs on one side, with the data systems of the energy suppliers on the other hand. Where relevant, the TSOs and third parties such as ESCOs and FSPs will also be accorded access to the CMS. Of course, this will be governed to ensure data is only shared where this is supported by market functioning requirements and/or customer mandates. From a supplier's point of view this means that they will be able to communicate to one clearing house instead of different clearing houses. For DSO processes of meter installation, operation, reading, processing, it means an optimisation (economies of scale). It is also, from the customers' perspective, a future proof model (smart and non-smart meter proof) and a flexible model. The data model will also change, towards an XML-based format. Communication standards, data rules and scenarios to facilitate the market which results in communication between CMS and different market players are discussed in market fora and written down. The new set of market data rules that will be implemented in the CMS will be smart meter ready and provide many more opportunities for market participants.

4 Review of Recommendations on Customer Data Management

The CEER Advice on Customer Data Management for Better Retail Market Functioning established five key principles and seven recommendations that should be considered in the design of data management models. The participating countries were asked questions directly related to the seven recommendations, in order to review the current or future status on implementing the Advice. Among the participating countries there is generally a high degree of fulfilment of the recommendations in the Advice, notably they are doing well in terms of the recommendations on privacy, security and non-discriminatory access. There is, however, also a low degree of consideration of the data management models in a regional or broader geographical perspective.

Recommendation 1: Privacy and Security

According to the Advice, customer meter data should be protected by the application of appropriate security and privacy measures. Customers should control access to their customer meter data, with the exception of data required to fulfil regulated duties and within the national market model. The principle should be that the party shall state which information they will collect, with what frequency and for how long.

For the purpose of assessing privacy and security, we have taken the reported future models of the participating countries as a basis. This enables us to assess against planned changes, for example if a country has already identified the need to strengthen their mode within this area. In the future data management model in 6 of the 8 participating countries, the customer will own and control access to historical consumption and customer data. In 7 out of 8 countries, the customer will control or approve access for third party market actors. This is considered as a high degree of fulfilment among the participating countries. In terms of third party access, CEER may report back to the Citizens' Energy Forum that in the majority of our selected data management models, access to data will be granted to third parties and that consumers will control or approve this access.

Category	Respondents
Customers own and control access to data through a data hub, including for 3rd parties	DK, NO
Customers principally own and control access to customer and metering data have to grant access before metering data is collected from remote metering points	NL
Customers legally own and control access to customer and metering data, suppliers have default access to data and customers approve access for 3rd parties	ES, GB, BE
Customers will be informed in advance of how their data is used. However, customers legally own their metering data and only suppliers have default access to their customers' data (consistent with legal provisions). Further, 2nd generation smart meters will improve customer empowerment because they will provide data directly from meters to customers in a secure manner (i.e. each customer can see only data of its own meter).	IT
Metering operators control access to customer and metering data, customers approve access for 3rd parties	DE

Table 6 – Ownership of Data in Future Model

Recommendation 2: Customer Rights and Information

According to the Advice, the relevant body in each member state (DSO/metering operator/other) shall make the following general information on meter data management publically available, as a minimum: (a) the customer's rights with regard to customer data management; (b) what type of customer meter data exists and what it is used for; (c) how customer meter data is stored and for how long; (d) how the

customer and market participants authorised by the customer get access to that data; and (e) within what time period the customer and market participants, authorised by the customer, have to wait to get disaggregated data. This should be ensured by the NRA. The above general information on meter data management should, as a minimum, be published on the website of the relevant body (DSO/metering operator/other) and must be presented in a customer-friendly way.

For the purpose of assessing access to information and customer rights, we have taken what is currently available in the participating countries as a basis. This type of measure could be considered a 'low hanging fruit', especially the minimum requirement of presenting information on a web-page in a customer-friendly way. In 5 out of 8 countries, the minimum requirement is fulfilled, and information about customer rights and the data management model is available online through the website of the NRA, another public body, suppliers and/or DSOs. In the remainder of participating countries, the customers are either informed directly by the entity collecting the data, the information is available in legal texts, or the information is not available altogether. This is considered as a moderate degree of fulfilment, but with little information reported in terms of the specific types of information that is available. Therefore, it is difficult to specifically address how harmonised the available information is. It is also notable that most countries comply with the minimum web-site requirement, but that no country goes beyond this.

Category	Respondents
Information is available through NRA or other public authority website, suppliers and/or DSOs	NO, NL, DK, GB, BE*
Customers are informed directly, orally or in writing, by entity collecting data	IT, ES
Information is available in legal texts	DE, ES

* In Belgium, the Regional Energy Regulators (RER) provide information.

Table 7 – Availability of Information

Recommendation 3: Customer Confidence

In the Advice it is recommended that in order to achieve energy efficiency benefits and other potential benefits, the relevant bodies in each country should take active steps to build customer confidence in sharing customer meter data. Those bodies could be the NRAs, the DSO/metering operator, public authorities and consumer organisations. Active steps to be taken might include information campaigns and the use of energy advisors.

For the purpose of assessing measures to increase consumer confidence, we have attempted to survey what the participating countries believe are the key measures in this regard. 6 out of 8 participating countries report that the ability of the consumer to control access to data is a key measure to increase consumer confidence in sharing customer meter data. In 3 countries, adequate measures for data privacy and security are highlighted as important for consumer confidence. In 3 countries, customer ownership of data is emphasised. In 1 country, the need for fair processing is highlighted. In summary, all these measures may be considered important for improving consumer confidence in sharing customer meter data.

Measure*	NO	IT	DE	DK	NL	ES	GB	BE
Customer ownership of data	+	+	+**		+	+		
Customer control of access to data	+		+	+	+	+		+

Adequate measures for data privacy and security	+	+	+				+	
Fair processing of data		+						

* Please note that these are only selected measures highlighted by the NRA. It is not intended to be complete nor exhaustive.
** In Germany the customer has the data sovereignty, but cannot prevent the use of data by the gateway administrator or any other entitled party.

Table 8 – Measures to Assure of Customer Confidence

Recommendation 4: Harmonisation

The Advice recommends MSs, or any competent authority they designate, to explore the costs and benefits of harmonising national common standards for data format and exchange at regional and/or European level.

None of the participating countries report to have completed a full cost-benefit analysis of harmonising data management standards at regional or European level. Norway and Denmark do, however, report on the existence of common Nordic recommendations on the development of data hubs for the purpose of harmonising Nordic retail energy markets. The participating countries focus mainly on some form of national standardisation of data formats and/or exchange. Germany does, however, mention that it employs an internationally developed and recognised standard, EDIFACT. Belgium mentions that a national standard is applied across all regions, but which reflects regional differences in technical regulations and public service obligations. Conclusively, there is generally a low degree of consideration for regional or European harmonisation of data management and across the participating countries the function, role and extent of data management models will continue to differ invariably.

Category	Respondents
Data formats and/or exchange is nationally standardised	BE, IT, NL, ES, GB, NO, DK, DE

Table 9 – Standards for Data Format and Exchange

Recommendation 5: Cases of Data Inaccuracies

According to the Advice, the relevant body (DSO/metering operator/other) should communicate to the customer any inaccuracies that might have taken place in relation to customer meter data and how these inaccuracies have been addressed (e.g. loss of meter data leading to an estimation of consumption in the bill). The NRA should ensure that measures for addressing these inaccuracies are established in legislation/regulation.

For the purpose of account for new measures and solutions with regards to how data inaccuracies are reported, both current and future models of the participating countries have been used as a basis for this assessment. In 4 out of 8 participating countries, DSOs and/or suppliers are responsible for informing customers of data inaccuracies. In 3 countries, the NRA can impose sanctions on DSOs with poor data quality. In 2 countries, there are other legal or regulatory measures on accuracy, incompleteness and disputes. 1 country reports the ability to check the quality of metering data on the data hub website. 1 country reports the ability to check bill accuracy at a tool at the NRA website. The various measures, solutions and responsibilities in the realm of data inaccuracies suggest that there is a high degree of fulfilment among the participating countries on this recommendation.

Category	Respondents
DSOs' overall quality of metering data is reported on the data hub website	NO

Possibility of checking bill accuracy at tool at NRA website	ES
DSOs and/or suppliers are responsible for informing customers of data inaccuracies	DK, ES, BE
Legal or regulatory measures on accuracy, incompleteness and disputes	NL, GB
Sanctions imposed by NRA on DSOs with poor data quality	NO, IT
Information via invoice by supplier or metering operator (depending on contractual arrangements)	DE

Table 10 – Rules or Standards for Handling Data Inaccuracies in Future Model

Recommendation 6: Practicalities and Formalities of Data Access

According to the Advice, the customer (or a market participant acting on behalf of the customer) should have easy access to customer meter data. This information should, where reasonable, be made available through an adequate channel of the customer's choosing (e.g. an in-home system or by means of a gateway).

For the purpose of assessing access to customer meter data, we have used information about the future models reported by the participating countries to account for any planned changes. Where access to data is referred to in terms of real-time data from smart meters, this is specified. In the future model, in 5 out of 8 countries, metering and customer data will be accessed by market participants directly in a centralised communications platform or data hub. In Spain, only the metering data will be accessed through the centralised platform, whereas customer data will be accessed at the DSOs or through a purpose built database by the NRA. In the Netherlands, an authorised market actor has access to several central databases through a standardised interface. In Italy the NRA is reflecting upon the opportunity – thanks to 2nd generation smart meters - to allow third parties to access the SII and provide customers with advanced reports on their consumption. In Germany, authorised market actors access data by sending messages in a standardised format between them. There is uniformly a high degree of fulfilment in terms of providing market actors with access to data.

Future model: (a) How is customer and metering data accessed by market participants at the entity storing these data?

Category	Respondent
Authorised market participants gain access to data through a central communications platform or data hub	NO (Elhub), DK (DataHub), IT (SII), BE (CMS), ES*, GB (DCC)
Authorised market participants gain access to data stored in groups of central databases through standard interfaces	NL (EDSN)
Authorised market participants gain access to data by sending messages in a standardised format	DE (EDIFACT)
Authorised market participants send data request to DSOs or NRA database	ES**

** Metering data only. ** Customer data only.*

Table 11 – Accessing Data for Market Participants in Future Model

In terms of access for customers, 3 out of 8 countries mention requirements for access to historical consumption data, whereas 2 countries mention access to real-time data, which will be handled through the smart-meter roll-out. Both these forms of access to data are purposeful in terms of the intentions of the recommendation of the Advice, but the degree of

fulfilment overall is relatively low. In 5 countries, it is not reported that consumers will have direct access to data in the future data management model, e.g. through a standard website interface. 1 country has not provided an answer to this question.

In terms of costs for customer access, 5 out of 8 participating countries report that access to consumption data, whether historical or real-time, is free. 3 countries have not provided an answer to this question. In 3 out of 8 countries market actors will pay a fee or costs to get access to historical consumption data. In 2 countries market actors will get the data free of charge. 2 countries have not provided answers to this question.

	NO	IT	DE	DK	NL	ES	GB	BE
Req. for customer access	National ID number in Elhub, real-time smart meter access	To be assessed after deployment of 2g SM)	Legal obligation for standardized access, if requested	Digital signature (eID / NemID)	Customer should get access in future model	Tele-communication	Request to suppliers, free IHD for smart meter real-time access	No access, request to DSOs possible
Req. for market actor access	Trading license	Getaway or application to application access or SII	Internet	N/A	Supplier has access in current model and will have this in future	Compliant IT-system	Privacy and security audit	N/A
Cost for customer access	Free	Free	N/A	Free	Free	Free	Free	Free
Costs for market actor access	Elhub fee for DSOs, suppliers and 3rd parties	Free	N/A	Free	Free	Free	Costs of DCC services recovered from suppliers and DSOs	Administrative costs are charged, tariffs to be decided by RERs*

* Regional Energy Regulators.

Table 12 – Access and Costs to Historical Data in Future Model

Recommendation 7: Non-Discriminatory Access

The Advice states that to support an effective and competitive market, the data management model should not give undue preference to one stakeholder over another. This is especially important in relation to DSO-led smart meter roll-outs; there should be non-discriminatory access to information when and where such meters are installed.

Question to NRAs: Are there any safeguards, legal or other, to ensure equal and fair access to data for all stakeholders? Are the rules prohibiting the exploitation of customer information data by vertically integrated companies, where DSOs is the entity managing the data?

There are a variety of safeguards, legal or other, which are intended to ensure an equal and fair access to data for all stakeholders in the participating countries. Going beyond the

required unbundling regulations, 5 out of 8 countries mention specific neutrality provisions in the legal framework. There seems to be a difference between countries that mention neutrality provisions by law, *de jure*, and by practice through the data management model, *de facto.* 3 out of 8 countries mention *de facto* measures. The Danish DataHub has restrictions that limit DSOs' access to customer information, e.g. the DSO is not able to see the supplier at a specific metering point. In the Netherlands, EDSN ensures equal and fair access to stored data for companies with the same market role, and there are discussions on how to improve access for independent service providers in the future. In Great Britain, the DCC must provide non-discriminatory access to its services.

5 Sharing Experiences and Lessons

Current or planned model: If another country would adopt your planned (or current) model, what recommendations would you give them with regards to (a) customer empowerment and (b) lowering barriers to entry? Are there any pitfalls?

6 out of 8 countries have provided answers that give insight into the experiences and lessons learned from implementing data management models. As part of this review, CEER also gathered information about studies, CBAs and similar reports on the respective data management models.

Norway
To fully prevent non-neutral and discriminatory behaviour from DSOs, Norway sees clear benefits with a centralised data management model that creates a market structure where market actors speak with a single neutral entity to gain access to data. This should facilitate easy consumer access, ownership and control. Norway has experienced that the implementation of a centralised data management and storage system can be a demanding process.

Italy
The Italian market is characterised by a high number of small and medium operators, both in the distribution and in the retail part of the supply chain. Historically, the incumbents which were originally vertically integrated with their retail counterparts, have imposed their communication standards and working procedures even though the situation at the beginning of liberalisation of the sectors, which started in the 2000s, was characterised by a high diversity of procedures, standards and communication protocols. The SII, Italian data management model managed by NRA, has been introduced to overcome these barriers, introducing a more centralised and transparent model that is bound to allow an easier access to the market for new entrants, especially in the retail market with regards to consumer data. With time, the SII is becoming a centralised hub to manage an increasing range of consumer related processes, and a huge repository of metering data, also used for settlement purposes. This solution will guarantee uniformity of treatment across operators and greater transparency and efficiency in all the processes currently managed through the SII.

Denmark
The development of the DataHub was based on a political decision, and a political/regulatory mandate was given to the TSO to develop and operate the DataHub. This decision was vital to ensure progress. Close cooperation and coordination between all stakeholders is necessary. Clear governance, roles and responsibilities between market players (DSOs, suppliers, etc.), TSOs and authorities is necessary.

The Netherlands
Recommends to investigate the possibility to extend the group of market roles that can influence the rules for data storage and data exchange. In line with this, extend the access to the data to include more market roles than DSOs, suppliers, metering operators and balance responsible parties. It is important to take into account the level of access right of each role. In the Netherlands, independent service providers have fewer access rights than suppliers. There are discussions on how to improve this in the future.

Spain
Highlights that proper and effective data access is essential in order to lower entry barriers and costs, and to reduce customer information costs. It is too early to assess the effect of the domestic hourly data and the standardised database for customer information data provided

by the NRA. One pitfall was experienced in November 2015 with a new regulation (Royal Decree 1074/2015), which had too strict an interpretation of confidentiality, resulting in information regarding the address of the supply point being erased from DSOs databases, thus making retailing activity substantially more difficult.

Great Britain
Recommends a centralised data management system and putting consumers at the heart of the roll-out.

Belgium
Experienced that the complexity of the development of the new market rules and setting up the Central Market System resulted in a much longer than expected timeframe for the project, and higher costs than initially estimated.

Conclusions

Among the NRAs that have participated in this review, almost all (7 out 8) report they had, or will have, a change of their national data management model moving from more decentralised to more centralised data management models. All participating countries are also planning to have smart meters in the future, albeit with nationally specific means and scope. This indicates that some form of centralisation of data management is considered necessary to appropriately handle and fully utilise the amounts of data generated by smart meters. The participating countries generally cite efficient data handling, fair competition and easier access to data as advantages of their future models. However, national models will vary not only in terms of technical functionality and the way in which access, exchange and storage of data occurs, but through various constellations of legal frameworks, responsibilities, rules and consumer rights.

The 2015 Citizens' Energy Forum specifically asked CEER to follow the Advice's guiding principles and recommendations for customer meter data management in their regulatory activities and report to the Forum on their use. The Forum also wanted to know whether or not consumers and third parties have access to the relevant information. In terms of recommendations on ownership, control over data and customer rights, this review sees a relatively high degree of fulfilment among the participating countries. In 6 out of 8 participating countries, the customer will in the future own and control access to data. In 7 countries, the customer will in the future approve access to data for third parties. In 5 countries, the minimum requirements for customer rights and information are fulfilled.

In terms of technical access for market actors to customer and metering data, 5 out of 8 countries report that in the future model, metering and customer data will be accessed directly in a centralised communications platform or data hub by authorised suppliers or third parties such as service providers and aggregators, where applicable. In terms of technical access for customers, 3 out of 8 regulators mention that there are specific requirements for customers to have access to historical consumption data. 2 regulators mention requirements for access to real-time data, which will be handled through the smart-meter access. Access to both these forms of data are purposeful in terms of the intentions of the Advice, however as a low number of countries reported that customers will have direct technical access to their data, the overall fulfilment of this recommendation is considered to be relatively low. In terms of measures to ensure non-discriminatory access to data, the participating countries are considered to have a relatively high degree of fulfilment.

According to the Advice, countries should assess the potential for regional or European level harmonisation of data standards. The review found that there was a low degree of fulfilment on this point. Only Norway and Denmark reported to have a shared regional recommendation on the implementation of data hubs.

The lack of consideration for regional and European-level harmonisation is relevant in relation to the European Commission's focus on data management in the *New Deal* and the consequent Impact Assessment for the Market Design Initiative. Considering the results of this limited study, there is little to suggest that the status quo option (0) of the Commission will lead to better cross border harmonisation and lower entry barriers arising from data management models. At the same time, many countries have already put significant investment and development into future data management models, which questions the feasibility of the option of a common European data hub (2). Considering the Commission's "most suitable" option (1) of defining responsibilities, criteria and set principles, the key question is how far potential EU-legislative measures will go in its definitions. Although most

participating regulators have not explicitly assessed regional or European harmonisation *per se*, some degree of harmonisation of criteria and principles is observed in relation to the recommendations of the Advice.

In summary, this review provides an insight into the current and future data management models that should be helpful in CEER's work on a Roadmap to Well-Functioning Retail Markets by 2025. One may learn from the considerations, lessons and experiences that have gone into the design of the various data management models reviewed here. Over the short- to medium-term, the report could function as a tool for best practice sharing among interested parties. Following up on this work, CEER would like to emphasise the need to delve deeper into some aspects of data management models, for example how data management models, technical standards and functions can be enablers or barriers for cross-border supplier activity. CEER will in the future also continue to be an enabler of best practice sharing in the area of data management.

Annex 1 – List of abbreviations

Term	Definition
2g SM	Second generation Smart Meter
AEEGSI	Autorità per l'energia elettrica il gas e il sistema idrico (Italian NRA)
BDSG	The Federal Data Protection Act (Germany)
BEIS	UK Department of Business, Energy and Industrial Strategy
BRP	Balance Responsible Party
BSI	The Federal Office for Information Security (Germany)
CEER	Council of European Energy Regulators
CMS	Central Market System (Future DMM in Spain)
DAPF	The Data Access and Privacy Framework (GB)
DCC	The Smart Data and Communications Company (GB)
DECC	the Department of Energy and Climate Change (GB)
DERA	The Danish Energy Regulatory Authority (Danish NRA)
DMM	Data Management Model
DPA	The Data Protection Act 1998 (GB)
EDIFACT	United Nations/Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) is the international EDI standard developed under the United Nations.
EDSN	Energie Data Services Nederland (Dutch DSO-owned ICT-org.)
ENWG	The energy industry act (Germany)
ESCO	Energy service company
FSP	Flexibility Service Provider (Belgium)
GGP	Guidelines of Good Practice
ICO	The Information Commissioner's Office (GB)
MIG6	Message Implementation Guide 6 (Spain)
MsbG	Messstellenbetriebsgesetz (the Metering Point Operating Act) (Germany)
NPS	Net Paid Services
NRA	National Regulatory Agency
NVE	Norges vassdrags- og energidirektorat (Norwegian NRA)
RER	The Regional Energy Regulators (Belgium)
RLM	Registered Consumtion Metering
SEC	The Smart Energy Code (GB)
SII	Integrated Information System (Future DMM in Italy)
SIMEL	Sistema de Información de Medidas Eléctricas (Spanish metering system)
SLP	Standard Load Profile
SPoC	Single Point of Contact

Table 13 – List of abbreviations

Annex 2 – Strengths, Regulation and Roles in Data Management Models

Regulators' Self-Assessed Strength of Data Management Model

Question to NRAs: Which are the most important strengths of the planned (or current) model with regards to (a) customer empowerment and (b) lowering barriers to entry? What conditions are needed for these strengths to be realized?

Norway
In Elhub, the principles of customer access and ownership to consumption data are considered key to empowerment. Easy access web interface and easy identification will facilitate this regard. Lower entry barriers, by making data more easily accessible for new market actors, including third parties, easier for cross-border suppliers and equitable fee structure.

Italy
SII will make data more easily accessible for new market actors. Customers are set to benefit from increased competition, transparency and more efficient switching processes.

Germany
Considers customer access to data and full control over who gets to access data crucial for empowerment. Generally highlights strict unbundling, standardisation of business processes, technical requirements and strong customer protection as important principles.

Denmark
The DataHub is a supplier centric model that strengthens empowerment by providing one point of entry for changing supplier, efficient handling of metering values, standardisation of communication and market processes, settlement for prosumers, increased transparency, single market access for consumers, access to information for consumers and access for third parties through power of attorney. This market model is creating incentives for suppliers and third parties to create new products and services. The DataHub ensures functional unbundling for all market actors.

The Netherlands
The main strengths of ESDN are centralised and nationally standardised rules and implementation. Previously the system was decentralised and suppliers needed contracts with each individual DSO. Consumers with a smart metering device can access data through the local access port on the metering device.

Spain
Empowerment is strengthened by guaranteeing customer access to data. However, the main issue for empowerment is the low benefit for consumer activity in energy markets in general, in terms of monetary gain or valuable services. A single point of contact for all DSO databases, and a common data format, guarantees neutrality, non-discrimination and efficient processes.

Great Britain
Empowering consumers and providing a platform for new consumer devices and services is at the centre of the Great Britain approach. Consumers will be able to access their data through an in-home display. By giving consumers control over who can obtain and use their data, it provides an incentive on suppliers and third parties to offer services that the

consumer values in exchange for providing that data. Another strength of the model is the centralised data management system using the DCC. This creates a market structure where market participants speak with a single neutral entity to get access to data.

Belgium

Both current and future models provide low-cost access to data, thereby ensuring that this does not represent an entry barrier for new market actors. The future system will strengthen consumer empowerment, as it will enable new services and their use as a consumer and/or prosumer.

Country	Category
Italy (IT), Norway (NO)	The NRA is responsible for regulation and monitoring compliance.
Germany (DE)	The NRA and the Federal Commissioner for Data Protection are responsible for monitoring compliance. Customer data management is regulated in the Federal Data Protection Act (BDSG) and in sections 49 and 66 – 70 metering point operation law (MsbG).
Belgium (BE)	The Regional Energy Regulators (RER) are responsible for monitoring compliance. Detailed regulation is dealt with by the Technical Rules, laid out and enforced by RER.
Spain (ES)	The NRA is responsible for monitoring compliance, and the Ministry of Industry is responsible for regulating.
The Netherlands (NL)	The NRA is responsible for monitoring compliance. DSOs, suppliers and metering operators are responsible for specifying rules for storage and exchange of consumer data. These rules are subject to NRA approval.
Denmark (DK)	The NRA is responsible for monitoring compliance, and the TSO is responsible for regulating. The NRA also approves methods within the TSO's regulations.
Great Britain (GB)	Current: The Information Commissioner´s Office (ICO) is responsible for monitoring compliance. Customer data management is regulated in the Data Protection Act 1998 (DPA). Future: Information Commissioner responsible for monitoring compliance with DPA, NRA responsible for monitoring compliance against distribution and supply license conditions, additional regulations also set out in the Smart Energy Code (SEC).

Table 14 – *Regulation of Data Management Models*

Country	Category
IT, NO	The NRA has the authority to develop and implement new regulations.
DE	The legislative authority develops new regulations and gives the NRA the competence to define specific determinations on selected subjects.
DK, NL	The NRA approves new regulatory change or improvements in customer data management proposed by TSOs, DSOs, suppliers or metering operators.
GB	NRA is responsible for approving changes to supplier or DSO licence conditions and industry codes. It also provides support to the Department for Business, Energy and Industrial Strategy when new regulation is being developed.
BE	The Regional Energy Regulators (RER) elaborate technical rules and requirements.
ES*	NRA sends a feedback report prior to a new regulation or regulatory change

*However, regarding switching procedures, NRA approves formats and procedures for message exchange systems by taking into account stakeholders views and looking for maximum consensus.

Table 15 *– Role of the NRA in Data Management*

Country	Answer
NO	The Norwegian TSO, Statnett, operates the standardised message exchange system Ediel. Statnett is also mandated to develop the new centralised data hub for the electricity market, Elhub. In the existing model, DSOs are responsible for registering and storing metering values, making these available for market participants on a non-discriminatory basis. DSOs are required by regulation no. 301 to collect metering values every three months. With Elhub and smart metering, all metering values will be reported automatically every day to Elhub, which will be the sole entity responsible for data management.
IT	Both the SII and the DSO are responsible for providing suppliers with data. The NRA has the responsibility for coordinating and developing customer data management policy. A third party company (AU) owns and develops the SII (Integrated Information System) on NRA's behalf. The SII is responsible, along with the DSO, for providing customer data. In the near future the SII will get a more central role. It will host a complete database of customers' records and meter data and it will become a central hub for cross-operator data communication, with decreasing responsibilities for DSOs. *Current model* a) The information exchange occurs between DSOs and suppliers through a decentralised communications model consisting of direct and standardised exchanges of information/meter data between a DSO and a supplier; b) The DSO is responsible for: meter reading and technical activities; collecting and storing metering data; meter data validation; making them available for market participants on a non-discriminatory basis. Commercial data are held in the SII; c) DSOs and suppliers have to keep to the Privacy Code and other rules on privacy *Future model* a) The information exchange will occur between the DSO and the SII and between the SII and the supplier. Meter, technical and commercial data will be held in the SII (commercial data are already held in the SII); the SII will be responsible for making them available to suppliers; b) The DSO is responsible for: meter reading and technical activities; collecting and storing metering data; meter data validation; c) The SII, DSOs and suppliers have to keep to the Privacy Code and other rules on privacy; d) with 2nd generation smart meters data (non-validated) will be also directly available in real time at home, through users' in home devices (IHDs)
DE	The Federal Office for Information Security (BSI) is commissioned by the German government with the development of security and interoperability requirements for German Smart Meter Gateways, additional components and services. Privacy requirements by the Federal Commissioner for Data Protection and Freedom of Information (BfDI) are directly integrated in technical specifications (protection profiles and technical guidelines).
DK	a) Energinet.dk (Danish TSO) administrates the DataHub. The suppliers are responsible for customers' data (responsible in registration of customer information etc.). The DSOs are responsible for data of metering points (registration of disruption of grid connection, new grid connection etc.). b) Again, Energinet.dk has the responsibility of storing, metering, collecting and to secure the validation of data. c) Energinet.dk is responsible for being in compliance with the EU directive on data protection. The directive is incorporated into Danish law.
NL	a) EDSN (an ICT-organisation owned by all DSOs) is responsible for the implementation, the maintenance and the technical development of the central databases and the communication protocols. b) The DSO's, suppliers, and metering operators are obliged to co-operate to setup the rules for storage and exchange of consumer data. The NRA has to approve these rules. The DSOs

	suppliers, and metering operators each implement these rules in their ICT, and EDSN (on behalf of the DSOs) implements these rules in the ICT of the central databases. c) The central database contains lots of consumer data. The DSOs are responsible for the protection of this data against unauthorised access, unauthorised alteration or unintended loss. The suppliers and third party service providers are responsible for ensuring that they have informed consent of the customer to access the data. The data protection agency is responsible for enforcement of the data protection law.
ES	*Metering system (SIMEL)* a) TSO manages the Spanish metering system (SIMEL) and is responsible for its proper functioning. New model: Smart metering full deployment, at least hourly data. *Customer data* *a)* • DSOs develop supply points databases. Decentralised model. Current model • New model: Additionally to the decentralised model, CNMC offers a single database (merging DSOs databases) *SIMEL* b) • TSO meters and collects data of some network points (boundary points) and the rest of the network is collected and metered by the DSOs. • DSO meters and stores its network data (“concentrador secundario”). • TSO stores at least big consumers and domestic consumer data (“concentrador primario”). • Metering agents are responsible for validation (so TSO validates its metered points and DSOs validates their own) • In case of regulation breaches in the data handling detected, the TSO communicates it to the CNMC and the Ministry. The CNMC performs inspections to verify such breaches. *Customer data* b) • DSOs collects, stores and gives access to their data • New model: CNMC also collects DSOs’ databases and standardises the format constituting a single contact point for suppliers to access them. c) Each agent (TSO, DSO, CNMC) is responsible for the data they store. The NRA also collects DSOs’ databases and standardises the format constituting a single contact point for retailers to access them.
GB	*Current model* a) System – the Department for Business, Energy and Industrial Strategy (BEIS) has the primary role in developing customer data management policy. b) Data management - responsibility for collecting meter data lies with suppliers, c) Data protection - customer data is subject to the protections of the Data Protection Act 1998 and its eight protection principles. Compliance with the Act is overseen and regulated by the Information Commissioner’s office. *Future model* a) System – responsibility for the data management system will continue to rest with BEIS. b) Data management – the DCC will act as a communications hub, connecting DCC users (suppliers, DSOs, energy service providers or other third parties) with smart meter data c) Data protection – customer data will continue to be subject to the Data Protection Act 1998, overseen and regulated by the ICO. In addition, the Data Access and Privacy Framework and

	Smart Energy Code will place further protections on how data is used.
BE	a) Metering system: The DSOs manage the Belgian metering systems and are responsible for the proper functioning of the data processes. New model: Data management will be handled by the Central Market System, which will act as a hub for data transfers and is future proof, meaning its processes are Smart meter ready. Customer data: • Current model: DSOs manage supply points databases. Decentralised model. • New model: the Central Market System will centralise crucial customer data, but direct access by customers is not foreseen at the first stage of development. b) MIG 4 (current market data model – Message Implementation Guide version 4) • TSO meters and collects data of some network points (boundary points and big industries which are connected to the TSO grid directly) and the rest of the network (distribution grids) is collected and metered by the DSOs. • DSO meters and stores its network data. • Metering agents are responsible for validation (so TSO validates its metered points and DSOs validates their own) Customer data • DSOs collects, stores and gives access to their data. Metering data are transmitted to suppliers for billing and switching purposes through the VAN network (current model) • New model (MIG 6): TSO/DSOs collect, store and provide access to their data. Metering data is transmitted to suppliers for billing and switching purposes through the Central Market System (future model). c) Each agent (TSO, DSO, regulators) is responsible for the data they store.

Table 16 – Other Roles in Data Management

About CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national regulators of electricity and gas at EU and international level. CEER's members and observers (from 35 European countries) are the statutory bodies responsible for energy regulation at national level.

One of CEER's key objectives is to facilitate the creation of a single, competitive, efficient and sustainable EU internal energy market that works in the public interest. CEER actively promotes an investment-friendly and harmonised regulatory environment, and consistent application of existing EU legislation. Moreover, CEER champions consumer issues in our belief that a competitive and secure EU single energy market is not a goal in itself, but should deliver benefits for energy consumers.

CEER, based in Brussels, deals with a broad range of energy issues including retail markets and consumers; distribution networks; smart grids; flexibility; sustainability; and international cooperation. European energy regulators are committed to a holistic approach to energy regulation in Europe. Through CEER, NRAs cooperate and develop common position papers, advice and forward-thinking recommendations to improve the electricity and gas markets for the benefit of consumers and businesses.

The work of CEER is structured according to a number of working groups and task forces, composed of staff members of the national energy regulatory authorities, and supported by the CEER Secretariat. This report was prepared by the RMF Task Force of CEER's CRM Working Group.

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More information at www.ceer.eu.