European Smart Grids Task Force
Expert Group 1 – Standards and Interoperability

"My Energy Data"

November 2016

"My Energy Data"

Smart Grids Task Force

Ad hoc group of the Expert Group 1 – Standards and Interoperability.

Date: November 2016

DISCLAIMER

This document is the result of the consensus reached among experts of the ad hoc group under the Expert Group for 'Standards and Interoperability for Smart Grids Deployment (EG1) within the European Smart Grids Task Force.

The European Commission has facilitated the consensus achieved among the stakeholders participating and participated in meeting as observer. This document does not represent the opinion of the European Commission. Neither the European Commission, nor any person acting on the behalf of the European Commission, is responsible for the use that may be made of the information arising from this document.

Contents

Executive summary

With smart meters being deployed across Europe, the amount of data that will be available about energy consumption will raise tremendously. This trend will be amplified by the development of IoT devices, that, deploying additional sensors, will lead to an exponential increase in the possibility to gather data. To fully reap the potential benefits for the energy market and consumers in general , it must be ensured that a trusted mechanism is in place for consumers to access and manage their data.

The existing European regulatory framework provides a sound base, whereas some of the European policy currently being drafted, such as the Winter Package and the European Data Economy initiative, could help address and further clarify questions raised by consumers and market operators.

Against this background, the Smart Grid Task Force EG1 ad hoc group on "My Energy Data" was launched on 22 April 2016, with the aim to get an overview of some of the existing initiatives on data access and data management in the field of energy distribution, to identify possible obstacles for controlled data access and data management, and to **explore at EU level the potential for and scope of a possible industrial initiative on a common format for energy data interchange**. The ad hoc group produced an initial analysis and opinion in July 2016, setting the preliminary framework for the present report.

This report, produced in a short timeframe, analyses related ongoing initiatives from ten Member States, as well as the North American Green Button initiatives, and frames initial considerations for such an industrial initiative on "My Energy Data".

The ad hoc group considered some implementation issues which will most likely arise as well as lessons learnt. In this sense, their work clearly shows how practices in Member States differ, while how to organize that "customer is in control" is a European wide issue– which, if well addressed, can significantly contribute to opening the European internal market for future Energy Services.

The ad hoc group which has prepared this report is composed of energy data stakeholders, in electricity, gas and other (energy) sectors such as heating, already involved in developing such services or exploring how "My Energy Data" services could be introduced. Thus, the ad hoc group is not representative of any one group of energy actors, but is rather composed of stakeholders seeing value in collaborating or exchanging information on approaches and/or considering a joint project in this area. The Commission has participated in these discussions as observer and facilitated the consensus among the industrial stakeholders participating in the ad hoc group.

All members have recognised the **urgent need for a concrete solution** to be proposed, as many projects are already under development and more are coming.

The report draws conclusions from its analysis related to the opportunities and benefits of an **open** industrial initiative for its participants. Such an initiative promoting a common solution for energy data exchange could enable the setting-up of a level playing field for the provision of multi-energy services facilitating their deployment, and creating a consumer-friendly mechanism that supports smart services. A common data format and model, would inter alia, allow unified hardware procurement, better alignment and co-operation with international partners and on international markets, and facilitate service **interoperability**: a service developed in one national market could easily be sold in other markets.

Finally, based on the benchmarking of some existing practices, the report proposes a solution which is a composite drawing of the best suited overall format and it is worth exploring. A common format would necessarily be built on top of what so far exists, given that Member States are already testing different approaches; it would nonetheless ensure interoperability and facilitate energy services market development. The ad hoc group is confident that an industrial initiative on the adoption of a common format can rely on existing work and produce concrete outputs within a year. Positive response concerning joining such an initiative has already been shown by the majority of the participants of this ad hoc group.

On the way forward, a Memorandum of Understanding will be drafted and proposed in early 2017 for signature by a core group of industries interested in the initiative, with the posibility for other participants to join at a later stage of the process. In January 2017, a first meeting to prepare such an initiative will be held following invitation to all interested stakeholders.

1. Introduction

Smart meters and sensors will lead to a steep change in the amount of data that will be available about energy consumption. This will assist consumers, help the industry to operate more efficiently and can enhance competition in the developing energy services market.

However, concerns about data access and privacy have been raised in many countries rolling out smart meters. It continues to be important to give consumers clarity and reassurance about the ways in which their energy consumption data can be accessed, by whom, for which purposes, and their choices about this.

Most importantly, to support energy transition and development of energy services it is key that consumers have access to trusted mechanisms to manage their data and create value with it, while being in complete control of their private lifestyle.

2. Scope

This report is intended as preparatory work, exploring the potential for and scope of a possible 'industrial initiative' concerning 'My Energy Data'. My Energy Data is the term adopted in this report as a generic description of services to offer customers the possibility of downloading their energy consumption information and granting access to third parties to that information to enable service providers to offer analytical and other services to customers.

The focus of this report is My Energy Data services to domestic/residential consumers, covering electricity, gas and potentially other forms of energy.

3. The Ad Hoc Group Process

The Ad hoc Group which has prepared this report is composed of companies/organisations already working in developing such services or interested in exploring how My Energy Data services could be introduced. The group is therefore diverse in its nature, and composed of stakeholders who see value in collaborating or exchanging information on approaches and/or considering a joint project in this area.

The group has considered a number of Member State examples of My Energy Data services, in order to learn from experiences to date. The work does not claim to be a comprehensive overview of all such initiatives. The report considers some implementation issues which have arisen or will most like arise in the future, and lessons learnt.

The report goes on to draw conclusions from its analysis related to the opportunities for an industrial initiative. The conclusions, which express the opinion of the group, should be seen as

identifying some of the provisional findings of the work so far and setting a framework for further work within the industrial initiative. They may also be helpful in assisting those not participating in any future industrial initiative.

4. Legislative framework & Role model

My Energy Data services are primarily subject to the EU General Data Protection Regulation (GDPR) 2016/679/EC, the Energy Efficiency Directive 2012/27/EU, the Electricity Directive 2009/72/EC, the Gas Directive 2009/73/EC and further country-specific legislation.

The GDPR establishes the overall requirements on the protection of natural persons with regard to the processing of personal data and on the free movement of such data which shall be directly applicable in all Member States from 25th May 2018. It addresses the tasks, rights and responsibilities of and the interactions between the following roles:

- Data subject
- Controller
- Processor
- Recipient of data (whether a third party or not)
- Data protection officer
- Supervisory authority

Within the specific scope of the GDPR, the data subject has the right of access to his/her data and be able to control the (third) parties with whom the data is shared. Access and control should be defined via authentication and consent mechanisms.

The Controller determines the purposes and means of the processing of personal data. The processor processes personal data on behalf of the controller, which might include collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction. Both controller and processor are advised by a data protection officer who is in charge to monitor compliance with this regulation and cooperates with the supervisory authority.

These roles interact with each other in order fulfil the key requirements of the GDPR, mainly:

- Lawful, fair and transparent processing of personal data;
- Consent mechanism to the processing of personal data;

- Transparent information and communication towards the data subject, e.g. in case of a personal data breach;

- Access of personal data by the data subject;

- Data subject's right to object, rectification and erasure ('right to be forgotten');

- Data subject's right to portability of personal data from one controller to another;

- Data protection by design and by default;

- Processing of data outside the EU;

- Documentation of processing activities.

The following figure shows the basic interactions between the roles of the GDPR in order to fulfil the above-mentioned requirements.
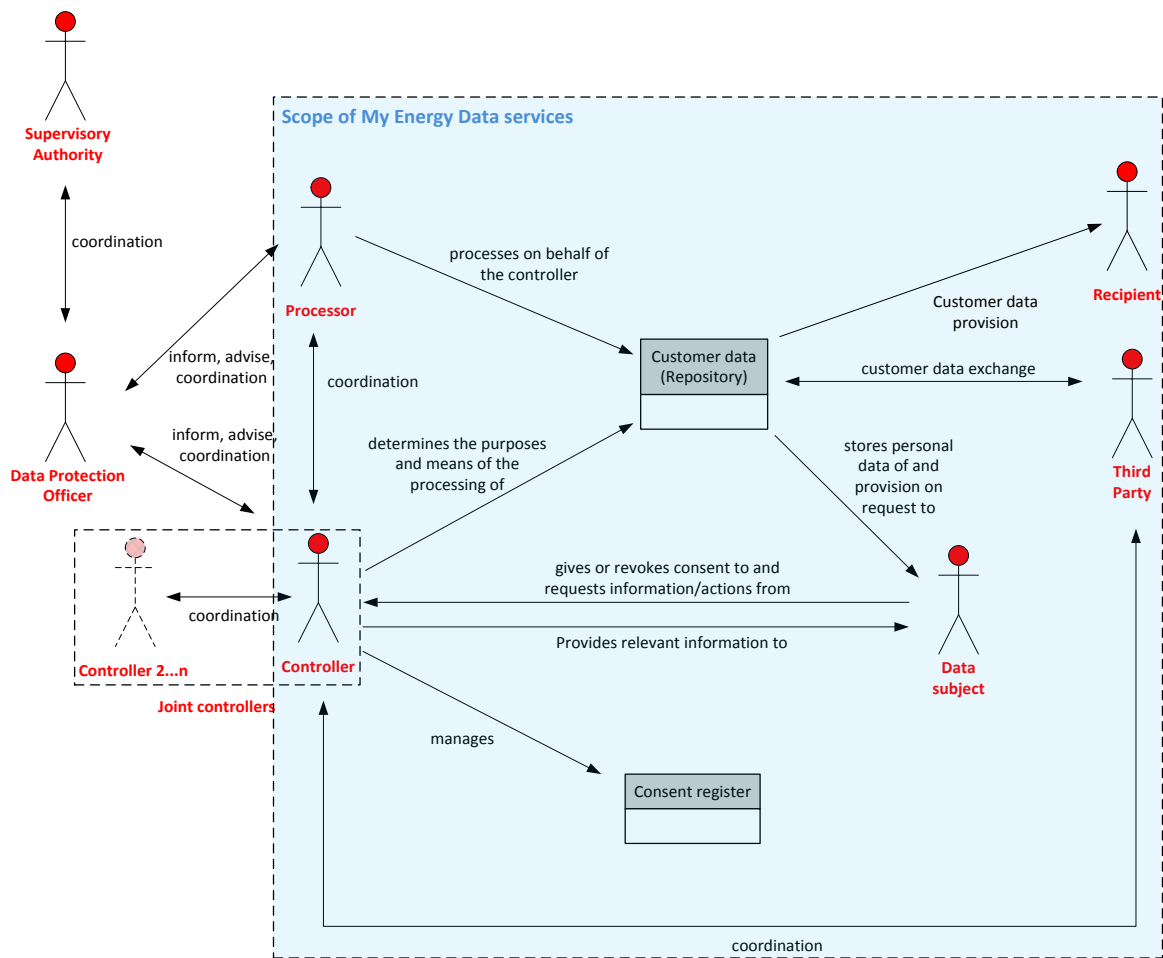
Figure 1 – Interaction model of GDPR roles in scope of "My Energy Data" services

Referring to My Energy Data services, further roles related to those established in the GDPR are mainly outlined in the Energy Efficiency Directive 2012/27/EU, the Electricity Directive 2009/72/EC and the Gas Directive 2009/73/EC, but also subject to other established role models in the European energy market (such as, for example the role defined by Ebix, EFET and ENTSO-E, commonly known as the harmonized electricity market role model).

A more comprehensive mapping of the roles from the GDPR to those of other regulations and role models can be found in annex 3.

To synthetically represent the main roles related to the delivery of "My Energy Data" services, the business related roles represented in following figure are proposed by the Task Force.

Figure 2 – Comprehensive roles model related to "My Energy Data" services

5. Short overview per country

A number of Member States are working to provide services involving consumption data being able to be downloaded by the customer or shared with third parties approved by the customer. This section provides a short overview of some of the present initiatives – for further detail, see Annex 7.
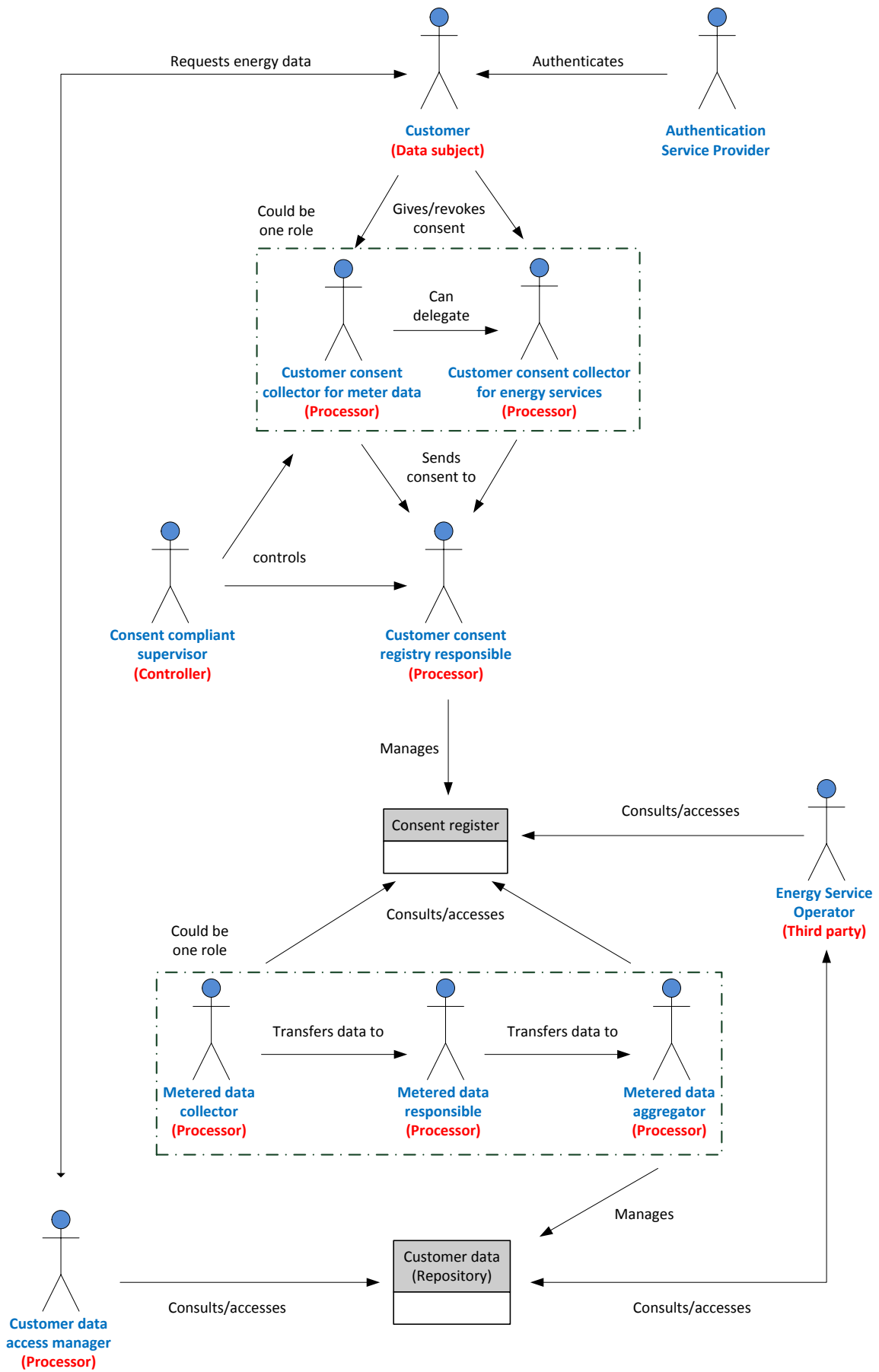
a) Belgium

The Belgian privacy legislation sets out general rules on consent (not only on energy issues). Specific provisions on smart meters will be provided by the Data Protection Impact Assessment (DPIA) that should be ready by the end of the year. The main issues under consideration concern:

- A Data-access-register and data-access-contracts, (to be regulated by the end of the year).
- Download locally (consumer portal) and "download structural messages" operated by a central data hub owned and operated by the DSOs (single Belgian central clearing house – 2018).

The DSO is the actor responsible for the metering process, including for the smart meter. The customer access to data depends on the choice of metering regime (low data access = yearly or high data access = quarterly data) and foresees an implicit consent.

A DSO can transfer customer data to third parties only if there is the consent of the customer. The DSO stipulates the contractual agreement and the conditions of data-access for third parties.

The control of contractual agreements and certification of third parties is perceived as unclear at the moment. Moreover, there is no clear framework concerning the use of data by DSO for public interest without prior consent (e.g. detection of frauds, detection of power quality problems, etc).

In Belgium roll-out of smart meters has not taken place yet.

Flanders Eandis

The service provided in Flanders by Eandis, enables both customers with smart meters and without smart meters to have access to their data via a web page. Customers can also access their consumption data via a webtool or export their files. Consumption history is available via the Eandis website.

It is being planned to allow supplier and/or third parties to receive consumption data via electronic messaging, which could be used for customer web based appliances as well.

Historical information (yearly consumption over the last three years) is a right guaranteed to all customers by the legislation. Moreover, monthly information flow is provided from the DSO to the supplier and, depending on the choice of the consumer, the DSO provides to the supplier 15 minutes' electricity data and hourly natural gas data, updated once a day (no real time, which is only accessible via the gate or the meter) to the supplier.

b) Denmark

Denmark has developed a central DataHub, which through uniform communication and standardised processes handles the interaction between the players in the electricity market.

The DataHub is already in operation. It is owned and operated by Energinet.dk, the Danish TSO. Energinet.dk has established codes that set the rules for the use of and the access to the DataHub.

Actors (DSOs, suppliers or third parties) who want access to the DataHub must sign agreements in which they warrant to comply with applicable legislation, including, in particular, the Danish Act on Processing of Personal Data.

The DataHub handles electricity meter data and business processes for all 3.3 million metering points in Denmark of which around 2 million are smart meters, and the market players exchange information about customers' consumption, move-in, move-out, etc. through the DataHub.

The customers do not have direct access to the DataHub, but can access their data through a web portal which is set up by the supplier or by using a web portal common for all suppliers, called eloverblik.dk. Electronic authentication called NemID[1], must be used to get access to the data.

Through these web portals the customers can also grant third party access to their data by using NemID, therefore DataHub (i.e. Energinet.dk) acts as consent manager. With the centralised system, the supplier is the only responsible for the contact with the customer.

The DataHub handles 15 minutes readings, where it is required for billing. For all other purposes, only hourly values are provided. The format supports 15 minutes, hourly, monthly, quarterly and yearly time resolutions.

Information on DataHub are updated maximum five days after the day of consumption/production, depending on the time required by DSOs to collect and update data[2].

New smart meters in Denmark must offer to customers the possibility to connect an external unit to the meter and continuously extract data. Thus, so far, this option has only been used by a very limited number of customers, probably due to the cost of such units.

c) Estonia

Estfeed

In Estonia, the Energy DATA FEED PLATFORM (Estfeed) project has been launched in 2015. The initiative aims at designing, implementing and testing an open software platform for energy consumptions monitoring and management from the customer (consumers/prosumers) side capable to interact with the energy network and to provide data feeds for an efficient use of energy. The project aims to build a software platform capable to integrate multi energy data sources and to

---

[1] www.nemid.nu
[2] In many cases data is uploaded within 24 hours of the consumption/production hour.

provide appropriate services to convert these data into valuable information for energy flexibility management, audit and benchmarking.

Estfeed is a consortium of five entities. The Estonian electricity and gas transmission system operator Elering, is the neutral party that will provide data sharing services.

Estfeed provides information via apps, concerning hourly electricity consumption, hourly electricity generation. Information on gas consumption and central heating consumption will be provided in the future. The information is updated daily.

The consent mechanism covers both the download and the share with third party possibility. Data is stored in the utility (DSO, TSO, DNO) database and transported only when the applications need it. There is no central database. The Security server can send messages and control the exchange of messages between different parties.

After the pilot and development phase, Estfeed will be open to the public at the end of 2016.

d) Finland

In Finland, in spring 2015, the Finnish Government has selected the TSO Fingrid as a "neutral stakeholder" and given them the task a) to solve the information exchange needs of the market players, b) to enable innovative third party solutions and services, c) to manage the data security and privacy issues.

The Datahub regulates the data access and privacy issues, controlling information exchange and authorizations. The customers control their authorizations electronically using Datahub services that can be entered through each energy company web pages.

Energy companies must get an authorization to be able to give the smart meter or other personal data to the third parties. The data can be used to manage the market processes (e.g. to invoice the present customer) on contractual basis without additional authorizations.

In the Datahub there are customer data, smart meter data (6 years' history), contract and invoicing data plus an extensive list of voluntary data fields (e.g. storage capability of the smart metering point).

The Datahub project encompasses both download and share my data.

e) France

DSOs are together responsible for Energy Individual Data Protection, and they must ensure access to individual customers to their own energy data via a secured web portal[3]. Individual customers must also be able to share - or authorize DSOs to - share their data to any authorized third party (through express customer consent). However, the consent process for individual customer is not yet fully defined (in particular roles and responsibilities of DSOs and Providers/third Parties).

---

[3] As per deliberation of *Commission de régulation de l'énergie* and *Code de l'Energie*.

Enedis

Enedis (the major French electricity DSO) has started the roll-out of smart meters and has launched pilot projects to provide customers access to their data (via Linky) as well to transfer their data to third parties (Solenn).

The Linky system is for electricity data only. The download of daily data from the DSO web portal is possible at any time for customers in a simple standard file format. Enedis, however is working on an alternative file format, basing on the IEC international data model CIM, which could be used as a starting base for the next steps in this ad hoc group to build a common interoperable standard.

Customers with an online account are provided by default, with maximum two years of historical data, consumption and production data in annually, monthly, daily resolution, and daily maximum power consumed. If customers have specifically asked for it, they are provided with consumption and production data in 30 minutes' intervals, for a maximum of two years of historical data. The DSO may have access to half hourly data without collecting consent only for operating needs, in a limited timeframe and specific area.

Besides, consumers can also directly access their consumption data in near real time through the connection of adapted devices to the smart meter.

f) Germany

Implementation of smart meters according to the Law for the digitalization of the energy transition (GDEW), will start during the first quarter of 2017. The law will cover metering data, market communication, contractual arrangements related to metering, electricity/gas heating/district heating.

Metering data will be stored directly at the smart meter device. Data up to 24 months can be downloaded either directly from the smart meter or from a server/database via the internet at any time by the customer (download my data) and shared with third parties (transfer my data). The supplier, who has the right to use the data, is obliged to delete all person-related metering data after the completion of his tasks. However, at the moment there is no clear definition concerning options to transfer the metering data out of the meter electronically.

Powerfox

Powerfox, one of the first initiatives rolled out, focuses on collection of electricity data only, Multi-energy data collection is planned from 2017 onwards. Residential customers don't have yet access through a webpage, but the service should be available in the near future. Direct access is available via an app solution for Android and it is planned for IOS in 2017.

Information on consumption data is collected in 1-minute resolution and displayed in free scalable time horizons by hourly and 7 days' horizon by 15 minutes' aggregations.

Information on generation data is collected in 1-minute resolution and displayed in free scalable time horizons by hourly and 7 days' horizon by 15 minute' aggregations.

Information on operational data (i.e. voltage) is provided in 15 minutes' resolution in stream but not saved. This data can be forwarded to partners interested in. Currently this data persists in streams of seven days, however this may change in the future with increased volume.

In addition, benchmarking with average consumption values in Germany is also provided.

The information is updated with 15- minutes maximum time delay for consumption and 1-minute delay for operational data, due to internal aggregation of values.

g) Great Britain

Through the Smart Metering Implementation Programme and consistent with the UK Government's broader "midata" initiative, arrangements have been put in place to enable domestic consumers to easily access their own energy consumption data. Consumers will be able to access their own energy consumption data through:

- Their In-Home Display (offered to all households free of charge) in near real time;
- The connection of additional devices to a Home Area Network as part of their smart metering system;
- Requesting information from their supplier;
- Authorized third party organisations (such as switching websites) to access their consumption information directly from their smart meters via the Data and Communications Company (DCC)[4].

In order to protect consumer interests whilst enabling proportionate access to data by energy suppliers and others, a Data Access and Privacy Framework has been established. The central principle of this Framework is that domestic consumers will have control over how their energy consumption data is used, except where this is required for billing or other regulated purposes.

Data can be accessed by authorised parties (subject to consumer consent) directly from the smart metering interface in the premises or through the Data and Communications Company (DCC). The solutions available address both "download my data" and "share my data".

In addition to energy suppliers and network operators, authorised third parties of the DCC, such as price comparison websites, home automation services and energy efficiency advice providers (as well as prospective suppliers). These third party users must obtain the explicit consent of the consumer before accessing their consumption data through the DCC.

In order to protect consumer interests whilst enabling proportionate access to data, a Data Access and Privacy Framework has been established. The central principle of this Framework is that

---

[4] Central body responsible for managing communication infrastructure.

domestic consumers will have control over how their energy consumption data is used, except where this is required for billing or other regulated purposes.

Smart meters store 13 months of half hourly data for electricity and gas. Most energy suppliers rolling out smart meters offer the ability to view the data on their website. 30 minutes' data is available remotely, while 10 seconds (electricity only) is available via the smart meter.

Information can be available on real time or updated every day, depending on the energy supplier, customer proposition and whether the access is granted via an app or the webpage.

h) Italy

The DSO is the actor responsible for the metering process. The retailer has a legal agreement with the customer and therefore the customer's consent to receive his metering data from the DSO. Monthly metering data per time band of Low Voltage customers (contractual power below 55kW) are sent to retailers for invoicing purposes.

A central database operated by Acquirente Unico Spa, called «Integrated Information System» (IIS), collects commercial and metering data from all the DSOs and manages the exchange of these data with the TSO (for balancing) and with retailers (for invoicing purposes).

Regulation about metering data exchange between the DSO and third parties is under discussion. The Regulation is not yet finalized on 1) customer consent to third parties different from the retailer 2) customer consent for the communication between the meter and the visualization field devices within the Home Area Network (HAN).

The DSO's remote metering management system will have to deliver the customers' load curves (15 minutes active and reactive energy curves and 15 minutes averaged active power curves) to the IIS system. These data will have to be validated and sent daily with specific H24/H96 success rates.

Moreover, the smart meter will have to send data through Power Line Communication (PLC) within the home area network. The communication protocol will be open.

1. Access to metering data by the retailer through the national IIS

The DSO uploads data on the IIS system for the customers connected to its grid. Within the IIS system a database stores the link between each POD (point of delivery) and the retailer having an active supply contract with the related customer. All the retailers subscribed on the IIS system have tailored permissions and can access only the data of the customers they have a supply contract with.

2. Delivery of metering data to the retailer by the DSO

The DSO knows the link between each POD and the retailer, since he has an active supply contract with the related customer. All the retailers can ask to the DSO only the data of the customers they have a contract with.

Enel system

Enel Distribuzione, intends to start the roll out of a new generation of smart meters by the end of 2016. The technical features of these meters and the related remote metering management infrastructure will cover the requirements on data management and data exchanged specified in Resolution 87/2016. Therefore:

1. An exchange of data will be implemented between the DSO's remote metering management system and the national IIS system and/or between the DSO's remote metering management system and the retailers.

2. A PLC communication channel from the meter to the HAN will be established.

Customers registered to the DSO portal, have a web page access to their daily load curves (power higher than 55 kW) or monthly consumption (split into the three time bands).

Information on electricity consumption and generation is provided 15 minutes' base for contractual power higher than 55 kW, and on monthly basis for other customers. Prosumers receive information electricity reversal flow data.

i) Spain

The Spanish Regulations Real Decreto 216/2014 and Resolución 6203/2015 set the framework for DSOs when it comes to consumption information (hourly load profiles) to be provided the end users (less than 15 kW of contracted power). The roll out of the smart meters in Spain will be completed by the end of December 2018.

From 1st October 2015, DSOs are required to publish the hourly load profiles and traders to bill their customers according to the hourly load profiles, if customers already have their smart meter integrated in the smart meter system.

Each DSO also provides a web site that allows to customers connected to its distribution network to consult and download their hourly load profiled (once billed). These load profiles are sent daily to traders, and customers are billed monthly according to their consumption profile.

The format could support any granularity, beside the hourly used.

DSOs also provide the possibility to customers to download in flat-file format CSV and Excel, the load profile made available to the trader for billing purposes. The file is accompanied by a graph representing the hourly data for the billing period. The file format to be used is unique for all DSOs in Spain and is specified in the regulation. Metering data from smart meters is stored in the DSO's metering management system.

The DSOs send the data to traders through secure FTP. Traders can only access their customers' data. Access to non-customers' data is possible only upon explicit consent.

j) The Netherlands

In the current system, the extraction and distribution of data is only possible from the so-called P4 portal of the smart meter, when the customer gives his consent. The energy supplier or independent services provider (ISP) who wants to offer a service to the customer has the obligation to obtain his consent to access the data. The Electricity- and Gas Act and privacy law requests the DSO to ensure that the consent is given by the customer before the extractions and distribution of the data to the relevant supplier or ISP. However, the DSO has at the moment no possibility to check the existence of a valid consent.

In order to amend the present consent system, two possible scenarios are under scrutiny:

1. Scenario 1: consent registered in a central Consent Register but the authentication of the market parties is de-centralised.

2. Scenario 2: consent is registered in a Central Consent Register and authentication and address validation is done centrally.

DSOs and market parties are discussing the two scenarios and will present their common solution to the regulators in order to see whether the new system does fulfill the requirements derived from both the energy and privacy legislation. DSOs foresee that at the end of 2017 a common system will be approved and the technical development will start. Ideally, the new system will be in place during the 2018/2019 time frame. However, market players feel that clarification at European and national level on the need for a consent register is needed.

The new regulation will require DSO to improve their consent checking procedures, and since the DSOs are data provider and as regulated party, it is likely that they will step forward to realize and manage the consent register. However, other market parties could also fulfil this role.

Hello Data

In the Netherlands, one of the commercial initiatives (or ODA: Independent Service Provider) being tested is *Hello Data*. The idea of HelloData is a platform that allows energy data sharing through an open standard protocol. It gives end-users (consumers) access and control of their energy supply and demand and personal energy data. Users can connect (digital) hardware to HelloData, and manage their energy data using services and applications. By accessing their personal HelloData account, they can control their own data. HelloData does not store energy data. It only logs registration data and settings. HelloData does not provide access via a webpage, but via a third party application.

HelloData provides information on electricity (P4) every 15 minutes, and (P1) every 10 seconds. Customers have access to real time information (P1) and daily updated information (P4).

DSOs Nederland solution

Information on consumption is provided by smart meters directly. The information provided in both physical ports P1 and P4, is about consumption (electricity and gas) and production (electricity). Upon request the information is provided for electricity 15 minutes, daily and monthly, while for gas hourly, daily and monthly. Although access via a webpage could be technically feasible, it is not at the moment provided, as this is not a role for DSOs in the current Dutch legislation.

On top of consumption and production data, the P1 port provides also additional power quality information (e.g. needed for charging electric vehicles). Moreover, the new type of smart meters, to be introduced in 2016, will provide real time meter readings for electricity and 5 minutes readings for Gas.

The information is updated daily on P4 (once a day a message with 96 quarterly values for electricity and 24 hourly values for gas in the most granulated option). On P1, every second a new message with actual values for electricity is sent. The values for connected meters are updated in the message according to the connection. For gas updates occur every 5 minutes.

6. The North American experience and Green Button

Green Button[5] is an industry led initiative launched in 2011 in the US, in response to an Obama Administration's call to action. It is the result of a collaboration among the White House, the National Institute of Standards and Technology (NIST), the Department of Energy (DOE), state regulators, utilities, vendors, SGIP and North American Energy Standards Board.

The idea of the Green Button initiative is to encourage all utilities and service providers to standardize the format and communication of energy data so customers and third-party-service providers can easily access and exchange energy usage information from utility or electricity suppliers. To date, 150 utilities and service providers are committed to provide users with their own usage information using the same format - consensus industry standard Green Button format. Green Button is to date available to more than 60 million customers in the US and an additional 2.6 million in Canada.

Green Button Download My Data

Green Button Download My Data provides downloadable energy data in an XML-formatted file. The customers can access via the utility web portal, login and download the Green Button Data file, which can then be used for further analysis.

Green Button Connect My Data

---

[5] More information available http://www.greenbuttondata.org/.

Green Button Connect My Data (CMD) allows a consumer to authorize a third-party service provider to receive direct access to their Green Button data. These authorizations are valid for an agreed upon time, and can be revoked at any time by the consumer.

Green Button CMD provides application developers an automated technique to access consumer energy information as well as providing consumers security. CMD requires applications to gain authorization from consumers. A typical method requires the consumer to provide authorization using a webpage, similar to how Facebook and Google based applications request users to approve access to their accounts. Once this authorization is granted, the application is able to automatically retrieve the consumer's energy data without any further involvement of the consumer.

Green Button data implements the North American Energy Standards Board's (NAESB) REQ 21 -- Energy Service Provider Interface (ESPI) energy usage information exchange standard. This standard ensures that energy information can be exchanged without requiring developers to invest in proprietary metered data conversion technologies. This enables application developers to create applications that provide services to consumers.

7. Typical use cases

Typical use cases related to My Energy Data (MED) services can be clustered into two groups, namely:

- Download my data
- Share my data

In addition to the implementation of MED use cases, it is important that other processes - as required by the GDPR and smart metering regulations - are already in place, e.g. the customer has accepted to participate in smart metering beforehand, any customer related processes are already implemented, and changes could be processed by the smart metering system operator.

The GDPR furthermore sets high level requirements for processes related to personal data, which are complementary to MED services, such as general authentication procedures, the erasure, rectification, restriction and objection of personal data and the security of data and the infrastructure[6].

Based on this, the following use cases can be derived and developed further:

---

[6] See Annex 4

Background to the provision of MED Services that need to be in place before use cases could be implemented

Smart Meter

REGULATIONS

REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 27 April 2016
on the protection of natural persons with regard to the processing of personal data and on the free
movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

(Text with EEA relevance)

General Smart Metering

- Acceptance of a SM by the customer
- Changes at request of customer

GDPR related requirements

- Authentification
- Scope of processing (incl. data collection granularity, but excl. of sharing with 3rd parties) is agreed by Customer
- Consent and revocation procedure (excl. MED services)
- Provision of general information mandated by GDPR
- Erasure, rectification, restriction and objection of personal data (excl. MED services)
- Security of data and infrastructure (DPIA)

Use Cases - MED Download my data

- Authentification of request
- Registry of request for download (e.g. frequently predefined, or on single request)
- Data provision in a „structured, commonly used and human-friendly format"

Use Cases - MED Share my data

- Authentification of request
- Consent registry of request for sharing (incl. revocation)
- Data transmission between controllers in a „structured, commonly used and machine-readable format"
- provide the customer with all of the information related to sharing of data on request
- Provide erasure, restriction and rectification of personal data to other controllers the data have been shared with
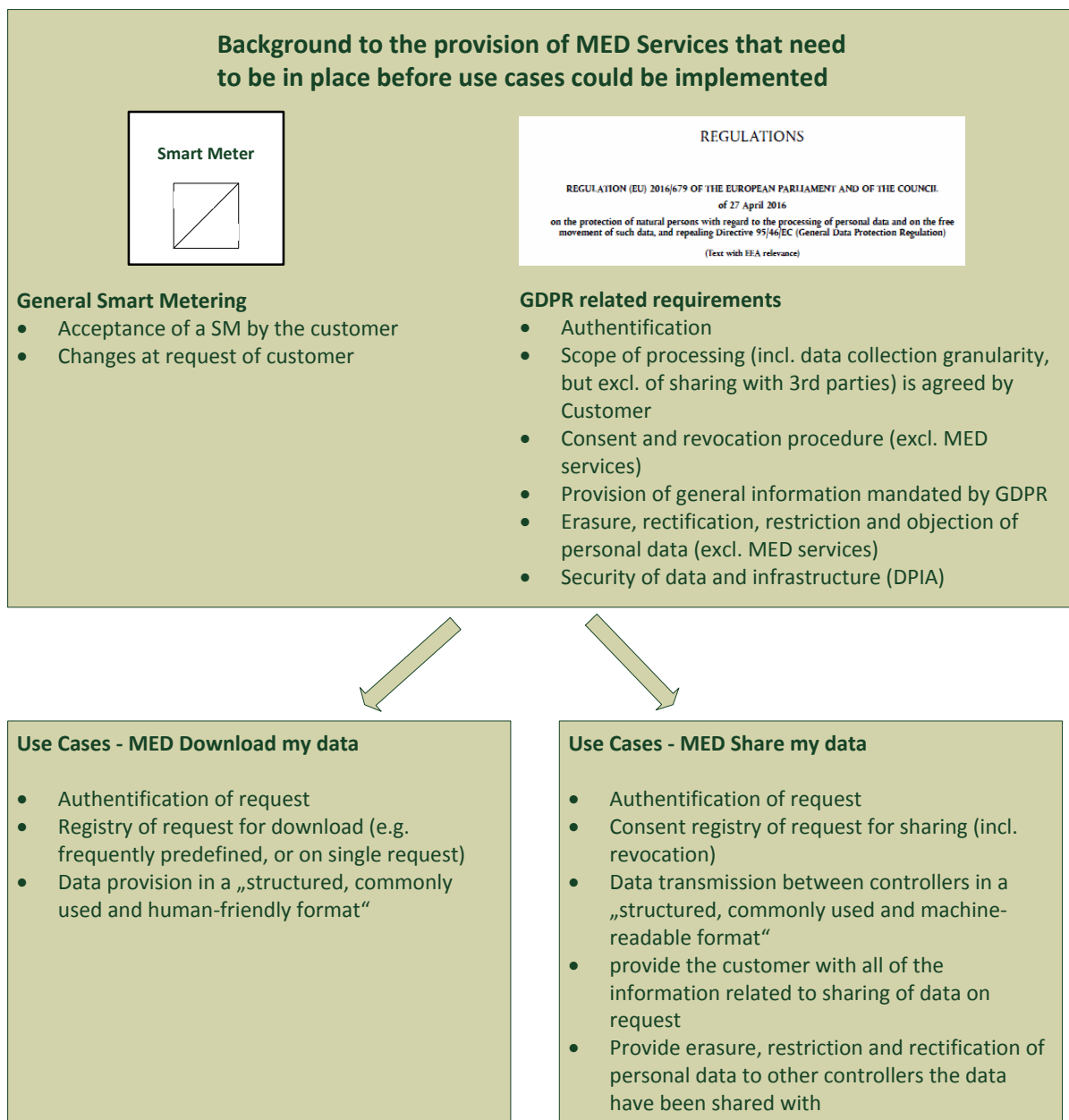
Figure 3 – Use cases for the provision of the "My Energy Data" services

Below a brief Use Cases description for the provision of the MED services (both Download My Data and Share My Data) is provided.

MED – Download My Data Use cases:

- **Authentication of request**

The data subject authenticates, e.g. with a username and password to be able to share his energy related data with other parties.

- **Consent registry of request for download**

All requests from the data subject should be registered, and it should be predefined if the download of energy appears on single requests or periodically specified periods, as determined by the data subject. The Data subject will have the capability to select a third party to access his energy related data. The Data subject should have the capacity to establish time period in which the third party has access to the energy related data. The Data subject will also have the capability to, at any time, revoke any consent provided to a third party to access his data.

- **Data provision**

The data subject is already logged in at the MED service and he/she is able to download his historical energy related data in a "structured, commonly used and human-readable format" as required by the GDPR. The data scope and time resolution shall be the ones established by the regulation in each Member States.

MED - Share my Data Use cases:

- **Authentication of request**

The data subject authenticates, e.g. with a username and password to be able to share his energy related data with other parties.

- **Consent registry of request for sharing**

The Data subject will have the capability to select a third party to access his energy related data. The Data subject should have the capacity to establish the time period in which the third party has access to the energy related data. The Data subject will also have the capability to, at any time, revoke any consent provided to a third party to access his data. In case of joint controllers, the responsibility for the consent registry has to be agreed between them in a transparent manner.

- **Data transmission**

According to the data subject's requirements, his energy related data will be shared with other party's controllers in a structured, commonly used and machine-readable format. The data is provided using the data format to be adopted for the "Share My Data" service. The data scope and time resolution shall be the ones established by the regulation in each Member States, but has to reflect the requirements of the connected service(s). This will further affect the frequency of energy

data exchange with third parties, as it depends on the connected service(s), if data need to be transmitted one-time or periodically in predefined frequencies.

- **Provide the customer with all of the information related to sharing of data on request**

The Data subject will have the possibility to access to all the information regarding any third parties he shares or has shared data with according to the GDPR Articles 13 and 14, including e.g.:

    i)   Name or category of third party;

    ii)   Start and end dates of the data sharing process;

    iii)   Legitimate interests pursued by a third party.

- **Provide erasure, restriction and rectification of personal data**

The data subject will have the right to request his personal to be erased, the use to be restricted or data to be amended, without undue delay. There needs to be a process in place to inform controllers of third parties who are receiving and processing personal data that the customer has requested to erase or to rectify them. This also applies when a customer requests to restrict the processing of his personal data, and to inform the data subject, before the restriction of processing is lifted.

- **Registry of the third party with the consent register process**

In order to enable a third party to collect and process personal data according to the data subject's requirements, it requires registration and system access to consent registers of other connected parties. This allows third parties to access data subject's consent, but also data subject's requests regarding a possible consent revocation or restrictions of collection and processing. Any changes related to a specific data subject should be provided automatically by the system, in order to enable the connected third parties to adapt their service near time.

8. Typical implementation issues

When going toward realization of the "share my data" and "download my data" services, a number of issues need, inter alia, to be addressed.

<u>Customer rights</u>

What is the nature of consent that they provide?

- It should be explicit and clear what rights customers have in relation to the GDPR.
- Is the customer giving/revoking consent to parties to request, collect, process and /or to parties who are managing and distributing data?
- Is the consent explicit or implicit (part of a contract)?

- Is at introduction/ an opt in, or opt out approach adopted?

Consent

The scope of the consent:

- Is the consent to collect/process/distribute data independent from the channels through which the data is transferred (will regulation be technology agnostic)?
- What should the granularity and time frame be regarding the data that is provided/ processed/collected?
- For which period, to which parties, with or without pass-through consent to other parties is granted?
- Is the consent given in general or is it given only in the context of certain application (how to avoid misuse of given consent?)
- Which parties and for which applications could be excluded from requesting consent, due to legal tasks to be performed?

Authentication of the customer

- How will the customer be authenticated and which trust level will be required?
- Who will provide the authentication service? Will this be provided from the utility sector or will this be provided by an independent authentication service provider (e. g. through a trusted national/ public authentication service which is used across multiple industry sectors)?
- How is ensured that there is a one-to-one relation between the authenticated customer and the data requested (e.g. how to deal with landlords owning the smart meter versus home renters whose behaviour is represented in the data)?

Responsibilities around the operating/maintaining the Consent Register

- It should be clear who would be responsible for operating and maintaining the consent register, and the related liabilities coming from the GDPR.
- It should be clear what the mandate for the operating/ maintaining party are and its responsibilities.
- What rules apply to the consent register operating party (e.g. would it be allowed to operate such a register in the commercial domain and or in the regulated domain)?
- What would be the source of income (business case) for the party operating the consent register?
- Would the party responsible for operating/maintaining the consent register itself have a customer contact relation (e.g. helpdesk etc.)?

- Will the party responsible for operating/maintaining the consent register require a specific certification (management system)?

Cyber security challenges

- How could it be technically ensured that the customer data is stored safely in the consent register, as also the data transfer related to the "share my data" service and the "download my data" service?
- How could the liability for cybersecurity legally be ensured (e.g. by declaration of accountants)?
- Will any party connected to MED services require a specific certification (management system) for information security?
- How to perform a Data Protection Impact Assessment specifically for MED, and how to ensure DPIA conformity during operation (e.g. a guidance document on this matter could support all parties using MED)?

Interoperability

- How to ensure interoperability across all parties interfacing consent registers and energy data (e.g. with global profile(s) describing the technically-specific MED implementation and testing)?
- Will there be (simple) interoperability tests to verify an individual party's MED compliance?
- How to ensure connectivity with other international flow of energy data (e.g. US Green Button) in case of global service providers?
- How could the service be adapted over time without customer impact (e.g. backwards compatibility)?
- How to maintain interoperability in the future and who will be responsible?

Technical Performance

What should be the requirements for the technical performance, e.g.:

- Availability of the services;
- Technical performance of the services (e.g. response times, processing speed, latency, channel capacity, compression…);
- Amount of data/bandwith requirements.

Costs of implementation and operation

- What are the costs of MED services for e.g.:
- Implementation and connection to wider systems (e.g. smart metering systems);
- System operation incl. update management;
- Certifications;

- Interoperability (testing);
- Ways of cost recovery in regulated businesses.

9.   Standards/formats where already decided at Member State level

As highlighted in previous chapters several Member States have implemented, or are in the process of implementing, different mechanisms to provide energy data to their end energy clients.

The table below provide an overview of the main data formats/standards in use in the different Member States to provide energy consumption data to their end energy clients:

Member State	Meter Reading Data available	Information Model	File format
France	Indexes (day), Load curve	Specific	CSV (RFC 4180)
Spain	Load profile	Specific	CSV (RFC 4180), Excel, PDF
Germany	Load curve	Specific	JSON (RFC 7159, ECMA 404 & 262)
Estonia	Load curve	Specific	XML (W3C)
Italy	Indexes (day, month), Load curve	Specific	
The Netherlands	Load curve	Specific	P4 : XML (W3C)
	Load curve (direct access to the meter)	DLMS/COSEM IEC 62056-61	P1 : IEC 62056-21
Great Britain	Meter registers; 13 months of half hourly interval readings for imported energy	DLMS/ COSEM and ZigBee Smart Energy on the metering equipment	Zig Bee Smart Energy over the smart meter home area network; XML from DCC (remotely)
Belgium	load curve	specific	EDIEL - XML in preparation
Denmark	Load curve	specific	ebIX

Table 1: summary of main standards in use in Member States considered

Arguments from stakeholders on the reasons why certain formats and information models are used:

Several arguments and considerations have been provided by stakeholders from the ad-hoc group concerning why certain file formats are used or not used. These should be taken into consideration when pursuing the adoption of a common format for energy data interchange.

CSV format

- It is easily readable by any customer on any type of equipment.

- It is mandatory by legislation, e.g. Spanish Regulation: Real Decreto 216/2014 and Resolución 6203/2015.

JSON

- Due to its structured data format, it is preferred for data transfer to external parties, when more frequent data exchange is required.

- It provides a fat-free alternative to XML. It is compact, readable and relatively faster because less data has to be transferred. Therefore, it is more suitable for frequent exchange of information.

- When it comes to frequent data exchange, such as consumption values, JSON allows fastest and efficient options like REST-API calls that with predefined format like JSON.

- Implementation of API-Interfaces and JSON-data formats of systems are preferred over asynchronous communication via smtp protocol.

XML format messages

- It allows compatibility of data coming from different network operators (DSOs). The format makes possible machine to machine interface development and simple data sharing.

- It is a format easy to use and easy to understand. In association with a XSLT file, XML files can be presented as standard readable HTML web pages.

- In The Netherlands Xml/webservices on P4 format provides a standard format between the DSO and datahub and between the datahub and customers of the datahub (energy suppliers, commercial service providers) which can easily be implemented by all users of the datahub, also the new ones.

Stakeholders have also indicated why certain information models are preferred:

DLMS/COSEM (IEC-62056)

- The format is developed for direct information access from the metering device.

- In the Netherlands the P1 format is derived from the standard, therefore it is easy to understand and to implement, requiring low processing power and memory (minimized number of bytes).

CIM (IEC-61968, -61970, -62325)

- This information model is being used for describing electricity systems (generation, transmission, distribution, DER).

- The US Green Button standard is basing on CIM descriptions and tags, but is not yet fully compatible with the CIM hierarchical information standard.

- CIM focusses on electricity; however a CIM-based model may be used for a gas and other fluids, as it is also the case for CM-based US Green Button format.

CIM and DLMS/COSEM are addressing different domains in the IEC smart grid reference architecture. However, a harmonization work has been started to join the two standards where domains are close (62056-6-9).

Possible approach for the industrial initiative

One of the key aspects that would significantly contribute to opening the European internal market for future Energy Services is for the industrial initiative to establish a common format for energy data interchange that allows companies to seamlessly provide their services throughout the EU. Not only would this aid those Member States (MS) and companies where detailed formats have not yet been defined, but it would also assist the provision of services to energy consumers in MS where plans are already in place.

A key intention of the industrial initiative is therefore to include the development of a high-level data format/model which allows compatibility or alignment with existing systems already decided. Parameters for such a format/model are noted towards the end of the following section.

10. Lessons, conclusions and opportunities for the industrial initiative

Based on the inputs provided by each MS initiative mentioned in this document we highlight in this chapter the main lessons and conclusions for the implementation of the MED service. We also address the potential benefits for the adoption of a common format for energy data interchange and the opportunities for an industrial initiative composed of European stakeholders for such an objective.

Lessons learnt

- Consumers - and/or third parties acting on their behalf - should have access to their metering data via a local standardised communication interface and/or remotely.
- The respective information from the smart meters should be made available to consumers in an easily understandable format, at no additional cost and in near-real time, in order to support demand response and other services.
- As a number of different formats have already been used within Member States, a common format would necessarily be compatible with what already existing.
- As some initiatives are quite advanced in their deployment, some candidate formats for the industrial initiative are existing.

- It is important to consider the business requirements for exchanging data and then distil the requirements for the data format.

- Formats should be easy to implement (working knowledge should be available in the market).

- The format performance is critical as some services will need near real-time answers, and possibly with many requests in a short amount of time; for example, the dynamic visualisation of a load curve would require as many requests as the customers change the scope of the visualization.

Data formats/models

Based on the use cases previously described we need to acknowledge the two broad categories of data formats/models which may be taken into consideration for the provision of data within the "My Energy Data" initiative:

1. A human-friendly format (like CSV/XLS/PDF), that the end user can access to view or download his smart metering data and use with common IT tools (Download My Data service).

2. A machine-friendly format (like XML/JSON/CSV) that is used to exchange energy data with other 3rd parties (Share My Data service).

The standards that are already used in the Member States for the energy data exchange are different; mentioned formats are e.g. CSV, JSON and XML. Proprietary formats which are harmonized with national smart metering system profiles are also mentioned.

Based on the MS responses considered, this report suggests basic technical requirements for energy data interchange that the 'My Energy Data' initiative should seek to fulfil:

- The format should be compatible with relevant European standards used in Member States smart meter rollout programs (e.g. CIM, ebIX or others). This would facilitate interoperability of energy services across Europe.

- The format should be adaptable to handle different data time resolutions (like daily, hourly, 30 min, 15 min, 1 min, seconds data from P1 port, or others adopted by Member States) or variable time resolutions.

- It should be flexible enough to support any type of variables and units (like for example aggregated energy consumption, Active & Reactive Energy - F1/F2/F3, Gas, Energy Production or heat), to be able to address the different use cases implemented by each Member State.

- Scalability should be guaranteed from the start in what regards to the incorporation of new variables/data in the future.

- The format should be easy to implement in the energy market with working knowledge which is already available.

Potential benefits

There would be potential benefits for a common format for energy data interchange due to:

- Allowing unified hardware procurement option;
- Alignment and co-operation with international partners;
- A common format supports more novel data services and bring more motivation for developers;
- A common format would facilitate service interoperability: a service developed in one national market could easily be sold in other markets.
- It would facilitate the development of energy market services.

There would be further advantages at European wide level if what is decided within the proposed industrial initiative could also be aligned and implemented at a European level, as this would allow:

- A more efficient connection to European smart metering systems and IoT devices in the future;
- The possibility to benchmark with national consumption values and to compare energy data from different countries;
- The option to have third parties' applications able to process consumption data from any DSO or any country. Having different formats would require customising those applications to every format;
- A common format that supports more novel data services and brings more motivation for developers.

This does not mean that there should be a single data format across Europe, or that this is the goal of the aforesaid industrial initiative. As noted earlier, Member State approaches already differ. However, an industrial initiative could produce an approach which allows compatibility or alignment with existing systems already decided, to allow such benefits to be realized more widely than the organisations/Member States represented in the industrial initiative. This aspect should be borne in mind.

It goes without saying that the selected format must be compatible with European and national legislation.

11. Recommendations on the way forward

A positive attitude concerning joining a possible initiative gathering European stakeholders for the adoption of a format has been shown by the majority of this ad hoc group participants.

In view of the performed analysis and the conclusion drawn above, it is reasonable to expect that an industrial initiative could build upon the existing work and produce concrete outputs within a year. Therefore, the ad hoc group intends to continue its work and invite to join all interested stakeholders which have not been extensively consulted due to time constraints. It recommends therefore that – after the publication of the European Commission Winter Package - a European industry initiative consisting of all interested stakeholders, such as, but not limited to manufacturers, utilities, vendors, laboratories and national regulators is formed in early 2017 with the aim to provide further detailed specifications on a common format for energy data interchange under consideration of the high-level requirements provided by this report.

A consortium or a multi-party Memorandum of Understanding will be proposed in early 2017 and hopefully signed by a core group of industries interested in the initiative. The first meeting of such initiative could already take place in January 2017.

In addition, the ad hoc group considers that the following next steps should be considered:

1. The services "download my data" and "share my data" should be specified in terms of functionality, protocols and data formats. These services should be defined independently of the smart meter implementations which are currently rolled out in Europe. A data model "mapping exercise" shall be carried out to identify the maximum common data attributes used in the existing implementations; this to ensure maximum effectivity of the services when standardized.

   The service specifications should support the interactions between the roles identified in the role model. Options should be developed, and it should be investigated what could be achieved on EU level and what could be additional added on national level. In addition, transition roadmaps to reach a common format could be identified.

2. The industry will be invited to come forward with technical specifications for these services. This will be part of the scope of the first meeting to be organized in January 2017. Where standards or interoperability profiles are currently missing, (e.g. on data model) the industry could be asked to come forward with proposals, which could also be sent as input towards CENCENELEC/ ETSI for future standards and interoperability profiles.

3. The European Commission may wish to consider how far the two identified services ("share my data" and "download my data") are recognized by Member States.

   In parallel, it would be useful to have clarification on the legislative framework underpinning the provision of MED services.

   Directives 2009/72/EC and 2009/73/EC state that "consumers 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 consumer for that service".

   This procedure, implemented at national level, should clearly define how the roles & responsibilities of the controller and processor are allocated to the supply undertaking and the party responsible for data-management, in view of the EU General Data protection regulation (GDPR), adopted in May 2016.

   Further clarification or guidelines to this respect by the European Commission would be welcomed particulalry concerning the responsibilities and liabilities that fall under the supply undertaking and the party responsible for data management, especially in case of joint controllers. This to avoid - as much as possible - different interpretations in the Member States.

   The forthcoming Winter Package as well as the European Data Economy initiative will impact the existing regulatory framework. Therefore, these recommendations, as well as any future work will need to read in the light of changes introduced by these policy initiatives.

Annex 1. List of participants/contributors

Name	Organisation
Manuel Sánchez- Jimenez	European Commission – DG ENER
Constantina Filiou	European Commission - DG ENER
Patricia Arsene	European Commission – DG CONNECT
Rodolphe de Beaufort (Chairman)	T&D Europe
Jeff Montagne (Co-chairman)	Enedis
Elisa Gastaldi	GE
Miguel Carvalho	ESMIG
Peter Hermans Ed van der Pijl	Stedin
George Rodenhuis	Netbeheer Nederland
Manuel De Tellechea Suarez	Eurelectric
Eva Mestres Cagigós	Endesa
Erik Linschoten	Alliander
Jörg Seiffert	E.ON/ CEN-CENELEC-ETSI SEG-CG
David Johnson	Consultant
Thomas Willson	ECOS
Silvia De Francisci	ENEL
Nadi Assaf	T&D Europe
Alexander von Jagwitz	ERA-Net SG+, BAUM
David Spillet	GEODE
Hans Jørgen Jørgensen	Dansk Energy
Ali Saravirta	Project Business Oy Finland
André Bryde Christensen	EnerginetDK
Kalle Kukk	Elering AS
Luc Decoster Bruce Almey	Eandis
Julien Quainon	GRDF

Annex 2. List of initiatives analysed

Name	Country
Linky - ERDF	France
Solenn - ERDF	France
Solenn - Flexiciency	France
New Meters and Integrated Information System - Enel	Italy
HelloData – MPARE B.V	The Netherlands
Central Consent Register	The Netherlands
Smart Metering Implementation Programme	Great Britain
Infrax (DSO)	Belgium
Eandis (DSO)	Belgium
VKU	Germany
Powerfox: Establish a marketplace for energy services based on metering data	Germany
DSOs Regulation	Spain
National Datahub Project	Finland
DataHub	Denmark
Estfeed	Estonia

NB: for sake of simplicity, when no full name established for the initiatives, reference is made to the company/entity that has provided the information.

Annex 3. My Energy Data Role and Interaction Model

Referring to My Energy Data services, further roles related to those established in the GDPR are mainly outlined in the Energy Efficiency Directive 2012/27/EU, the Electricity Directive 2009/72/EC and the Gas Directive 2009/73/EC, but also subject to other established role models in the European energy market, such as the harmonised electricity market role model from ENTSO-E, evolvDSO, or the DAMA/DMBOK. These roles can then be mapped onto the GDPR, e.g.:

- The data subject could be considered as the customer or the party connected to the grid.
- The controller could be considered as the party responsible for data management (partly) or the metered data responsible.
- The processor could be considered as the party responsible for data management (partly), metered data collector or metered data aggregator.

1. Roles and definitions based on 2016/679/EU

Role	Definition	Related to
Controller	natural or legal person, public authority, agency or other body incl. his representative which determines the purposes and means of the processing of personal data, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction	Party responsible for Data Management 2009/72/EC 2009/73/EC Metered Data Responsible Harmonised electricity market role model Customer Relationship Manager evolvDSO Customer consent collector DAMA/DMBOK Customer consent registry responsible DAMA/DMBOK

		Executive data steward DAMA/DMBOK
Processor	natural or legal person, public authority, agency or other body incl. his representative which processes personal data on behalf of the controller, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction	Party responsible for Data Management 2009/72/EC 2009/73/EC Metered Data Responsible Harmonised electricity market role model Metered Data Collector Harmonised electricity market role model Metered Data Aggregator Harmonised electricity market role model Data Manager evolvDSO Customer Relationship Manager evolvDSO Business data steward DAMA/DMBOK
Recipient	natural or legal person, public authority, agency or other body to which the personal data are disclosed, whether a third party or not	may also be the data subject/consumer

Third Party	natural or legal person, public authority, agency or body other than the data subject, controller, processor and persons who, under the direct authority of the controller or processor, are authorised to process personal data;	
Data Subject	identified or identifiable natural person who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person	Party Connected to the Grid Harmonised electricity market role model (final) Customer 2012/27/EC 2009/72/EC 2009/73/EC
Supervisory Authority	independent public authority which is established by a Member State pursuant to Article 51 to ensure that the requirements of the GDPR are fulfilled	Regulatory Authority 2009/72/EC 2009/73/EC
Data Protection Officer	expert of data protection law and practices who is designated to mainly advise the controller or the processor, to monitor compliance with the GDPR and to cooperate with the supervisory authority	Data Security Administrator DAMA/DMBOK

2. Roles and definitions relating to those of 2016/679/EU

Role	Definition	Reference
Party Responsible for Data Management	Responsible to ensure that customers 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	2009/72/EC 2009/73/EC

(final) Customer	customer in general means a wholesale or final customer of electricity or gas final customer means a customer purchasing electricity or gas for his own use	2012/27/EC 2009/72/EC 2009/73/EC [applies to domestic customers only]
Regulatory Authority	independent public authority which is established by a Member State to ensure that the requirements of 2009/72/EC and 2009/73/EC are fulfilled. This includes helping to ensure, together with other relevant authorities, that the consumer protection measures, including those set out in Annex I, are effective and enforced	2009/72/EC 2009/73/EC
Metered Data Responsible	A party responsible for the establishment and validation of metered data based on the collected data received from the Metered Data Collector. The party is responsible for the history of metered data for a Metering Point.	Harmonised electricity market role model
Metered Data Collector	A party responsible for meter reading and quality control of the reading.	Harmonised electricity market role model
Metered Data Aggregator	A party responsible for the establishment and qualification of metered data from the Metered Data Responsible. This data is aggregated per a defined set of market rules.	Harmonsied electricity market role model
Party Connected to the Grid	A party that contracts for the right to consume or produce electricity at an Accounting Point (Consumer, Producer, Prosumer)	Harmonized electricity market role model
Data Manager	handles metered, contractual and network data. Among the tasks the data manager performs are: Collection, validation, analysis, archiving of historical	evolvDSO

	records Provision of data originating from meters, network monitoring and sensing devices, and contracts.	
Customer Relationship Manager	coordinates contractual arrangements, sets requirements, and provides detailed data to eligible parties.	evolvDSO
Customer consent collector	- Collect customer consent - Transmit customer consent to registry - Collect customer consent revocation	New Role
Customer consent registry responsible	- Store customer consent in registry - Operate customer consent registry - Revoke customer consent - Collect customer consent revocation	New Role
Authentication Service Provider	- Authenticate customer	New Role
Executive data steward	- Ensure data governance (policies, control, …)	DAMA/DMBOK
Business data steward	- Manage Master Data - Manage Data Quality	DAMA/DMBOK
Data architect	- Manage Master Data - Manage System Development	DAMA/DMBOK No mapping to GDPR
Data analyst modeler	- Manage Master Data - Model Data - Specify Data Format (including Metadata)	DAMA/DMBOK No mapping to GDPR
Database Administrator	- Administrate and tune database	DAMA/DMBOK No mapping to GDPR

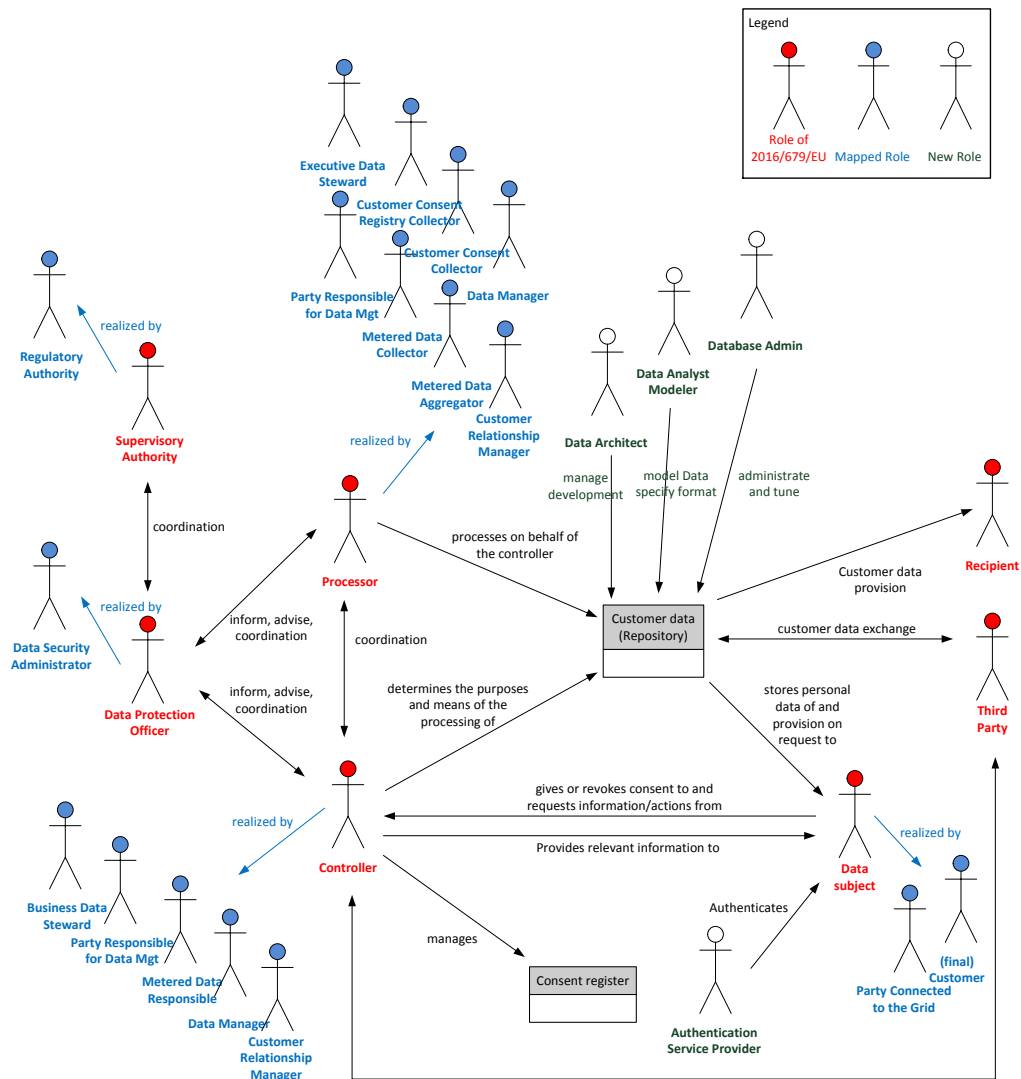| Data Security Administrator	- Manage Data Security	DAMA/DMBOK

Interaction Model with mapped Roles

Figure 4 – Additional roles implied in "My Energy Data" services delivery
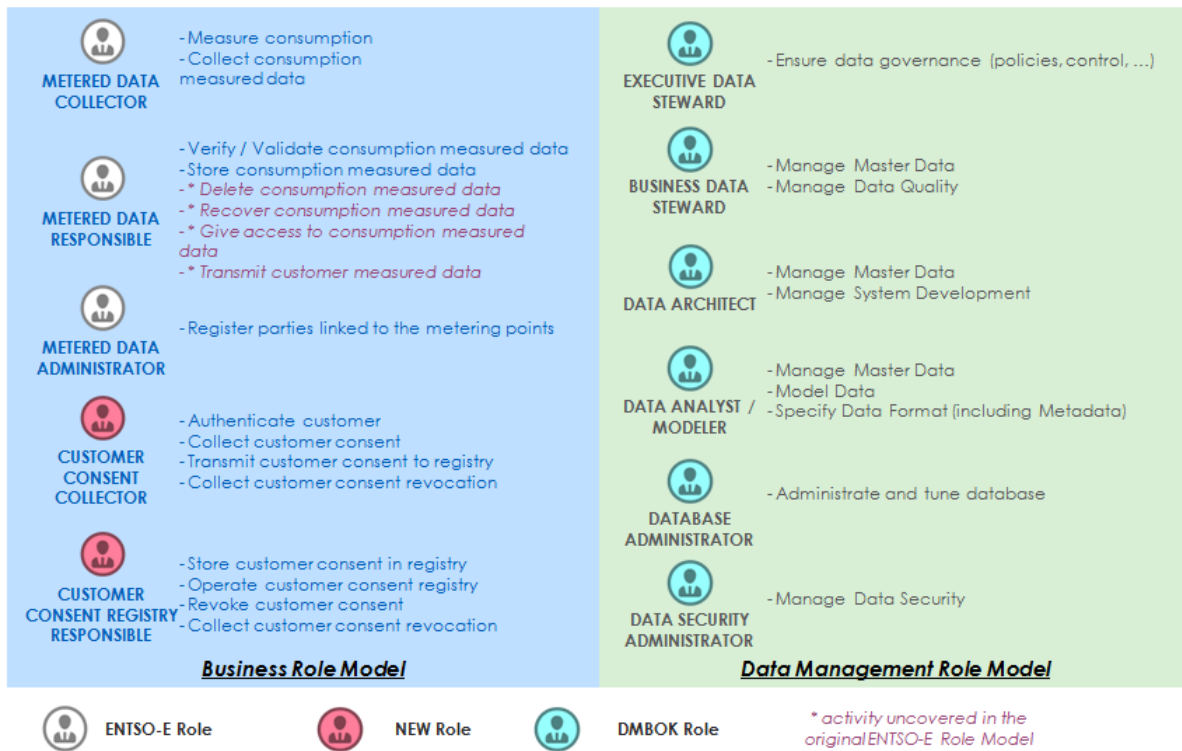

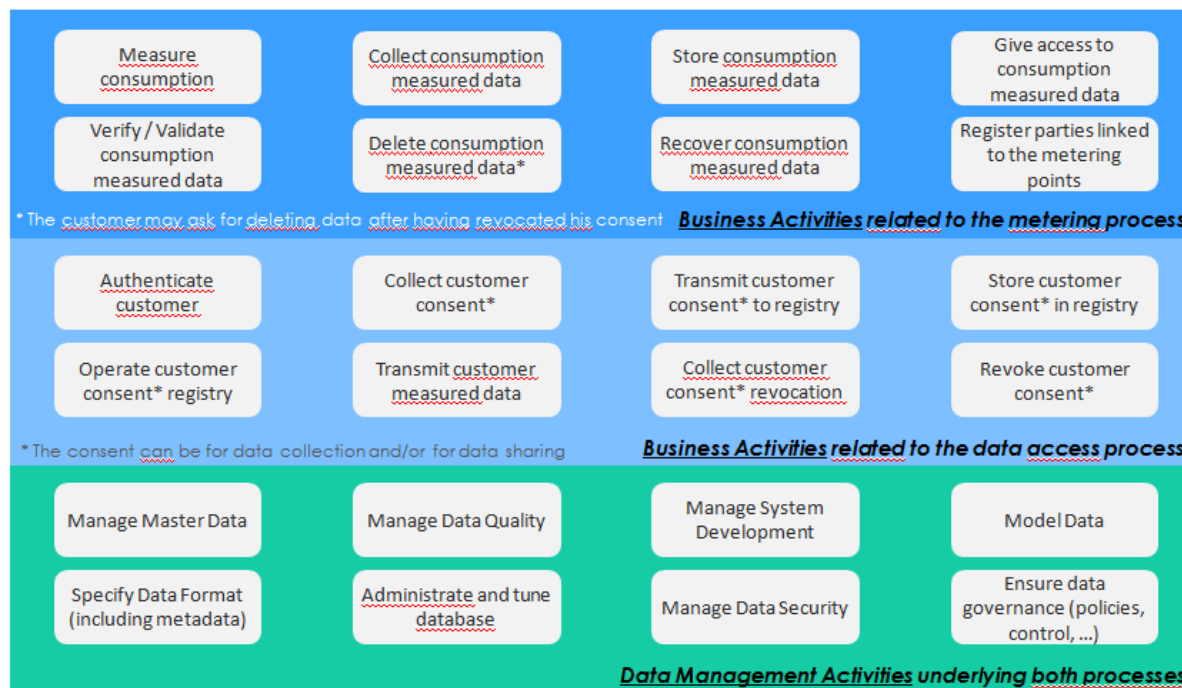*Figure 5: Main roles under Business & Data management Role model*

Figure 6 – Business and Data Management activities related to "My Energy Data" services

Annex 4. List of use cases related to GDPR

Automated generation and provision of general Information to the customer

- Provide the customer with all the information from 2016/679/EU Article 13 [automated by controller];

- Provide the customer with all the information from 2016/679/EU Article 14 [automated by controller];

- Provide the customer with access to his/her metering data and all the information from 2016/679/EU Article 15 [on request by customer];

- Generate a copy of the personal data undergoing processing from the system [on request by customer];

- Communicate a personal data breach to the customer without undue delay [automated by controller].

Consent or consent revocation by the customer

- Authenticate customer [automated by controller];

- Collect customer consent (revocation) [automated by controller];

- Collect customer consent (revocation) [automated by controller];

- Transmit customer consent (revocation) to registry [automated by controller];

- Store customer consent (revocation) in registry [automated by controller];

- Operate customer consent registry [automated by database admin].

Erasure, rectification, restriction and objection of personal data

- Rectify customer's personal data without undue delay [on request by customer];

- Erase customer's personal data without undue delay [on request by customer];

- Inform other controllers which are processing the personal data that the customer has requested to erase [automated by controller];

- Restrict processing of customer's personal data [on request by consumer] [automated by controller];

- Inform the customer before the restriction of processing is lifted [automated by controller];

- Object to processing of personal data [on request by customer];

Data storage and portability

- Request the personal data [on request by customer];

- Provide the personal data to a customer in a structured, commonly used and machine-readable format [automated by controller];

- Transmit personal data from one controller to another controller [on request by customer];

- Operate customer data repository [automated by database admin].

Annex 5. List of acronyms

DSO: Distribution System Operator

GDEW: German Law for the Digitilization of the Energy Transition *Gesetz zur Ditalisierung der Energiewende*

GDPR: General Data Protection Regulation

HAN: Home Area Network

IIS: Integrated Information System

IoT: Internet of Things

MED: My Energy Data

MS: European Member State

ODA: Independent Service Provider in The Netherlands

POD: Point of delivery

PLC: Power Line Communication

TSO: Transmission System Operator

Annex 6. Informal advice to the Commission against the background of the 'My Energy Data' industrial initiative – July 2016

Legislative framework: Smart metering data collected and processed[7] are of two broad kinds: system data (e.g. related to the technical situation in the distribution system) and customer data, which is generally used in the provision of My Energy Data –type services.

My Energy Data services are subject to the EU General Data Protection Regulation 2016/679/EC, the Energy Efficiency Directive 2012/27/EU, the Electricity Directive 2009/72/EC, the Gas Directive 2009/73/EC and country-specific legislation.

General guidance: The General Data Protection Regulation by its nature establishes harmonised data protection principles and rules across the EU. Detailed arrangements concerning the operation of My Energy Data services, access by customers to their metering data and sharing it with their chosen third parties will vary across MS and reflect national market arrangements, structures and country-specific legislation.

My Energy Data services: Similar to the Green Button initiative in North America, My Energy Data services are envisaged as including a 'download my data' service and a 'share my data' service, together with an associated consent registration service.

Data access and consent: Except where data concerns the fulfilment of regulated tasks and legal roles and responsibilities (see 'Exceptions' below), any person (consumer or prosumer) should have access to their data and be able to control the parties with whom the data is shared. Access and control should be via defined authentication and consent mechanisms.

Exceptions: Data for grid operators (DSOs/TSOs) relevant for their legal tasks of grid operations & planning and data for the contracted supplier necessary for billing, settlement or other regulated activities/obligations should be defined and be excluded from the consent mechanism.

Consent mechanism: Subject to the above exceptions, the customer should be able to allow or disallow specific parties access to metering data available from smart energy meters and/or distributed energy resources. Customers should be able to modify and terminate the data privacy options they have chosen.

Consent scope: The scope of the consent should be clearly defined. It should provide information regarding the options for which is consent being given - which data elements, for which granularity and timeframes, for which period, to which parties, with or without pass-through consent to other parties. Consent scope may be updated due to possible future service requirements.

Third parties: The consent mechanism should ideally minimise registration procedures for third parties to be enrolled into the mechanism and enable consumers freely to transfer their data to their

---

[7] NB: Multiple actors possibly involved, but has to be agreed with the role and actor model.

services. Third parties, who are also governed by EU Data Protection legislation, should respect consent given by the consumers/prosumers.

Registry operation: Consent registration should be as simple as possible (low threshold) for consumers/prosumers. That could mean any authenticated party/person can register his/her consent by visiting a website and enter the parameters of the consent.

The consent registry should be operated so as to ensure a level playing field in the market with respect to distributing data to those entitled to it. This operator of the registry should authenticate the request and verify the availability of consent for each data transaction executed.

Authentication: The authentication mechanism should allow the parties concerned to verify that:

- The person registering the consent is actually who he/she says he/she is AND
- The subject of the consent (access to functions and or data) is actually related (person has jurisdiction) to that person.

To be able to verify this, both upon registration and periodically, (and specifically whether the second criterion above is still true), specific mechanisms are necessary. By way of example, either of the following should be enabled:

- The facilitator of the consent registry (which could be the DSO) verifies both the above. To be able to do so, the facilitator has to have access to registries (or services) to query. In the Netherlands, this could be for example the DigID-registry (centralised; identity) and the registration of 'habitat' (local, per community). The facilitator could access these services direct or via a proxy.
- The facilitator of the consent registry dispatches the verification to a trusted party that has access to aforementioned registries and confirms to the facilitator that both criteria are met. Examples of trusted parties include Green Button (US), and Idensys (Netherlands).

DSO application: In general we believe all My Energy Data services should be clear and measurable, and defined in terms of data formats, performance and availability.

The party delivering these services should ensure that performance and availability requirements are met.

Where it is decided that DSOs, or entities operated by DSOs, operate a central data-hubs, this should be subject to regulatory safeguards as regards neutrality and the provision of services on a level playing field. Such safeguards are especially important where the DSO is not unbundled. Safeguards should include the existence of a compliance function within the DSO, on the lines envisaged in the 'Third Package'.

Compliance officers or any other person that is responsible for data protection should monitor the provision of My Energy Services to end customers and the operation of the consent registration service. DSOs should facilitate market parties and/or customers requesting data in a neutral way, and must comply with both the relevant regulations from NRAs who regulate DSOs and with the requirements of the data protection authorities, to only distribute data with customers' consent, in an auditable way.

Annex 7. Detailed overview per country

a) Belgium

The Belgian privacy legislation sets out general rules on consent (not only on energy issues). Specific provisions on smart meters will be provided by the Data Protection Impact Assessment (DPIA) that should be ready by the end of the year. The main issues under consideration concern:

- A Data-access-register and data-access-contracts, (to be regulated by the end of the year).

- Download locally (consumer portal) and "download structural messages" operated by a central data hub owned and operated by the DSOs (single Belgian central clearing house – 2018).

The DSO is the actor responsible for the metering process, including for the smart meter. The customer access to data depends on the choice of metering regime (low data access = yearly or high data access = quarterly data) and foresees an implicit consent.

A DSO can transfer customer data to third parties only there is the consent of the customer. The DSO stipulates the contractual agreement and the conditions of data-access for third parties.

The control of contractual agreements and certification of third parties is perceived as unclear at the moment. Moreover, there is no clear framework concerning the use of data by DSO for public interest without prior consent (e.g. detection of frauds, detection of power quality problems, etc).

In Belgium roll-out of smart meters has not taken place yet.

Flanders: Eandis

The service provided in Flanders by Eandis, enables both customers with smart meters and without smart meters to have access to their data via a web page. Customers can also access their consumption data via a webtool or export their files. Consumption history is available via the Eandis website.

It is being planned to allow supplier and/or third parties to receive consumption data via electronic messaging, which could be used for customer web based appliances as well.

Historical information (yearly consumption over the last three years) is a right guaranteed to all customers by the legislation. Moreover, monthly information flow is provided from the DSO to the supplier and, depending on the choice of the consumer, the DSO provides to the supplier 15 minutes' electricity data and hourly natural gas data, updated once a day (no real time, which is only accessible via the gate or the meter) to the supplier.

b) Denmark

Denmark has developed a central DataHub, which through uniform communication and standardised processes handles the interaction between the players in the electricity market

The DataHub is already in operation. It is owned and operated by Energinet.dk, the enterprise responsible for the operation of the transmission grid and the electricity system in Denmark, as required in an amendment of the Danish Electricity Act in 2010.

Energinet.dk has established codes that set the rules for the use of and the access to the DataHub.

Actors (DSOs, suppliers or third parties) who want access to the DataHub must sign agreements in which they warrant to comply with applicable legislation, including, in particular, the Danish Act on Processing of Personal Data.

The DataHub handles electricity meter data and business processes for all 3.3 million metering points in Denmark of which around 2 million are smart meters, and the market players exchange information about customers' consumption, move-in, move-out, etc. through the DataHub.

The customers do not have direct access to the DataHub but can access their data through a web portal which is set up by the supplier or by using a web portal common for all suppliers, called eloverblik.dk. Electronic authentication called NemID, (see www.nemid.nu) must be used to get access to the data.

Through these web portals the customers can also grant a third-party access to their data by using NemID, so DataHub (i.e. Energinet.dk) is consent manager. With the centralised system, the supplier is the only responsible for the contact with the customer.

Use cases: Access to own data through a (common) web portal made available by the supplier(s).

Granting of access to third parties to data through the same web portal(s).

Data from the meters are sent to the DataHub from the DSOs who own and operate the meters. In the DataHub the data are stored and made available for the actors.

Consent to a supplier's access to historical data in the DataHub is given by the customer when engaging in a contract on supply of electricity.

Consent to third parties' access to data is given through the supplier's web portal or eloverblik.dk and is registered in the DataHub.

Some customers used to have access to data stored at the DSO responsible for metering. This access stopped 1 April 2016, when a supplier-centric market model was introduced in Denmark. Now the supplier is responsible for the contact with the customer, and the customers have to wait longer before their data are available through the DataHub.

The DataHub also only handles hourly readings, and 15 minutes readings, where it is required for billing.. The format supports 15 minutes, hourly, monthly, quarterly and yearly time resolutions.

Information on DataHub are updated maximum five days after the day of consumption/production, depending on the time required by DSOs to collect and update data[8].

New smart meters in Denmark must offer a possibility to the customer for connecting an external unit to the meter and continuously extract data, but so far, this option has only been used by a very limited number of customers, probably due to the cost of such units.

c) Estonia

In Estonia, the Energy DATA FEED PLATFORM (Estfeed) project has been launched. This is an initiative to design, implement and test an open software platform for energy consumptions monitoring and management from the customer (consumers/prosumers) side capable to interact with the energy network and to provide data feeds for an efficient use of energy.

The project aims to build a software platform capable to integrate many data sources and to provide appropriate services to convert these data into valuable information for energy flexibility management, audit and benchmarking. Development efforts will be distributed in four main topics: software architecture, communications, data acquisition/management and computational intelligence. A Service Oriented Architecture will serve as integration and open platform with specialised services for data acquisition and management at different time scales (from real time to season) capable to deal with existing solutions (SCADAS, energy monitors), but also capable to integrate new sensing technologies (smart metering, sensor networks) deployed.

The goal of Energy DATA FEED PLATFORM is to build common framework and validate it in several scenarios as industries, administrative buildings and homes, but at the same time it is conceived as multi user platform capable to take advantage of its intensive use for benchmarking purposes. Its development will be based on international recommendations (as the ISO, IEC standards), experience of partners in the consortium with a large trajectory in both, development of industrial solutions for energy monitoring, in different domains (industry, administration). The idea is to be multi-service, tackling not only electricity, but also gas and district heating.

Estonian electricity and gas transmission system operator (TSO) Elering is the neutral party that provide data sharing service. Energy DATA FEED PLATFORM is a consortium of five entities (transmission network operator, global scale ICT Company, electricity distribution network operator, heating grid operator and renewable energy producers). Estfeed brings together data sources and applications. Data sources range from electricity, gas and district heating smart meter readings to weather forecast and energy day-ahead prices. It also can be consumption information from individual devices in industry, offices, households.

---

[8] In many cases data is uploaded within 24 hours of the consumption/production hour.

The objective of the Estfeed project is to create a smart grid that allows market players to get energy consumption information securely and transparently, understand the needs related to the metering point and change their behavior accordingly.

Estfeed is a portal that gives developers a chance to access this information flow. By interpreting and combining data they can create useful applications for themselves or their customers (end consumers). The aim of the applications is to create efficiency, either for cost optimization or for end consumers. Estfeed is integrated part of Estonian public information exchange platform called X-Road. This means high security standards. X-Road enables access to all kind of public data sources which may be of relevance for the developers of Estfeed applications. Central platform also means better economics for the society.

The consent mechanism covers both the download and the transfer to third party possibility. Data is stored in the utility (DSO, TSO, DNO) database and transported only when the applications need it. No central database is needed. The Security server can send messages and control the exchange of messages between different parties.

The initiative will cover: electricity smart meter readings (1h, 24h period), gas meter readings (24h period), central heating readings (1h, 24h period). It will address both download and share data possibility. The information is updated daily.

An extensive number of use cases has been approached already (View Organizations, View the Details of an Organization, Register an Organization, Parse User Input, Edit the Information of an Organization, Delete an Organization, Register an Application, View Applications, View Application Details, Edit Application Information, Activate an Application, Deactivate an Application, Add the Information of an Estfeed Contract to a Data, Source or an Application, Edit the Information of an Estfeed Contract, Suspend an Estfeed Contract, Continue an Estfeed Contract, Terminate an Estfeed Contract, Add a Service Version Subscription to an Application, Remove a Service Subscription from an Application, Delete an Application, Register a Data Source, View Data Sources, View Data Source Details, Edit Data Source Information, Activate a Data Source, Deactivate a Data Source, Add a Provided Service Version to a Data Source, Remove a Provided Service Version from a Data Source, Delete a Data Source, View Services, View Service Details, Register a Service, Edit the Description of a Service, Add a Version to a Service, Delete a Version of a Service,D elete a Service, View Classifiers, Add a Value to a Classifier, Edit a Value of a Classifier, Delete a Value of a Classifier, View System Parameters, Edit the Value of a System Parameter, View Persons, Add a Person, View the Details of a Person, Edit the Information of a Person, Add a Mandate Object to a Person, Add an Existing Mandate Object to a Person, View the Details of a Mandate Object, Edit the Information of a

Mandate Object, Delete a Mandate Object, Delete a Person, View Mandates, Add a Mandate, , Import Mandates, Delete a Mandate).

The data is stored in a utility (DSO, TSO, DNO) database and transported only when an application need it. No central database is needed. The Security server can send messages and control the exchange of messages between different parties. The content of the message is not known to platform operator.

After the pilot and development phase, Estfeed will be open to the public at the end of 2016.
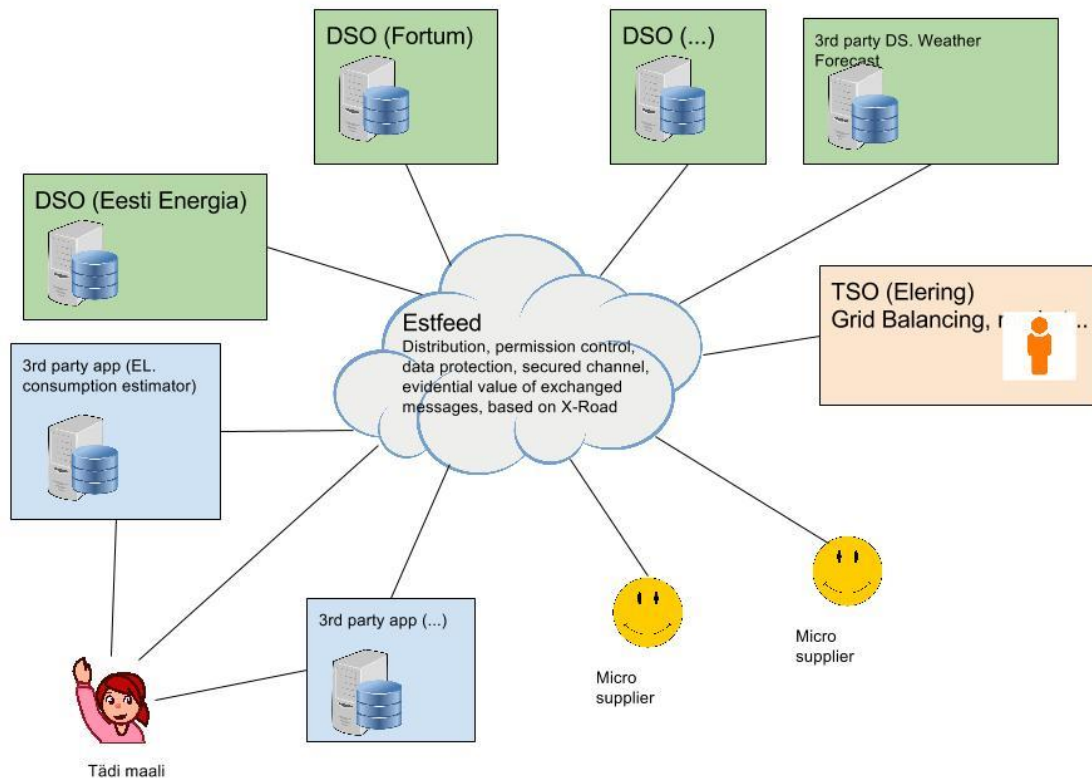
Figure 1: Estfeed Data flow
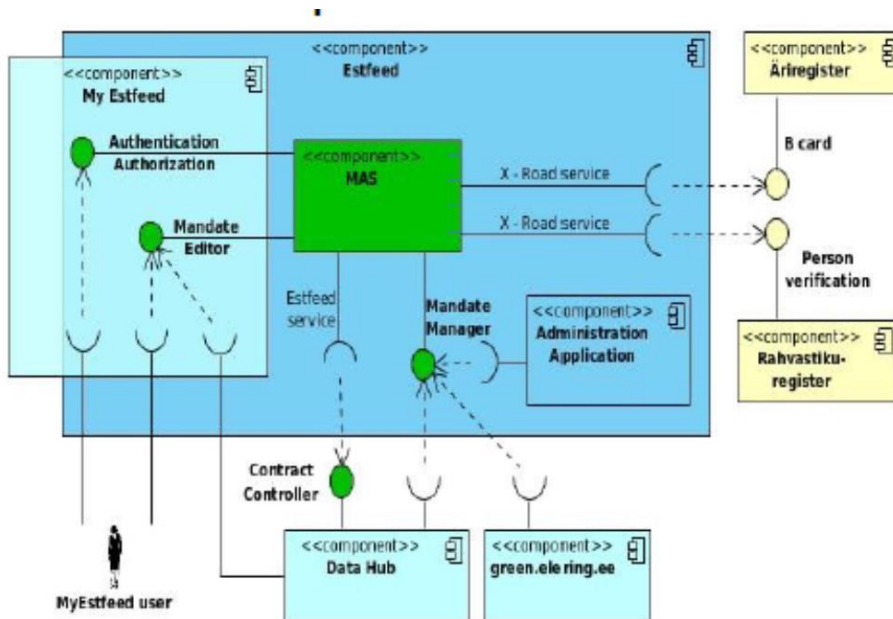
Figure 2: ESTFEED Consent mechanism: Public key infrastructure (ID card, security server software components) and public registers (business register, citizen register) are used for authentication purposes.

d) Finland

In Finland, in spring 2015, the Finnish TSO (Fingrid Oyj) launched a project with the aim to clarify information exchange on the electricity retail markets and make it more efficient. Datahub – the centralized information exchange. The Finnish Government has selected the TSO Fingrid as a "neutral stakeholder" and given them the task a) to solve the information exchange needs of the market players, b) to enable innovative 3. party solutions and services, c) to manage the data security and privacy issues.

The data in the Datahub is handled as private data. The Datahub regulates the data access and privacy issues. The customers control their authorizations electronically using Datahub services that can be entered through each energy company web pages. Using these services, the customers use their strong electronic authentication methods in order to manage their authorizations.

Energy companies must get an authorization to be able to give the smart meter or other personal data to the third parties. The data can be used to manage the market processes (e.g. to invoice the present customer) on contractual basis without additional authorizations.

Data quality in the energy companies is one of the critical issues, since the Datahub control mechanisms are based on electronic authentication of customers. However, many energy companies do not have all the needed data on their customers, e.g. the social security numbers of all the customers. In 2019, data sent between electricity consumers, sellers and distribution companies will be stored in the Datahub, where it will be equally available to all market operators.

In the Datahub there are customer data, smart meter data (6 years history), contract and invoicing data, plus an extensive list of voluntary data fields e.g. storage capability of the smart metering point.

The Datahub project encompasses both download and share my data. The role of the Datahub is to control the information exchange and authorizations.

Roles encompassed are: electricity consumers, sellers and distribution companies as well as third parties.

All stakeholders have been and will be involved in the discussion are electricity consumers, sellers and distribution companies.

Data contents and the information exchange methods and intervals between stakeholders have been highlighted as issues relevant for standardization.
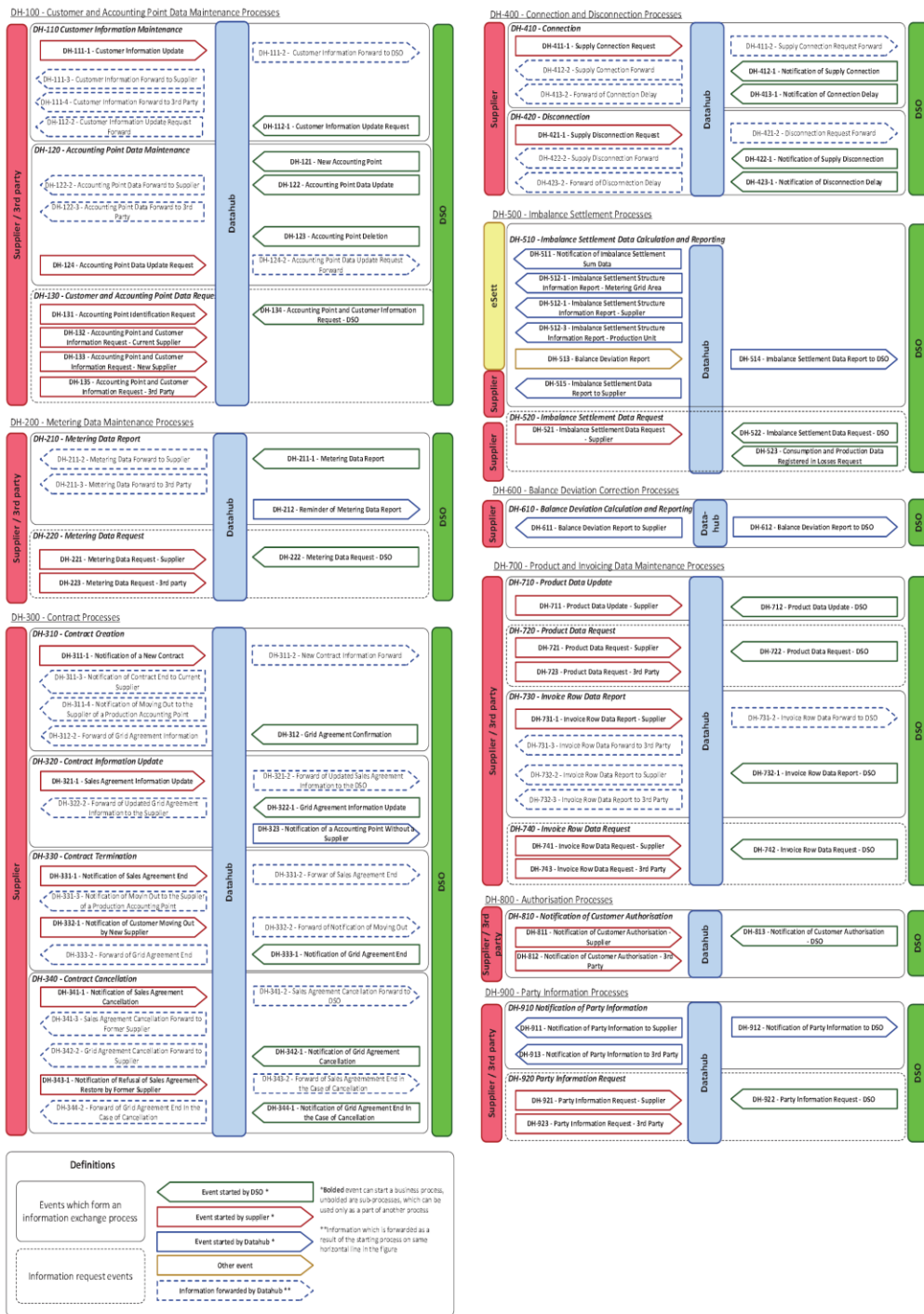
Figure 3: Datahub use cases and Datahub processes in Finnish initiative

e) France

In France, the legislative framework concerning energy data access and transfer is under construction, however, some indications are already provided by the Law on energy transition. In the present system, DSOs are together responsible for Energy Individual Data Protection, and they must ensure access to individual customers to their own energy data via a secured web portal[9].

---

[9] As per deliberation of *Commission de régulation de l'énergie* and *Code de l'Energie*.

Individual customers must also be able to share - or authorize DSOs to - share their data to any authorized third party (through express customer consent).

However, the consent process for individual customer is not yet fully defined (in particular roles and responsibilities of DSOs and Providers/third Parties). Only in some specific cases, such as for "Flexibility aggregators" and "Energy Providers", there are clear indications of the need of collecting customer consent before getting any data from DSOs.

Enedis

Enedis, (the major French electricity DSO) has started the roll-out of smart meters and has launched pilot projects to provide customers access to their data (via Linky) as well to transfer their data to third parties (Solenn).

The Linky system is for electricity data only. The download of daily data from the DSO portal is possible at any time for customers in a simple standard file format. However, Enedis is working on an alternative file format, basing on the IEC international data model CIM, which could be used as a starting base for the next steps in this ad hoc group to build a common interoperable standard. Half hourly data is possible to customers that have provided their consent. The DSO may have access to half hourly data without collecting consent only for operating needs, in a limited timeframe and specific area.

Besides, consumers can also directly access their consumption data in near real time through the connection of adapted devices to the smart meter.

Sharing data through the DSO data exchange platform with third party is for the time being only possible with energy providers, and it is not generalized yet. A separate consent is requested for data transmission and use, but not necessarily collected by the DSO.

The consent mechanism works as follow: customers equipped with a Linky smart meter are invited to connect to Enedis web portal where they can consent to the collection of their half hourly data, storing in the information system and the downloading. Customers can easily opt out from this process and so far, the web portal does not include the possibility to provide consent to share data with third parties. Providers can send requests to Enedis for starting load curve data collection (monthly to daily data and if available half hourly data) and accessing customer data. There is no requirement to show the customer consent upfront, but the provider must be able to provide it if asked, in order to get access to daily and infra daily data.

There is no clear indication concerning the process of controlling consents collected on provider side by the DSO and this is perceived as a weakness, because there is no clear guarantee that customer data is properly used.

In the project Solenn, a consortium of stakeholders (Local Authorities, Ademe, Enedis, Industrial players, university of Bret) is experimenting the sharing of individual customer electricity data with third parties.

Individual customer consent is collected by the Local Authority present in the consortium. Consent is controlled and stored by Enedis, technically backed by a consent web site built by an Internet Service provider. Consent revocation by the client is also enabled through the web site. A platform makes data available to third parties for Energy Management purpose (Individual coaching, collective emulation, etc).
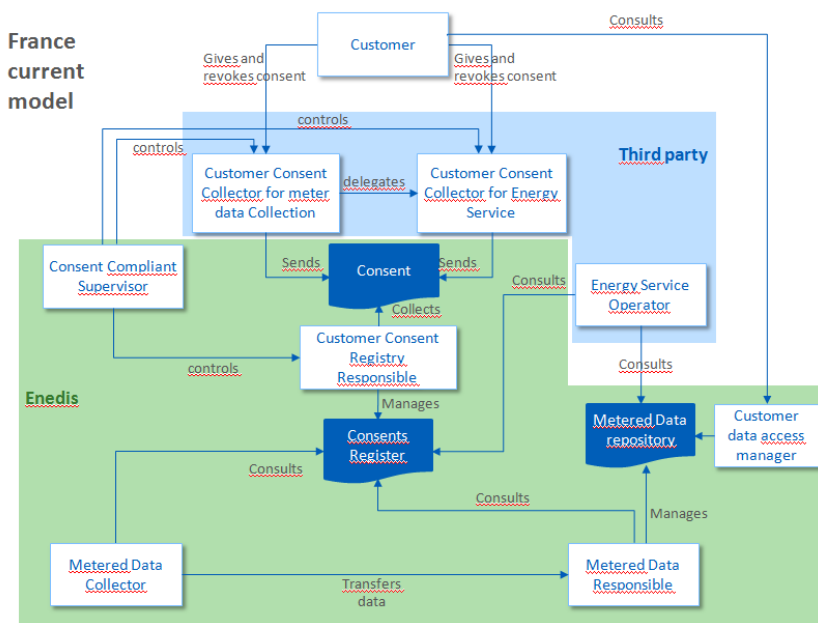

Figure 4: Current model in France

f) Germany

n Germany, the Law for the digitalization of the energy transition (GDEW) has entered into force at the beginning of September. It distinguishes between:

1. Customers with a higher consumption and/or bigger renewable energy feed-in systems, who will be equipped with a so-called "intelligent metering system" (ca. 15% of the market).

2. Customers with a consumption below 6000 kWh/a and/or feed-in systems < 7,5kW peak , who will be equipped with a so-called "modern metering equipment" (ca. 85 % of the market).

 Implementation of smart meters according to this law will start during the first quarter of 2017.The law covers metering data, market communication, contractual arrangements related to metering, electricity/gas heating/district heating.

Metering data must be stored directly at the smart meter device. Data up to 24 months can be downloaded at any time by the customer (download my data) and shared with third parties (transfer my data). The supplier, who has the right to use the data, is obliged to delete all person-related

metering data after the completion of his tasks. However, at the moment there is no clear definition concerning options to transfer the metering data out of the meter electronically.

Powerfox

Powerfox, one of the first initiatives rolled out, focuses on collection of electricity data only, Multi-energy data collection is planned from 2017 onwards. Residential customers don't have yet access through a webpage, but the service should be available in the near future. Direct access is available via an app solution for Android and it is planned for IOS in 2017.

Information on consumption data is collected in 1-minute resolution and displayed in free scalable time horizons by hourly and 7 days' horizon by 15 minutes' aggregations.

Information on generation data is collected in 1-minute resolution and displayed in free scalable time horizons by hourly and 7 days' horizon by 15 minute' aggregations.

Information on operational data (i.e. voltage) is provided in 15 minutes' resolution in stream but not saved. This data can be forwarded to partners interested in. Currently this data persists in streams of seven days, however this may change in the future with increased volume.

In addition, benchmarking with average consumption values in Germany is also provided.

The information is updated with 15- minutes maximum time delay for consumption and 1-minute delay for operational data, due to internal aggregation of values.

g) Great Britain

Through the Smart Metering Implementation Programme and consistent with the UK Government's broader "midata" initiative, arrangements have been put in place to enable domestic consumers to easily access their own energy consumption data. Consumers will be able to access their own energy consumption data through:

- Their In-Home Display (offered to all households free of charge) in near real time;
- The connection of additional devices to a Home Area Network as part of their smart metering system;
- Requesting information from their supplier;
- Authorized third party organisations (such as switching websites) to access their consumption information directly from their smart meters via the Data and Communications Company (DCC)[10].

In order to protect consumer interests whilst enabling proportionate access to data by energy suppliers and others, a Data Access and Privacy Framework has been established. The central principle of this Framework is that domestic consumers will have control over how their energy consumption data is used, except where this is required for billing or other regulated purposes.

---

[10] Central body responsible for managing communication infrastructure.

Smart metering equipment is capable of storing a minimum of 13 months of half-hourly and two years of daily consumption data for electricity and gas. In addition, real time readings (better than 10 second updates) are available for electricity across the Home Area Network and are displayed, together with half-hourly information on gas consumption, to the consumer through their In-Home Display. The In-Home Display also provides the consumer with easy access to historical consumption information for the purposes of comparison.

Data can be accessed by authorised parties (subject to consumer consent) directly from the smart metering interface in the premises or through the Data and Communications Company (DCC). The solutions available address both "download my data" and "connect my data".

While the data is therefore stored on the meter itself, authorised users of the Data and Communications Company (DCC) can request consumption data from these meters, in line with the requirements set out in the Data Access and Privacy Framework.

In addition to energy suppliers and network operators, authorised third parties of the DCC, such as price comparison websites, home automation services and energy efficiency advice providers (as well as prospective suppliers). These third-party users must obtain the explicit consent of the consumer before accessing their consumption data through the DCC.

In order to protect consumer interests whilst enabling proportionate access to data, a Data Access and Privacy Framework has been established. The central principle of this Framework is that domestic consumers will have control over how their energy consumption data is used, except where this is required for billing or other regulated purposes. The main features of this Framework are:

- Energy suppliers can access monthly consumption data for billing and other regulated purposes. Access to more granular data will depend on consumer consent; daily data can be collected if the customer has not opted out of providing it and half hourly data can be access if the customer has opted in to make it available.

- Network operators will be able to access energy consumption data (including half-hourly) without consent, but only if they have implemented protocols for anonymising this data which have been approved by the Regulator.

- Third party users of the DCC will only be able to access consumption data with the explicit consent of consumers.

Information on the purposes for which data is collected by suppliers and third parties must be provided to the consumer. They must also contact the consumer at appropriate intervals, reminding them of their data access choices and providing information on how they can opt-out of data sharing (where relevant).

The local interface to the meter is standardized (ZigBee Smart Energy). Consumers can request up to 24 months of detailed energy consumption information directly from their energy supplier. Where such a request is made, the information must be provided to the consumer free of charge and in a readily understandable format.

Smart meters store 13 months of half hourly data for electricity and gas. Most energy suppliers rolling out smart meters offer the ability to view the data on their website. 30 minutes' data is available remotely, while 10 seconds (electricity only) is available via the smart meter.

Information can be available on real time or updated every day, depending on the energy supplier, customer proposition and whether the access is granted via an app or the webpage.
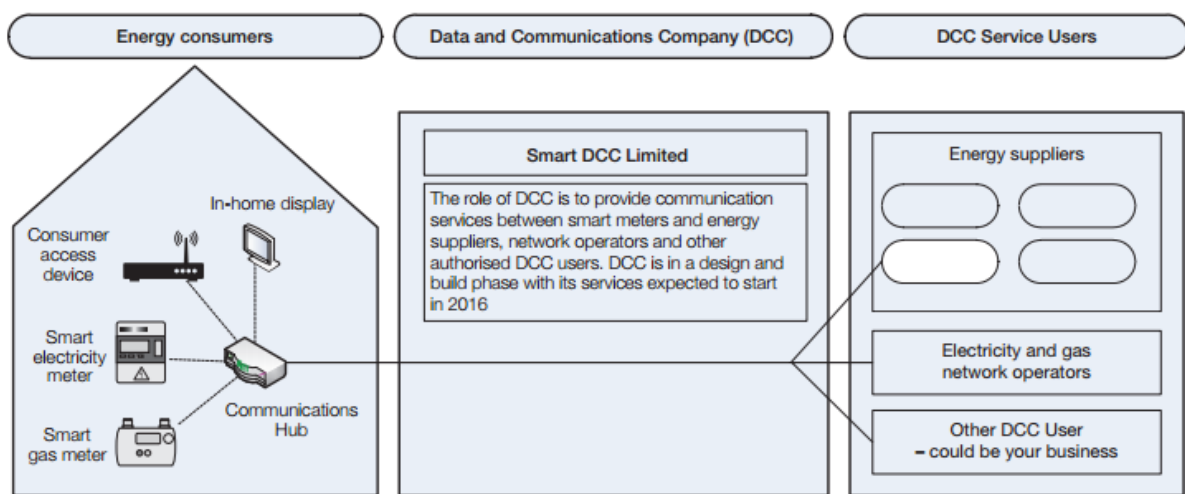

Figure 5: Principal use cases in Great Britain

h) Italy

In Italy, decree 102/2014, art. 9, comma 3b establishes that the metering data registered by the smart meter are owned by the final customer, according to the customer data ownership principle.

The DSO is the actor responsible for the metering process. The retailer has a legal agreement with the customer and therefore the customer's consent to receive his metering data from the DSO. Monthly metering data per time band of LV customers (contractual power below 55kW) are sent to retailers for invoicing purposes.

A central database called «Integrated Information System» (IIS), collects commercial and metering data from all the DSOs and manages the exchange of these data with the TSO (for balancing) and with retailers (for invoicing purposes).

Regulation about metering data exchange between the DSO and third parties is under discussion. In particular, the Regulation is not yet finalized on 1) customer consent to third parties different from the retailer 2) customer consent for the communication between the meter and the visualization

field devices within the HAN. Some guidelines have been published by the Italian authority for electricity, gas and water (AEEGSI) within the scope of resolution 87/2016. These guidelines partially concern the scope of the IIS system (that is managed by a public entity, the «*Acquirente Unico*» to ensure impartiality and non-discrimination among operators) and the provision of data to the final customer within the home area network (HAN).

The DSO's remote metering management system will have to deliver the customers' load curves (15 minutes active and reactive energy curves and 15 minutes averaged active power curves) to the IIS system. These data will have to be validated and sent daily with specific H24/H96 success rates.

Moreover, the smart meter will have to send data through PLC within the home area network. The communication protocol will be open.

For the time being, the customer consent management is defined only the use case:

1. Access to metering data by the retailer through the national IIS

- The DSO uploads data on the IIS system for the customers connected to its grid;

- Within the IIS system a database stores the link between each POD (point of delivery) and the retailer having an active supply contract with the related customer;

- All the retailers subscribed on the IIS system have tailored permissions and can access only the data of the customers they have a supply contract with.

2. Delivery of metering data to the retailer by the DSO

- The DSO knows the link between each POD and the retailer having an active supply contract with the related customer;

- All the retailers can ask to the DSO only the data of the customers they have a contract with.

The consent mechanism works as follow:

1. For the time being only the retailer - having an agreement with the customer for the energy supply - is supposed to access the customer's data. The customer consent is provided when the agreement is signed and forwarded to the DSO. Moreover, the link between each POD and the retailer having an active supply contract with the related customer is stored in the IIS (all the retailers subscribed on the IIS system have tailored permissions and can access only the data of the customers they have a supply contract with). Third parties (such as value-added service providers) access to customer data and consent management mechanisms have not been defined yet and the Italian Authority is expected to provide regulation about this topic in upcoming resolutions.

2. The process for the authorization of local communication between the smart meter and any third party's device installed within the HAN will be started by the customer that will request the

DSO to enable such communication channel on the customer meter. Details about this consent mechanism have not been defined yet.

Enel system

Enel Distribuzione, intends to start the roll out of a new generation of smart meters by the end of 2016. The technical features of these meters and the related remote metering management infrastructure will cover the requirements on data management and data exchanged specified in Resolution 87/2016. Therefore:

3. An exchange of data will be implemented between the DSO's remote metering management system and the national IIS system and/or between the DSO's remote metering management system and the retailers.

4. A PLC communication channel from the meter to the HAN will be established.

Customers registered to the DSO portal, have a web page access to their daily load curves (power higher than 55 kW) or monthly consumption (split into the three time bands).

Information on electricity consumption and generation is provided 15 minutes' base for contractual power higher than 55 kW, and on monthly basis for other customers. Prosumers receive information electricity reversal flow data.
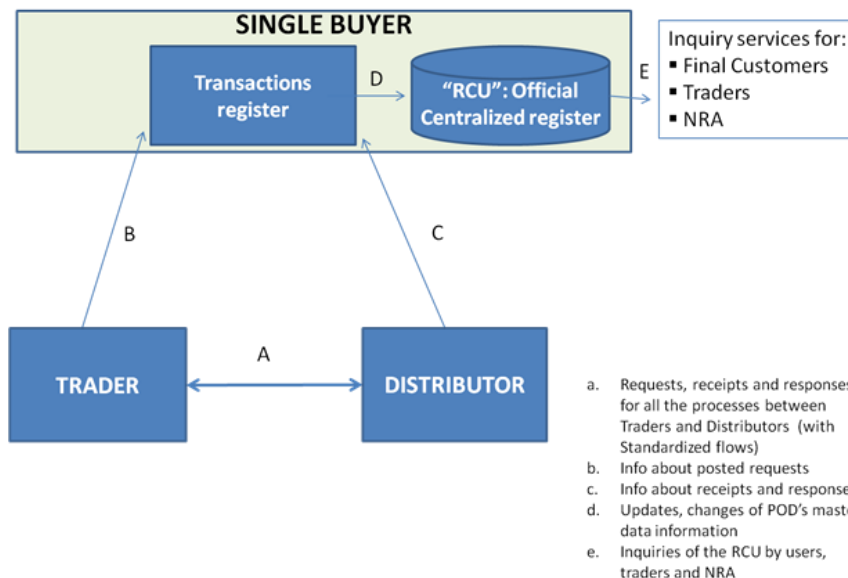

Figure 6: Italian Data Model from (evolvDSO) project

i) Spain

The Spanish Regulations Real Decreto 216/2014 and Resolución 6203/2015 set the framework for DSOs when it comes to consumption information (hourly load profiles) to be provided the end users (less than 15 kW of contracted power).

From 1st October 2015, DSOs are required to publish the hourly load profiles and traders to bill their customers according to the hourly load profiles if customers have already have their smart meter integrated in the smart meter system. The roll out of the smart meters in Spain will be completed by the end of December 2018.

Each DSO also provides a web site that allows that customers connected to its distribution network to consult and download their hourly load profiled (once he has been billed). These load profiles are daily sent to traders, and customers are billed monthly according to their consumption profile.

The format could support any granularity, beside the hourly used.

DSOs enable the possibility that the same load profile made available to the trader to bill customers; can be downloaded by the customers in flat-file format CSV and Excel, together with a graph representing the customer hourly data for the billing period. The file format to be used is unique for all DSOs in Spain and is specified in the regulation. Metering data from smart meters is stored in the DSO's metering management system.

The DSOs send the data to traders through secure FTP.

Traders can only access the information of their customers. If traders want to access the information of customers different than theirs, that aren't their own customers, they need to ask and obtain such consent.

j) The Netherlands

A reform of the system is currently under discussion in the Netherlands ('Consent Register'). It is generally recognized that the present system presents some inadequacies.

In the current system, the extraction and distribution of data is only possible from the so-called P4 portal of the smart meter, when the customer gives his consent. The energy supplier or independent services provider (ISP) who wants to offer a service to the customer has the obligation to obtain his consent to access the data. The Electricity- and Gas Act and privacy law requests the DSO to ensure that the consent is given by the customer before the extractions and distribution of the data to the relevant supplier or ISP. However, the DSO has at the moment no possibility to check the existence of a valid consent.

In order to amend the present system, two possible scenarios are under scrutiny:

3. Scenario 1:
   - The customer gives still consent to market parties, his consent is registered in a central Consent Register and the authentication of the market parties is de-centralised.
   - The DSO can perform real-time check on given consent, before meter reading and meter data distribution takes place.

-   The Customer has access to the Consent Register and is able to check his/her given consent to different market parties.

-   The authentication for the Consent Register is done by market parties (e.g. by comparing meter number, a letter to the customer or a code on the meter display).

-   An annual accounting/assurance report is performed.

4. Scenario 2:

-   The customer gives still consent to market parties, but the authentication and address validation is done centrally. The consent is registered in a Central Consent Register.

-   The DSO can perform real-time check on given consent before meter reading and meter data distribution takes place.

-   The customer has access to the Consent Register and is able to check his/her given consent to different market parties and can also terminate/ modify given consent in the Central Consent Register.

-   The authentication for registry in – or access to the Consent Register is preferably done by using existing authentication methods, already in use by other (semi)governmental organizations.

DSOs and market parties will elaborate the scenarios and will present their common solution to the regulators in order to see whether the new system does fulfill the requirements derived from both the energy and privacy legislation. DSOs foresee that at the end of 2016 a common system will be approved and the technical development will start. Ideally, the new system will be in place during the third quarter 2017.

The scope of the initiative includes both gas and electricity data, made available for all interested (market) parties that have obtained the consent of the customer.

The new regulation will require DSO to improve their consent checking procedures, and since the DSOs are data provider and as regulated party, it is likely that they will step forward to realize and manage the consent register. However, other market parties could also fulfil this role.
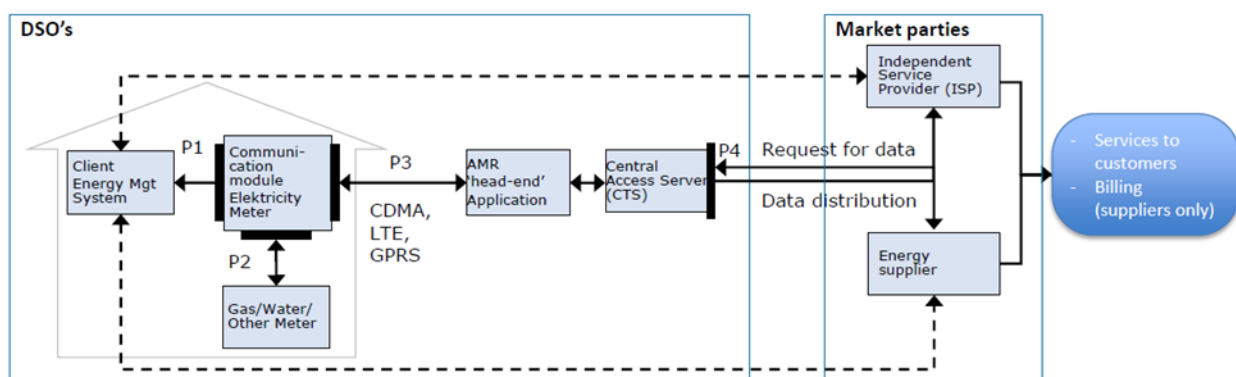

Figure 7: Existing situation in The Netherlands

Hello Data

In the Netherlands, one of the commercial initiatives being tested is *Hello Data*. The idea is of HelloData is a platform that allows energy data sharing through an open standard protocol. It gives end-users (consumers) access and control of their energy supply and demand and personal energy data. Users can connect (digital) hardware to HelloData, and manage their energy data using services and apps. By accessing their personal HelloData account, they can control their own data. HelloData does not store energy data. It only logs registration data and settings. These are the main features:

1) The data are measured by the equipment (e.g. smart meter) at the consumers' households.

2) The device will be connected to the consumer HelloData account.

3) The consumers can determine for themselves which data they want and do not want to share.

They are in the driving seat in terms of ensuring their own privacy. Consumers give permission with a simple "Yes" or "No" in HelloData for sending these data to the services and apps. The consumer is able to choose in which resolution the data will be shared with the services and apps.

HelloData does not store energy data. It only logs registration data and settings. HelloData does not provide access via a webpage, but via a third party application.

HelloData provides information on electricity (P4) every 15 minutes, and (P1) every 10 seconds. Customers have access to real time information (P1) and daily updated information (P4).

DSOs Nederland solution

Information on consumption is provided by smart meters directly. The information provided in both physical ports P1 and P4, is about consumption (electricity and gas) and production (electricity). Upon request the information is provided for electricity 15 minutes, daily and monthly, while for gas hourly, daily and monthly. Although access via a webpage could be technically feasible, it is not at the moment provided, as this is not a role for DSOs in the current Dutch legislation.

On top of consumption and production data, the P1 port provides also additional power quality information (e.g. needed for charging electric vehicles). Moreover, the new type of smart meters, to be introduced in 2016, will provide real time meter readings for electricity and 5 minutes readings for Gas.

The information is updated daily on P4 (once a day a message with 96 quarterly values for electricity and 24 hourly values for gas in the most granulated option). On P1, every second a new message with actual values for electricity is sent. The values for connected meters are updated in the message according to the connection. For gas updates occur every 5 minutes.