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EDDIE

EUROPEAN DISTRIBUTED
DATA INFRASTRUCTURE
FOR ENERGY

D5.1
Intermediate report on best-practices and EU region connectors created

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DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Acronyms/ Abbreviations	Description
AP	Access Provider
API	Application Programming Interfaces
BPRT	Best-Practices Round-Table
CA	Consent Administrator
CEP	Clean Energy Package
CSV	Comma-separated values
DEE	Data Exchange Environment
DSO	Distribution System Operator
EC	European Commission
EC-Code	Energy Identification Codes
eIDAS	Electronic Identification, Authentication and Trust Services
EP	Eligible party
GDPR	General data protection regulation
GLN-Code	Global Location Number Code
HEMRM	Harmonised Electricity Market Role Model
HRM	Harmonized Role Model
MDA	Metered Data Administrator
MDC	Meter Data Collector

MDR	Meter Data Responsible
MS	Member states
n. a.	Not available
NCA	National Competence Authority
NIF	Tax identification number in Spain
PA	Permission Administrator
POD	Point of delivery
RC	Region connector
RT	Round-table
SEEG	Smart Energy Expert Group
TSO	Transmission System Operator

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1 Executive Summary

This intermediate report consolidates the findings from the first 18 months of the project's Best Practices Round Tables (BPRTs) for Data-Sharing Infrastructure Operators, identifying key practices and challenges in data sharing facilitated by DSOs, TSOs and independent/ dedicated entities.

1.1 Key Objectives and Findings

- **Harmonized Role Model**: The report endorsed the role of a Harmonized Role Model (HRM) embodied by European legislation and translated for Member State (MS) environments to national actors.
- **Pivotal Information Model(s)**: The report highlights the need and the possibility to create common and pivotal information models that national data exchange can be mapped to. It strongly recommends the adoption further development of IEC CIM.
- **Best-Practices Identification:** Through BPRTs, the project identified best practices such as consent-based data sharing and the provision of near real-time data. These practices are crucial for improving transparency and efficiency in energy data management. They vary heavily between MSs in implementation and degree of success.
- **Challenges and Solutions:** Several common issues were identified, including the complexity of certification processes, authorization procedures, and the lack of multilingual content. The report proposes sustainable solutions such as process improvements, enhanced documentation, harmonization of practices, and leveraging technological advancements to create a more user- and economy-friendly data ecosystem.
- **Country-Specific Insights**: The report provides detailed insights into the existing infrastructure and practices in various member states including Austria, Denmark, Estonia, Finland, France, Greece, Netherlands, Italy, and Spain. Each country's section includes specific challenges and tailored solutions to improve data-sharing practices.
- **Outlook:** The report outlines the next steps for the final report, which will include further detailed findings and recommendations for each member state. The project aims to continue refining and implementing best practices across the EU to ensure a cohesive and efficient data-sharing infrastructure.

1.2 Key conclusions

The first months of the initiative and the works on connecting a common European API to regional data-sharing infrastructures have led to the following intermediary conclusions:

- Infrastructures that keep data close to the source (and therefore not breaking up natural points of reference and connectivity with responsibility for physical infrastructure) are very effective (e.g., AT, EE, FR, ES).
- In terms of efficiency and availability of data there is no difference between MSs featuring National Data Hubs, decentralised Energy Market Communication environments and hybrid scenarios.
- Key is a well-organised, documented, and fair stakeholder integration and standardized processes.
- Onboarding to MS data exchange environments is often very expensive for non-domestic actors. This needs to be improved and European means for that should be leveraged broadly for the energy domain (e.g., Electronic Identification, Authentication and Trust Services (eIDAS)).
- Proper transposition of the Clean Energy Package (CEP) and Commission Implementing Regulation (EU) 2023/1162[1] is by far not set in all MSs, which places a big burden on solutions that attempt to operate at a European Scale. Improvements are on the horizon, but it is still a challenge to cover all regions within the project scope.

1.3 Report findings

The EDDIE project is making significant progress in identifying and addressing the challenges in energy data sharing within the EU. The facilitation of knowledge exchange already has significantly improved environments in different MSs, and the respective effects are expected to even increase in later stages of the initiative. The best practices and solutions documented in this report serve as a foundation for future improvements and harmonization efforts. The final report will build on these findings, providing comprehensive recommendations to enhance the European energy data infrastructure.

The document provides a comprehensive overview of the current state and future direction of data-sharing practices in the EU energy sector, aiming to foster a more integrated and efficient system.

[1] https://eur-lex.europa.eu/eli/reg_impl/2023/1162/oj

2 Introduction

This report is an outcome of the EU-funded project "EDDIE", which stands short for "European distributed data infrastructure for energy". This intermediate report includes all documented best-practices identified during the round-tables (e.g., consent-based data-sharing, making accessible near real-time data) and other observed issues to improve data-sharing infrastructure (e.g., hurdles to effective user flows, unnecessarily complicated processes). Hence, it was the primary function of the so-called "Best-Practices-Round-Tables" (BPRTs) to learn about the different situations in different member states, to identify different roles and responsibilities and to get in contact with relevant persons. Therefore, the BPRT was a first step to efficiently manage the integrations with the regions.

The TSO–DSO Data Management Report[2] describes regarding roles and responsibilities the following: "Data management model refers to the framework of roles and responsibilities assigned to any party within the electricity system and market and the subsequent duties related to data collection, processing, delivery, exchanges, publishing and access."

To get in contact with the right persons in each member state to be able to organise BPRTs was not always an easy task, but at the end it was possible to get nine member states (Austria, Denmark, Estonia, Finland, France, Greece, Italy, Netherlands, Spain) presenting their data exchange infrastructure and organisation. So far, this was a great success and many thanks to those countries for their contribution and active participation.

It was one of our first "lessons-learned", that regarding data exchange issues, it is essential to have a "top down" contact list, starting from governmental institutions (e.g., Ministries, Regulatory Bodies) to Stakeholders and further on to associations, network operators and at least high-qualified technical personnel. One of the first tasks was to clarify roles and responsibilities, after that, identifying relations and processes between the different roles and responsibilities. The European Master Data Model (which is described later in this report) was a helpful guideline to identify relevant actors – while it is not legally binding. Member States may choose how to implement the interoperability requirements in their national system reflecting national practices, e.g., regarding the communication and component layer. It is also the intention of this report, to make national practices regarding this aspect more transparent for eligible parties. All our findings yet were gathered during the round-tables and are documented in the related chapters of this report.

[2] https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/entsoe_TSO-DSO_DMR_web.pdf

2.1 Purpose of Document

The objective of this report is to show best practices and identified issues around data-sharing infrastructures. An additional aspect is that based on best-practices to be able to learn from countries which are in a higher stage of progress to overcome hurdles, which were identified in different countries all over Europe. Therefore, the purpose of this report is to improve already set up data sharing environments, but even more to provide guidance to member states (MS) and many other stakeholders as well as eligible parties, which are currently building up their energy data sharing infrastructures.

2.2 Scope

To be able to make statements about different data sharing infrastructures and access to them, it is essential to define, in a first step, the scope of data that will be exchanged.

The TSO–DSO Data Management Report[3] describes following types of data: "The main types of data, classified by timeframe, that have to be collected are:
Planning data (declared):

- Forecasts.
- Scheduled data, and
- Master data (contractual), declarations.

Measured data (certified):

- Real-time measurements; and
- Ex-post measurements: metered data."

European legislation defines two relevant types of data that are exchanged: Validated historical metering data and non-validated near-real-time metering data. These two types of data are also mentioned in the Commission Implementing Regulation (EU) 2023/1162[4] of 6 June 2023, Article 2, Paragraphs 3 and 4:

- Validated historical metering and consumption data means historical metering and consumption data collected from a meter, a conventional meter or a smart meter, or a smart metering system, or completed with substitute values that are determined otherwise in case of meter unavailability.

[3] https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/entsoe_TSO-DSO_DMR_web.pdf
[4] https://eur-lex.europa.eu/eli/reg_impl/2023/1162/oj

- Non-validated near real-time data from a smart metering system as referred to in Article 20, first subparagraph, point (a) of Directive (EU) 2019/944[5]

The scope of this report emphasizes these two types of data.

In a second step, it is necessary to understand the processes that will be needed to be able to exchange that data. As already mentioned, we referred to the European Master Data Model that is described later in this document. It is important to mention that the intention with EDDIE is to connect different data exchange infrastructures from different member states which each other. It is not the intention to harmonize European data exchange infrastructures.

2.3 Background

The goal of the data exchange regulation of the European Commission is to enable final customers in the retail electricity market and eligible parties to access the above described two kinds of data, in a timely, simple and secure manner. Furthermore, according to the regulation, it should ensure that suppliers and service providers have transparent and easy access to final customers' data, in a manner that the data is easy for them to understand and use, if customers have given the required permission[6]. How this works now in different member states is described in this report.

In general, there are different data management models in place. According to the GEODE fact sheet on data management models[7], there are three different categories of data management models existing, those are typically classified based on the architecture of data storage and exchange. The most widely known models are the de-centralised model, the centralised model, and the hybrid model. The three models were also used to describe the data management model of the related member state.

[5] https://eur-lex.europa.eu/eli/dir/2019/944/oj
[6] see also COMMISSION IMPLEMENTING REGULATION (EU) 2023/1162 of 6 June 2023 (3)
[7] https://www.geode-eu.org/wp-content/uploads/2020/05/202005-Fact-sheet-GEODE-Data-Management-FINAL.pdf

3 European viewpoint

In the energy sector, Directive (EU) 2019/944[8] of the Clean Energy for all Europeans Package[9] establishes the rights to access energy-related metering, production and consumption data for customers and eligible parties of their choice. Services of this kind empower customers, can consult energy buyers based on their consumption patterns or contribute to efficient energy management, amongst others.
For the success of the project, it is essential to have a clear picture of roles and responsibilities, data exchange processes and a collective understanding of the underlying semantics, and to generate a reliable, technical mapping towards European legislative reference models. This was executed in the theoretical part, derived from the wordings of the European legislation and from other resources, to define a process and role model, which is used as reference model to describe the situation in each examined member state. Of course, EU-regulations, implementing acts and related documents were used, to create such a model. This model is then used as reference model in the related country fiches.

3.1 European legal framework

High-level provisions in the Clean Energy Package (particularly Directive 2019/944[8] Article 19, 20, 23 and 24), are just a start towards a participative, digitalized energy system – similar provisions are already elaborated for far more than just bare data access. The European Commission (EC) has recently published the first of the so-called Data Interoperability Implementing Acts [10] following Article 24 of the Directive, which foresees the full interoperability of Energy Services across the Union.
The same Article also states that the EC shall release non-discriminatory requirements and procedures *based on existing national practices*. The latter is really to be noted, as it demands a smarter approach than just designing operation models at a European level and rolling them out. This would also contradict Article 23, which clearly states Energy data management as a subject to Member State decisions.

The first act expressing such provisions - Commission Implementing Regulation 2023/1162 – coins a European approach to Interoperability based on European Reference Models for

[8] https://eur-lex.europa.eu/eli/dir/2019/944/oj
[9] DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU.
[10] https://energy.ec.europa.eu/publications/implementing-regulation-interoperability-requirements-and-non-discriminatory-and-transparent_en

relevant processes. In fact, it defines a minimum set of procedures, data and responsibilities that must be implemented in each MS, without pre-empting *how* this implementation is to be done. This allows more flexibility to accommodate the fulfillment of often challenging requirements with the needs of national settings. Member States are then obliged to map their national procedures to the common reference model, and the EC will collect and publish them. Recent exercises done in preparation have shown that the procedure leads to particularly superior results in terms of comparability and convergence between member states. Data exchange for customer switching, demand response and other processes will soon follow.

However, these mappings work on a business requirement, non-technical and semantical level. One main aim of Project EDDIE is to define technical reference models based on these legal reference models, and map national environments technically towards a common, usable implementation. The initiative establishes a uniform user and application developer experience throughout all data exchange relations.

Another big issue is that Article 20(a) of the Directive foresees the access to real-time data from smart meters through a *standardized or remote interface*. As remote access to these data streams is not often realized (and as this most probably would even bring unfamiliar problems), these valuable data sources lack a trusted efficient way to connect with (more than one) service providers. The same is the case for behind-the-meter assets and *dedicated measurement devices (DMD)* as provisioned by (Recast Renewable Energy) Directive (EU) 2023/2413 [https://eur-lex.europa.eu/eli/dir/2023/2413/oj] or also the interfacing with building automation systems as foreseen in Article 14 of the (Energy Performance of Buildings) Directive (EU) 2024/1275 [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275&pk_keyword=Energy&pk_content=Directive]. All these regulations just mandate different actors to make available data, but do not specify how it may be transferred in a secure, efficient, and non-discriminatory way and usable by multiple actors in need.

Project EDDIE either (1) provides technical reference implementations for important gaps that have been left open in the relevant regulatory framework (e.g. the connectivity with in-house assets through AIIDA, region connectors, etc.), (2) helps data-sharing infrastructure operators and national regulators discover shortcomings or improvements to their implementations and (3) feeds back learnings and best practices to the European legislative expert groups to learn for the future (e.g., in the system operator proposal for a new Network Code on Demand Response, the development of new Implementing Acts for Data Interoperability, the Joint Working Group Data Interoperability between ENTSO-E and EU DSO

Entity, and in the future to the European Commission's Smart Energy Expert Group (SEEG), particularly to the Data4Energy subgroup.).

3.2 European Master Data Model

The European legal framework defines European roles as sets of responsibilities, without pre-empting their assignment in a national setting (*Figure 1*). These roles may be fulfilled by one or multiple national actors, and a national actor may fulfil more than one of these roles. For example, role *Permission Administrator (PA)* as foreseen in Commission Implementing Regulation 2023/1162 is embodied by Estonian TSO Elering for Estonia, by all over 100 DSOs in Austria, or by AELEC's DataDis service in Spain.

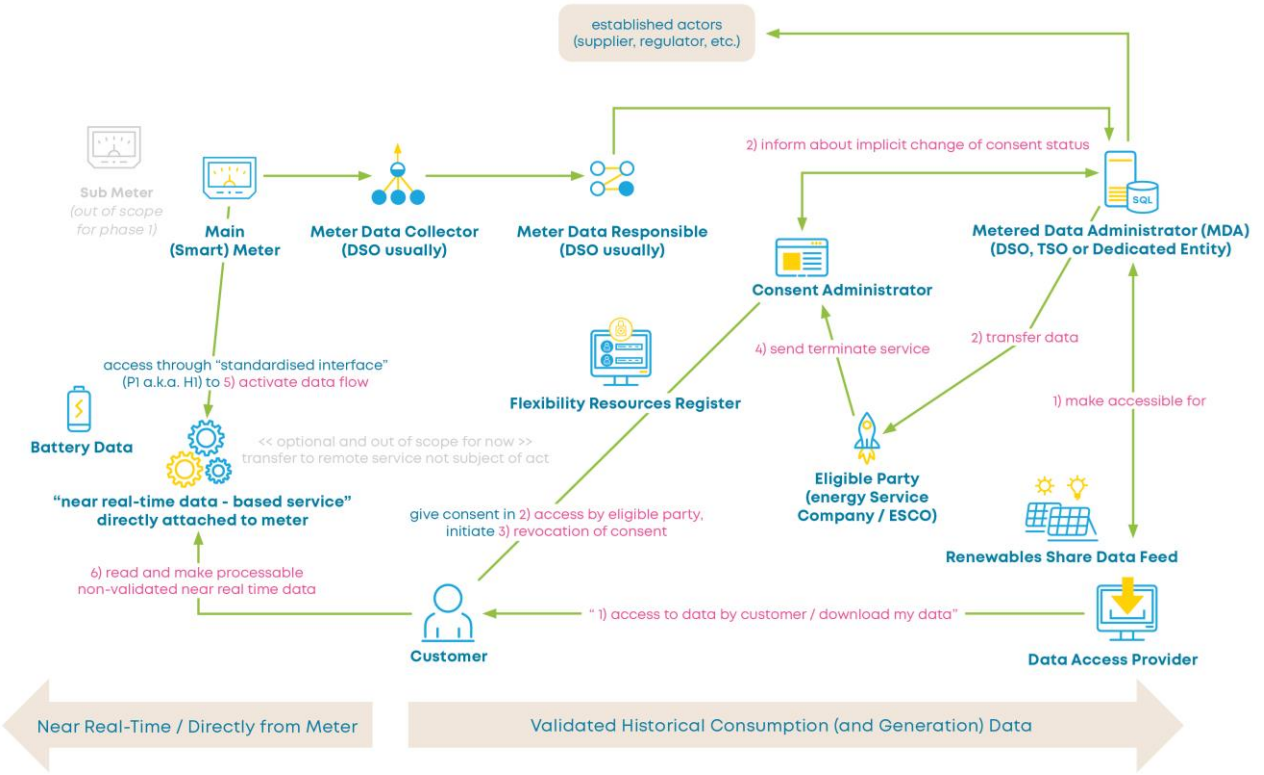


Figure 1 Harmonized Role Model (HRM) embodied by European Legislation or the legally nonbinding HEMRM.

A unified European Application Programming Interface (API) for data exchange between responsible actors must have standardized and streamlined knowledge about the responsible parties and relevant data connected to them (e.g., URLs of consent management/customer portals, etc.). EDDIE needs this European Master Data Model in a structured and machine-readable format to provide a clean and efficient user experience e.g., through the dropdown boxes in the consent management popup (*Figure 2*).

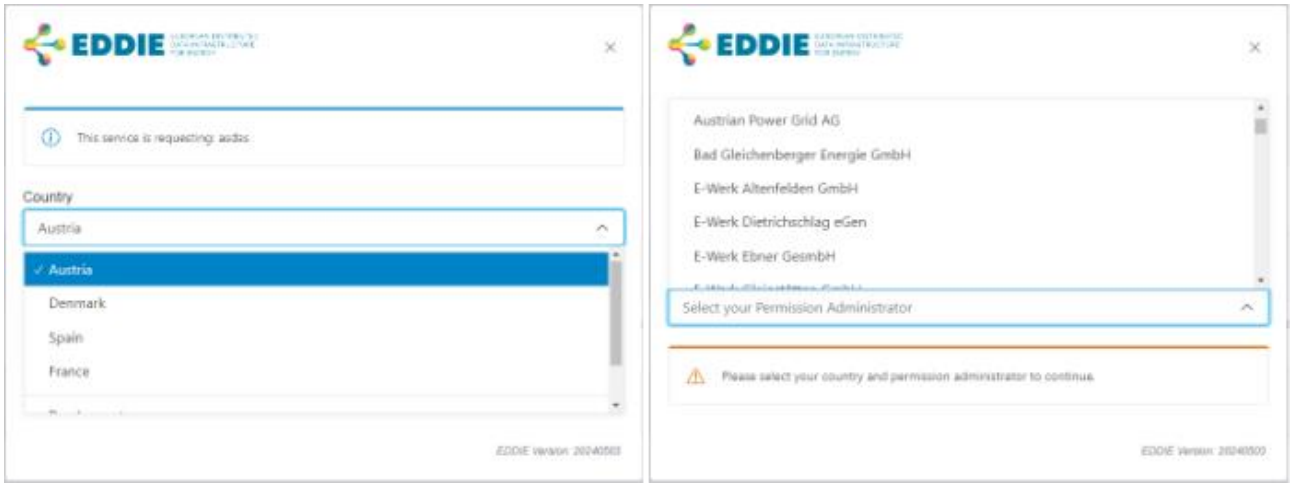


Figure 2 European Master Data Model serving the needs of EDDIE Consent Management Flow

Engineered information is translated into processable information and published as Open Source/Open Data, as this information is also needed by many other solution providers. Data items from the Master Data Model (e.g., number of accounting points served) are relevant input to business strategy decisions for the operators of energy data-driven services. In the future, it shall be kept in sync with the information collected by the European Commission on the mappings of national practices as mandated in Commission Implementing Regulation (EU) 2023/1162. In the next months, a series of other helpful features are in the development queue, for example an automatic pre-selected proposal of the *Permission Administrator* based on the location of the popup user.

4 Best Practices Round Table for Data-sharing Infrastructure Operators

A round-table (RT) was convened to obtain the necessary data and information from the individual countries. The Best Practices Round Table for Data sharing Infrastructure Operators (BPRT DSIO) is primarily meant to be a network of operators of energy data-sharing infrastructures, that they can use to exchange and learn from each other. It is meant to discover quick wins and to assist across Member States. In addition to that, the RT helps the Development Team to implement EDDIE Connectors for the different regions by providing knowledge, test accounts, data and short-circuit technical support. The development team provides data-sharing infrastructure operators their first-hand experiences, learnings and proposals for improvement made during integrating. The various phases in connection with the RT are shown in *Figure 3*.

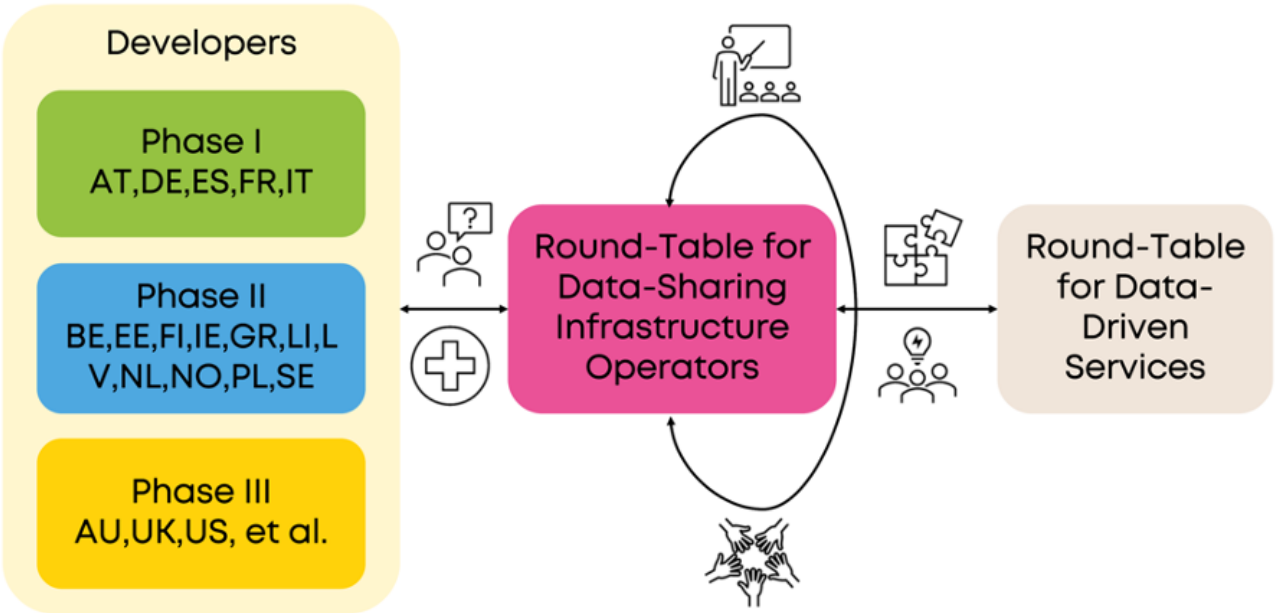


Figure 3 BPRT DSIO

With the knowledge and experience acquired by the RTs, we intend to achieve the following:

- Learn from each other and assist Region connector development team
- Agree on best practices and user/service provider experience standards
- Collectively address issues and requirements of data users
- Network to cope with future challenges

The RT is open explicitly to DSOs, TSOs or other independent Metered Data and Permission Administrators (e.g., National Data Hub Operators) in the sense of the Harmonized Electricity Market Role Model (HERM).

4.1 Summary of the MS's existing infrastructure(s)

Since the start of the project, we had various round-tables (RT) in which experts from the individual countries presented the energy industry data exchange from their countries as shown in *Table 1*.

Country	Classification	Organization	Date	Site/Location
Austria	Decentralized	EDA Energie-wirtschaftlicher Datenaustausch GmbH	April, 26th 2023	MS Teams
Italy	Centralized	Acquirente Unico	May, 16th and 17th 2023	Bolzano and MS Teams (hybrid)
France	Centralized	Enedis, SRD Energies	June, 5th 2023	Enedis SA/Paris
-			June, 29th 2023	MS Teams
Spain	Decentralized	Datadis	September, 28th 2023	Madrid and MS Teams (hybrid)
Netherlands	Hybrid	MFF/BAS	November, 02nd 2023	MS Teams
Finland **Greece**	Centralized n. a.	Fingrid n. a.	December, 07th 2023	MS Teams
Denmark **Estonia**	Centralized | Centralized	Energinet Elering	January, 25th 2024	MS Teams
-			February, 29th 2024	MS Teams

Table 1 Round-table discussions during the project

4.1.1 Austria

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 26.04.2023.
How the energy data exchange works of the electricity and gas sector in Austria was explained by the colleagues of EDA Energiewirtschaftlicher Datenaustausch GmbH (EDA) (https://www.eda.at/?lang=en). The energy data exchange is organized in a mainly decentralized way as we can see in *Figure 4*. In this concept, the data is kept close to the source and only shared, if there is a consent from the final customer with another party. Only historical metering data is exchanged over the decentralized data infrastructure from EDA. Near real-time data can only be received directly from the smart meter via an adapter.

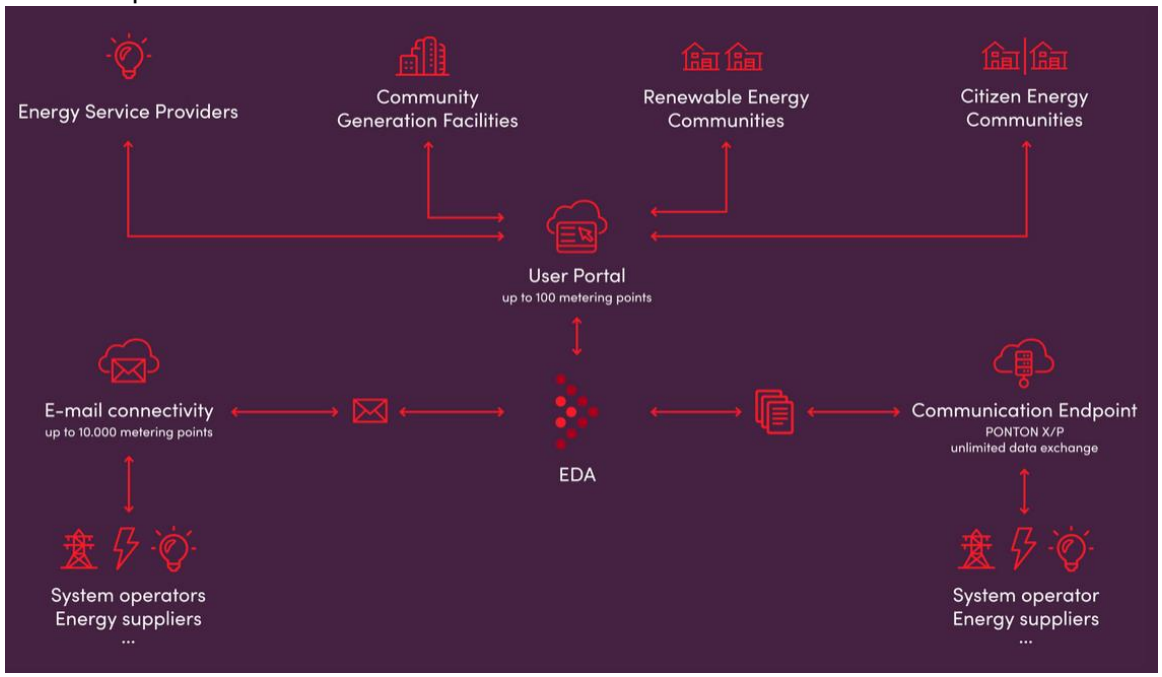


Figure 4 Data exchange Austria

As Figure 5 shows, the Distributed System Operators (DSO) play a huge role in the energy data exchange in Austria[11]. The DSOs are responsible for most of the roles and must act as different actor in the whole system. The DSOs in Austria take on the role as Meter Data Collector (MDC), Meter Data Responsible (MDR), Metered Data Administrator (MDA), Permission Administrator (PA) and the Access Provider (AP).

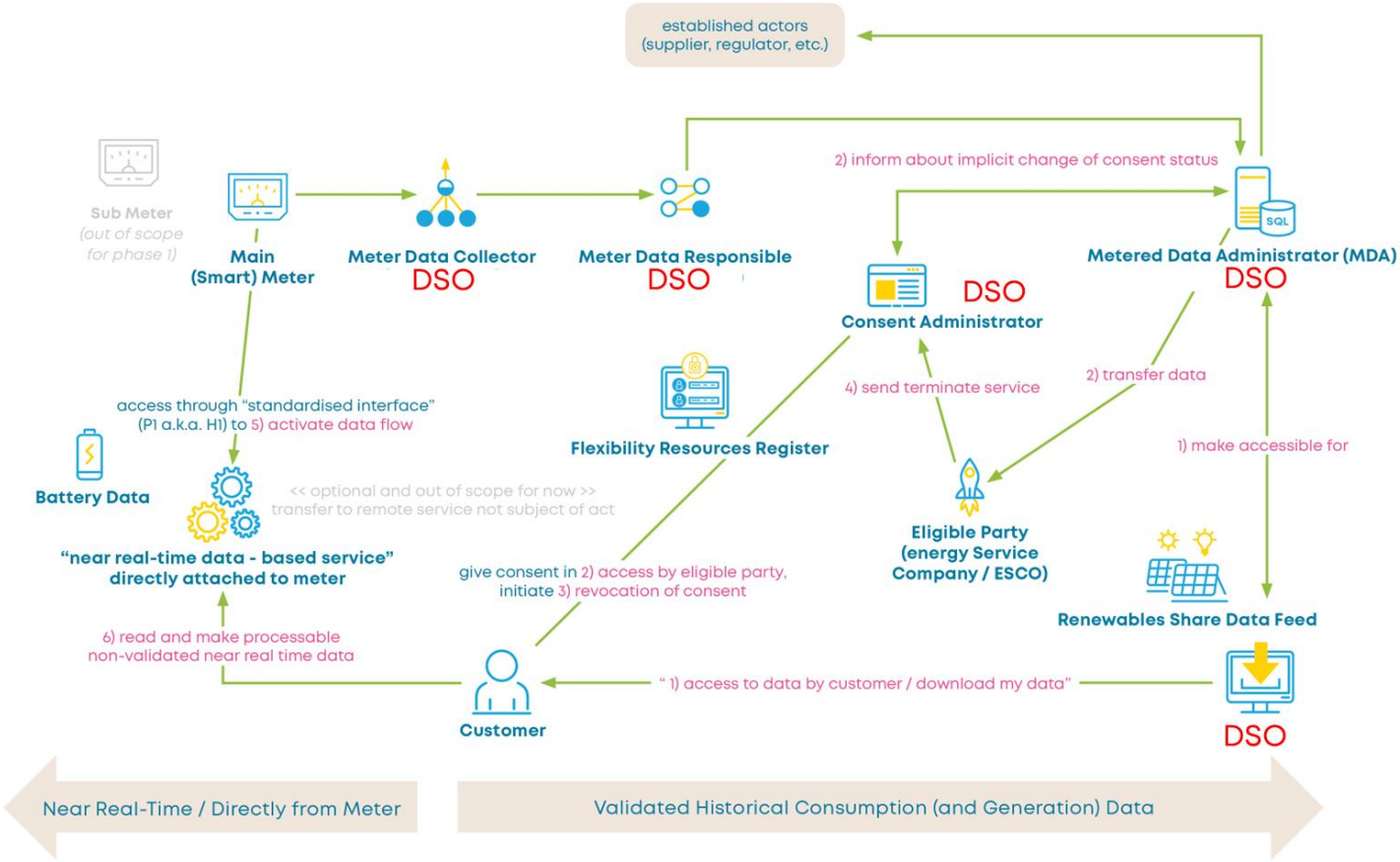


Figure 5 HRM Austria

[11] https://www.eda.at/wie-funktioniert-eda?lang=en

4.1.2 Denmark

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 25.01.2024.
How the energy data exchange works of the electricity sector in Denmark was explained by the colleagues of Energinet (https://en.energinet.dk/). The energy data exchange is organized in a centralized way as we can see in *Figure 6*. In this concept the data is kept in a central data hub where all authorized parties can access and retrieve the data. Only historical metering data is exchanged over the DataHub from Energinet. Near real-time data can only be received directly from the smart meter via an adapter.

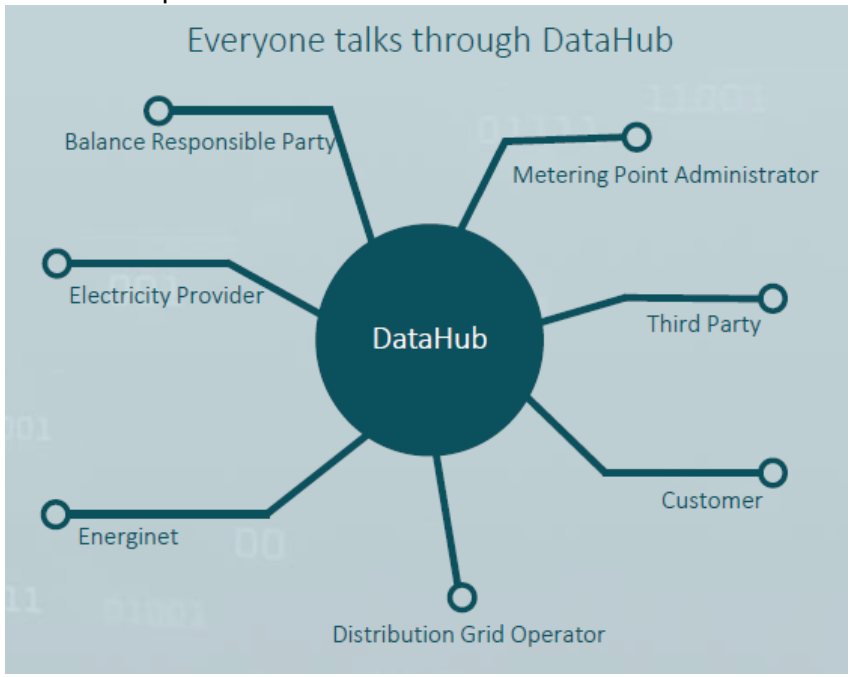


Figure 6 Data exchange Denmark[12]

[12] https://en.energinet.dk/media/qouleeb5/danish-electricity-retail-market.pdf

As *Figure 7* shows, the Distributed System Operators (DSO) play a role in the collecting process of the metering data from the smart meters. Afterwards the metering data is transferred to the Energinet DataHub from Energinet. The DSOs are responsible for most of the roles and must act as different actor in the whole system. The DSOs in Denmark takes on the role as Meter Data Collector (MDC) and Meter Data Responsible (MDR). The roles Metered Data Administrator (MDA), Consent Administrator (CA) and the Access Provider (AP) are taken from Energinet via various applications (DataHub for storing the data; Eloverblik (https://eloverblik.dk/welcome) for personal data; Energi Data Services (https://www.energidataservice.dk/) for public energy data like overall carbon emissions etc.).

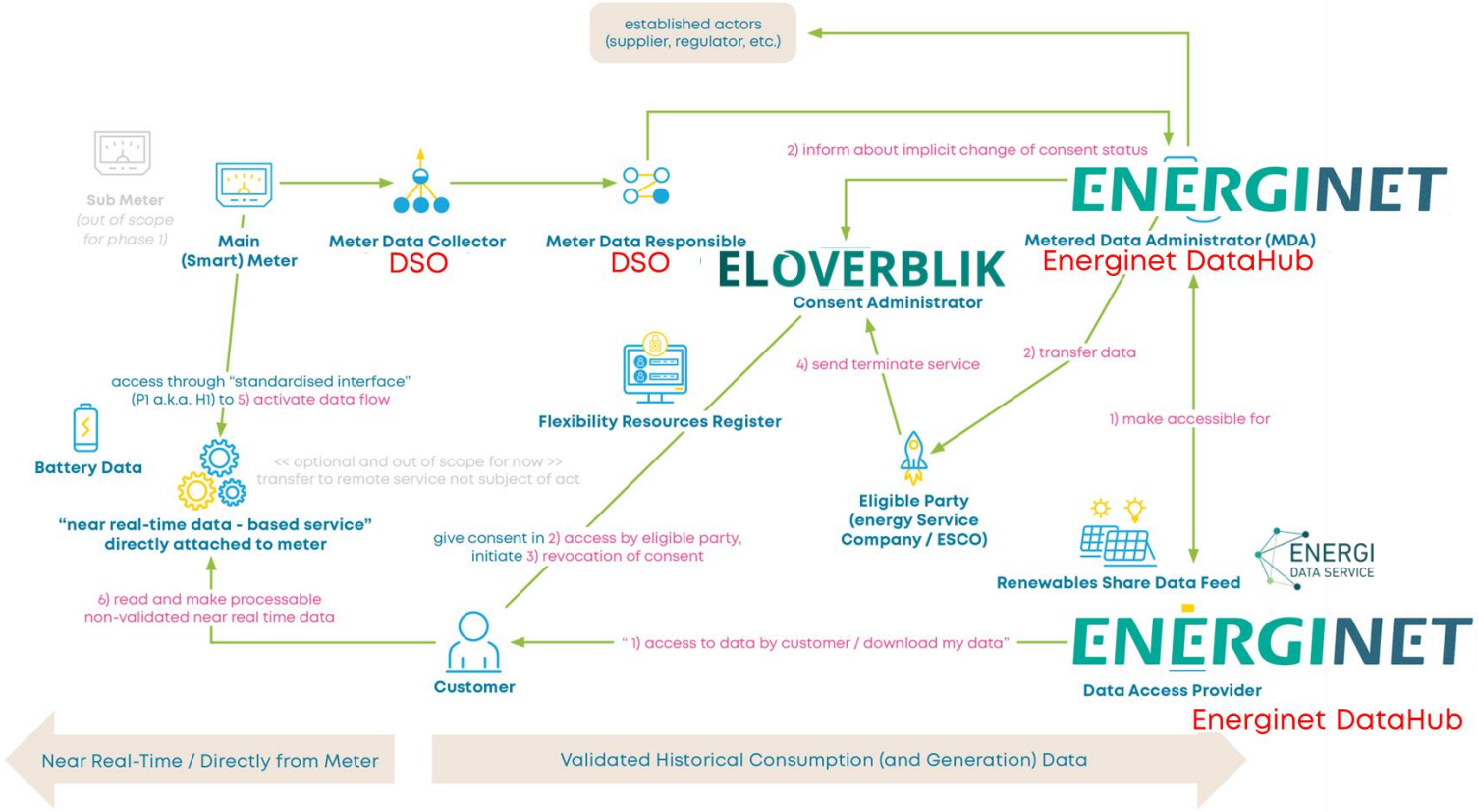


Figure 7 HRM Denmark

4.1.3 Estonia

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 25.01.2024.
How the energy data exchange works of the electricity sector in Estonia was explained by the colleagues of Elering (https://elering.ee/en). The energy data exchange is organized in a centralized way as we can see in *Figure 8*. In this concept the data is kept in a central data hub where all authorized parties can access and retrieve the data. Only historical metering data is exchanged over the Datahub from Elering. Near real-time data can only be received directly from the smart meter via an adapter.

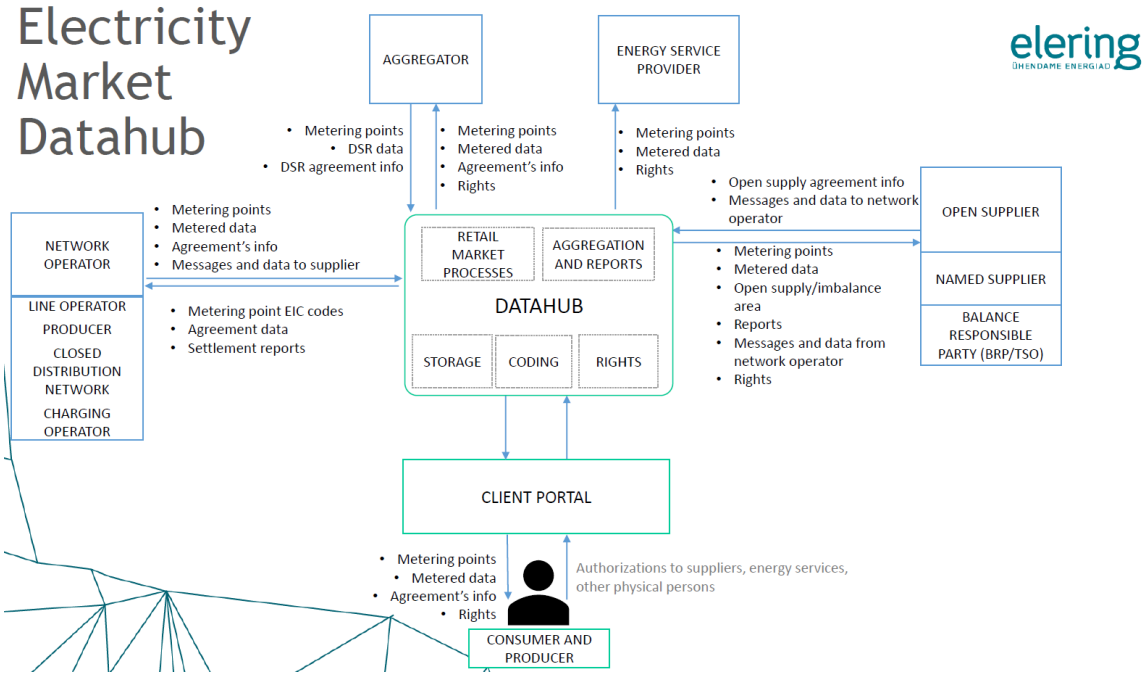


Figure 8 Data exchange Estonia[13]

[13] https://elering.ee/sites/default/files/2020-08/EL_Guide%20for%20Using%20and%20Joining%20Data%20Hub_2020_08.pdf

As *Figure 9* shows the Distributed System Operators (DSO) play a role in the collecting process of the metering data from the smart meters. Afterwards the metering data is transferred to the Estfeed Datahub from Elering. The DSOs are responsible for most of the roles and must act as different actor in the whole system. The DSOs in Estonia take on the role as Meter Data Collector (MDC) and Meter Data Responsible (MDR). The roles Metered Data Administrator (MDA), Consent Administrator (CA) and the Access Provider (AP) are taken from Elering via various applications (Estfeed Datahub for storing the data; Estfeed Client Portal to give access to this data; Elerings PARM (Permission Access roles management) which acts as the consent broker in Estonia).

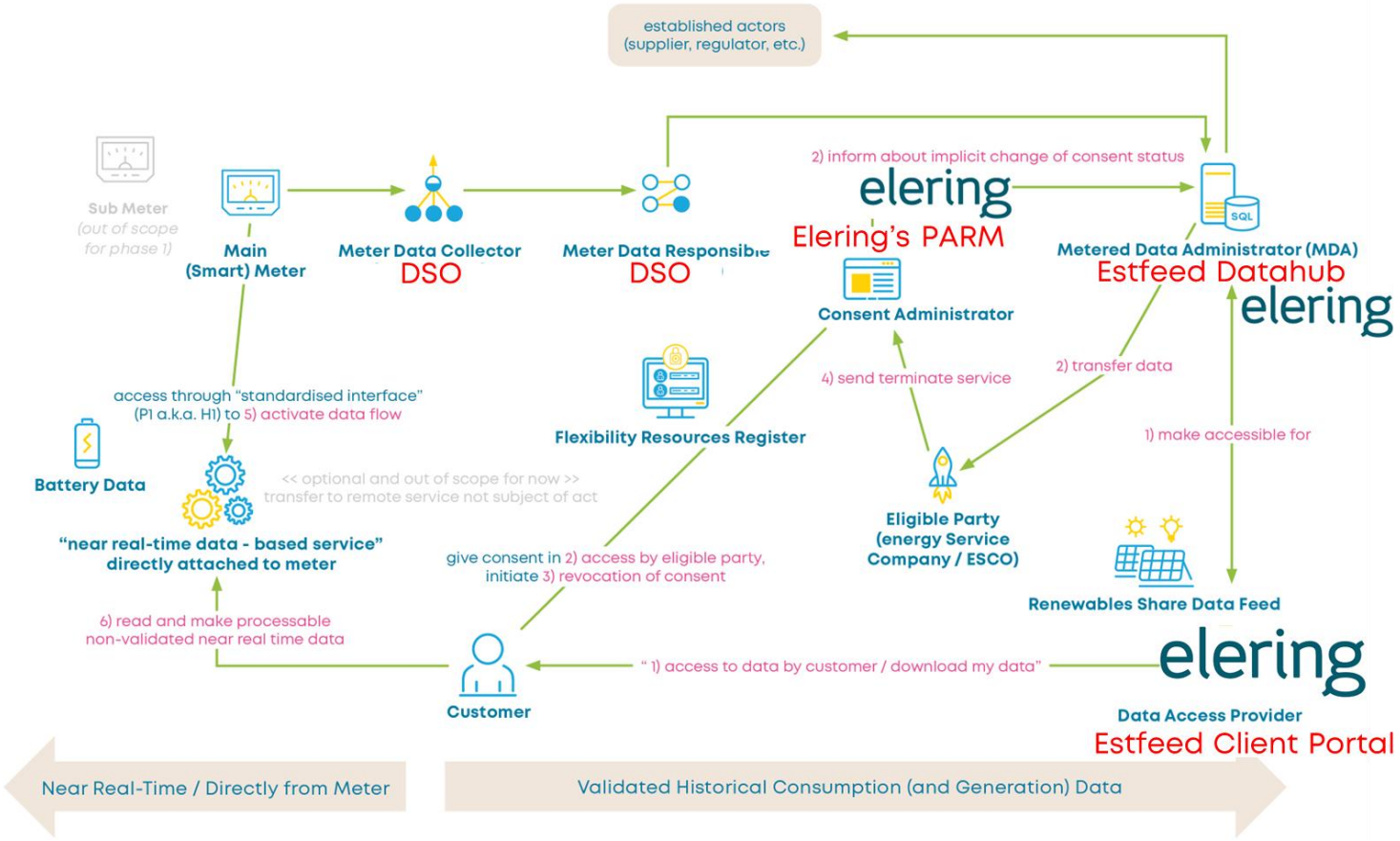


Figure 9 HRM Estonia

4.1.4 Finland

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 07.12.2023.
How the energy data exchange works of the electricity sector in Finland was explained by the colleagues of Fingrid (https://www.fingrid.fi/en/). The energy data exchange is organized in a centralized way as we can see in *Figure 10*. In this concept the data is kept in a central data hub where all authorized parties can access and retrieve the data. Only historical metering data is exchanged over the Datahub from Fingrid. Near real-time data can only be received directly from the smart meter via an adapter.

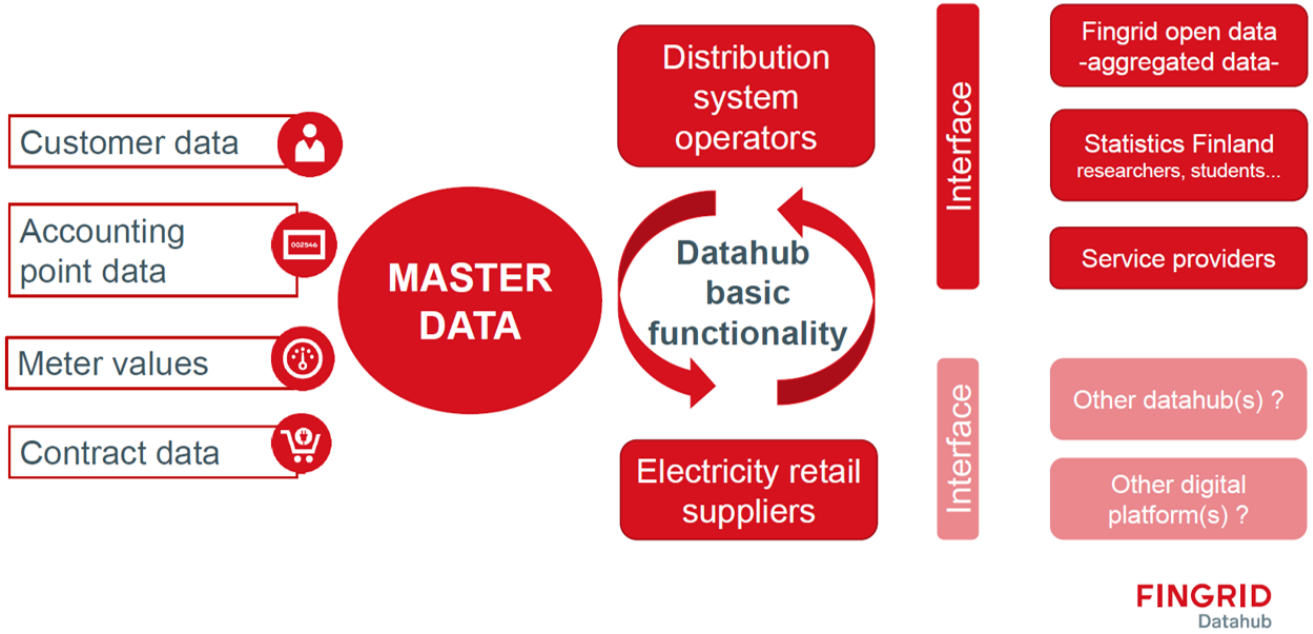


Figure 10 Data exchange Finland[14]

[14] https://www.fingrid.fi/en/electricity-market/datahub/

As *Figure 11* shows the Distributed System Operators (DSO) play a role in the collecting process of the metering data from the smart meters. Afterwards the metering data is transferred to the Fingrid Datahub (https://www.fingrid.fi/en/electricity-market/datahub/) by the DSOs. The DSOs are responsible for the early phases of the metering data process, taking on the roles of Meter Data Collector (MDC) and Meter Data Responsible (MDR). They may also out-source these responsibilities to service providers. The roles related to sharing the data are played by Fingrid Datahub. These are Metered Data Administrator (MDA), Consent Administrator (CA) and Data Access Provider (AP).

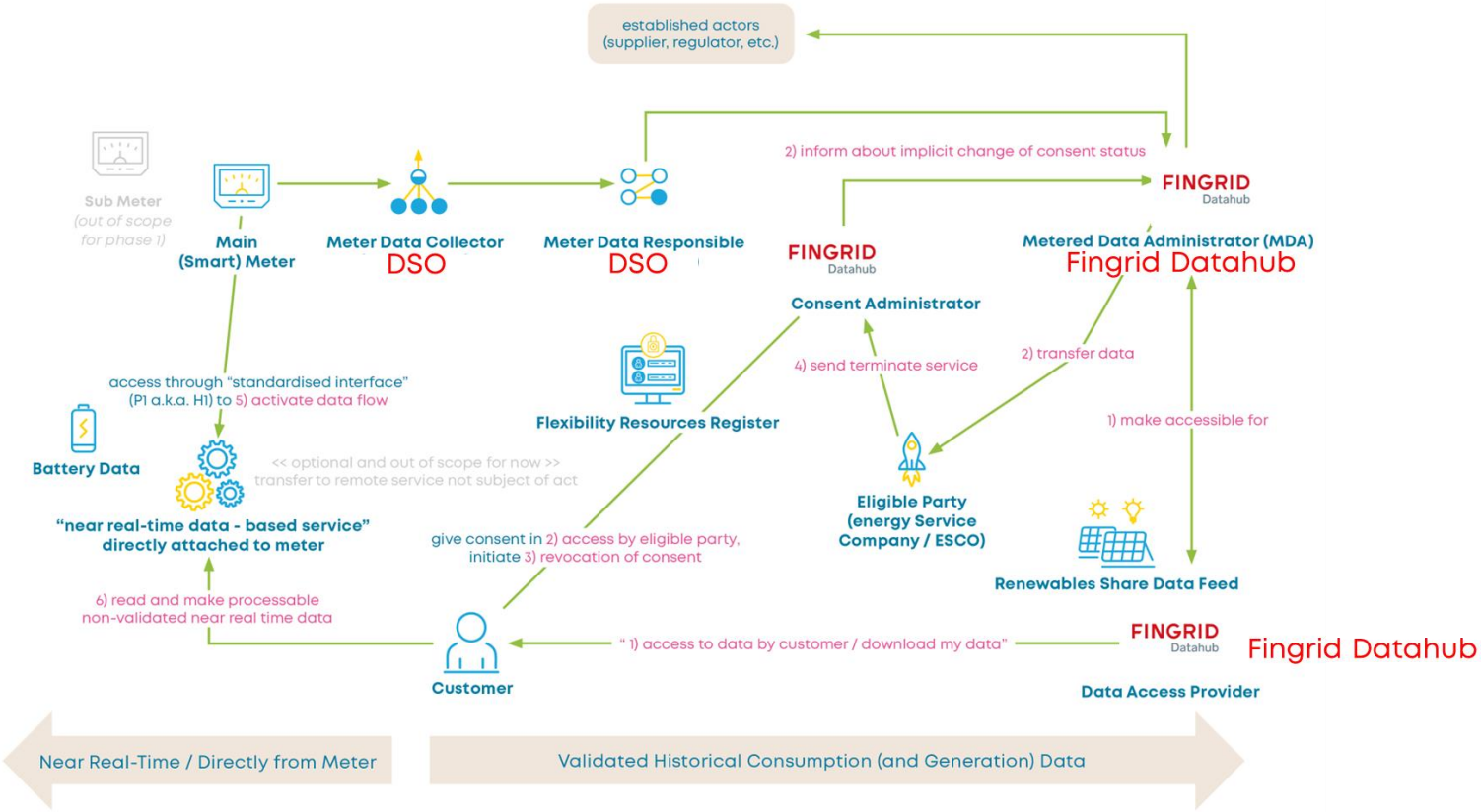


Figure 11 HRM Finland

4.1.5 France

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 05.06.2023.
How the energy data exchange works of the electricity sector in France was explained by the colleagues of Enedis (https://www.enedis.fr/). The energy data exchange is organized in a mainly centralized way as we can see in *Figure 12*. In this concept the data is kept in a central data hub where all authorized parties can access and retrieve the data. Only historical metering data is exchanged over the Datahub from Enedis and SRD Energies. Near real-time data can only be received directly from the smart meter via an adapter.

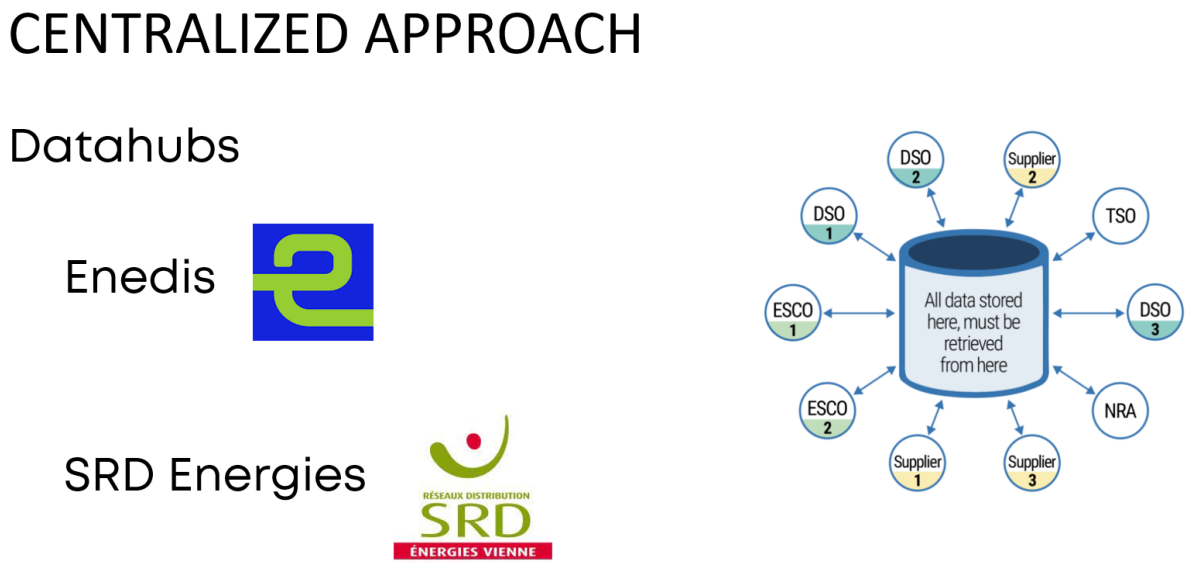


Figure 12: Data exchange France

As *Figure 13* shows the Distributed System Operators (DSO) play a huge role in the energy data exchange. The DSOs are responsible for many roles and must act as different actor in the whole system. The DSOs in France take on the role as

Meter Data Collector (MDC) and Meter Data Responsible (MDR). The roles Metered Data Administrator (MDA), Consent Administrator (CA) and the Access Provider (AP) are taken from Enedis and SRD Energies via various applications.

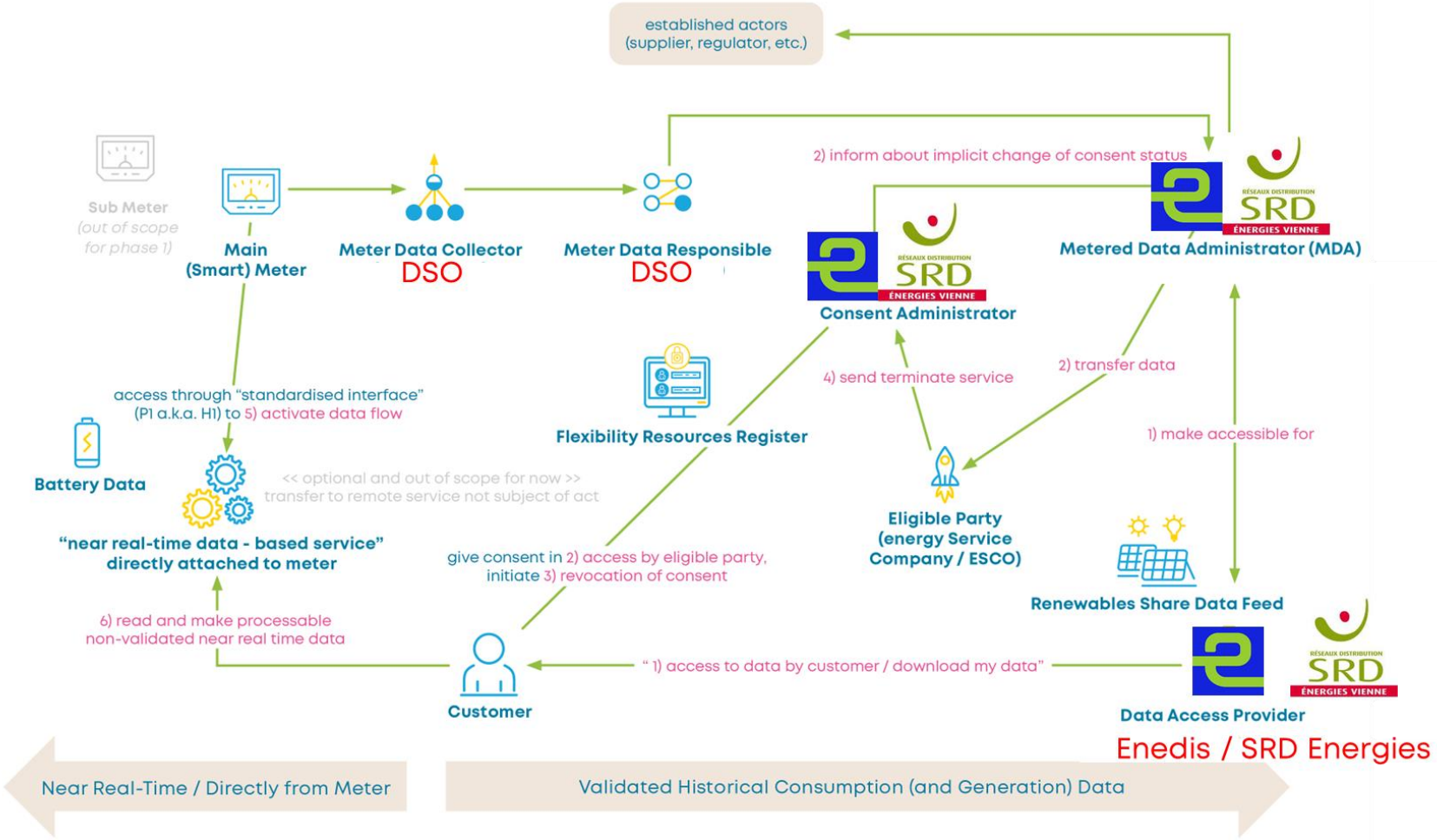


Figure 13 HRM France

4.1.6 Greece

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 07.12.2023.
How the energy data exchange works of the gas sector in Greece was explained by the colleagues of DEDA (https://deda.gr/en/home-2/). Now historical metering data is available to relevant parties only as flat files (CSV-files). No API is available at this point. Near real-time data can only be received directly from the smart meter via an adapter.

4.1.7 Netherlands

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 02.11.2023.
How the energy data exchange works of the electricity sector in Netherlands was explained by the colleagues of EDSN (https://www.edsn.nl/). The energy data exchange is organized in a hybrid way as we can see in *Figure 14*. In this concept the data is kept in a decentral at the Metered Data Administrator (MDA) where all authorized parties can access and retrieve the data. The data access and the permission administration are controlled in central applications. Only historical metering data is exchanged over the decentralized data infrastructure. Near real-time data can only be received directly from the smart meter via an adapter.

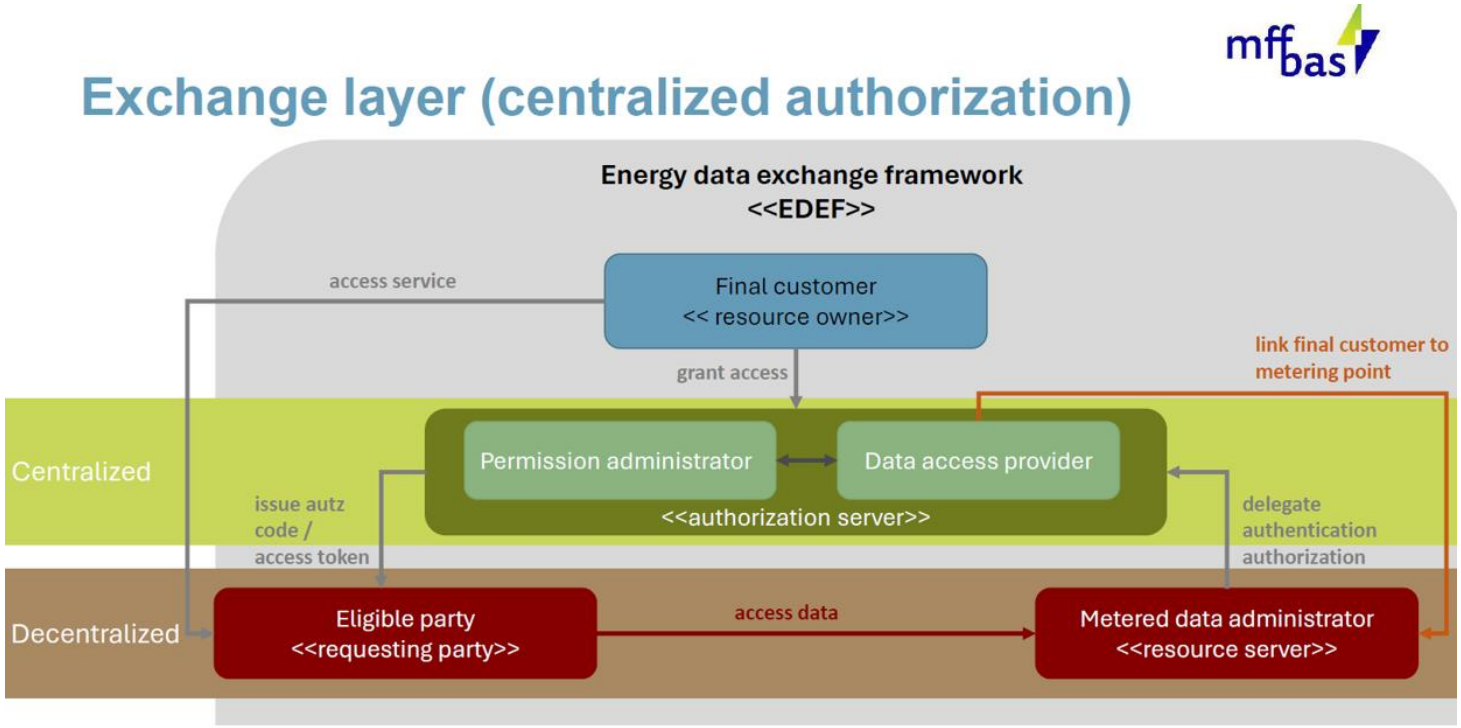


Figure 14 Data exchange Netherlands[15]

As *Figure 15* shows the Distributed System Operators (DSO) play a role in the collecting process of the metering data from the smart meters. The DSOs are responsible for most of the roles and must act as different actors in the whole system. The DSOs in Netherlands take on the role of Meter Data Collector (MDC), Meter Data Responsible (MDR) and Metered Data Administrator (MDA). The roles Consent Administrator (CA) and the Access Provider (AP) are taken from MFF (Market Facilitation Forum) & BAS (Administrator Energy Data Exchange Framework).

[15] https://www.mffbas.nl/en/

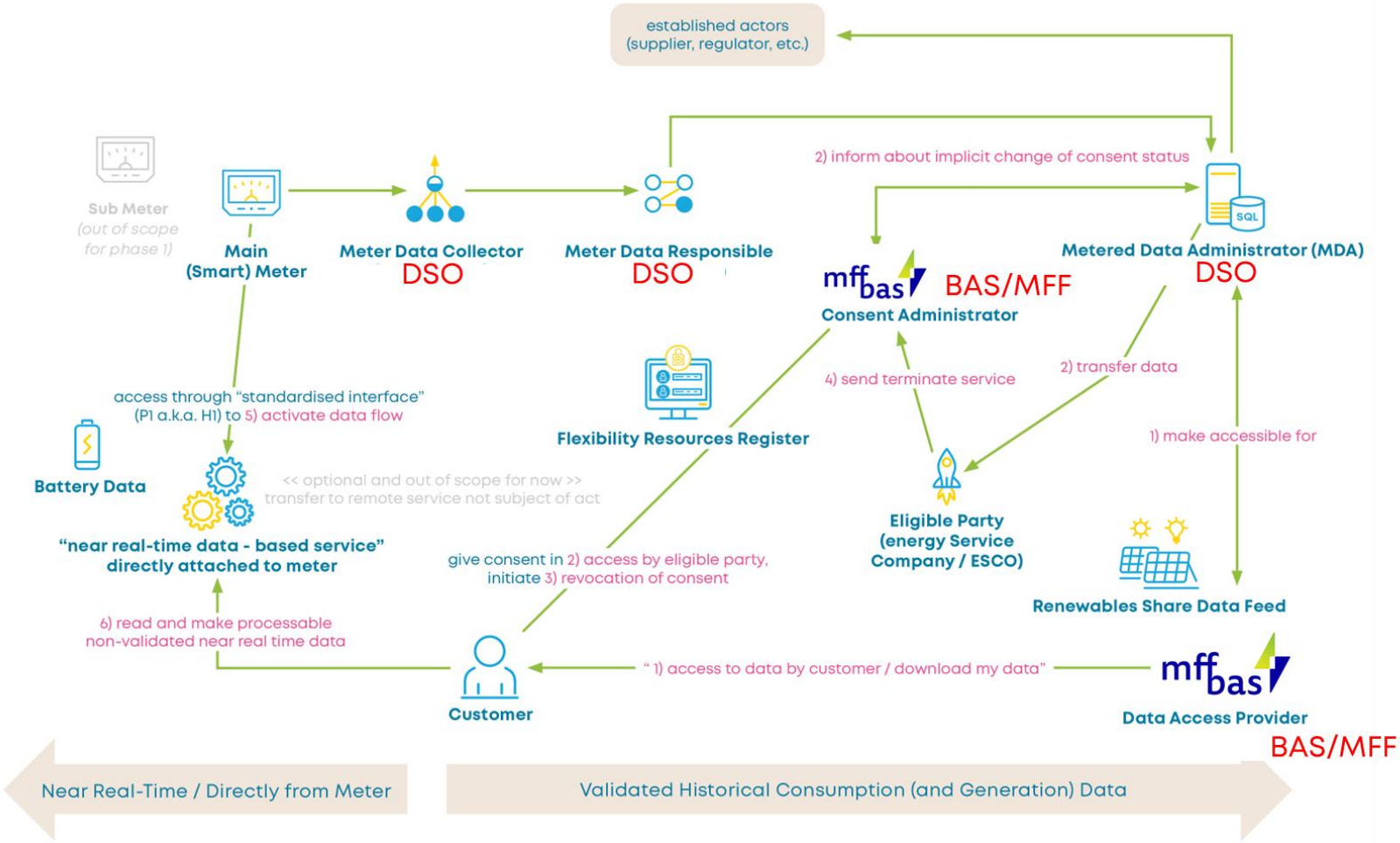


Figure 15 HRM Netherlands

4.1.8 Italy

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 16.-17.06.2023. How the energy data exchange works of the electricity sector in Italy was explained by the colleagues of Südtiroler Energieverband (https://www.sev.bz.it/de/s%C3%BCdtiroler-energieverband/1-0.html). The energy data exchange is

organized in a mainly centralized way as we can see in *Figure 16*. In this concept the data is kept in a central data hub where all authorized parties can access and retrieve the data. Only historical metering data is exchanged over the Datahub from Portale SII. Near real-time data can only be received directly from the smart meter via an adapter.

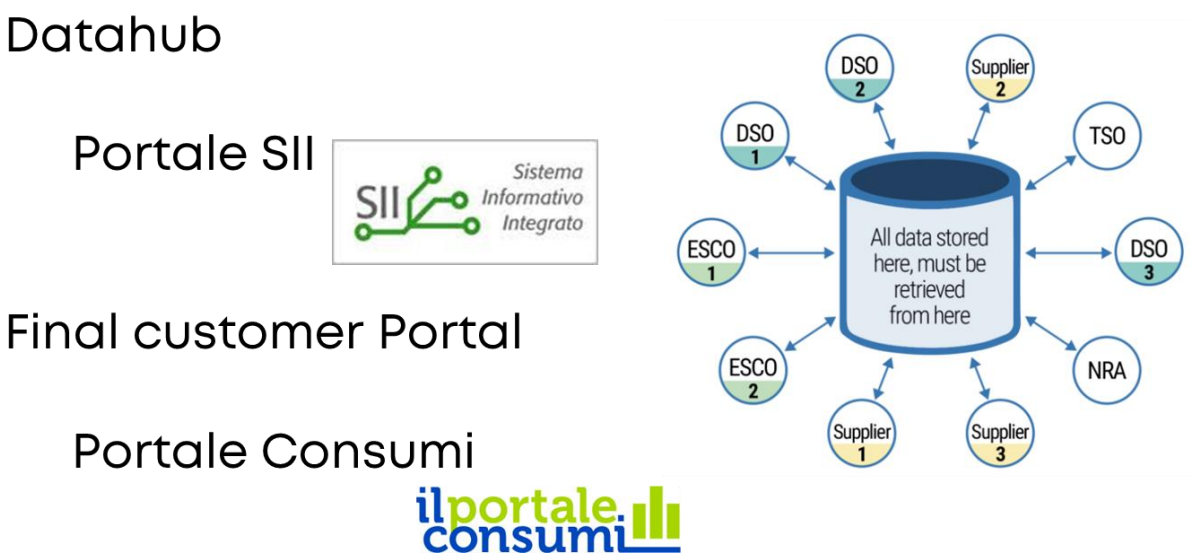


Figure 16 Data exchange Italy

As *Figure 17* shows the Distributed System Operators (DSO) play a huge role in the collecting process of the metering data from the smart meters. The DSOs are responsible for most of the roles and must act as different actor in the whole system. The DSOs in Italy take on the role as Meter Data Collector (MDC), Meter Data Responsible (MDR) and Metered Data Administrator (MDA). The roles Consent Administrator (CA) and Access Provider (AP) are taken from Acquirente Unico (https://www.acquirenteunico.it/) Portale SII (https://siiportale.acquirenteunico.it/) and Portale Consumi (https://www.consumienergia.it/portaleConsumi/). Acquirente Unico serves as a government-regulated entity overseeing the centralized Datahub Portale SII, which acts as the central repository for all energy-related data. Under this system, the Distribution System Operator transmits data to Portale SII, which then makes it accessible to eligible party. Additionally, Portale Consumi provides a platform for individual end customers to access their validated historical

metering data stored on Portale SII, along with other pertinent information such as contractual power details and point of delivery (POD) number.

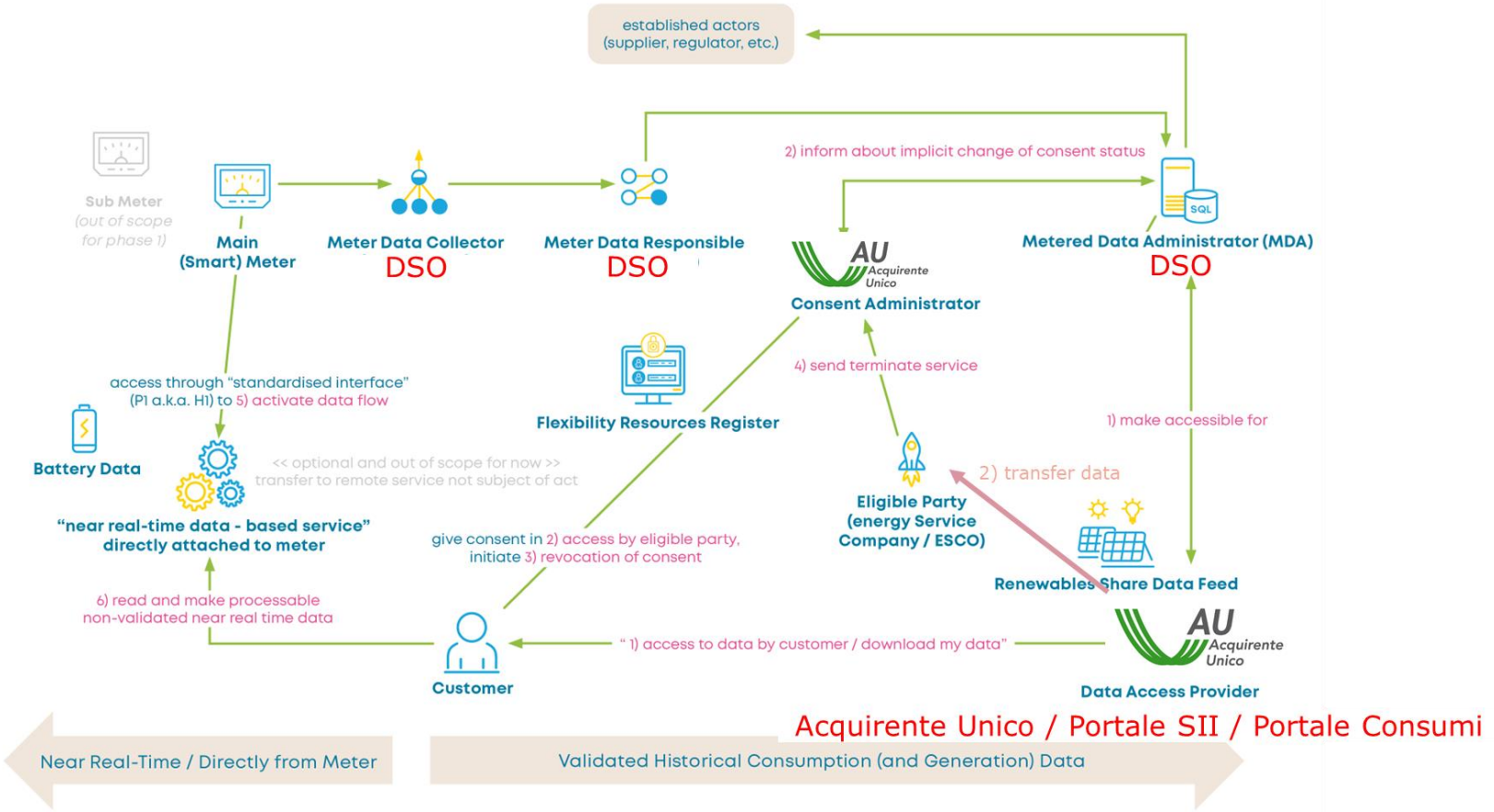
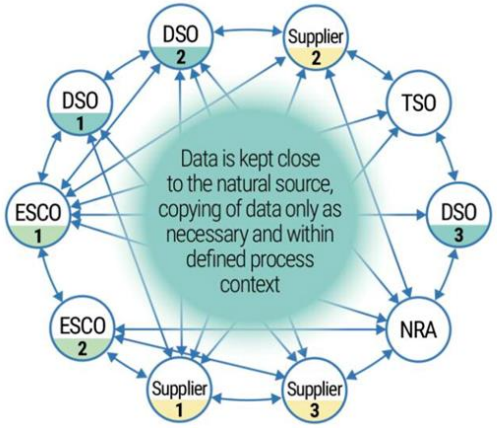


Figure 17 HRM Italy

4.1.9 Spain

The MS infrastructure was discussed and presented in the Best Practice Round Table (BPRT) held on 28.09.2023.
How the energy data exchange works of the electricity sector in Spain was explained by the colleagues of Aelec (https://aelec.es/). The energy data exchange is organized in a mainly decentralized way as we can see in *Figure 18*. In this concept the data is kept close to the source and only shared, if there is a consent from the final customer with another party. Only historical metering data is exchanged over the decentralized data infrastructure. Near real-time data can only be received directly from the smart meter via an adapter.



The De-centralised Model is an architecture in which data is stored at the source (e.g. metering information at DSO, contract information at supplier, capability data at DER, etc.) and systems are communicating directly with each other. Market actors are working together to develop standardized market communication.

Figure 18 Data exchange Spain[16]

As we can see in *Figure 19* and *Figure 20* Datadis (https://datadis.es/home) is responsible for providing access to personal and aggregated data. Therefore, Datadis is dealing with the customer consents and operates as a consent broker in Spain.

[16] https://www.geode-eu.org/wp-content/uploads/2020/05/202005-Fact-sheet-GEODE-Data-Management-FINAL.pdf

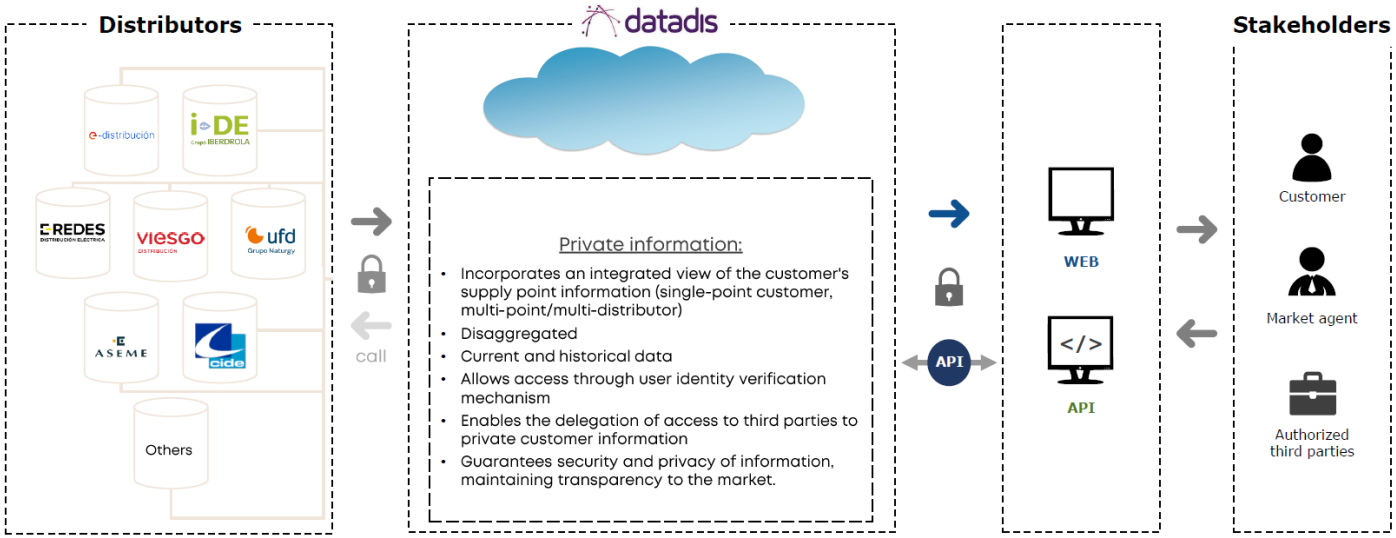


Figure 19 Data exchange private information Spain

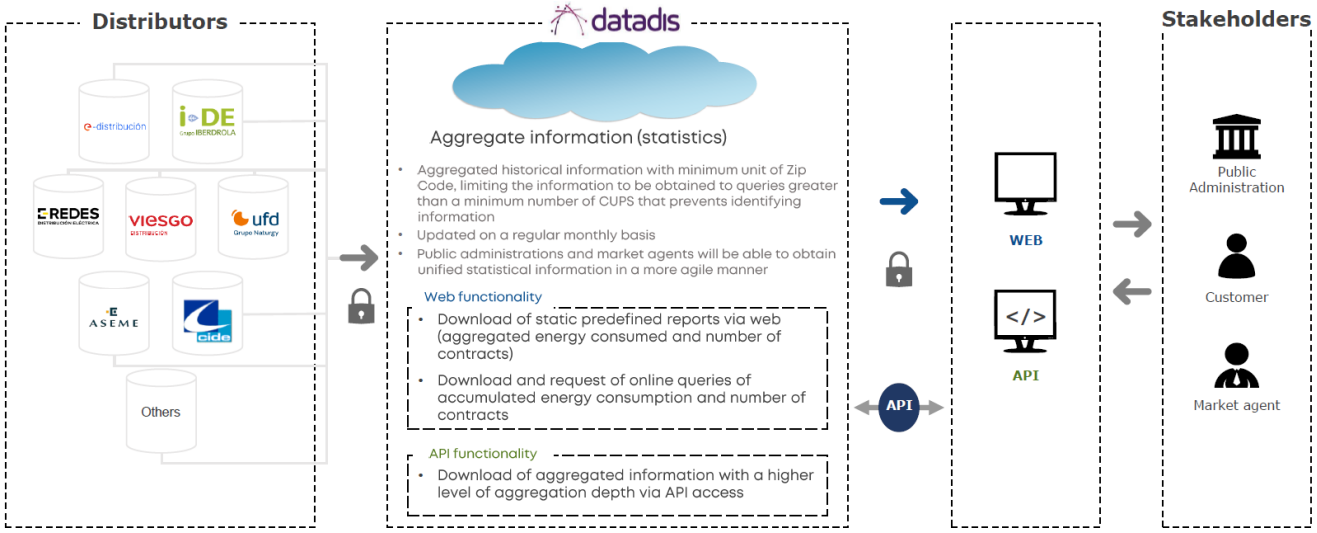


Figure 20 Data exchange aggregate information Spain

As *Figure 21* shows the Distributed System Operators (DSO) play a huge role in the collecting process of the metering data from the smart meters. The DSOs are responsible for most of the roles and must act as different actor in the whole system. The DSOs in Spain take on the role as Meter Data Collector (MDC), Meter Data Responsible (MDR) and Metered Data Administrator (MDA). The roles Consent Administrator (CA) and Access Provider (AP) are taken from Datadis.

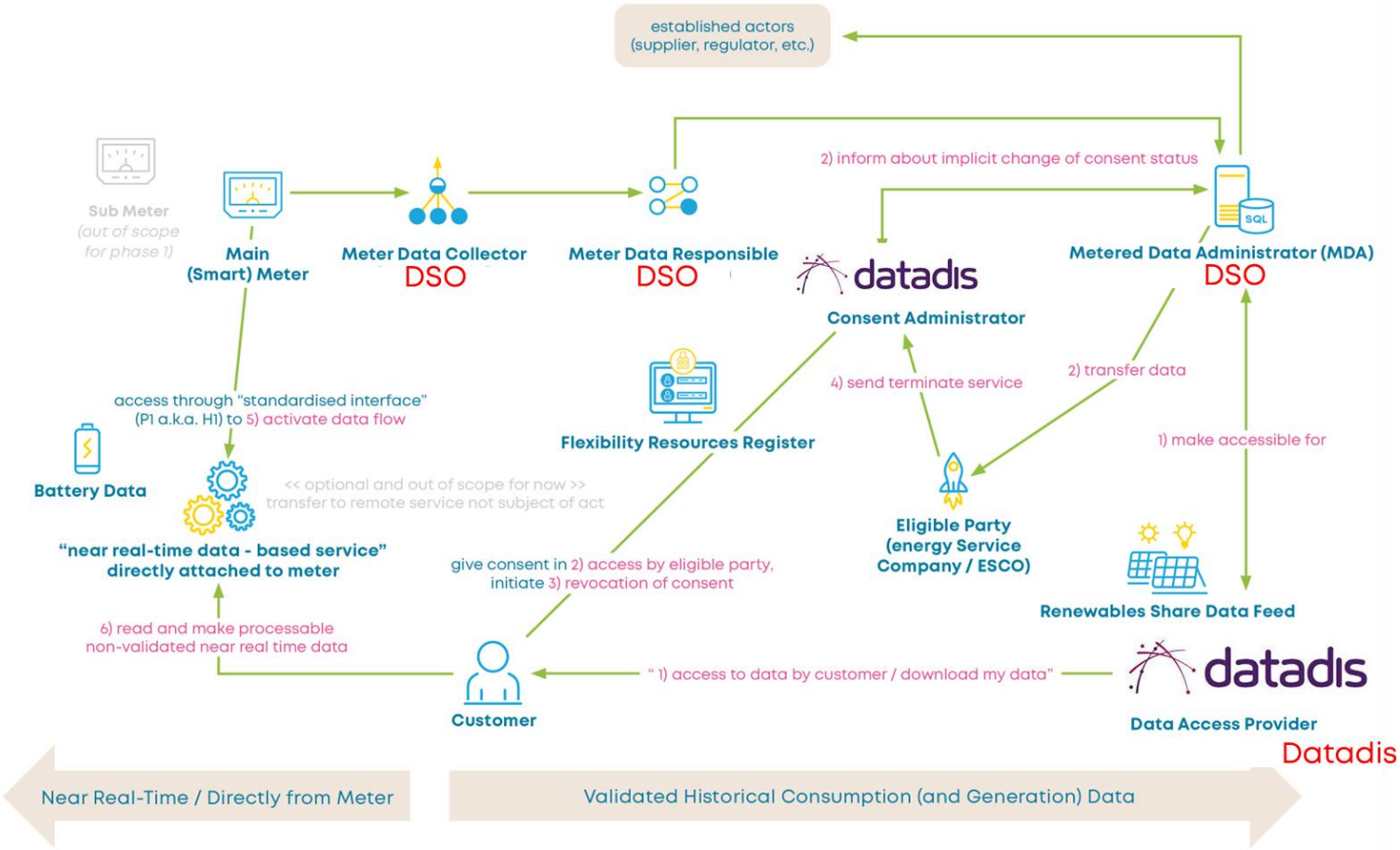


Figure 21 HRM Spain

4.2 Interaction with second Round-Table

As we can see in *Figure 22*, the Best Practices Round Table for Data sharing Infrastructure Operators (BPRT DSIO) interacts with the second broader stakeholder engagement committee – the Best Practices Round-Table for Data-Driven Services (BPRT DDS), discovering and incorporating experiences and needs expressed by eligible parties who use the energy data for their business cases.

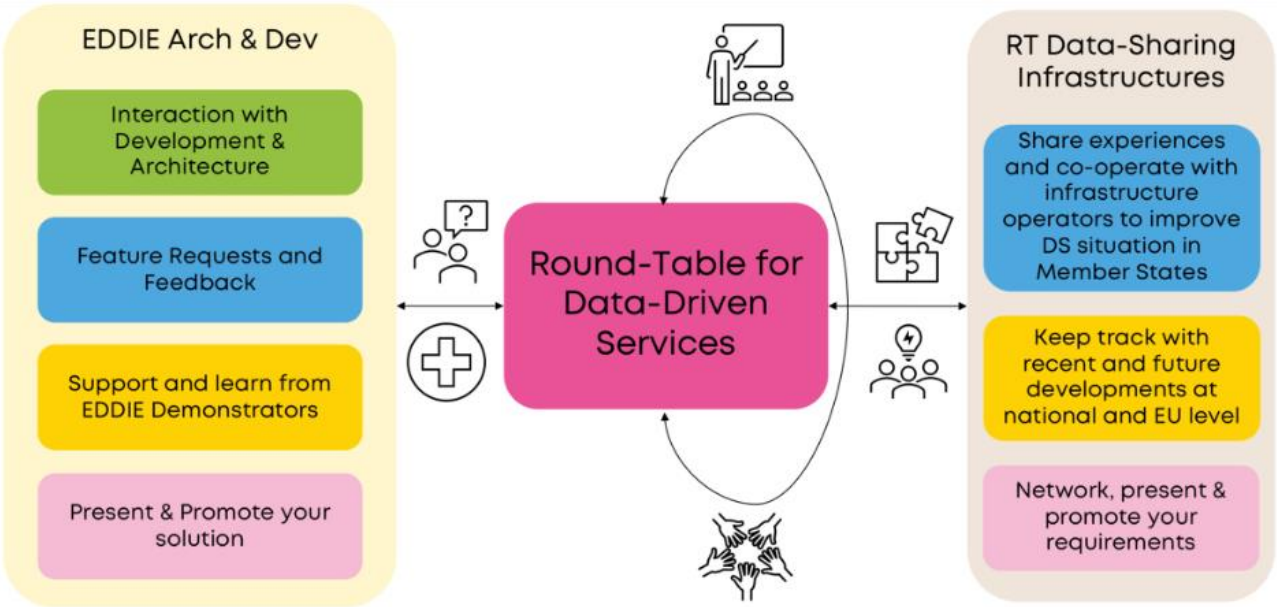


Figure 22 BPRT DDS

The interaction between the two RTs ensures that the information from the respective stakeholders is also shared by the other group. These synergies generate further ideas on how the individual players can further improve themselves.

5 Status of region connectors

5.1 Introduction

This chapter provides an overview about the latest state of development of the region connectors. It describes the various approaches different countries use to enable final customers for providing access to their energy data.

5.2 Austria

In Austria, EDA (Energiewirtschaftlicher Datenaustausch) is the authority for defining standardized market documents and processes to request and receive data. The marked documents are XML files that are sent via an AS4 protocol messenger. For data exchange in Austria, a proprietary B2B software (Ponton X/P Messenger) is used as an AS4 messenger.
The process for requesting data access is called CM_REQ_ONL (Consent Management Request Online). This process requires eligible parties (EPs) to send a CCMORequest (Customer Consent Management Online Request) to request permission from a customer. This request contains all necessary information such as which kind of data is requested, the time frame for which it is requested as well as which DSO should handle the CCMORequest. Metering data in Austria is always available in daily granularity, but customers can opt into quarter hourly granularity.
The Austrian region connector (RC) currently depends on using the AS4 messenger for requesting historical validated data and future data. It is possible to request data for up to 3 years in the past (depending on whether the metering point was active at that time). In Austria, requesting data for the past is a different process as requesting data for the future. This means it is not possible to request data from the past to the future with one single request. The data is pushed to the RC from the AS4Messenger whenever it is available.
The RC uses the information provided in the pop-up to create a CCMORequest document which is sent via the AS4 messenger. The messenger ensures that the message is received by the corresponding DSO.
Currently, the Austrian RC currently does not support requests for accounting point data yet. Furthermore, the RC does not store any energy data. The only GDPR relevant data stored by the RC is the metering point of the customer.

In the follow graphics the process of granting/declining a permission is illustrated from the final customer's perspective:

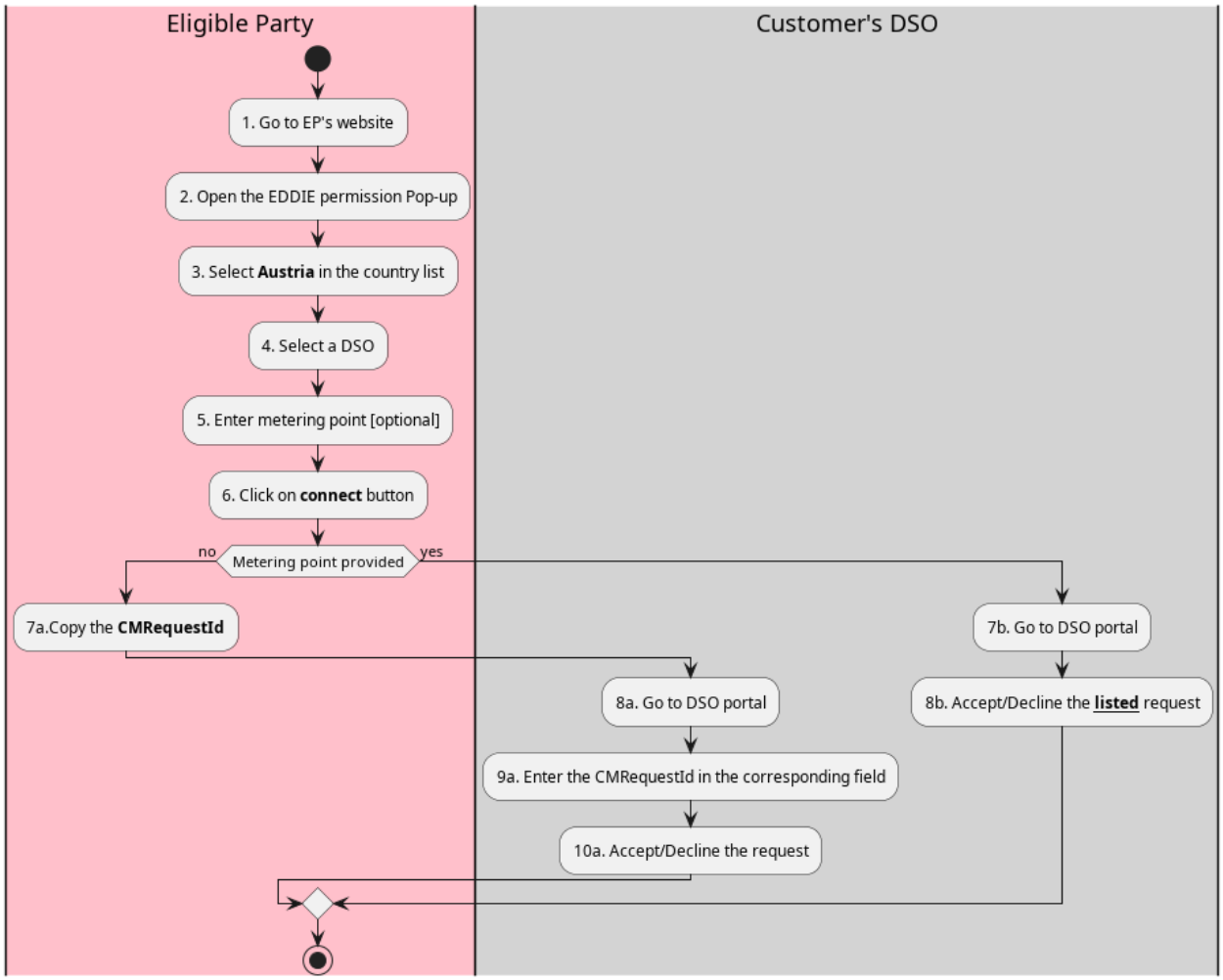


Figure 23 Permission process Austria (EDA)

The RC produces the following status updates at the following process steps: Step 6 produces CREATED followed by either MALFORMED or VALIDATED. VALIDATED continues with either UNABLE_TO_SENT or PENDING_PERMISSION_ADMINISTRATOR_ACKNOWLEDGEMENT after which it produces either INVALID or SENT_TO_PERMISSION_ADMINISTRATOR. Step 8b or 10.a produces either ACCEPTED or REJECTED.
Additionally, when a request is not handled in time, the status is updated to TIMED_OUT. The revocation of a permission leads to the status REVOKED. Apart from that, an EP can also terminate the permission via a CIM Consent Market Document message which will be signalled by a TERMINATED status.

All data received by the RC is mapped to the CIM *ValidatedHistoricalDataMarketDocument* and provided via Kafka.

For an EP to currently use the Austrian RC, they need to first register as an energy service provider with ebUtilities.at. Registering with them gives you an eligible party id which is used to identify the EP in the Austrian energy market. To exchange data with Austrian DSOs via EDA the AS4 protocol must be used. Any AS4 messenger can be used, such as the commercial XP Messenger of Ponton with a dedicated license. Since the RC depends on the Ponton XP Messenger, it is necessary for the EP to acquire a license for the Messenger and set it up with Ponton. Once it has been setup, the RC needs to know to which instance it needs to connect. Once it has been connected, you should set the default adapter used by the Ponton XP Messenger to be whatever you configured the RC to be, if this is not done, some Messages might not be properly delivered to the RC. If this is all done, it is recommended to send a test message to a DSO in Austria, as this will kick off the process of enabling the Ponton XP Messenger for the Austrian energy market. This process might take a day. Even with this, it is not guaranteed that other DSOs will have you registered, which might delay the first few CCMORequest sent to those DSOs. In Austria, there was limited possibilities to get test accounts. Therefore, private metering points with access to the corresponding DSO web portals of the developers have been used.

5.2.1 Near real-time data from the smart meter

Different smart meters with different customer interfaces are used in Austria. Some examples for the interface are infrared, MEP, DSMR, MBUS (different physical connectors) and wireless MBUS. The data available via these interfaces also varies by model, but all Austrian smart meters output the *total positive and negative active energy* as well as the *positive and negative active instantaneous power.*

The multitude of different physical connectors makes supporting all Austrian smart meters a challenge. To address this, the Austrian advocacy *Oesterreichs Energie* has commissioned a smart meter adapter[17] compatible with all Austrian smart meters. AIIDA relies on this adapter to get the near real-time data from the meter.

Once the adapter is connected to the meter and the customer's home wireless network, it provides two ways for other devices to access the near real-time data: Via a pull-based REST API or via a push model with MQTT.

For AIIDA, the push-based approach has been chosen, as it results in minimal latency for new meter readings. An MQTT broker is required for this operating mode, an example is provided

[17] https://oesterreichsenergie.at/smart-meter/technische-leitfaeden

with the AIIDA software. Both, AIIDA and the adapter need to be configured to use the same MQTT broker.
The adapter sends the meter readings in form of a JSON document. This document includes all the values that the smart meter outputs, as well as the corresponding timestamp per reading. After AIIDA has parsed this document, it stores it in a local database and sends the values to an eligible party, if an appropriate permission exists.

AIIDA has been successfully tested with two different smart meters and adapters. The two include smart meter from the DSO *Linz Netz* and one from *Netz Oberösterreich*. The former smart meter outputs its data via wMBUS every five seconds, while the latter makes its data available every second via an infrared interface.

During tests, an issue regarding the measurement timestamp has been discovered: The clock of one of the smart meters in our lab is not accurate, and therefore any measurement that this smart meter outputs, has a timestamp that is 19 years in the past. This is not an exclusive issue of Austrian smart meters.
A possible solution would be to use the timestamp when AIIDA receives the data, but this timestamp may not reflect the exact time the measurement was taken by the smart meter. However, as the data is exchanged between meter and AIIDA only within the local network, the difference between the smart meter's measurement timestamp and the timestamp when AIIDA receives the data might be expected to be negligibly small.

5.3 Denmark

Energinet is the Danish national energy transmission system operator and provides a datahub for customers and third parties to access and share energy-related data. The data can be accessed over the Eloverblik API (Customer[18] and Third-party[19]). Currently, data can only be retrieved with the customer API.
The data is returned in JSON only. In general, the region connector (RC) has no external dependencies. As a user, it is mandatory to have an account at the Energinet data hub. In this data hub the user can generate themselves an access token with which he/she can grant the Denmark RC access to their data.
Data can then be requested of a maximum timespan of approx. 2 years (730 days). Possible granularities for retrieved data (if the metering point does not support your granularity, the

[18] https://api.eloverblik.dk/CustomerApi/index.html
[19] https://api.eloverblik.dk/ThirdPartyApi/index.html

next smallest granularity will be retrieved) are quarter-hourly, hourly, daily, monthly, and yearly.
Data from the past as well as from the future can be retrieved via the *Customer API.* In addition to the revocation from customer's side, the permission of the final customer can also be terminated by the EP.

Currently it is not possible to retrieve data via the 3rd-party API. Also requesting accounting point data is not supported yet.

There were no accounts for testing available for us, but a metering point and an access token of a Danish resident have been provided for testing purposes.

In the follow graphics the process of granting/declining a permission is illustrated from the final customer's perspective:

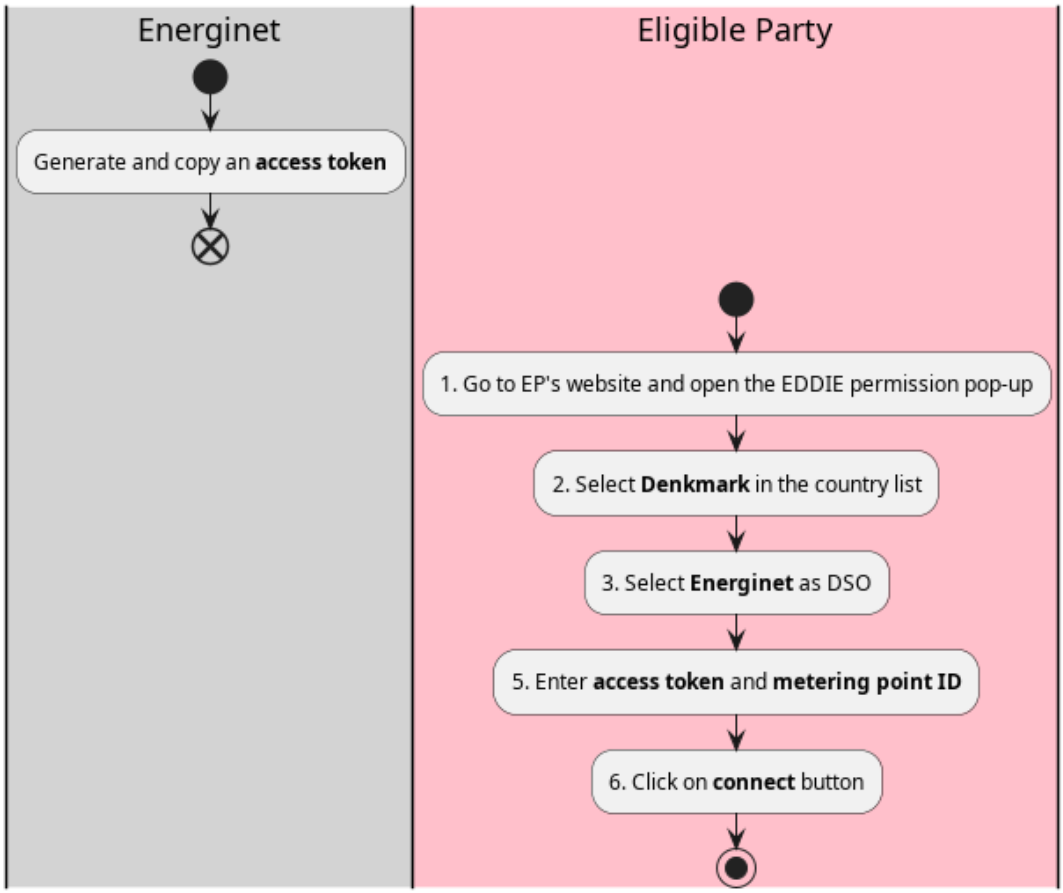


Figure 24 Permission process Denmark (Energinet)

The final customer must create an access token in the portal of Energinet. Based on the user input in step 5, errors can occur due to a wrong access token or a wrong metering point. Otherwise, the permission is created successfully.

The following status updates will be produced:

After step 6 a CREATED status will be produced, followed by either a VALIDATED or MALFORMED status depending on the attributes of the request. The RC then tries to perform a test call to the Eloverblik API with the retrieved access token. If the API does not work right now or the token is not valid the UNABLE_TO_SEND status will be produced, otherwise the PENDING_PERMISSION_ADMINISTRATOR_ACKNOWLEDGEMENT is created which is then followed by the SENT_TO_PERMISSION_ADMINISTRATOR state. This then followed only by ACCEPTED as the user accepted the permission when giving the RC the valid access token.

5.4 France

In France the DSOs must provide their customers a secure web portal to access their energy data. Currently, only the major French DSO, ENEDIS, is integrated.
ENEDIS rolled out Linky Smart Meters which provide electrical data. This data can be accessed via the Data Connect API[20]. This API offers third parties to access the electricity data of individuals.
Consumption as well as production data is available as daily, or 30-minute values and data can be requested a maximum of 3 years to the past.
The EP must create an account at ENEDIS' web platform[21]. Then the EP must fill out a contract to use the *Data Connect* API, which takes several days to be approved.
After the contract is approved, the user can create a *sandbox* application which then can be used to set up the *production* environment. Each created application has its own ID and secret which is important when using the API.
To unlock the application in the *production* environment, the EP must provide a URL to ENEDIS where they can verify and check the running application. Additionally, there must be an information displayed to inform the user that he shares the data with the EP.
Finally, a valid callback URL is required and needs to be provided to the sandbox application before unlocking it into production.
To properly configure the ENEDIS region connector (RC) an EP needs the following information:

[20] https://datahub-enedis.fr/services-api/data-connect/documentation/
[21] https://mon-compte.enedis.fr/auth/XUI/#login/&realm=/enedis

- The client ID of the application in production
- The client secret of the application in production

Currently this RC can request and retrieving user data from the past and the future. The permission of a user can be terminated by the EP. The request of accounting point data is not supported.
When registering at ENEDIS, a sandbox application can be created, which makes testing request of test data from their API possible. However, the authorization flow **CANNOT** be tested with the sandbox environment.

In the follow graphics the process of granting/declining a permission is illustrated from the final customer's perspective:

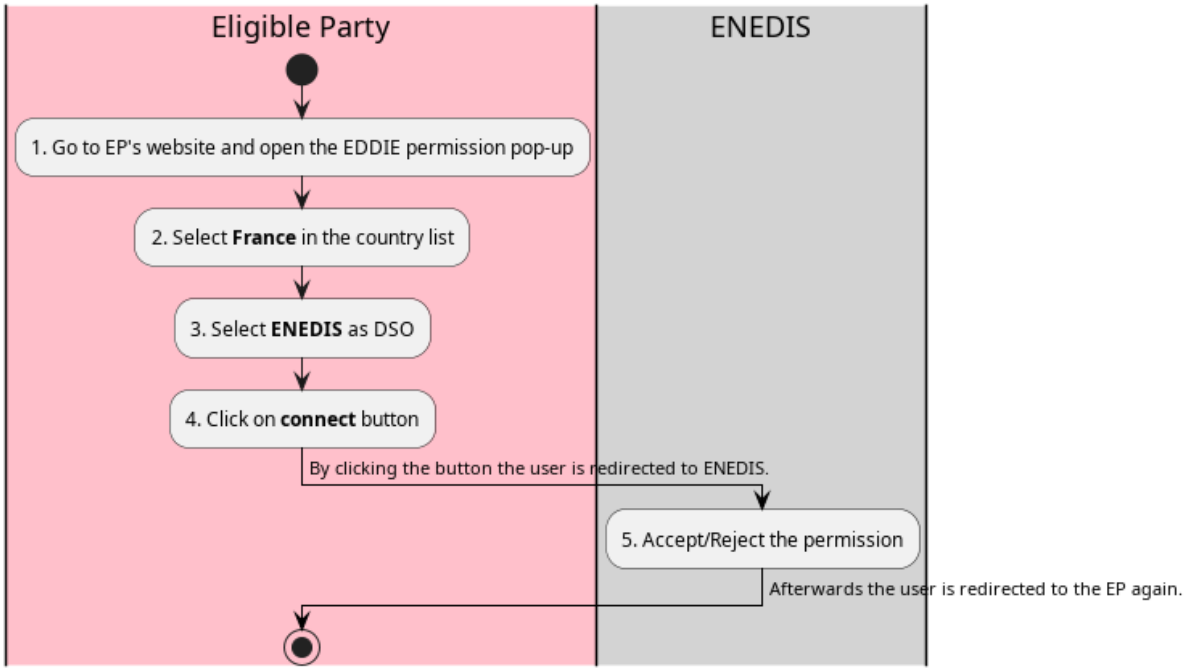


Figure 25 Permission process France (Enedis)

When the final customer accepts or rejects a permission, a redirect back to the callback URL provided by the EP is triggered. The callback URL contains a parameter with the metering point of the user if accepted.

The following status updates will be produced:

When the user clicks on the button as illustrated in step 4, the CREATED status is produced followed by either a MALFORMED or VALIDATED status. After that the redirect URI will be built

based on the Client ID provided by the EP leading to change the status to PENDING_PERMISSION_ADMINISTRATOR_ACKNOWLEDGEMENT. Then the user must either accept or reject the permission. By doing so ENEDIS will send a request to the EP's callback URL. When the request on the callback URL is received, the status will change to SENT_TO_PERMISSION_ADMINISTRATOR. If the *usagePointId* embedded in the request by ENEDIS is null, the status will change to REJECTED, otherwise the status changes to ACCEPTED.

5.4.1 Near real-time data from the smart meter

The Linky smart meter offers a digital information output commonly called *Transmission of Information to the Customer* or *TIC*.
The information is transmitted using amplitude modulation on a carrier signal with a frequency of 50 kHz. To decode this signal, plug and play solutions are available for purchase, and guides for DIY solutions can be found on the Internet as well.
To integrate the Linky smart meter with AIIDA, additional external hardware is required. As an example, this hardware could be a USB/serial converter which is plugged via a USB port into the computer running AIIDA, and AIIDA can then interpret the converted signal. Another possible solution would be a (third party) device, that reads the smart meter output and sends the readings to an MQTT broker. AIIDA then receives the readings from this broker.
The Linky meter also includes a power supply circuit that can power an additional small radio transmitter, to transmit the TIC signal over the air. There are different versions. Some meters integrate this power supply via a USB serial port, but the majority of Linky meters have this power circuit with a three-pin TIC connector.

5.5 Italy

At the time of writing this document, the parameters governing third-party access to energy data in Italy remain under deliberation by the relevant regulatory bodies. While avenues for first-party data acquisition subsist within the Italian jurisdiction, EDDIE is actively engaged in continuous dialogue with the colleagues at ARERA, the nation's energy regulatory authority. We are assiduously monitoring the evolving landscape to ensure a comprehensive understanding of any prospective developments that might facilitate third-party data access. The integration of Italian data flows can begin once the necessary authorisations have been duly granted by the competent authorities. By contacting ARERA and drawing attention to the gap in data provision to third parties, ARERA has initiated a process to

establish the rules for sharing data with third parties authorized by end customers. This possibility should be available by the end of 2024.[22]

5.5.1 Near real-time data from the smart meter

The Italian meter is using power line communication (PLC) as the near real-time customer interface. As PLC has limited bandwidth, unlike other smart meters, the Italian smart meter is only pushing measurements every 15 minutes.
In addition, it also outputs a new measurement when a certain threshold is crossed. These thresholds are defined in 300-Watt intervals (i.e., 300W, 600W, 900W, ...). E.g., when the power consumption changes from 150W to 480W, a new measurement will be pushed, but if the consumption changes from 310W to 580W, no new measurement will be sent.

The Italian company Sinapsi has created a device called Alfa. It can be plugged into a power socket anywhere in a customer's home and it decodes the PLC readings from the smart meter and sends them to their cloud. The customer can then view his consumption values in a mobile app.
Sinapsi offers paid access to their cloud and thereby an easy way to get a customer's data. To use their cloud, each EP would have to establish a contract with Sinapsi and, more important, for each customer, the EP must prove to Sinapsi with e.g., a document, that they have the customer's permission to access their data.
In addition to sending the data to Sinapsi's cloud, the Alfa device also outputs the measurements via Modbus TCP. A preliminary test has confirmed that data can be read via Modbus TCP.
To use the Alfa device with AIIDA, the customer only needs to input the IP address of the Alfa device in AIIDA.

5.6 Spain

In Spain, the DSOs act as the metered data administrators and Datadis is the permission administrator and broker. Datadis provides the functionality to request permission from a customer data. Datadis is not a Datahub, but they provide APIs to retrieve data from customers. This works by delegating the API requests to the DSO responsible for the metering point of the customer. This API provides a uniform process and data model for all of Spain. Metering data in Spain is always available in hourly granularity, but certain meters can also provide quarter hourly granularity.

[22] https://www.arera.it/fileadmin/allegati/docs/24/158-24.pdf

A permission in Spain has a start and end date as well as a list of metering points that are accessible. When the permission is active (between start and end), it is possible to retrieve validated metering data for up to 2 years in the past and future validated data up to the end date of the permission. During the active permission it is also possible to access the contract data associated with each metering point. The maximum time a permission can be active for, is 2 years. Datadis does not distinguish between granted permissions i.e., EPs can have multiple permissions for the same metering points. When requesting data for a metering point it just checks if there is a currently active permission for that metering point.

Datadis provides no public documentation for requesting permissions without the use of their web portal. We reverse engineered the requests their Web portal sends to be able to request permission from the Datadis region connector (RC). The RC also has no way to check if a permission request has been accepted or declined by user on the Datadis portal.

The Datadis RC currently supports requests for historical validated and future data from up to 2 years in the past to 2 years in the future. There is currently no support for accounting point data.
If a customer has accepted multiple permission requests for a metering point and now revokes a single permission, there is no way for the RC to detect which permission request was revoked. This means that all permission requests for future data will continue to retrieve data for as long as there is still a valid permission for the time frame of the permission request.
No energy data is stored by the RC. The only GDPR relevant data stored by the RC is the NIF (user identification), the metering point of the customer, the supported granularity of the metering point, as well as which distributor the metering point is associated with.

In the follow graphics the process of granting/declining a permission is illustrated from the final customer's perspective:

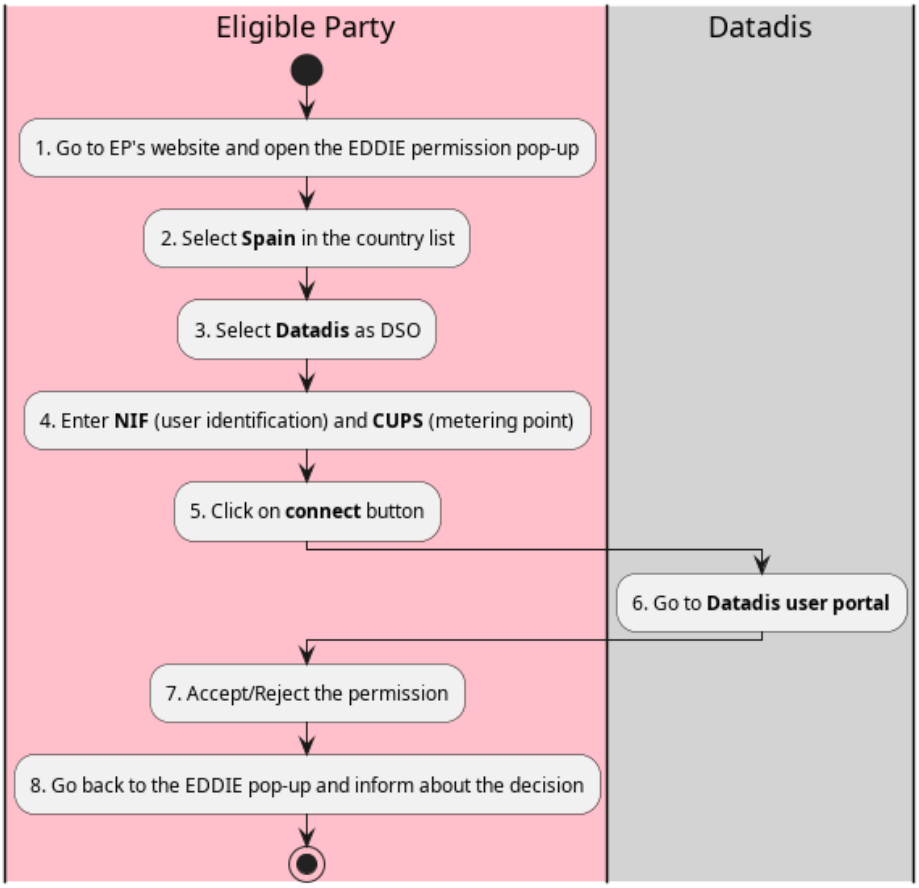


Figure 26 Permission process Spain (Datadis)

The RC Connector produces the following status updates at the following process steps: Step 5 produces CREATED followed by either MALFORMED or VALIDATED. VALIDATED continues with either UNABLE_TO_SEND or PENDING_PERMISSION_ADMINISTRATOR_ACKNOWLEDGEMENT after which it produces SENT_TO_PERMISSION_ADMINISTRATOR. Step 8 produces either ACCEPTED or REJECTED. Apart from that, the EP can also terminate the permission via a CIM Consent Market Document message which will produce a TERMINATED status.
In case a final customer revokes a permission, there is no possibility now that the RC is informed about this. This results in receiving a 403 Forbidden response when the RC tries to request data, which leads to the status REVOKED.

For EPs to use the Datadis RC, they only need to register an account at Datadis. The RC requires the login credentials for this account to work properly.

Datadis has no test environment or accounts for testing. For our development we were dependent on a real account provided by Aelec.

5.7 Countries in progress

Additionally, we have made initial heads-on for connecting to the MS infrastructure in other countries including Germany, Netherlands, Finland (Fingrid), Belgium (Fluvius) and the US (Green Button). For these we have successfully accomplished the prerequisites with contracting, technical on-boarding meetings, creation of accounts at required platforms, and prepared our local infrastructure to be able to connect to these countries.

6 Identified Issues and Best-Practices

6.1 Introduction

This chapter provides an overview about the common issues which were found in the onboarding process of the previous mentioned countries. Further on, we have developed best practices with the respective countries and derived them from the problem areas.

6.2 Common Issues

The following section outlines various issues and challenges faced by eligible parties (EPs) and final customers in the energy sector across different European countries. These issues range from technical problems with APIs and data formats to legal and regulatory hurdles, as well as difficulties with customer consent and data access.

Technical Issues

- Inconsistent implementation of APIs and data formats across different countries and Distribution System Operators
- Lack of standardization in data formats and APIs, making it difficult for EPs to access and process data
- Technical errors and inconsistencies in API responses, such as returning error codes 500 instead of 400 for malformed requests

Legal and Regulatory Challenges

- Eligible parties must obtain a GLN (Global Location Number) code to register as service providers, which can be a complex and time-consuming process
- Lack of legal basis for eligible parties to access final customer data in some countries
- Complicated certification processes for EPs in some countries

Customer Consent and Data Access

- Difficulty in obtaining customer consent for data access, with some countries having complex and time-consuming processes

- Lack of transparency and clarity in customer consent processes, with some countries not displaying consent duration or providing unclear error messages
- Inconsistent implementation of customer consent processes across different countries and DSOs

6.3 Best practices

The energy sector is undergoing a significant transformation, and one of the key focus areas is improving the accessibility and usability of energy data. One best practice is the introduction of a directory service where DSOs can request the name of the company from the EP-Code. This will enhance the transparency and user-friendliness of the consent management process, as the Consent Administrator will no longer need to manually input the name of the requesting party.

Streamlining the registration process is also a crucial best practice. The implementation of a single registration process for the National Competence Authority (NCA) and the Data Exchange Environment (DEE) will simplify the onboarding experience for eligible parties, reducing the administrative burden and improving overall efficiency. While a single registration process for final customers with metering points in different areas remains a challenge without an easy solution, other best practices can be implemented to enhance the user experience.

Providing low-threshold instructions for end-customers to access near-real-time data, and the NCA's commitment to providing a standard interface for this data, will make it more accessible and user-friendly.

Harmonizing the web portals of Metering Point Administrators (MDAs) is another best practice that can improve the experience for final customers. By providing templates for the MDAs, their websites can be made more consistent and intuitive, especially for customers with metering points in multiple grid areas. Supporting affected DSOs with best practices to handle eligible party requests is crucial to ensure the readiness of the entire ecosystem.
This collaborative approach will help address any implementation challenges and ensure a smooth transition to the new data-sharing framework.

Expanding the availability of contracts and documentation in multiple languages, such as providing the contract in English as well as the native language, is a best practice that enhances accessibility and inclusivity for eligible parties from diverse backgrounds.
Automating the approval process for eligible parties within a specific time frame is another best practice that can improve the efficiency and responsiveness of the system. This will

ensure a more streamlined onboarding experience for new market participants. Improving the documentation of the message schema, including the definitions, optional parameters, and the handling of specific data types, is a best practice that will enhance the overall usability and transparency of the energy data ecosystem.

Ensuring that the RequestID is generated by the DSO itself, rather than the framework, will also help maintain the uniqueness of these identifiers.

The requirement of obtaining a GLN-code for eligible parties, issues with certification processes and authorization procedures, and the lack of multilingual content and comprehensive documentation. The sustainable solutions proposed aim to address these challenges through process improvements, enhanced documentation, harmonization of practices, and leveraging technological advancements to create a more accessible and user-friendly energy data ecosystem.

7 Conclusion and Outlook

This intermediate report contains the experiences made in the first year of the project's Best Practices Round Tables (BPRTs) for Data-Sharing Infrastructure Operators. The progress made in the first phase of the project was excellent and onboarding of new member states went on steadily. On the other hand, it has also come to our attention that in the forthcoming phase of the project, we are encountering an increasing number of obstacles pertaining to the acquisition of appropriate contact persons and information concerning data exchange infrastructures regarding the remaining member states.

Moreover, the intermediate report will serve as a means of preparing the final report, which will incorporate additional comprehensive findings from the remaining member states. The goal of the work package's related deliverables is to identify best practices across the EU to ensure a cohesive and efficient data-sharing infrastructure on a European level, while connecting to existing data sharing infrastructures on national levels. EDDIE enables as "central point of access" with its developed connectors one major requirement regarding eligible parties.

The described method of connecting distributed data sharing infrastructures should also serve as state of the art implementation in terms of privacy by design and security by design, and it also aligns with the general objectives of the Clean Energy Package (CEP) and Commission Implementing Regulation (EU) 2023/1162[23]. As one can see at the example of Italy, EDDIE may lead to better implementations in the different member states, so that eligible parties have access to final customers data.

[23] https://eur-lex.europa.eu/eli/reg_impl/2023/1162/oj

8 References

ARERA resolution data availability for eligible parties
https://www.arera.it/fileadmin/allegati/docs/24/158-24.pdf

COMMISSION IMPLEMENTING REGULATION (EU) 2023/1162 of 6 June 2023
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9 ANNEX (Common Issues)

In the following pages common issues in different countries are documented. There is a suggestions how to solve this issues in a sustainable way. Also, if applicable, an EDDIE Workaround is documented, so the proceeding of the creation of a region connector could go on.

9.1 Austria

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	It must be possible to forward ConsentRequestId as parameter to PA portal	Also described in Proposal Part B Page 16, in the Austrian case we need a ConsentRequestID to be generated up-front (by the EDDIE Consent Facade) and then, the framework would send a ConsentRequest message to the DSO portal. The end user would then have to search by this ConsentRequestId in the portal of the DSO to accept/reject a comment.	Provide a field in the popup user interface for the user to copy the ConsentRequestId for later use in the DSO Portal	Integrate functionality as quick win in DSO portals, needs to be addressed in CCM core group within Austrian Energy Association
2	Display of EP-Code in Consent Administrator	The Consent Administrator only receives the EC-Code from the eligible party and must manually input the name of the requesting party, so that in the portal of the Consent Administrator the name of the requesting party is displayed and not only the EC-Code	-	Introduction of directory service, where DSOs can request the name of the company from the EP-Code

3	Dual registration required (one time at NCA and one time at DEE)	An eligible party must register at first at the NCA (National Competence Authority) to receive the EP-Code and after that he has to register again at the DEE (Data Exchange Environment) to connect to the infrastructure, so that he can communicate with the DSO	-	Only one registration for NCA and DEE
4	No single registration for final customer (for each DSO needed)	If a final customer has metering points in different metering grid areas, the final customer must register in more than one web portal from the Metering Point Administrator	-	No easy solution found yet
5	Complicated access to near-real-time data	It is complicated for final customers to get access to near-real-time data because it is very technical	-	Provide a low-threshold instruction for end customers
6	No standard interface for near-real-time data	No standard interface for near-real-time data is available yet	-	The NCA will provide a standard interface for near-real-time data
7	Slightly different web portals (DSO)	The final customer must accept a request from an eligible party in the web portal of the MDA. The web portals of the different MDAs look different, so that it is not self explaining for a final customer with metering points in more than one metering grid areas	-	Provide templates for MDA, so that their websites approximate to each other
9	Readiness of some DSOs to manage eligible party requests not yet there	Not all DSOs are ready to communicate with eligible parties because they have not finished the software implementation yet	-	Talk to the affected DSOs and draw their attention to this fact. Support them in the implementation with best practices

10	Multilingual contract	The contracts are available only in German language. Some EPs might come from non-German speaking countries	Online Translation Solution	The contract should be available in English language as well
11	EP approval process	Some DSOs are quick, while others are slow to approve the request of a new EP	-	EPs get approved automatically within specific period
12	Incomplete schema definitions	There are several definitions that are not explained in the schema, such as "TransmissionCycle: V... variable" or "MeteringInterval: V... variable"	-	Improve documentation of schema
18	RequestID generation	Right now, the RequestID needs to be generated by the framework. This could lead to a duplicate of RequestIDs at a DSO	-	RequestID shall be generated by the DSO itself, for the ID to be always unique
19	Incomplete documentation	There are optional parameters for which it is not explained, if they have default values nor how they influence a response	-	Improve documentation
20	Incomplete documentation	There is no difference between consumption and production data. E.g., user has two different metering points, one for consumption; one for PV production. Accessing photovoltaic production data must be realized using consumption records. Parameter EnergyDirection is reserved for energy communities	-	Improve documentation
21	Unclear schema	According to the schema ConversationID AND MessageID could have the same value	-	Improve documentation of schema

22	Unclear schema	CMRequests are managed differently. While some DSOs accept any format, other DSOs do require it to be generated according to the schema.	-	Harmonized approach for all DSOs
23	Unclear schema	The schema does not define which CRC algorithm must be used	-	Improve documentation of schema
24	Inconsistent Implementation at different DSOs	Some DSOs do not support the sending of a request without a ConsentRequestID. Some DSOs react differently if a higher granularity than available is requested. EPs cannot a priory know which granularity is available, so there should be the option to request a minMeteringInterval and a MaxMeteringInterval. Similar for requests for historical data back in time	-	Improve schema

9.2 Denmark

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Eligible party must first obtain GLN-code	GLN-code is required to register as a service provider in the system. These are administered by GS1	In test environments it may be possible to use a synthetic GLN-code	

9.3 Estonia

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Eligible party must first obtain GLN-code	GLN-code is required to register as a service provider in the system. These are administered by GS1	In test environments it may be possible to use a synthetic GLN-code	

9.4 Finland

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Eligible party must first obtain GLN-code	GLN-code is required to register as a service provider in the system. These are administered by GS1	In test environments it may be possible to use a synthetic GLN	
2	Certification process can be unnecessarily complicated	There is a certification process which must be completed before new eligible party can begin operation. That may be overly complicated compared to the needs of the party	For testing purposes with synthetic data, the certification is not required.	In the long term the certification requirements may be adjusted.
3	The process for assigning access to data is unnecessarily complicated	Currently, a private customer must be guided to log in into customer access portal and they must authorize the eligible party to access data. This can be complicated for the average user.		The authorization process could be improved so that it would require less input from the user directly, and more of the required data could come from the service provider's system "prefilled"

4	The process for assigning access to data is unnecessarily complicated	Currently, a private customer must be guided to log in into customer portal and they must authorize the EP to access data	-	The authorization process could be improved so that it would require less input from the user directly, and more of the required data could come from the service provider's system "prefilled"

9.5 France

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Customer is not informed about consent duration	When giving consent for an EP, the Enedis page for granting this consent, does not display for how long the consent will be valid	Display it to the user beforehand	Show it on the website where the user accepts the consent [Enedis' answer] The display of the final customer consent in the Enedis personal account will be implemented in early 2024.

2	Multilingual contract	Right now, the contract is available only in French language. Some EPs might come from non-French speaking countries.	Google Translate	Provide a contract in English language. [Enedis' answer] The translation of the contract into French is not planned. Indeed, from a legal point of view, only the French version is authentic.
3	Enedis Website	Right now, only the French version is usable (e.g. the client secret cannot be displayed in the English version). Furthermore, the English documentation is incomplete and outdated	Google Translate and use French version	Provide a working and up-to-date version in English [Enedis' answer] Language of information available: - Datahub website : only in French. No translation is planned - Swaggers of Dataconnect API (available on Datahub website): consideration in progress for a translation into English in the coming months - Final customer personal account on https://mon-compte-client.enedis.fr/ - Website: will remain only in French
4	Health endpoints for API	Currently it is not possible to check of the API is working. There is only the option to subscribe to a mailing list to be informed		Provide health endpoints for the API [Enedis' answer] No IT development is planned to answer to this requirement. An automatic update of API health would be too consuming for our IT infrastructures

5	Sandbox permission process missing	For an application in sandbox mode, it is not possible to implement/test the authorization flow, as this is only available in production mode	Get access to an app in production mode	Functionality should be available also in sandbox mode. [Enedis' answer] A consideration is in progress to implement this function in 2024.
6	Sandbox does not reflect production behavior	While in the sandbox e.g., data can be requested for 10 years into the past, in production mode it is only possible for 3 years into the past. Therefore, testing is hardly possible		Harmonize the behavior of sandbox and production [Enedis' answer] A consideration is in progress to possibly implement in sandbox the same operation than in production. As a reminder: - the sandbox operation is not comparable to production operation. Indeed, in sandbox, data are fictitious. - In production, the following data are available: o Load curves: up to 2 years back o Consumptions history: up to 3 years back
7	Complicated structure of metering API v5	In comparison to v4 now each endpoint has its own base URL path, which makes the documentation unclear and confusing		Structure v5 like v4 [Enedis' answer] A consideration is in progress to possibly implement this update.

8	Incomplete documentation of Authorization v1	What happens if a user is redirected to Enedis to give his consent and denies?		Improve documentation [Enedis' answer] If a final customer refuses to give his consent for the third party of his choice, once he is connected to his Enedis customer account, then the third party will not be able to access his data (and will therefore not receive any notification of any access key [PRM id + consent id] to the data). And if the final customer revokes his consent, it is possible to test, in the sandbox, the behavior of the app with the PRM 26584978546985 (PRM number 8) as explained here : Découvrir les API – Enedis DataHub (datahub-enedis.fr)
9	Incomplete documentation of metering API v5	The response codes of malformed requests are misleading, e.g., by returning response code 500 instead of 400. As of Romain (first level support of Enedis) false requests are not further processed, dropped and then result in error 500		Improve documentation [Enedis' answer] This operation is explained in French (sorry) in the documentation of V1 authorize API : « Veuillez noter que si le format de la requête tel qu'explicité dans ce swagger n'est pas respecté, l'API répondra en 500 (erreur technique). » [here: https://datahub-enedis.fr/services-api/data-connect/documentation/autorisation-v1/]. In English: « please note that if the format of the request is not as shown in this swagger, the HTTP response will be 500 (technical response) ».

9.6 Greece

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Eligible party must first obtain GLN-code	GLN-code is required to register as a service provider in the system. These are administered by GS1	In test environments it may be possible to use a synthetic GLN-code	
2	No API available	The data cannot be received over an API. It can only be received over flat CSV-files.	-	Make data accessible over an API
3	No Permission process	Now there is no permission process in place. So, the data sharing is also not possible in a correct way		Provide a permission process for accessing the data

9.7 Netherlands

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	Eligible party must first obtain GLN-code	GLN-code is required to register as a service provider in the system. These are administered by GS1	In test environments it may be possible to use a synthetic GLN-code	With the new Energy Act (mid 2025 probably) the GLN code is no longer allowed. Dutch eligible parties will need to register with the national EIDAS compliant identity provider (e-Herkenning) (which will return an id from the national Chamber

				of Commerce. Other European eligible parties should be able to register themselves with their own national EIDAS compliant identity providers

9.8 Italy

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	There is no legal basis for eligible parties to access the data of final customers	Due to a lack of legislation, energy data cannot currently be accessed by energy service providers or private individuals via any interface	-	Create a legal basis according to §23 EU law

9.9 Spain

#	Title	Description	EDDIE Workaround	Sustainable Solution
1	NIF español	For Datadis, companies need to have a "NIF Espanol" / Spanish VAT number. Process to get a VAT for foreigners is complex	Aelec and soporte@datadis.es created accounts for EDDIE manually	Support of EIDAS / EU Logins for onboarding.

2	Access can only be given for the future, but then for ALL data	There is no purpose limitation for data access		
3	Unknown technical error if customer that data is requested from does not exist	There is an unknown error if the requested account does not exist (e.g., identified by NIE). Error message is not helpful and should be more meaningful		
4	No API for authorization/permission available	Currently, permission from the final customer cannot be tied to a purpose and can't be requested through an API call		
5	Notification about a successful authorization is just given via email	There is just an email channel that indicates that a request for permission has been granted/revoked		
6	Sometimes the DSO cannot be reached	It often takes exceedingly long to click on "Third party supplies" and then it says e.g. "It has not been possible to contact some of the distributors"		
7	Only accepted requests are validated	When we send a permission request, everything is accepted by the backend. The validity is only checked if the user gives permission		