BENEFIT ASSESSMENT OF AN EU-WIDE DATA EXCHANGE PLATFORM

A report to Elering AS
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Context and scope

The Clean Energy Package (CEP) states that consumers own their energy data. All EU Member States have to lay down the rules regarding the management and exchange of meter data. Elering (together with TenneT and Energinet) is looking into the benefits of a European Data Exchange Platform (DEP), an interoperability platform that would provide retailers, energy service providers, and other eligible market participants with a single, standard access point for consumers' metering data. Pöyry has been engaged to assess the benefits of having a joint energy meter data access and management platform for EU and the targeted member states, and we have chosen 2023 as the nominal year for assessment.

Description of benefits

Improved access to meter data is one means by which the operation of the energy markets, improved energy efficiency and the efficient transition to sector coupling can be achieved. Data access is necessary to perform many of the existing functions within the competitive energy market, and difficulty in accessing data from multiple sources is a barrier to the efficient and competitive market development. At a general level, the value of easier access to meter data would come from:

- **Improved** application of services in markets where the use cases would still exist in the counterfactual
  - **Cost savings** from existing and planned market operations;
  - **Improved competition** in existing market segments, by lowering the cost of data access which can otherwise serve as a barrier to entry;
- **Accelerated** innovation and unlocking of benefits from certain use cases, due to faster and easier access to data via DEP, as compared to the counterfactual; and
- **Enabled** deployment of new use cases in the markets where the data would not be available.

In addition, a separate identified benefit unrelated to specific use cases involves **ICT cost savings** from building new national and local data exchange and access platforms and consent management.

These sources of value are usually linked to certain market use cases and their related benefits. Therefore, in order to analyse the benefits of the Data Exchange Platform, we developed a use case-centric approach that focuses on benefits arising from groups of use cases. Figure 1 shows the identified use case groups with some examples of use cases and their benefits.

Figure 1 – Use case groups requiring meter data and their benefits

Group	Example of use cases	Benefits
Retail market	Easier access to consumption profiles of potential customers[1] Enable competition through easier supplier switching; Energy administration, book keeping, validation settlement	Increased competition and reduced customer prices (and supplier margins) Cost savings when accessing several markets
Energy efficiency	Energy management audits Energy monitoring services Inform consumers of consumption and impact behaviour; Building energy management	Saved energy Reduced losses Reduced CO2 emissions
Flexibility	Implicit demand response Explicit demand response settlement Finding best location for Distributed Energy Resources; Vehicle to grid; EV charging; Grid planning	Deferred/reduced DSO grid investments Better ancillary services Energy market benefits Enabling EV adoption
Other innovative use cases	Comparison tool (clean energy package) Greenness of energy audit Microforecasting Financing Renewables (digital PPA)	Enabling renewable investments Other
Single platform instead of country-specific data exchange and access solutions in all EU member states		Cost savings

Findings and conclusions

Based on Pöyry's analysis, discussions with the market participants and project stakeholders this study has identified the following findings:

Meter data access is still a problem in the EU: roll-out of smart meters and establishing data hubs are only first steps towards an effective and well-functioning electricity market with supporting services. Market participants still encounter data access barriers across the EU and often need to engage with several meter data entities in each country, irrespective of whether smart meters are in place. For example, in Spain or Germany a market participant requiring meter data will need to deal with multiple DSOs and data platforms.

Easy and secure access to (smart) meter data will enable a wide range of benefits: market participants are currently exploring several use cases that are providing electricity market benefits. Improved cross border data access through the proposed European Data Exchange Platform would lead not only to cost savings but realisation of these full benefits in instances where such use cases would have not been possible otherwise.

The sources of these benefits are generated from four use case groups (retail market processes, energy efficiency, flexibility, other innovative use cases), as well as a separate benefit of reduced ICT costs.

1 Consumption profiles can used to enable targeted marketing and to offer the most suitable electricity tariff or service.

The potential size of the benefits is significant already in 2023: Although many of the benefits identified in this study are difficult to quantify and simplifying assumptions need to be made, our findings reveal that even a conservative approach leads to significant benefits in the form of energy saved, lower carbon emissions, reduced grid losses, deferred grid investments and ICT cost savings, as shown in Figure 2.

Figure 2 – Results of the quantification for 2023

	Benefit	Unit	DEP Scenario	Counter-factual	Improve-ment
Energy Efficiency	Energy saved, reduced consumption	TWh savings/year	24.6	22.3	2.3
	Energy saved, lower grid losses	TWh savings/year	6.7	6.1	0.6
	Energy saved, reduced consumption	Mtons CO_2 savings/year	8.2	7.4	0.8
	Energy saved, lower grid losses	Mtons CO_2 savings/year	2.2	2.0	0.2
	Reduction in transmission capacity Postponed/reduced investments	MEUR/year	465	422	43
Flexibility	Reduction in grid congestion - Postponed/reduced investment	MEUR/year	647	598	49
	Electric grid flexibility, load shifting	TWh savings/year	7.5	6.9	0.6
IT Cost	IT cost saved in data hubs	MEUR	14	140	126

1. INTRODUCTION

The Clean Energy Package (CEP) states that consumers own their energy data[2]. They must be able to share their data, and the data access and exchange must be efficiently organised. Based on this requirement, all EU Member States must lay down rules regarding the management and exchange of meter data.

Against this background, Elering (together with TenneT and Energinet) is looking into the benefits of a European Data Exchange Platform (DEP), complementing and if possible replacing aspects of individual national data management platforms, which would enable international actors to interact with a single portal rather than numerous national systems[3]. Their plan is to form a TSO Working Group to identify the potential use cases that can be realised on the back of such international data access and sharing.

Pöyry has been engaged to assess the benefits of having a joint energy meter data access and management platform for EU and the targeted member states. The scope of the analysis includes a qualitative analysis of the benefits compared to the counterfactual, as well as quantification of certain benefits in 2023.

The work was carried during October and early November 2019 and focused on:

- discussion with the project stakeholders in order to understand the specification and functionality of the proposed data exchange platform;
- discussions and interviews with market participants regarding the access to meter data, as well as different use cases and respective benefits; and
- Pöyry's qualitative and, where possible, simple quantitative assessment of the potential benefits of the data exchange platform using selected use cases.

The scope of the work does not include a cost analysis of DEP. The analysis is not a full cost benefit analysis of the DEP, but rather an assessment of the potential power market related benefits from the DEP. We performed a limited quantification of benefits, which relies on simplifying assumptions.

This report is structured as follows:

- Section 2 provides a description of the Data Exchange Platform and a counterfactual scenario against which benefits are defined;
- Section 3 describes the framework for assessing the benefit of DEP;
- Section 4 provides a qualitative description of the data access, with use cases that illustrate benefits and limitations; and
- Section 5 shows the methodology, assumptions and results of the quantification of selected benefits.

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2 "[…] data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services", Directive 2019/944 Common rules for the internal market for electricity.

3. The individual Member States are currently developing systems and rules in an uncoordinated manner and DEP would enhance interoperability and lower the cost of data access.

2. DATA EXCHANGE PLATFORM

Easy and secure access to meter data is an integral part of the effective and well-functioning electricity retail market. Currently, different models for access and exchange of data between market participants are in use and under implementation in the EU/EEA Member States. Typically, it is the distribution system operator (DSO) or other metering responsible party that provide metering data to customers and eligible market participants, often leading to multiple differing meter data platform even within one country.

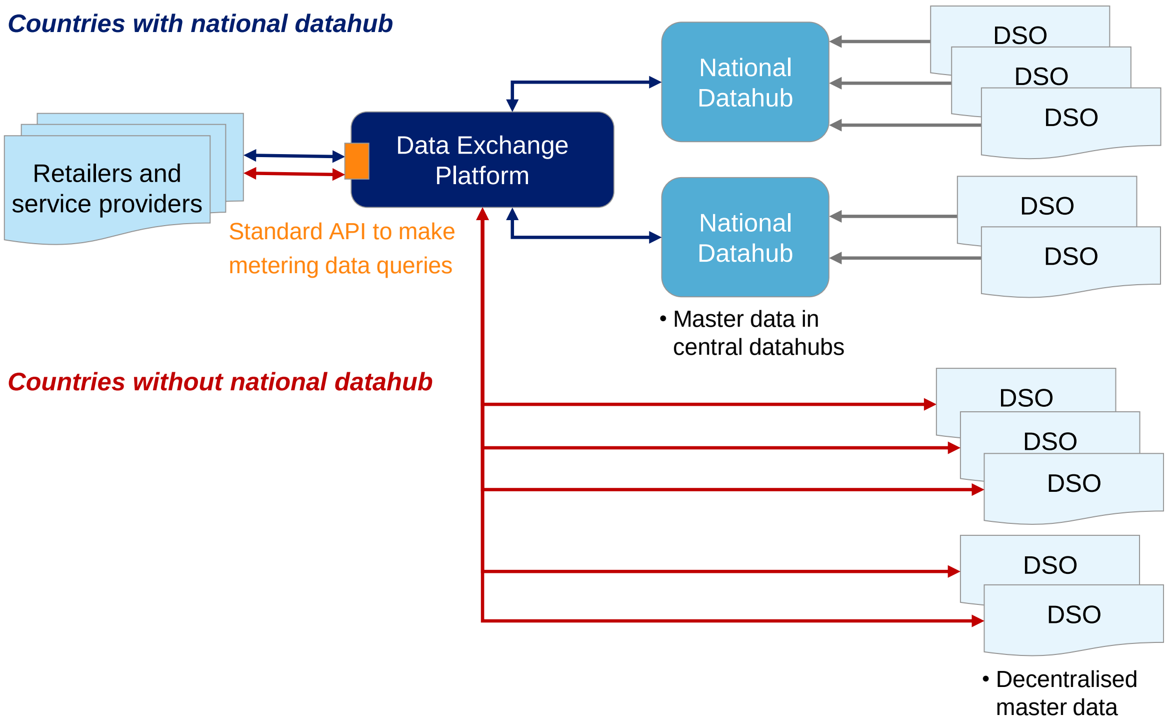
A few countries such as Denmark, Norway, Estonia and the Netherlands have implemented centralized data exchange platforms, i.e. data hubs, to provide single, standard access points for the national metering data. Some other countries, including Finland and Sweden, are implementing similar national data hub platforms. However, there is no EU-wide platform that gives access to metering and consumption data that is held in national data hubs or DSOs' management systems for metering data.

Based on the Electricity Market Directive (2019/944/EU), validated historical consumption data shall be made available to final customers on request, easily and securely and at no additional cost. Final customers should be able to retrieve their own metering data and to give another party access, acting on their behalf. In order to promote competition in the retail market and to avoid excessive administrative costs for the eligible market participants, Member States must facilitate interoperability and non-discriminatory and transparent procedures for data access. The Electricity Market Directive does not require the implementation of data hubs or other platforms per se, but these are one solution for easy and secure data access and data exchange.

Energy Data Exchange Platform (DEP)

The proposed European Energy Data Exchange Platform (DEP) is an interoperability platform that would provide retailers, energy service providers and other eligible market participants with a single, standard access point for customers' metering data. The vision is that a market participant entitled to the data can access the metering data through a single access point regardless of the country in which its potential customer is physically located. In countries with national data hubs, the obvious solution is to integrate the DEP in national data hubs as illustrated in Figure 3. If there is no national data hub, all DSOs and other metering responsible parties could build integrations between their metering data management systems and the DEP. The master data for metering data is located either centrally in national data hubs or in DSOs' decentralised metering data management systems.

Figure 3 – Setup for Energy Data Exchange Platform



The benefits of the DEP depend on the accessible data and the key features of the DEP, i.e. what DEP would do and enable. In this study the key features of the DEP are assumed to be as follows:

- DEP provides electricity retailers, energy service providers and other eligible parties with a standardised application programming interface (API) to retrieve metering data located in national data hubs and decentralized metering systems.
- DEP integrates with the national consent management portals (i.e. systems and processes to enable third party authorisation), but it does not provide a customer portal itself. The customer portals and all customer relations are handled by the local TSOs, DSOs or other national entities.
- DEP provides a secure connection and trust between parties that exchange data, but the data itself moves directly from peer to peer. In other words, DEP provides a standardised API to metering data, but data does not move via the DEP and the DEP does not store any data.
- The granularity of the metering data depends on the functionalities of the national metering system. It can be e.g. 15 min, 30 min or 1 hour.
- DEP provides validated historical consumption data, not real-time consumption data. The delay may typically be from one to a few days.
- The availability and quality of data depends on the implementation of smart metering. Metering data with low level of granularity retrieved from conventional electricity meters is not that useful for competitive retailers and energy service providers.

- In order to access metering data, also some customer data and structural data concerning accounting or metering point is required as well as tools for strong identification.

The list above describes the key features of the DEP 1.0 as seen at the time of writing this report. The functionalities would evolve in the course of time, providing market participants with additional benefits which are not quantified in this study. The first version of the DEP does not include retail market processes such as supplier switching or move-in/move-out. If these can be implemented in a later phase, the benefits would be much greater. In order to achieve these benefits certain barriers relating to harmonisation of retail market regulation and processes as well as many technical issues such as standardized common data format should be solved.

The more countries (i.e. national data hubs and DSOs / metering responsible parties) are joined in the DEP, the greater are the benefits. The national coverage of the metering and accounting points should be high. In some countries this may be challenged by the late smart meter roll-outs.

Counterfactual scenario

In order to assess the benefits of the DEP, we need to understand how markets and retail offerings would develop without such a platform – this is our ‘counterfactual’ scenario. The following outcomes are expected in the ‘counterfactual scenario’ for different EU Member States:

- each EU Member State to develop its own solution;
- some partial integration to take place; and
- some EU Member States will fail or delay implementation of a centralized solution.

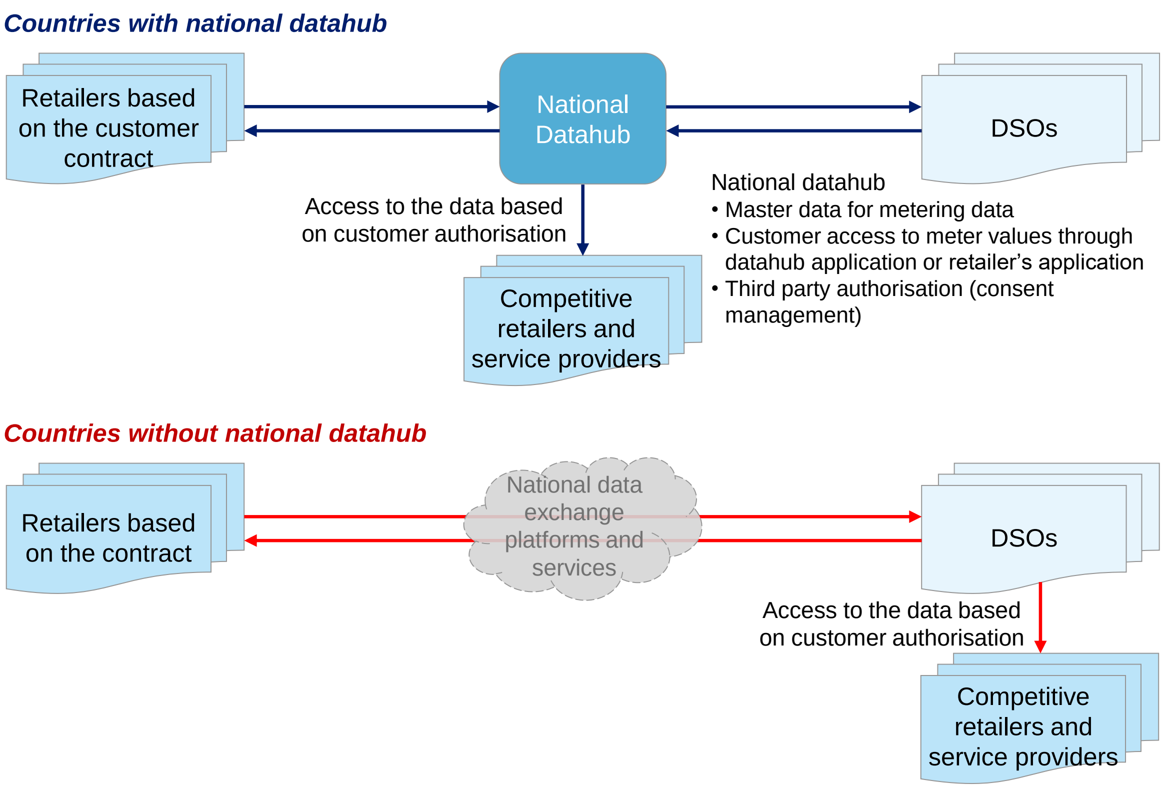
Without an EU-wide central platform for data access and exchange, each EU Member State is expected to develop its own solution to provide customers and eligible market participants with data access.

It is very likely that an increasing number of EU Member States will implement national data hubs and experience suggests that some integration of national data hubs will take place – for example, in the Nordic countries. Moreover, some effort towards harmonisation and increased interoperability of data exchange is expected to take place EU-wide but a harmonised mandatory data format and data exchange model is not considered plausible for another ten years.

However, there will still be some Member States where there is no centralized data exchange platform. In these countries a competitive retailer or energy service provider must agree on data access bilaterally with all DSOs or other metering responsible parties. The administrative burden of this is easy to see when we consider that across the EU there are more than two thousand DSOs.

Figure 4 illustrates the counterfactual data exchange environment, where competitive retailers and service providers can access metering data through national data hubs or by agreeing separately with each DSO. In all cases the access to metering data is based on the customer’s authorisation. Further details regarding the country clustering are presented in the Quantification part of the report in Section 5 and Figure 6.

Figure 4 – Counterfactual scenario without EU-wide data exchange platform



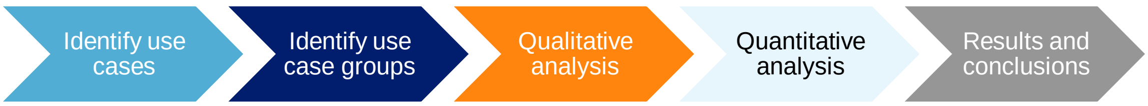
3. METHODOLOGY FOR BENEFITS ASSESSMENT

The purpose of the DEP is to ease and improve access to cross border meter data. Data access is necessary to perform many of the existing functions within the competitive energy market, and difficulty in accessing data from multiple sources is a barrier to the efficient and competitive market development. At a general level, the value of easier access to meter data would come from:

- **Improved** application of services in markets where the use cases would still exist in the counterfactual:
  - **Cost savings** from existing and planned market operations;
  - **Improved competition** in existing market segments, by lowering the cost of data access which can otherwise serve as a barrier to entry;
- **Accelerated** innovation and unlocking of benefits from certain use cases, due to faster and easier access to data via DEP, as compared to the counterfactual; and
- **Enabled** deployment of new use cases in the markets where the data would not be available.

In addition, a separate identified benefit unrelated to specific use cases involves **ICT cost savings** from building new national and local data exchange and access platforms and consent management.

These sources of value are usually linked to certain market use cases and their related benefits. Therefore, in order to analyse the benefits of the Data Exchange Platform, we developed a stepwise approach that focuses on use cases and their benefits. The methodology of this study is based on a qualitative and quantitative assessment, as shown in the figure below.



Identify use cases: We identified a number of existing and potential use cases that (a) require meter data and (b) would unlock certain benefits to different stakeholders and market participants. There is a large number of use cases with differing degrees of complexity, innovation and maturity that could provide market benefits; and we have identified a non-exhaustive list based on discussions with market participants, Data Alliance stakeholders and Pöyry's experts.

The purpose of this step was to identify some examples of use cases, without the ambition of providing an exhaustive list. The focus was to highlight some of the existing use cases, as well as some with a less mature business model, still realisable in the medium term. A list of examples is provided in Figure 5.

Figure 5 – Use case groups requiring meter data and their benefits

Group	Example of use cases	Benefits
Retail market	Easier access to consumption profiles of potential customers[4] Enable competition through easier supplier switching[5] Energy administration, book keeping, validation settlement	Increased competition and reduced customer prices (and supplier margins) Cost savings when accessing several markets
Energy efficiency	Energy management audits Energy monitoring services Inform consumers of consumption and impact behaviour Building energy management	Saved energy Reduced losses Reduced CO2 emissions
Flexibility	Implicit demand response Explicit demand response settlement Finding best location for Distributed Energy Resources Vehicle to grid EV charging Grid planning	Deferred/reduced DSO grid investments Better ancillary services Energy market benefits Enabling EV adoption
Other innovative use cases	Comparison tool (clean energy package) Greenness of energy audit Microforecasting Financing Renewables (digital PPA)	Enabling renewable investments Other
Single platform instead of country-specific data exchange and access solutions in all EU member states		Cost savings

Identify use case groups: In the next step we grouped use cases in categories depending on the market segment and major benefits they provide. The following groups of use cases have been identified:

- Retail market processes
- Energy efficiency
- Flexibility
- Other innovative use cases

ICT cost savings is a separate benefit of the DEP that is not directly related to a specific use case.

Qualitative analysis: In this step, the benefits arising from improved data access for each use case group are identified based on discussions with market players and Pöyry's assessment.

Quantitative analysis: for certain use case groups and benefits we developed methodology and assumptions to quantify the benefits for the DEP scenario and for the counterfactual, allowing calculation of the possible impact of the DEP.

4 Consumption profiles can used to enable targeted marketing, and to offer the most suitable electricity tariff or service.

5 Seamless supplier switching is not enabled in the first version (DEP 1.0).

4. QUALITATIVE DESCRIPTION

4.1 Problem

In the majority of the discussions with market participants, a lack of easy data access across borders has been one of the encountered problems. The rollout of smart meters and establishing data hubs are a first step towards an effective and well-functioning electricity market with easy and secure access to metering data.

Whether the meter data access is provided via the DSOs or a separate data hub, the market players will need to engage with one or several entities in each country, making expansion of their operations to other EU countries costly and time consuming. This leads to market participants choosing to explore business models only in the few markets that they fully understand and for which they can easily access data, knowing that other EU markets would be too costly and time consuming.

Case study: Fenieenergia; retailer from Spain

"As a retailer we are the last mile from the energy system to the consumer and therefore the hourly meter data is key for this relationship. In this sense, sometimes it seems that we only use data from the customers for invoicing matters (where monthly data is ok) but actually we also give monitoring services, advisory on improving contractual power or energy consumption, hourly indexed products, alerts systems for customers to adapt or reduce consumption and even energy management service"

In Spain there are around 200 DSOs and each has a different platform to obtain data. Also, for each type of customer we access data in different ways. In this sense, for customers over 50 kW of power we can access the meter by telematic methods, but under 15 kW we access different ftp that each DSO publishes. Nowadays we connect every 4 hours to around 15 different ftp of the main DSOs of Spain. This has little sense in a digitalized world and we should definitely move towards a global data hub."

This argument is one of the findings of a recent study on format and procedures for electricity data access[6]: 'at EU level […] suppliers are likely to face strong market barriers from a data management perspective'. Also, 'easy access to accurate and timely data through smart meter deployment is a pre-condition for the emergence of flexibility and novel energy services'.

This can be an issue also within the borders of one country. As an example, in Germany there are over 800 DSOs which are responsible for the meter data and this creates a barrier for data access for innovative service providers who are not retailers (especially in areas where there are only a few relevant customers per data hub). Similarly, countries like Spain, Poland or Austria have opted for the DSO as a facilitator while having a large number of DSOs.

For each use case there might be several other barriers than meter data access, and in the short and medium terms many innovative business models will not be commercialised even with improved meter data access. However, a DEP would be a first step towards a more harmonized European electricity market, driving initiatives for further harmonisation.

6. Format and procedures for electricity (and gas) data access and exchange in Member States, March 2018

4.2 Benefits and limitations to the analysis

As shown in Figure 5, we identified a number of use case groups, consisting of existing and potential "use cases" that (a) require meter data and (b) would unlock certain benefits to different stakeholders and market participants.

The value of easier access to meter data comes from:

- **Improved** application of services in markets where the use cases would still exist in the counterfactual:
  - **Cost savings** from existing and planned market operations;
  - **Improved competition** in existing market segments, by lowering the cost of data access which can otherwise serve as a barrier to entry;
- **Accelerated** innovation and unlocking of benefits from certain use cases, due to faster and easier access to data via DEP, as compared to the counterfactual; and
- **Enabled** deployment of new use cases in the markets where the data would not be available.

In addition, a separate identified benefit unrelated to specific use cases involves **ICT cost savings** from building new national and local data exchange and access platforms and consent management.

For each use case group we analysed the benefits unlocked with a Data Exchange Platform in place. We carried out interviews with market participants in order to validate our understanding and account for limitations towards achieving these benefits. This section gives a more detailed qualitative description of each use case group both over long term and by our selected analysis year of 2023.

Retail market processes

Because retail market processes and underlying energy consumer legislation are not harmonised across the EU countries, execution of retail market processes (e.g. supplier switching) is not yet a very realistic feature of data exchange platform by 2023. An electricity retailer will need to be established as company in each country it wants to operate, involving significant technical, regulatory and commercial effort. With several of these challenges solved in the longer term, a more interconnected European retail market would lead to stronger competition and lower margins.

> **Case study**: Spotty Energy; European energy retailer
>
> Currently in Austria and Sweden. Previously active in Estonia, Latvia and Finland, before the client portfolios were sold.
>
> *"We need energy meter data for three reasons:*
> - *making offers to the clients (new and existing),*
> - *invoicing and*
> - *energy information analysis for our clients.*
>
> *Better European meter data would help achieve:*
> - *Easier start in a new market*
> - *Seamless supplier switching*
> - *More competition and personalized solutions;*
> - *Better understanding of consumption and opportunities for cost savings"*

We discussed this with a number of market players, and we observed a consensus that meter data access is one of many hurdles for cross border operations.

Generally, the decision to enter a new market is based on a lot of other factors (familiarity with the market, marketing costs, overall strategy etc.) and data access is not the largest concern. Typically, a large retailer would consider acquiring a local company when entering a new market, as it solves a number of technical and regulatory challenges, including data access. For the smaller players like Spotty Energy, lack of data access is a more severe problem, as it adds to the challenges of prospecting and entering new markets. As a consequence, this provides competitive advantage to the existing energy suppliers which have existing access to meter data.

To conclude, retail markets will exist in the counterfactual and therefore DEP will only lead to an **improvement** of energy retail activities which would manifest through:

- **Cost reduction**: The players that are already active in multiple markets in the counterfactual would incur reduced interface costs with one common platform; and
- **Increased competition**: The reduced cost of data access would enable a retailer to access more markets than otherwise, increasing the competitive picture in those market and reducing the retail margin in the end user electricity price.

Energy efficiency

Access to metering data would benefit energy efficiency efforts (e.g. ESCO concepts), especially concerning customers with many accounting points located in several metering grid areas and countries. The multitude of use cases that enable energy efficiency (e.g. informing customers of consumption, building energy management, energy efficiency audits) will lead to a certain level of energy reduction. Despite the rollout of smart meters, data availability is still a problem for third parties operating in this space. Companies like DEXMA (see attached case study) face barriers when dealing with different DSO for access to meter data.

> **Case study**: DEXMA is a leading provider of Energy Management Software from Barcelona that offers a first class energy intelligence SaaS solution to over 346 partners in 45 countries, serving a global network of 3000 organisations.
>
> *"Despite the deadlines for end up within the deployment of high-resolution smart meters in Europe in 2020, the market reality is that this kind of data is not available 100% nowadays for the grid operators, neither for the end customer or third parties. The reason behind it, is not only the fact that plenty of smart meters have not been installed yet, but the fact that despite being installed at customer premises, they are not available in the information backend of the grid operators. Their IT backends are very complex systems with millions of readings and critical processes. In addition, most of them are based on legacy code, making them very difficult to update and upgrade. As a matter of fact, the current situation of energy consumption information availability is that monthly data is always accessible internally for DSOs/Utilities (as it is required for billing purposes), but not always for third parties. The same thing is occurring with hourly and quarter-hourly smart meter data. Therefore, making that meter data available could significantly boost companies such as DEXMA".*

In addition to the energy efficiency focused mainly on residential sector efficiency improvement, a reduction in overall electricity use will reduce energy losses in the electricity grid. The reduced grid losses are straight forwardly resulting from reductions in transmitted energy through the grid. The benefit share attributable to the DEP mainly arises from energy efficiency measures enabled by third party providers (ESCOS) selling meter data based services to real estate and private households helping them reduce energy consumption. Such services are improved with better access to data.

The concrete benefits that arise from these use cases which are enabled by DEP are listed and describe in Section 5.2.

Flexibility

Flexibility is reflected by the capability of market participants (demand side and generation) to adjust the consumption/generation depending on the market conditions. Currently there are a number of use cases in the market (e.g. implicit/explicit demand response, location optimisation for DER etc.) seeking to capture the value of flexibility. There are many barriers to realising the full demand side potential, including data access.

Data availability is still a barrier[7] for the efficient introduction of flexibility management. According to SmartEn, the association of market players driving digital and decentralised energy solutions, '*Relevant data access for all service providers' is one of the five guiding principles that will improve integration of demand-side flexibility across Europe*[8]*.*' Currently the aggregators that pool flexibility and convert it to electricity market services are mostly focusing on larger customers and usually install their own meters and controllers. The potential flexibility from the residential and smaller commercial market is still relatively unexplored, and access barriers related to meter data is one of the reasons. The need for data access for flexibility services is similar to that for retail activities: screening to identify suitable customers, and measuring and validating for settlement (although for some services e.g. frequency response, interval meter data alone is not sufficient).

On a general level, the value of flexibility is generated from three application areas: energy trading, frequency management and system services to the TSO, and DSO management. Quantifying the value of additional flexibility that is unlocked by better data access is a complex exercise and therefore our focus has been only limited to shifting of generation and load in time. The benefits that arise are described in section 5.2 and include reduced grid losses and deferred grid investments.

Other innovative use cases

In the previous use case groups the selected use cases and benefits are related to the power market, are achievable in the near future, and the underlying business models are already existing or being tested in certain markets. Additionally, we see a number of other innovative use cases without proven business models that require access to meter data.

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7 Workshop report: *Access to Energy Data*, EER, 2019

8 'A common European data format and framework will be developed, to facilitate interoperability and data access between different Member States'; 2019 European Market Monitor for Demand Side Flexibility

We have discussed with a number of companies (e.g. Wepower, Metry) that have business models outside of the categories described above. Meter data availability is a precondition for existing companies like these as well as other future startups, new ventures and technological innovation, which may be premature to describe at the moment.

Case study: Wepower – '*meter data is our lifeblood*'

Business: *"Platform that allows procuring electricity directly from renewable energy producers using data enriched portfolio management features to make the purchase decisions more effective"*

Meter data use: *'Energy meter data is our lifeblood. Ease of access to meter data determines our market access cost, customer on-boarding speed and cost. How energy meter data access is organized is a key maturity indicator we look for in our business development when considering whether to enter a market or wait.'*

Example: *'In Spain, we need 8 integrations with 8 different systems controlled by 8 different entities, 6 utilities and 2 hubs consolidating smaller utilities. Spanish TSO has all the data, but is categorically not allowed by regulation to share it. There's no standard way to do all the 8 integrations and conflicting business interests can pose problems.'*

ICT cost savings

The DEP provides open source tools for data sharing and consent management. We assume that some organisations take these into use and thus avoid the need to invest in building the consent management system themselves.

Although not a use case as such, the costs of saving ICT costs from developing national data hubs and local interfaces in all the markets can be significant. It will be quantified based on assumptions for number of relevant markets where and a benchmark of ICT cost saving per market. The specific ICT costs to be saved will depend significantly on the counterfactual and we will discuss and agree with the client on this aspect.

5. QUANTIFICATION AND RESULTS

Where possible, we have looked to quantify the scale of benefits arising from the facilitation of the use cases through the introduction of the Data Exchange Platform. Our approach to this follows established cost-benefit assessment methodology and focuses on deriving conservative and reasonable values for DEP-driven benefits unlocked in 2023, noting that such benefits may continue to accrue across longer time periods.

We have not attempted to quantify the benefits for all use cases, instead focussing on the most realistic and credible benefits for a sub-set of use cases. The results presented at the end of this section should not be interpreted as an exact value of the total benefit of DEP, but instead as a proxy for the minimum, conservative estimate of the DEP benefit with likely additional benefits (as described in the qualitative part).

5.1 General methodology

Our methodology examines how the introduction of the European Data Exchange Platform changes the deployment and impact of particular use cases relative to a case in which the DEP does not exist (the counterfactual). In this sense we observe relative benefits from:

- **Improved** application of services in markets where the use cases would still exist in the counterfactual;
- **Accelerated** innovation[9] and unlocking of benefits from certain use cases, due to faster and easier access to data via DEP, as compared to the counterfactual; and
- **Enabled** deployment of new use cases in the markets where the data would not be available in the counterfactual (failed or late data hub implementation).

In addition, a separate identified benefit unrelated to specific use cases involves **ICT cost savings** from building new national and local data exchange and access platforms and consent management.

In order to quantify the possible benefits of a central DEP compared to the counterfactual, the EU member states have been divided into 3 clusters (see Figure 6). The cluster division[10] is derived from several European studies which present their forecast on central data hubs and/or smart meter rollout[11].

- Cluster 1: Centralised data hub and over 80% smart meters by 2023 (10 countries)

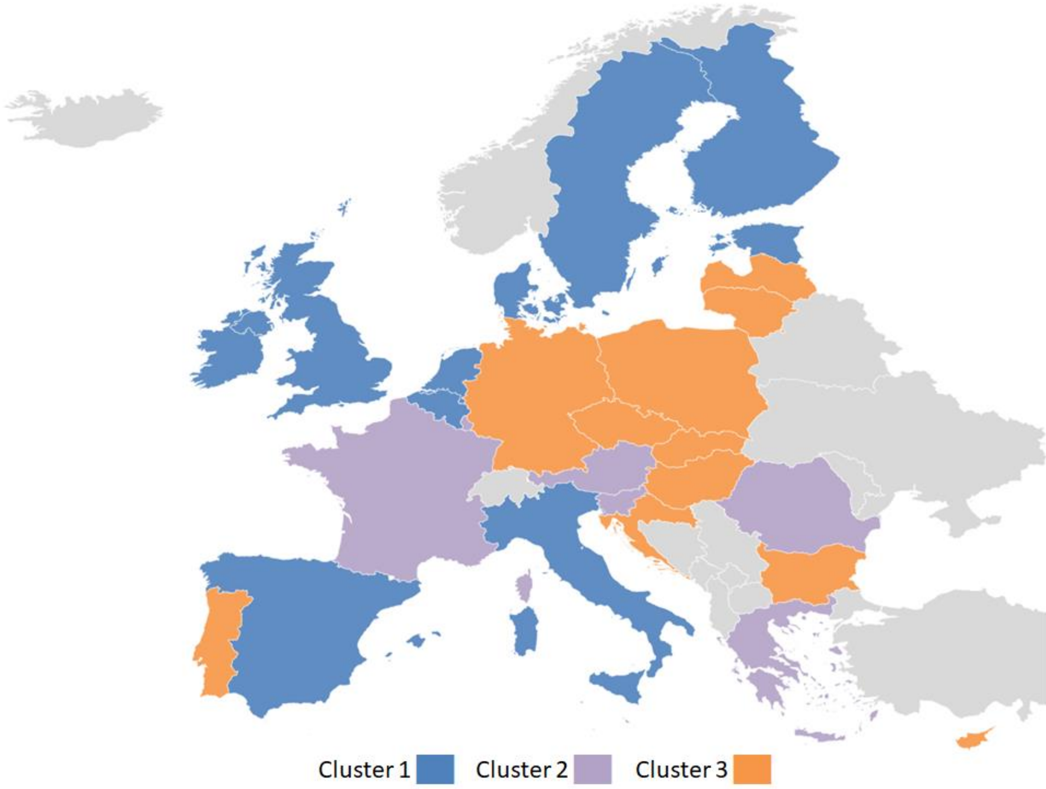
9 Since the analysis will focus only on one year (2023), the 'Accelerated innovation' will fall into either 'Enabled' or "Improved" category for the year.

10 A fourth cluster with a central data hub but below 80% smart meter by 2023 is possible but no countries qualified into that category and it was disregarded.

11 The studies: _Format and procedures for electricity, and gas, data access and exchange in Member States_, asset, 2018; _Data exchange in electric power system: European state of play and perspective_, Thema, 2017; _Review of Current and Future Data Management Models_, CEER, 2016; *Cost-benefit analyses & state of play of smart metering deployment in the EU-27*, European Commission, 2014;

- Cluster 2: Decentralised data hub(s) but over 80% smart meters by 2023 (7 countries)
- Cluster 3: Decentralised data hub(s) and below 80% smart meters by 2023 (11 countries)

Figure 6 – Mapping of the cluster division



For each benefit related to a use case group, assumptions have been made about the effect on each cluster in both DEP scenario and in the counterfactual, as shown in the Figure 7. Based on these assumptions as well as other energy market metrics (e.g. total size, carbon intensity, etc.), the benefits for the DEP and counterfactual scenario have been calculated.

Figure 7 – Illustration of assumptions defining process

Use Case X Benefit Y	Counterfactual			With a central DEP		
	Cluster 1	Cluster 2	Cluster 3	Cluster 1	Cluster 2	Cluster 3
Improved	x%	y %		a%	b %	
Enabled			z%			c%

5.2 Assumptions and limitations

Section 4.2 described the use case groups and related benefits. A number of use case groups with related benefits have been selected for the quantification. The selection has been made by focusing on the benefits that are most credible in the short term and where the assumptions can be linked to evidence from other market studies. By its nature, the quantification can only be a broad-brush estimate.

Figure 8 – Selected benefits for quantification

Use case group	Quantified benefits	Benefits not quantified
Retail market		*Increased competition and reduced margins* *Cost savings when accessing several markets*
Energy Efficiency	*-Reduced energy demand in buildings* *-CO2 savings* *-Reduced energy losses* *-Reduction in transmission capacity*	*Other energy (and related CO2 and losses) reductions*
Flexibility	*- Reduction in grid losses* *- Deferred grid investments*	*Ancillary services improvement* *Energy market benefits* *EV adoption*
Other innovative use cases		*New innovative businesses*
Reduced ICT costs	*Reduced development cost*	

Retail market processes

Because data is only one of the many barriers for a more harmonized and competitive retail market (as described in Section 4.2), this study does not provide a quantitative analysis of the benefits that can be unlocked in the target year 2023. The full benefits from improved data access in the retail market are unlikely to be visible in such a short amount of time.

However, due to the size of the retail market, even an insignificant improvement in competition or service offering would translate in significant financial benefits for customers. For example, the value of electricity supplied to households in the Euro Area net of network costs, taxes and other components is estimated at 36 billion EUR per year[12]. If, as a result of stronger competition or lower costs, the retail margin reduces from an assumed average level of 1.2% to 1% (average Euro Area), the savings to households would represent 72 million EUR per annum.

12 Electricity use in households in the Euro Area in 2017; Eurostat (nrg_pc_204_c; nrg_cb_e)

Energy Efficiency

The energy efficiency is the common element in a group of use cases which will be **enabled** with better data access, leading to the following quantifiable benefits:

- Reduced electricity demand in residential sector which leads to:
  - Reduced electricity consumption;
  - Grid loss reduction as a result of reduced electricity consumption;
  - CO2 emission reduction as a result of reduced electricity consumption and grid losses;
- Reductions in required transmission capacity and capex;

Reduction of electricity demand in the residential sector results from targeted energy data based services from third parties. Residential sector is chosen from a delimitation aspect considering a combination of known services provided in the sector combined with available European statistical data. Electricity consumption is reduced through analysis of meter data. Two prominent examples are the services currently provided by Metry and Greenly, entirely meter data based energy efficiency services provided in the Swedish real estate and private end user market.

Grid loss reductions are derived directly from energy use reduction. Grid losses are dependent on the power flows on the system. Reduced power flows directly lead to lowered transmission losses. Both benefits are ultimately quantifiable as reductions in both produced electricity and the related CO2-emissions.

Reductions in capex requirements also follow from the reduced dimensioning of load on the system. Reduced flows result in reduced grid capacity needs and a lower overall network cost over time. Further details on the assumptions and rationale for quantification are described in Annex A.

Flexibility

Flexibility is the common element in a group of use cases which will be **enabled** with better data access, leading to the following quantifiable benefits:

- Grid loss reduction, as a result of peak load shifting;
- Reductions in required transmission capacity and capex;

The quantified benefit from flexibility revolves mainly around shifting of generation and load in time. Under the conditions that delimit the scope of this study, the load shifting needs to be enabled by access to historical data and can therefore be improved by a DEP. This means that flexibility gains achievable with the DEP consist of improvements identifiable through data pattern analysis that would have not been possible to carry out otherwise. Analysis facilitated by DEP data access will typically lead to third party service provider improvements sellable to both utilities and private sector end users. Demand curves from these end users will, as a result of implemented measures, adapt to market conditions as a result. The adapted demand pattern includes shifting of consumption from high price hours to low price hours as well as shifting consumption to avoid grid congestion, i.e. enabling a different market outcome than would have been the case otherwise. Basically, elasticity is improved in the market place and consumption is shifted to points in time when it is more optimal from both a cheap power availability perspective as well as a grid capacity availability perspective. Ultimately the consequence for power flow on the electricity grid is a smoothed utilisation, shaving major peaks and redistribution that flow to other hours. Further details on the assumptions and rationale for quantification are described in Annex A.

Other innovative use cases

The analysis focuses on the existing use cases with existing and energy market related business model. Therefore, the benefits of this 'other' use case group have not been quantified.

ICT Cost savings

To enable any functionality based on meter data cross border within EU, consumer rights (GDPR) must be respected and managed. Each data hub within the EU with intentions to facilitate international participation in the domestic market and allow several stakeholders to access end user data need to have a consent management solution in place. The GDPR works as opt-in legislation which basically means that consents will have to be logged, traced with possibilities for short notice revocation.

Pöyry's findings to date suggest that consent management is still an immature part of the data solution development within the EU electricity sector. Front runner TSOs are struggling to get proper solutions for consent management in place in conjunction with the relatively fast roll out of national data hubs. In an interview the Swedish TSO Svenska Kraftnät stated: '*Parallel to the development of IT systems for the Swedish Electricity market hub, a separate workstream for legal compliance of the entire hub and retailer centric market model is currently underway. Work on regulation specification and implementation of GDPR is still not at a level sufficient to initiate system development related to GDPR and consent management. As such we have no view on the associated costs*'.

In an effort to shed light on the cost components of consent management systems, a leading provider of generic enterprise consent solutions has been interviewed. From their perspective it is also clear that the space is immature and no off the shelf solutions are in place to be sold to TSOs or the like and consequently no cost figures are given.

One option to solve the apparent absence of a widely deployed consent management system is to utilise already developed solutions and license these to partnering TSOs entering into collaborative arrangements. Elering, Energinet and TenneT are aiming to launch Open Source tools for the DEP. A partnering solution or Open Source will mean that the development cost is split on each of the countries that will go live with a data hub before 2023. In line with assumptions in this report, that number of countries is 10, whereof Estonia and Denmark are the two only countries with developed solutions already in place. The basis of the quantification in this report is thus the avoidance of 8 additional consent management projects each at an estimated cost of 5 MEUR or more.

5.3 Results

Figure 9 presents the results of the quantification performed for several benefits within the use cases energy efficiency, flexibility and reduced ICT cost. The counterfactual presents the total savings in terms of TWh/year, million tonnes CO_2-

reduction per year or MEUR/year for Europe without a central DEP. The difference between the DEP-scenario and the counterfactual is the improvements which the DEP gains attributable for by 2023.

Figure 9 – Results of the quantification

	Benefit	Unit	DEP Scenario	Counter-factual	Improve-ment
Energy Efficiency	Energy saved, reduced consumption	TWh savings/year	24.6	22.3	2.3
	Energy saved, lower grid losses	TWh savings/year	6.7	6.1	0.6
	Energy saved, reduced consumption	Mtons CO_2 savings/year	8.2	7.4	0.8
	Energy saved, lower grid losses	Mtons CO_2 savings/year	2.2	2.0	0.2
	Reduction in transmission capacity Postponed/reduced investments	MEUR/year	465	422	43
Flexibility	Reduction in grid congestion - Postponed/reduced investment	MEUR/year	647	598	49
	Electric grid flexibility, load shifting	TWh savings/year	7.5	6.9	0.6
IT Cost	IT cost saved in data hubs	MEUR	14	140	126

According to Figure 9, the reduced consumption of several TWh/year represents a significant benefit of improved and enabled use cases from energy efficiency from better data access with DEP. These will have significant monetary value worth millions of Euros, as well as relevant reduction in CO_2 and lower grid losses.

The quantified benefits of the flexibility use cases have enormous potential for both cost- and energy savings in terms of deferred grid investments and lower grid losses. Our analysis concludes that even a small improvement in the DEP-scenario as compared to the counterfactual would translate to significant value.

The IT cost saved in data hubs has the highest cost improvement between the DEP-scenario and the counterfactual, but it should be noted that this is a onetime cost compared to the other costs which are expressed per year.

The total yearly savings contributed to the DEP from the use cases energy efficiency and flexibility is 92 MEUR/year, 3.5 TWh/year which is translated to a reduction of 1.6 million tonnes of CO_2/year. In addition to the yearly cost savings between the DEP scenario compared to the counterfactual, the DEP brings a one-time value of 126 MEUR in reduced IT cost.

ANNEX A – QUANTIFICATION ASSUMPTIONS AND RATIONALE

Energy Efficiency

The EU has targets to deliver EU wide energy efficiency improvement of 30% by 2030. Our simplistic assumption is that the electricity sector bears its proportion of that relative reduction, thus also reducing base line electricity consumption by 30%. Bear in mind that there is currently an additional growth component on top of the base line due to the rapidly evolving electrification (industrial, transportation etc.) which means that the absolute electric sector development will be one of consumption increase.

For further quantification purposes, the previously explained cluster method is applied through use of electricity sector statistics from Eurostat. Each cluster will thereby be assigned a certain annual efficiency improvement until 2023.

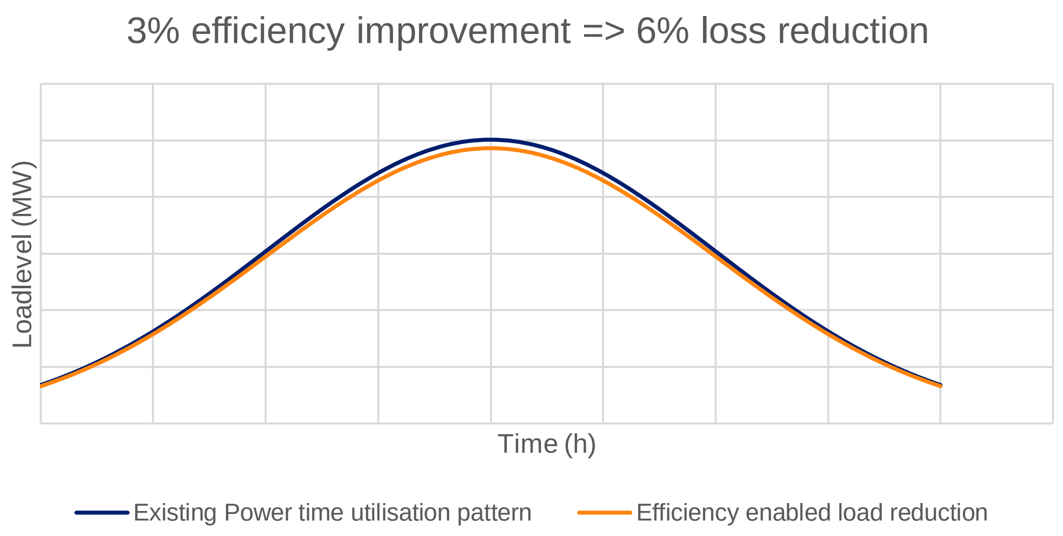
The difference between the DEP scenario and the counterfactual scenario lies in the share of the efficiency gain attributable to the DEP. The fundamental drivers for energy efficiency improvements are independent of the DEP existence. However, we also clearly see that there are certain tangible benefits that indeed are attributable to the DEP existence. In our quantifications, end user efficiency improvements attributable to the DEP consist largely of increased competition after the DEP enables more ESCOs to enter the market. Already today third-party service providers are exploring this space and opportunity, selling services to real estate companies based on data available through comprehensive data acquisition efforts throughout the EU. As such it is established that the need, services, and proven efficiency gains exist and that they are reliant upon access to the type of data that the DEP will greatly enhance the access to.

The energy efficiency potential in each cluster in 2023 has been assessed by comparing the general European targets with the current energy usage per square meter for buildings in each country. This assessment is regarded as the counterfactual scenario. The additional savings with a central DEP is then assessed for each cluster. This will quantify the yearly savings 2023 for the DEP-scenario, the counterfactual scenario and the difference between the two scenarios. The difference of the two scenarios is the DEP contribution to the energy efficiency savings achieved. The DEP is assumed to have a greater potential to increase the energy efficiency for cluster 2 where the data availability is high because of the smart meter rollout but where there is no central access to the metering data for third party. Cluster 1 has already taken benefit of much of the value a DEP can bring in terms of central access to metering. Cluster 3 has the same energy efficiency potential as cluster 2 but lack the complete metering data to take the full benefit of the DEP.

As mentioned in the qualitative description, the DEP is assumed to reduce grid losses mainly because of reductions in distributed energy arising from broad energy efficiency measures. Grid losses are quadratically dependent on the transmitted power level through the grid which means that the absolute loss reduction will be greater than the absolute power flow reduction and that the relative loss reduction will be on the order of the overall energy efficiency percentage. Grid losses are quantified by multiplying the electricity generation in each cluster with the average grid losses in Europe. In the counterfactual scenario grid losses are also significantly reduced as the main drivers of energy efficiency improvements are not related to the existence of a DEP. However, a fraction of the improvement is, and that fraction varies slightly between the clusters and is showcased in the assumptions table for the quantification.

Figure 10 illustrating energy efficiency improvement is shown below. In the figure a normal distribution of power levels in a system is illustrated as the base line and a 3% reduction in load is represented by a separate line visualising the effect of energy efficiency improvement. Loss calculations considering the quadratic nature of losses shows that the associated loss reduction is close to 6%:

Figure 10 – Reduced energy use



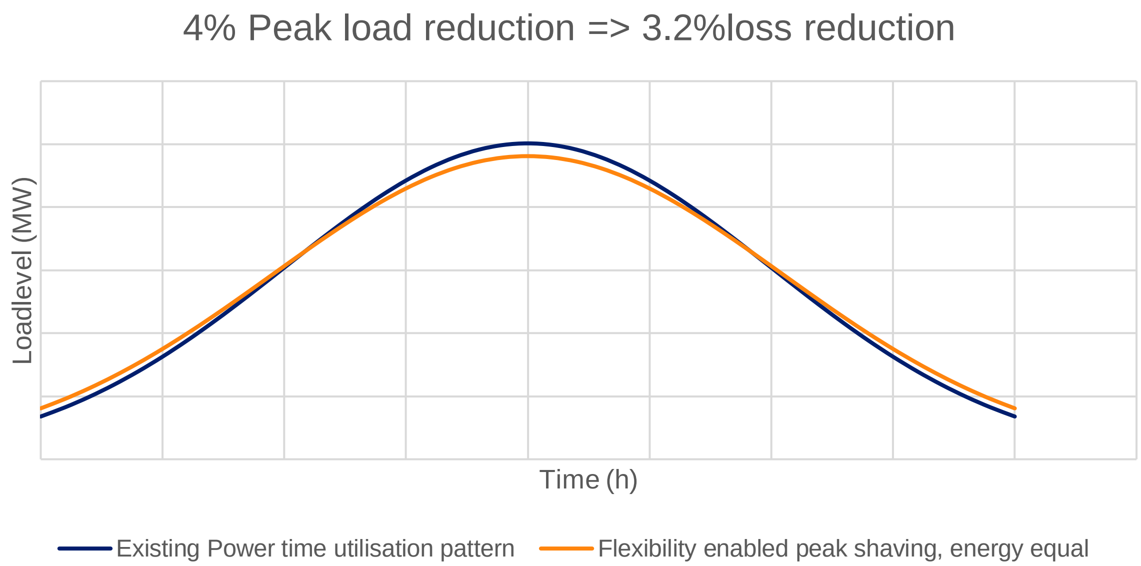
Source: Pöyry

As a result of the increased energy efficiency and reduced grid losses, less electricity is produced which is translated to a CO_2 reduction. The CO_2 reduction is determined by multiplying the amount of reduced need of electricity with the average carbon intensity of the electricity mix for each cluster.

Flexibility

A more even time distributed energy use results in **reduced grid losses** though the reduction in high power flow hours that drive losses due to the quadratic relationship between power flow and loss. A 4% reduction in peak load will, at normal distribution of power levels, reduce losses by 3.2% as illustrated in the figure below.

Figure 11 – Time-redistributed energy use



Source: Pöyry

A DEP will not support (near) real-time processes such as controlling generators (balancing, frequency control, ancillary services) or loads (short term demand side flexibility) until after 2023. This is valid for both commercial and residential sector, as well as EV market segment (smart charging or V2G). If structural data relating to accounting point is accessible (type of production, storage facilities, heat pumps, other distributed and controllable energy resources etc.), it can be used together with meter data to analyse potential for demand side flexibility. Depending on the technical and commercial terms and conditions of (reserve) marketplace, meter data can be used for verifying demand side flexibility and calculating remuneration as would be the case with time differentiated tariffs.

Flexibility results in better utilisation of existing electric network infrastructure and thus **defers grid investments** to some extent.

Figure 12 – Principal flexibility impact on grid investment

Source: E.ON

Deferred grid investments are true for both transmission and sub transmission systems – typically TSO and DSO systems.

For example, in Sweden, where lots of effort is currently being put into understanding the flexibility domain as a short-term mitigation action to avoid local and regional grid congestion, a report by the national regulatory authority shows that the flexibility peak load reduction potential is 15-25%[13]. A reduction in peak load facilitates a similar size reduction in grid capacity since the peak load is the dimensioning factor for grid capacity. The large majority of the flexibility needed to enable peak load shaving and equalising grid utilisation is independent of a DEP, and Pöyry calculates with a 10% share attributable to the existence of a DEP. Without a DEP there will be sub optimisation within each country and there will be less data to analyse to fine tune aggregation and bids in the day-ahead market – especially cross border. Additionally, poor data access entails fewer competitors for provision of related services and higher prices in the market.

13 Source Energy Markets Inspectorate (Ei), 2016 & Skytte et al 2018

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