EASE

European Association for Storage of Energy

Local Flexibility at DSO Level and the Multi-service Business Case of Energy Storage

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Introduction

Renewable energy uptake is set to increase significantly over the next decade in line with the European Climate Targets. This will require optimising the use of the existing power grid and rethinking how the energy system as a whole will work. Given the sheer amount of new renewable capacity to be accommodated by 2030, the scale and quantity of network reinforcements needed to support this will be very significant [1].

Electrification of the transport and heating sectors could also require significant upgrades as electricity grids would have to support additional demand from electric vehicles, heat pumps and electric boilers. All of these devices can also work as flexibility providers, but if their degree of flexibility is insufficient, this will drive complex demand profiles with large changes in short periods of time, requiring TSO-DSO coordination to ensure optimal planning and operations across transmission and distribution networks. Moreover, network operators can be reluctant to invest in new infrastructure where they face forecasting risks [2] as this increases the risk of asset stranding [3].

To date the most common source of short-term local flexibility in Europe are active network management schemes (ANM). These schemes take advantage of grid flexibility to manage real-time or expected congestions adopting the most apt grid configuration to reduce the electrical constraints. These solutions are largely developed in France, Italy, Belgium and to a lesser extent in Spain. Grid reconfiguration results in a costless solution to constraints as no redispatch is instructed. Another form of ANM is offered by flexible connections. The contractual arrangement for these connections encompasses an initial lower cost for connecting to the grid in exchange for possible uncompensated curtailments. These contracts can be an alternative considered by renewable developers in scenarios with a low penetration of renewable generation but the curtailment risk increases as more renewable projects are connected to the same access point, potentially hindering the business case of these projects. In these situations, local flexibility products such as Demand turn-on and turn-off could be used to manage those risks.

Following the consultation on “Options for the design of European Electricity Markets in 2030”, further investigation on the development of local flexibility markets based on learning from pilot projects has been agreed.

It is worth noting that short term flexibility markets can solve network constraints beyond congestion resulting in whole system outcomes. For example, at times of low demand, voltage at transmission level increases and this could trigger investment in equipment such as STATCOMs to regulate voltage. The Power Potential [4] project successfully demonstrated **the use of flexibility provided by Distributed Energy Resources connected at DSO level to solve voltage constraints** at transmission level.

Finally, short term flexibility markets are essential in supporting the adoption of flexible, low carbon technologies. Nevertheless, the need for such markets will vary depending on network configuration and generation mix. These technologies generate direct and indirect financial benefits to end consumers and require investment signals for their adoption.

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[1] For example, analysis of the scale of grid reinforcements required to connect new RES-E to load centres in Ireland show that under a business-as-usual scenario these cannot be delivered in time to meet 2030 targets. New RES resources connecting quicker than new infrastructure is built will be constrained, increasing re-dispatch costs. Eirgrid1 estimates re-dispatch cost in 2030 at € 207 million corresponding to approximately 3,000 GWh if all planned generation is connected as planned. The issue of network constraints does not limit to high re-dispatch cost but also to the incentives and risks faced by RES-E generators. RES-E projects developed in constrained areas will have limited access to electricity markets (e.g., energy, ancillary services, and capacity) impairing their economical dispatch resulting in high market risk and higher cost of capital.

[2] Catapult Energy Systems, 2018. “Preparing UK Electricity Networks for Electric Vehicles”

[3] As noted by the Council of European Energy Regulators CEER, there is no clear and uniform regulatory definition for stranded assets at a European level. However, when this risk materialise a network company cannot recover their investment costs as the expected conditions that define effective investment changes between the expected and actual environments. One of the most common reasons for this is underutilisation of the assets due to low demand, technical or environmental constraints. This can create a capacity gap which cannot be filled with new infrastructure in a timely manner, as the lead times can be extensive, posing a key risk to Electrification.

[4] National Grid ESO,2021. “Power Potential, Final Showcase”. https://www.nationalgrideso.com/power-potential. Moreover, a Cost Benefit Analysis (CBA) prepared by Cambridge University estimated total savings up to £161 million by 2050 if this form of flexibility is widely adopted in the UK.

1. Where Energy Storage Comes into Play

The use of technologies such as energy storage across the entire electricity value chain can support renewable generation integration while addressing network congestion and locational operational challenges. In this case storage would complement and support the current infrastructure while contributing to local security of supply. Moreover, this approach could also prevent the building of new overhead lines which is very challenging in many places, e.g., long lead times 5+ years and societal acceptance. Energy storage can play an important role in addressing the myriad challenges of the energy system, providing much-needed flexibility at various locations and timescales across the system.

Energy Storage has a key role to play as a Local Flexibility provider, supporting the reduction of redispatch costs while time shifting low carbon energy and by supporting a cost-effective electrification of the transport and heating sectors that could otherwise require massive investments in infrastructure. In a nutshell, EV charging patterns are characterised by high power short duration events. Deploying sufficient network capacity to serve concurrent charging of multiple EVs would require significant levels of investment. However, the additional capacity dedicated to serve peak EV demand would have lower levels of utilisation compared to infrastructure dedicated to serve baseload demand. Smart charging for electric vehicles (EVs) has a key role to play in minimising the load impact from EVs and in enabling an important source of flexibility for the whole system while empowering consumers. Smart charging must be considered a grid flexibility solution for the power sector. Energy storage assets and EV smart charging solutions can complement network infrastructure to deal with high peak demand during low to medium duration events. Enabling this application of energy storage requires adequate conditions and frameworks, e.g. support from the Recovery Fund, well designed fiscal incentives to increase flexibility in areas affected by systematic network constraints, inclusion of storage in network planning, adequate Flexibility market design.

Furthermore, at both distribution and transmission level, energy storage can provide key services [5] to support the secure, reliable, efficient, and cost-effective operation of the grid. However, such services must be designed and tendered in such a way that they allow for a level playing field for various flexibility options. An adequate Flexibility market design would enable the monetisation of flexibility provided by storage when acting as both demand and generation. Allowing it to be stackable with other services.

The following table presents a diverse set of services that could be stacked to underpin the business case of an energy storage facility.

[5] Please find in the EASE Energy Storage Applications Summary the detailed summary of the different energy storage applications of the many services energy storage can provide.

Category	Service / Application	Customer	Market Liquidity	Value	Duration Requirement	Contracted Revenue
Ancillary Services	Frequency Response	TSO	High	€	Short	No
	Reserve		High	€€	Short	No
	Black Start		Low	€€	72 h	Bilateral
Network asset services (Location is key)	Flexibility Market/Constraint Management	TSO/DNO	Low	€€	Long	Yes
	Reactive power (voltage control)	TSO/DNO	Low	€€	N.A.	Bilateral
Resource adequacy and arbitrage	Capacity Market	TSO	High	€	Long	Yes
	Imbalance market	Supplier / Generator	High	€€	Medium	No
	Day ahead market		High	€	Medium	No
	Back-up power	C&I customer	N.A.	€	Long	N.A.

As can be seen from that last column in the table, revenue certainty is weak given the limited number of services that offer long term contracts. Indeed, article 6(9) of EU 2019/943 limits the contracting period of balancing capacity to one day. National Regulatory Authorities can approve longer contracting periods to the extent this measure is needed to ensure security of supply or to improve economic efficiency.

The definition of balancing capacity products should be clarified and clearly set out. This will avoid creating delays and will ensure homogeneity in ancillary services market design across Europe (at the same time, it is crucial to leave leeway to national or regional authorities to define balancing capacity products that are suitable for them, For example, in 2020 the Irish regulators embarked in the redesign of arrangements for the procurement of a suite of 14 innovative ancillary services and interpreted balancing capacity products as those covering the reserve-based System Services [6]. Only 6 out of the 14 were classified as balancing capacity products and a consultation was launched to gather feedback from industry.

In addition, when designing procurement frameworks, it is also important to recognise that the necessary market conditions may not be fully in place for all ancillary services. Some of the aspects impacting this have been identified by Irish regulators [7] and are the following:

- Nature of the service itself.
- Need for new technologies.
- Locational issues.
- Lack of competition.

[6] SEM Committee, 2020. "System services future arrangements. Scoping paper. SEM-20-044"
[7] SEM Committee, 2020. " System services future arrangements. High Level Design Consultation. SEM-21-069"

Local flexibility markets are impacted by all the above, therefore when considering the procurement of these services it is important to ensure frameworks provide a pathway for investment. This can be achieved by taking a flexible approach to their procurement, allowing for fixed contracts, longer-term procurement, and daily auctions.

2. Legal framework for flexibility services

Article 32 of the electricity Directive (EU 2019/944) mandates the procurement of flexibility services in accordance with transparent, non-discriminatory and market-based procedures. There are several examples of flexibility procurement pilot projects in Europe (e.g. Flexibility Markets in the UK, Enera, GOPACS and NODES). As a result, innovative frameworks for the procurement of flexibility services have started to emerge.

In addition, Article 13 (5) of the electricity market regulation (EU 2019/943) mandates "appropriate grid-related and market-related operational measures in order to minimise the downward re-dispatching of electricity produced from renewable energy sources or from high-efficiency cogeneration". Furthermore, an annual renewable electricity redispatch threshold of 5 % is set for countries in which electricity from power-generating facilities using renewable energy sources or high-efficiency cogeneration does not represent more than 50 % of the annual gross final consumption of electricity.

As an important potential provider of flexibility services and an unparalleled solution to solve local congestions and RES integration the energy storage sector has a vital role to play in the discussions, complementing the perspective of TSOs and DSOs on these matters. Therefore, stemming from the current situation in this paper, EASE seeks to provide an overview on the existing reports and recommendations for TSO-DSO coordination for active system management/local flexibility services and add to the discussions the energy storage sector suggestions.

3. Overview of local flexibility options in operation to date

In broad terms, generation and demand trigger investment in network infrastructure when their respective peak usage exceeds available grid capacity. Installing new grid assets is capital intensive and could eventually suffer delays due to licensing and permits. Therefore, the possibility to provide alternatives emerged. In general, flexibility options are segmented in the following categories:

1) Active Network Management (ANM) schemes:

- Grid flexibilities which are essentially costless option (no redispatch cost) to manage real-time or expected congestions adopting the most adapted grid configuration to lower the electrical constraints (= direct power flows to centres of demand through alternative routes) This require specific investment on the network (switch gear, etc.) and an appropriate training of the persons in charge of dispatching electricity flows. Such grid flexibilities prevent huge redispatch costs. They are largely developed in France but also in Italy, Belgium and to a lesser extent in Spain (as mentioned above).

- Flexible Connections: connection agreements/contract under which there is no guarantee of firm access to the grid at times of network constraint. The downside of flexible Connections is that renewable developers are exposed to uncompensated curtailment risk [8].

2) Flexibility services: contractual agreements for the delivery of various active and reactive power services to solve local network constraint issues.

3. 1. Flexible Connections

Flexible connections are agreements/contract whereby new users effectively accept certain restrictions concerning their access to the network whilst the asset is connected in exchange for lower connection costs and/or a speedier connection. Curtailment of generation connected through these is activated remotely via Active Network Management (ANM) systems.

The pros: One of the key benefits for the network operator is response certainty as instructions are dispatched from the control room and enacted by ANM control systems physically located at the provider's site. This allows maximising utilization of existing network capacity securely.

The cons: The downside of this form of flexibility is the inherent volume risk at which RES distributed energy resources (DER) are exposed. Current approaches for determining curtailment of flexible connections, to manage network congestions, are deterministic and rule based. One example is based on a pro-rata methodology where curtailment is shared equally across all generators exporting in the moment of the constraint in the impacted ANM zone. It is worth noting that the risk of curtailment lies entirely with the customer throughout the lifetime of the connection agreement. In addition, forecasting curtailment volumes is challenging especially when the time horizon goes beyond five years, creating significant financial risk to renewable projects.

Energy volume risk is not the only challenge faced by parties entering into these agreements. Connection firmness impacts service availability (e.g. ancillary, capacity) reducing revenue.

3.2 Flexibility Services

Flexibility services are used to solve local network constraints by calling on flexible demand or generation. These are procured through open flexibility markets and are delivered by active network users. Local peak demand issues are solved through products that call on local generation to increase export, or on demand to reduce import. In contrasts, constraints caused by generation are solved through products that call on local generation to reduce export, or on demand to increase import as illustrated in Figure 1. Flexibility services are an umbrella that cover a range of products to secure local capacity needed at different time horizons, i.e. long, medium and short term.

[8] 2019/943 Art. 13 (7) "Where non-market based redispatching is used, it shall be subject to financial compensation by the system operator requesting the redispatching to the operator of the redispatched generation, energy storage or demand response facility **except in the case of producers that have accepted a connection agreement under which there is no guarantee of firm delivery of energy."**

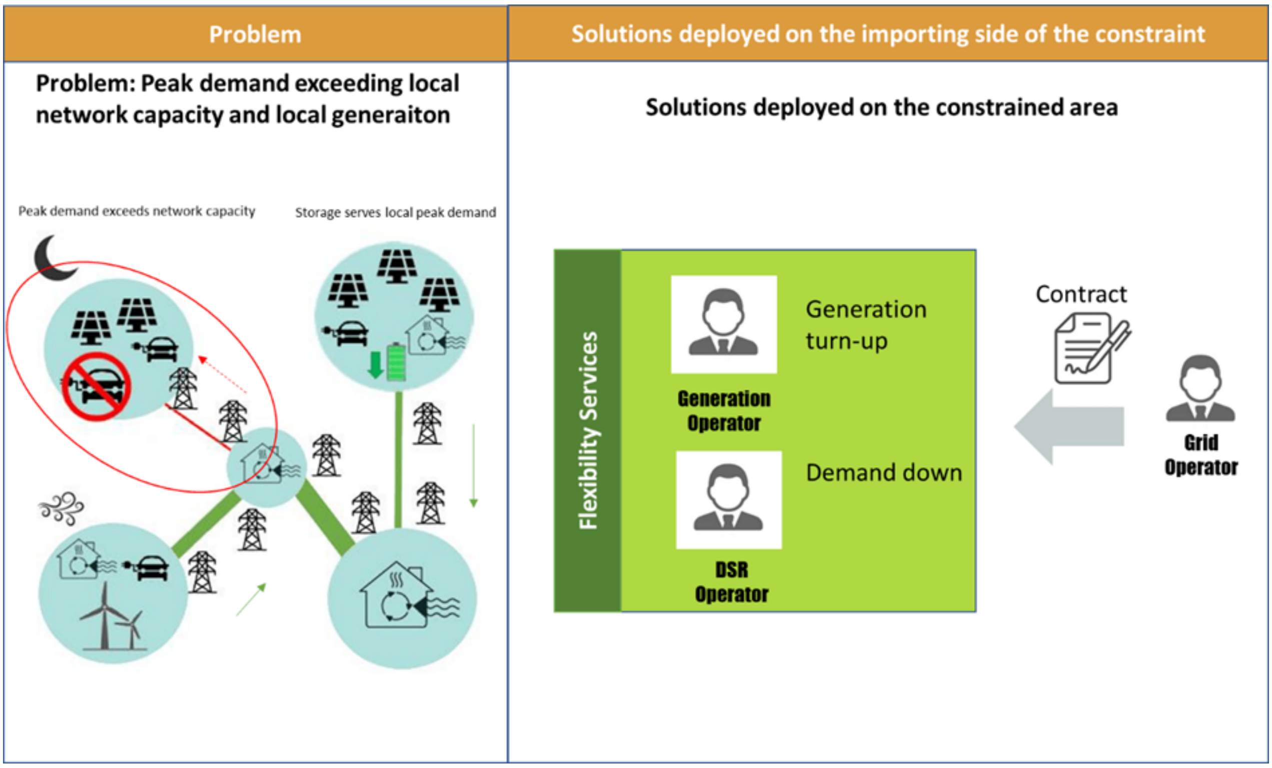

Figure 1. Flexibility services used in addressing local peak demand issues.

The pros: Currently flexibility services markets are used to procure products to solve peak demand issues. However, in the near future these could also see the procurement of products to deal with periods of excess overnight, wind generation coinciding with low demand. Markets for flexibility services will play a key role in achieving net-zero at the lowest cost and in the adoption of energy storage by creating a route to market for the value created by the sector. This is why the market design of flexibility services is of paramount importance to the industry.

One key consideration of flexibility markets design regards contract duration. This varies depending on local network needs. For example, the longest contracts awarded during the last tender round ran by UKPN covered periods with a maximum length of 7 years [9]. This is of paramount importance as this can underpin the bankability of storage projects.

The cons: Flexibility markets in operation are not compatible with the provision of multiple services, e.g. voltage regulation, hindering the business case of energy storage. However, wherever possible, various sources of revenue should be stacked.

Finally, it is important to highlight that the application of energy storage in Flexibility markets can reduce redispatch costs and support investment in renewables. This can be achieved by tackling the market dynamics that result in RES generation curtailment. These dynamics can be classified as over-supply, network constraint, operability constraints and curtailment.

Generation over-supply occurs when available RES generation exceeds demand and is not compensated through redispatch costs resulting in investment risk. Network constraints occur when network capacity considerations limit how much power can be allowed onto the electricity network.

[9] Source: (UKPN,2020). "Post Tender Report - Bids. Flexibility Services - Procurement April 2020 ". Available online at: https://smartgrid.ukpowernetworks.co.uk/flexibility-hub/ consulted on 10-01-2021.

Finally, Operability constraints occur when locational operational requirements (e.g. Blackstart, Voltage or Transient Stability) result in the need to reduce the output from RES to accommodate minimum levels of conventional synchronous generation. Network and Operability constraint are compensated through redispatch costs, unless any grid flexibilities could be implemented (and flexible connection activated) to reduce the strain as mentioned above.

Figure 2 presents an overview of the ways storage could be operated in Flexibility Markets to reduce RES curtailment and its comparison with Flexible Connections. It is important to highlight that currently there is no mechanism at DSO level to tackle over-supply, resulting in investment risk to RES developers and potentially reducing the load factor of energy storage assets. This is a complex problem that could be solved through the rolling out of market-based curtailment. This was explored by UKPN through Energy Exchange [10], demonstrating significant benefits.

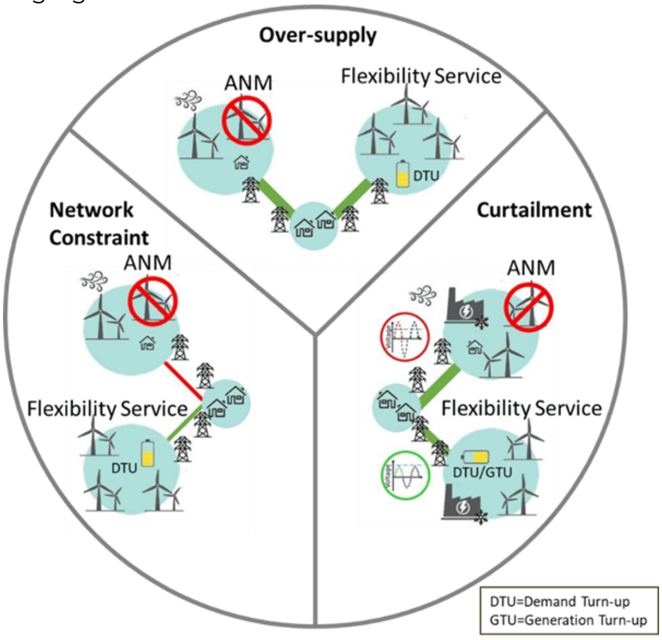

Figure 2: *Flexibility services used in addressing locational constraints.*

4. Local Flexibility Options and Implications on the Business Case of Energy Storage

Flexibility is one of the main value drivers for energy storage. Therefore, it is important to analyse trends of flexibility initiatives and their impact on its business case. Highlighting possible options for their evolution and key market design questions.

First, current Flexibility service initiatives overlook the demand turn-up capabilities of storage to deal with excess renewable generation and do not procure this service. Instead, flexible connections are the preferred option to deal with potential overgeneration reducing the revenue stacking potential for energy storage. Furthermore, energy time shift is one of the main applications for storage but this application can be hindered in cases of poor coordination between storage operators and DSOs relying on Active Network Management. For example, in scenarios where renewable energy is curtailed rather than allowing storage to absorb excess energy. This could result in reduced storage load factors, impacting storage projects economics.

[10] https://innovation.ukpowernetworks.co.uk/projects/energy-exchange/

Table 1 Illustrates current applications of local flexibility options to tackle the various constraints, highlighting a silos approach. Flexibility markets can be used to solve all network constraints. This would create investment signals to low carbon technologies, support revenue stackability and consequently the adoption of technologies such as storage. In turn this would result in significant cost savings to end consumers while reducing CO_2 emissions.

Second, ANM such as grid flexibilities or flexible connection can also be used to solve network constraints. As regards grid flexibilities, grid investments have been made in some EU countries since a long time in order that they could be used to tackle constraints at local level and direct power flows to centres of demand through alternative routes.

Regarding Flexible connections, a storage operator could opt for it to benefit from a speedier connection and reduced development costs in constrained areas. However, this may limit its export ability, possibly reducing its ancillary services revenue. Furthermore, its participation in local flexibility markets could be impaired at some periods in time depending on the actual arrangements.

Third, there is a lack of a transparent methodology to compare storage options to Grid flexibilities and Flexible connections. **An adequate methodology should be developed to assess the period over which a storage asset would supplement existing network capacity cost effectively.** This methodology should include the full set of Local Flexibility Services a storage unit is able to provide even if storage operators may have to make a choice between the type of local flexibility services they want to provide because providing several of them at the same time may not work well at some places or period of time. These include addressing the following constraints: Demand, Generation, Voltage, Pre-Fault.

Table 1. Overview of current flexibility options uses and an ideal case for storage. Source: adapted from ENA. [11] Where: green indicates the service supports the business case for storage; yellow indicates service supports business case for storage but is non-ideal and white indicates non-applicable or could potentially hinder the business case for storage.

		Local Flexibility Options		
Constraint	**Product Definition**	**Flexible Connection**	**Flexibility Services (current)**	**Flexibility Services (Storage)**
Generation Congestion	**Export turn-down**	green	white	green
Peak Demand	**Export turn-up**	white	green	green
Peak Demand	**Import turn-down**	white	green	green
Generation Congestion	**Import turn-up**	green	proved [12]	green
Voltage constraints	**Reactive power (import/ export)**	white	in trials	green
Pre-Fault Constraints	**Black Start**	white	in trials	green
Blackstart [13]	**Distributed Re-start**	white	in trials	green

Finally, there is no mechanism in current market arrangements to integrate what would be considered as generation oversupply.

[11] Source: (ENA,2020) "The Interactions between Flexible Connexions and Flexibility Services"
[12] National Grid ESO,2021. "Power Potential, Final Showcase". https://www.nationalgrideso.com/power-potential.
[13] More information on the ReStart project available online at: https://www.nationalgrideso.com/future-energy/projects/distributed-restart

5. Case Study: Lessons Learnt from Flexibility Services in the UK

Although the UK has exited the common EU market, DSO licence Condition 31E [14] was introduced in December 2020 and the UK implements Article 32 of the Clean Energy for all Europeans Package (Incentives for the use of flexibility in distribution networks). This licence condition sets out the circumstances in which DSOs can procure flexibility, the principles that should be applied for its procurement, and the need for coordination with other parties during the procurement and utilization of flexibility services. The design and implementation of Flexibility Markets in the UK is at an advance stage and good practice recommendations have emerged through consultations. This section builds on the steps followed in the implementation of Flexibility markets in the UK and explores their compatibility with the business case of energy storage. These markets are aligned with the Clean Energy Package and could provide a good reference to the development of such markets in Europe.

Flexibility markets emerged in 2017 as a result of Ofgem's Smart Systems and Flexibility Plan. Since then, Distribution Network Operators (DNOs) have designed and procured flexibility services covering various locational specific needs. In addition, the Energy Networks Association [15] has played a key role in driving standardisation efforts across DNOs and the Electricity System Operator in the procurement of flexibility services through the Open Networks Programme.

Currently three flexibility services are standardised across the country. The main applications are **deferral of demand-driven network reinforcement, manage planned maintenance, and unplanned interruptions**. Suitable points of connection to resolve constraints are classed "flexibility zones". Each geographical zone can be identified on a visibility platform such as Piclo Flex [16] where additional information such as capability and service period requirements can be found. Flexibility providers are paid capacity payments in the form of availability fees in addition to a utilisation fee for the energy delivered when instructed by the DSO. Availability payments are reduced by a performance factor derived by comparing actual energy delivered to the energy contracted to be delivered during utilisation event. Finally, the duration of contracts ranges from 1 up to 7 years. The terms available is dependent on the requirements specific to each zone and may therefore be less than 7 years. It is important to highlight the locational and sporadic nature of the events that would see these services activated.

Table 3 presents a summary of key best practice recommendations that emerged as a result of a general consultation on Flexibility Services launched in 2020. It is based on feedback from all stakeholders, including network users, energy market participants, network operators highlighting areas in need for further development. Please refer to Appendix A for further details on each of the four areas identified.

[14] More information available online at: https://www.ofgem.gov.uk/publications/electricity-distribution-standard-licence-condition-31e-flexibility-procurement-statements-2021

[15] The ENA is an industry body funded by UK gas and electricity transmission and distribution licence holders

[16] https://picloflex.com/dashboard

Table 3. *Summary of flexibility market areas with high relevance on the business case of energy storage*

Area	Impact on the business case of storage
1. Market design compatibility with a net-zero carbon energy system.	Impact on carbon emissions should be considered when assessing various flexibility options and adequate GHG emission thresholds should be set. Generation turn-up services can be provided by diesel generators. Despite utilisation is expected to be low, carbon considerations should be included when assessing potential service providers.
2. Market confidence and transparency (need for neutral market facilitators).	Market transparency is paramount for the development of business cases. Sufficient information is needed to inform an assessment of the competitive landscape, estimate market depth, establish potential operating regimes and revenue stackability. There is a need for neutral market facilitators. Commercial solution developers need to be comfortable with the fairness applied when evaluating flexibility options. Without this, funds will not be committed for the development of flexibility solutions. The methodology to compare various flexibility options should be transparent and facilitate a level playing field among the various options.
3. Procurement cycle.	Adequate coordination between DSO /TSO and well-defined primacy/precedence rules are needed to support revenue stackability. This is paramount to the business case of energy storage. The role of regulators in ensuring coordination between DSO/TSO is key to ensure the achievement of whole system outcomes. This is likely to have a great impact on the reduction of costs to end consumers.
4. Storage specific related considerations.	There is a need for revenue certainty. Long duration (i.e., 4 hours+) energy storage investments are capital intensive. Furthermore, alleviating peak generation and demand might require systems with multiple hours of duration. Multiple year contracts are recommended based on capacity payments. Locational markets, such as the flexibility services one, are not liquid and solutions are exposed to unique market dynamics. Procure demand turn-up services for congestion management purposes and make this service stackable with other flexibility services. Enabling renewable curtailment trading can foster new business models for storage. Need to correct wholesale market imbalance as a result of the provision of any DSO flexibility services by a storage unit with balancing obligations. For example, if a storage unit with balancing obligations has declared a 0 MWh position across an entire day and the DSO activates a Demand Turn-up service, the storage unit would be in imbalance and would be liable for imbalance charges. Currently the clarification process with the Electricity Market Operator is not automatic and this should be improved.

6. EASE Recommendations for the Design of Flexibility Options:

- Monitor the implementation of article 32 of EU 2019/944 across Europe.
- **Development of Standardised Flexibility Services markets based on capacity payments.** Ideally these markets should enable contracting peak demand, congestion, voltage and stability products and should be compatible with zero carbon ambitions. Contractual frameworks should provide revenue certainty for solutions that require the development of physical assets. This would promote investability.
- Development of harmonised common principles to be integrated in assessment methodologies used to compare the cost and benefits of various Network options, e.g. ANM (grid flexibilities, flexibility connection), Flexibility Services and Network Reinforcement. Promote collaboration with key stakeholders in an open and transparent way.
- Enabling the trading of curtailment in the case of flexible connections and foster the creation of platforms to exchange energy in case of network congestion.

7. Appendix A

The following section provides greater detail on each of the points covered in Table 3.

1) Market design compatibility with a net-zero carbon energy system

- Develop a carbon assessment and optionality valuation, considering a holistic view of costs (inputs) and benefits (outputs) of the provision of different type of flexibility sources including electricity, heating and cooling where relevant.
- Place a carbon emission limit that will apply to all contracted technologies.
- Cap on the level of permissible uncompensated curtailment of flexible connections; prioritise the adoption of the flexibility option that better mitigates the volume risk faced by Renewable Energy Distributed Energy Resources (RES DER). Where flexibility services and ANM (grid flexibilities, flexible connections) are available in a constrained area, utilise flexibility services in cases when ANM schemes do not mitigate RES DER volume risk adequately.

2) Market confidence and transparency (need for neutral market facilitators)

- Develop a transparent Evaluation Methodology to compare ANM (Grid flexibilities, Flexible connection), flexibility services and conventional network reinforcement to increase confidence and transparency in markets by applying a standard method of decision-making to network options.
- Develop a methodology to assess market depth for flexible connections and flexibility services to quantify and forecast evolution and reliance on flexible connections and flexibility services capacity.
- Information should be made available to transmission system operators (and industry) on the operation of DSO networks. That would enable all parties to forecast constraints, effects on local networks and curtailment. Included should be info on levels of Distributed Energy Resources connected, state of the system and availability of dispatchable facilities. In addition, DSOs to provide platforms that enable disclosure of info for the efficient operation of flexibility markets
- Address the concerns raised that ANM schemes (grid flexibilities, flexible connection) are deterring growth of flexibility services and the impact their growth will have in the development of efficient flexibility markets. For example, RES energy is curtailed preventing it from being taken by storage though a demand turn-up flexibility service. Actions could include:

o Capping and / or retiring flexible connections volumes; incentivising DSOs to reduce need for flexible connections / be accountable for the energy curtailed.

o Using flexibility services as the main alternative to reinforcement, and flexible connections solutions only as (a proven) last resort.

o Prioritising flexibility services ahead of flexible connection curtailments to encourage more liquidity in flexibility markets and to provide assets benefitting from flexible connections with alternatives to curtailment.

o Need for substantial improvements in information and transparency.

o Current and future network needs and forecasting future value.

o Curtailment likelihood / curtailment requirements over life of assets/ provision of curtailment information closer to real-time.

o Closer to real-time data to unlock the provision of closer to real-time products and services and efficient flexibility markets.

o Access rights to encourage optimisation of existing assets. Share data on ANM availability /utilisation of controls to understand better the impact on flexibility market development.

o Demand turn-up to help mitigate renewable curtailment should be standardised in a coordinated manner between the TSO and DSO.

o Stacking Info support: Tools to enable Flexibility Services Providers to receive advice on stackable revenues for a specific asset technical spec. by event. A national sign-posting website to indicate services across all DNOs & TSO.

o Data on local distributed energy resources should be made available to enable market analysis/ investor confidence.

o Market Platforms: Introduce a flexibility procurement platform to:

1. Assist the industry with the potential of multiple procurers/ providers
2. To aid coordination of flexibility delivery across the system
3. Improve communications with all the market players.

o Primacy Rules and Principles: Develop clear principles and rules for addressing service conflicts between the Transmission and distribution networks and other market actors; balance the technical requirements/ risks for the whole system with the needs of a flexibility procurement platform, value for flexibility services providers and the end consumer. Determining network primacy principles and rules; providing more transparency and clarity on how dispatch scenarios will be managed in the future.

o Full commitment to prioritising stackability. Avoid locking parties out due to procurement timescales. Improve DSO info on constraints impacting resource availability to the TSO. Contracted resources must be able to provide other valuable services when there is no conflict between the services required by DSO. Standardise documentation, technology and coordinate procurement timetables etc. Harmonise [tender] qualifications to create an unrestricted procurement process; accommodate a variety of longer- and shorter-term services year-round.

o Standardise generation turn-up services, creating a consistent customer experience and reduce the threshold for participation to open up these markets to more customers.

o Greater coordination/ transparency/ standardisation between the DSOs and TSOs to facilitate system actions that mimic those of a single national SO (Dx and Tx).

o Ensure the technology/ software that the networks use is compatible across industry – open standards.

o One national signposting website that gives an indication of the flex services required across all DSOs and the TSO.

3) Procurement cycle

- Information to be provided as early as possible to have clear requirements.
- Reduce admin burden and the costs to qualify for the different markets – harmonisation; “trading” Passport[17].
- Standard procurement windows would be beneficial and ensuring these do not clash with other market tendering timelines.

[[17] A trading passport would be a document recognised by DSOs and TSOs and indicating markets for which a given asset has pre-qualified successfully.

- Use of a Pre-Qualification Questionnaire (PQQ) in flexibility procurements and the alignment of timings across DSOs to deliver a consistent and simpler approach for customers to participate.
- Greater coordination between Regulators, DSOs and TSOs to design stackable services.

4) Storage related considerations

- Contractual: Contractual duration in line with the expected period over which the flexibility asset enables network infrastructure investment deferral. Alternatively based on the period over which the asset contributes to the reduction of redispatch costs. This is not in contradiction with EU 2019/943 art 6 as Flexibility services mentioned in this article are not intended for balancing but to solve network congestion in specific locations where physical constraints limit market liquidity.
- Alignment of service exclusivity (e.g., DSO vs TSO) and information sharing positions between TSO contracts and DSOs. For example, some primary frequency control contracts might include clauses that would ban participation in other markets even if services are compatible, e.g., voltage control. DSO common contracts with no unjustified barriers to service provision. DSO Commercial frameworks to align and balance liabilities & revenues.
- Enable the trading of curtailment, where it is relevant.
- Incentivise investment: quantify the future size and value of DSO flexibility; provide greater visibility of constraint management and future value growth predictions, network nodes with bottlenecks, curtailment forecast based on credible future energy scenarios to achieve net zero. Publish clearer, public tests for strategic investment so that DSOs are able to fairly assess using flexibility and alternative options to network investment in their planning decisions. Route to market to net zero/green flexibility.
- Automatic correction of wholesale market imbalance as a result of the provision of any DSO flexibility services (as in the Balancing Mechanism (BM), one of the most important tools grid operators use to balance electricity supply and demand in real-time).

Notes

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About EASE:

The European Association for Storage of Energy (EASE) is the leading member - supported association representing organisations active across the entire energy storage value chain. EASE supports the deployment of energy storage to further the cost-effective transition to a resilient, low-carbon, and secure energy system. Together, EASE members have significant expertise across all major storage technologies and applications. This allows us to generate new ideas and policy recommendations that are essential to build a regulatory framework that is supportive of storage.

For more information please visit www.ease-storage.eu

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Disclaimer:

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