CEER Guidelines of Good Practice for Flexibility Use at Distribution Level

A joint DSO response paper

May 2017

CEER Guidelines of Good Practice for Flexibility Use at Distribution Level

A joint DSO response paper *May 2017*

KEY MESSAGES

- The regulatory framework for DSOs should encourage the development of flexibility and DSOs should take the decision on what is the best solution to help with their specific challenges, either by use of flexibility or through expansion of the grid. In addition, it is important that the option of network reinforcement should not be neglected as in many cases it cannot be fully replaced by flexibility.

- DSOs fully support that all flexibility resources i.e. generation, storage and demand compete on a level-playing field and DSOs should procure them in a technology neutral manner. Indeed system operators should define their flexibility needs and make them transparent to market parties who can then compete to deliver the best solutions.

- Flexibility markets for DSOs to procure the local flexibility products they need do not yet exist. These markets will need to be designed and created at the distribution level. Such local flexibility markets will have to be integrated into the DSO regulatory framework which in turn will have to accommodate choices between investing in grid assets and/or spending on flexibility services. Whatever the decision is taken, DSOs have to be sufficiently remunerated for whichever mechanisms they use.

- DSO must define and specify needs in advance on which local products market parties must then be able to deliver. At this early stage is premature to talk about harmonisation of these products, we believe that it is important to foster innovation and have the DSOs in cooperation with market actors to pilot and test a variety of new approaches.

- European Regulators should be open to a range of models (one size does not fit all) that would enable DSOs to access and use flexibility. CEER should provide overarching principles for a regulatory framework at EU level, whereas details of specific flexibility regulation should be left to the Member State level. It must be noted that any model should consider financial viability for all concerned parties.

- CEER's description of the different possibilities to use flexibility such as rules, connection agreements, network tariffs and a local market is welcome. This comprehensive approach should also be reflected in the proposed Clean Energy Package which only addresses the market based procurement option for DSOs. Since congestion in the distribution system is mainly a local issue, the best way will probably consist in a combination of different solutions, depending on the local situation. Furthermore, adequate tools should be given to the regulators and DSOs to ensure the most relevant and adapted solutions, without prejudging the best solution.

- One missing aspect from the consultation is the case where the DSOs need to manage the impacts and congestions caused by the activation of flexibility by other parties. We recommend regulators to acknowledge this use case in order to foster the implementation of right interfaces and processes with market players, including a more clear definition of responsibilities and actions. Coordination with market parties is crucial to foster market uptake of flexibility products and services.

- Regulators should assess the most adequate solutions that will bring value to society and to consumers in a cost-effective way. This should be discussed, agreed and implemented together with DSOs based on their own specific needs to get access to flexibility resources, their coordination with other system operators, including TSOs, the way they will coordinate with commercial parties. Finally, the right solutions must be achieved by the DSOs in an integrated way.

- DSOs providing voltage control or reactive power absorption at the DSO-TSO interface should not be tagged as 'flexibility' but as a technical optimisation of the grid, which is not in the domain of markets. These activities are integral to joint system operation and not to be offered or traded on the market in order to ensure that the DSOs stay in their role as neutral market facilitator. Nonetheless, voltage and reactive power could also be procured via the market and this should be done where more economical.

- All the tools described by CEER to be used by regulators are important for DSOs to remove barriers and facilitate the use of flexibility at DSO level. The regulatory framework should allow different solution and combination of tools. A 'principles-based' approach is far better than a prescriptive 'one-size-fits-all' approach due to the different national conditions and this is especially so at this early stage of the transition. The regulatory framework should be technology neutral and let the DSOs decide which is the least costly option for an efficient grid management.

Introduction

The four Associations representing European Distribution System Operators (DSOs), notably CEDEC, EDSO for Smart Grids, EURELECTRIC and GEODE welcome CEER's consideration of the use of flexibility with an emphasis on the distribution level and are pleased to provide this single joint response. Consideration of flexibility issues at distribution level is most welcome as it has been missing from many policy approaches so far. Any future regulation should fully consider the need to integrate and support flexibility at the distribution level which is the most affected by the ongoing transformation.

Policymakers and regulators should have a clear understanding on the real practical needs of DSOs, which could be captured in the following statement:

> *'DSOs need to have adequate means in place to make use of flexibility resources, supervise flexibility operations and make it easier and cost-efficient for customers to benefit the most, while ensuring quality of service and security of supply in a challenging environment.'*

Furthermore, regulators also need to be aware of two main aspects with regards to DSOs' flexibility roles. One aspect is how does flexibility impact distribution system operation in relation to their dual function, namely market facilitation and reliable electricity service provision, and another aspect is the own technical needs of the DSOs.

The European Commission's proposals on a regulatory framework that allows and incentives DSOs to procure flexibility services, which may complement or obviate the need to upgrade or replace electricity capacity and supports both the efficiency and secure operation of the distribution system, is welcomed. Nevertheless, this should not place any limitations on DSOs from accessing all forms of flexibility options, including by the models set out by CEER in this consultation.

Since there is little or no experience in the use of flexibility services at the DSO level, we recommend that CEER Guidelines should focus on general principles for a regulatory framework in order to guide and to enhance the use and delivery of DSO flexibility services. Detailed flexibility regulations if necessary can be set out at Member State level, taken into consideration the evolving roles of the DSOs as well as the specific needs of DSO and TSO cooperation in the different circumstances in each Member State or locality.

Subsequently, once experience is gained, more detailed proposals in this scope can be considered and based on for example innovative demonstration projects that enable to test new concepts and solutions in a market oriented environment.

Consultation Questions & Responses

Flexibility at Distribution Level (see sections 2.2 and 2.3)

1. What are, in your opinion, the main drivers for flexibility use by DSOs going to be in the coming years?

The main driver is the energy transition itself that is being led by the European Commission and the Member States with strong involvement of DSOs, and which is aiming for a consumer-centric approach bringing about a cleaner and cost-effective energy system.

To make this happen, DSOs will not only have to integrate in their normal operations the increasing amount of DER but will also have to cope with new needs and third-party business models being introduced to facilitate DER deployment. At the same time, DSOs will have to bring their networks to even higher levels of efficient network development.

DSOs will need to manage grid constraints at the distribution level, requiring them to operate the network closer to its technical/electrical limits, while at the same time ensuring system stability, due to following factors:

- Increasingly active customers (customer centric approach adopted by the European Commission giving new rights to customers to engage, individually or collectively in energy generation and consumption);
- Electrification of transport and of the heating sector;
- Integration of renewables including variable energy sources on distribution grid level and limiting the need for curtailment of RES production;
- Technological innovation (including generation, storage, smart meters and grids, internet of Things …);
- Development of active system management tools for the distribution grid (e.g. voltage level control and power quality).
- Decreasing amount of inertia in the grid due to declining number of large, centralised power plants on the transmission grids;
- New mechanisms to allow controlled islanding[1] in case of incidents;
- Allow More time allowance to develop networks, or even substitute them;.
- Regulatory pressure for increasing system efficiency and service quality.

These drivers will change the energy flows and patterns on the system. DSOs will be under increasing pressure to avoid and to manage grid congestions and constraints at the distribution level. They might need or be asked by customers additional capacity for short periods, or at very short notice on several places in the network.

In addition, grid users will also need a wider range of options when connecting to and using the grid than they have today. Besides the traditional option of being firm users ('fit and forget' scenario), they will increasingly have the option to be partially or totally flexible ('fit and manage' scenario). This paradigm changes the system and undoubtedly leads to a new scenario in which the way DSOs manage their grids will change considerably.

[1] *According NC RfG requirements, in case of line tripping, generators' capabilities could be used to support islanding until the line is restored.*

2. Please provide any alternative definitions for flexibility that you think capture the focus of this paper.

The Associations recommend the definition of flexibility as stated below based on the definition in EURELECTRIC's report on Flexibility and Aggregation (January 2014) and on the definition in the European Commission Smart Grids Task Force Expert Group 3, Regulatory Recommendations for the deployment of flexibility (January 2015).

Flexibility could be defined as: the modification of generation injection and/or consumption patterns, on an individual or aggregated level, in reaction to an external signal (price signal/network tariff/activation/congestion) in order to provide a service within the energy system or maintain stable grid operation. The parameters used to characterise flexibility can include: the amount of (active) power modulation, the duration, the rate of change, the response time, the location. The delivered service should be reliable and contribute to the security of the system.

Apart from the generic definition, it is worth mentioning the distinction between explicit and implicit flexibility should be included in any definition.

Explicit flexibility (sometimes called "volume based"): flexibility activated in reaction to a 'volume based' explicit signal. Costumers receive a specific reward to change their consumption upon request, triggered by e.g. flexibility needs of the BRP or a constraint in the network.

Implicit flexibility (sometimes called "price based"): flexibility activated in reaction to a price (market or system operator) signal.

DSO Uses for Flexibility (see section 2.4)

3. Should DSOs be encouraged to use flexibility to manage the distribution network where this is more efficient than reinforcing the network? Please provide an explanation.

The leading principle for DSOs is to serve society at lowest societal costs, while maintaining security and quality of supply and service, as well as ensuring customer efficient and timely access to the network. Therefore, DSOs should be allowed to supervise flexibility operations and to procure flexibility services to enable them to manage their networks given the challenges posed from growing amounts of distributed generation and increasing participation of customers through demand response. If this framework has been established, encouragement is not necessary, since DSOs will inherently be inclined to use flexibility if it is more cost-efficient than reinforcing the network.

Still, the concept of efficiency here must be clear as it should consider a broader approach on the costs implicit to each option. Whereas flexibility can be a less direct cost than reinforcing the network in some cases, it will not be possible to fully replace network expansion (reinforcement) by flexibility and in some cases network expansion/reinforcement may be necessary to ensure security of supply. Temporarily procurement of flexibility could however help to overcome the time needed to complete expansions/reinforcements. It is therefore, up to the DSOs to take a decision on what is the best solution to help with their specific challenges; either through flexibility or through expansion/reinforcement of the grid. It is important to consider this because the decision that DSOs make are not only based on costs but also on the risks and its consequences and the assessment of both in the long term.

In addition, we believe that it is important to exchange relevant information between DSOs, TSOs, grid users and market participants to contribute to network development plans in order to increase transparency and to ensure our role as market facilitators, e.g. DSOs could make capacity available to market participants and this could help DSOs to solve congestion management problems and technical constraints.

In the same line, we welcome European Commission's proposal which includes a regulatory framework that allows and incentives DSOs to procure flexibility in order to improve efficiencies in the operation and development of the distribution system. However, DSOs believe that the Clean Energy Package proposals should not only be limited to the market, but include a broader perspective such as the one outlined by the CEER consultation with its different flexibility options: rules-based, connection agreements, tariffs as well as markets.

4. Should all sources of flexibility be treated equally in the market and by system operators?

We fully support that all flexibility resources i.e. generation, storage and demand compete on a level-playing field, as long as they present viable options to deal with congestions and other operation related problems faced by DSOs. Barriers for market access should be as low as possible to assure the most cost-efficient and technological suitable solution.

With this in this mind, DSOs should access flexibility services in the market in a technology-neutral manner to ensure that the most efficient resources are utilised first in serving the system's need for flexibility also taking into account the required levels of security/reliability in grid management. Picking "winning technologies" upfront as well as product or service definitions that discriminate against certain technologies should be avoided. Indeed, system operators should define their flexibility needs and make them transparent to market parties who will compete to deliver the best solutions.

Flexibility markets for DSOs to procure the local flexibility products they need do not yet exist. These markets will need to be designed and created at the distribution level. Such local flexibility markets will have to be integrated into the DSO regulatory framework. This framework will have to accommodate choices between investing in grid assets and/or spending on flexibility services.

5. Are there any uses for flexibility that you think we have missed and should be considered? If yes, please provide an explanation.

The case where the DSO has to manage the impacts and congestions caused by the activation of flexibility by other parties has not been included at all in this consultation nor in any other discussions to date. For the avoidance of doubt, this stands totally apart from the other cases, mentioned/ cited elsewhere in this document, where a DSO may consider the use of flexibility as a cost-effective measure to mitigate a network issue. The impact of this use case needs to be at least acknowledged and it should become clear to which extent a DSO is allowed to publish a market restriction.

The use of flexibility in different time frames should be explored in more detail. For the day-ahead timeframe this should also include the grid capacity forecasting process as part of the nomination process. Requirements for market parties should be formulated so that the DSOs are able to make a reliable forecast from which they can determine the need for flexibility in day ahead.

Other use cases we identified as missing are the use of flexibility for black start situations, as well as for mitigating power losses.

The avoidance of congestion by technical measures is also not mentioned. In the first place a DSO will try to avoid congestion by applying technical measures (e.g. configuring the network in such a way that congestion does not occur).

In some countries, as a consequence of the evolving role of DSOs and the impacts of the energy transition process, some DSOs see a growing need to take up a more active role on local energy balancing which might arise in the future. This will need a reinforced collaboration with TSOs and clear definition of roles and responsibilities regarding local management. This evolution will foster the possible development of local energy markets for flexibility.

When or if it arises that DSOs operate storage without engaging in commercial activities, DSOs should be allowed to use own grid-scale storage assets that will help them to create better conditions, as neutral market facilitators, for flexibility services to be traded in the markets.

We recommend CEER should consider these uses for flexibility when developing its guidelines at EU level.

6. Do you think it is important for Member States to establish standardised EU definitions of the various flexibility products, to facilitate market participation in flexibility use at distribution level?

It is worth mentioning that it is up to market parties to provide the products that meet the DSOs' reasonable needs. However, from experience, this means that the DSO must be able to define and specify his needs in advance on which products the markets must then be able to deliver and the regulatory framework must allow the DSO to recover the costs.

Following the answer to Q4 above, flexibility markets for DSOs do not exist yet. However, at some point it could be cost-effective to support these markets with platforms where flexibility service providers[2] having access to flexibility sources (like storage devices, demand response, flexible generation, using individual or aggregated assets) compete and manage risks (performance and credit for example).

At this early stage, we believe that it is important to foster innovation, have the DSOs in cooperation with market actors to pilot and test new approaches, and then elaborate standardised definitions (common language, terms and definition regarding products) for flexibility products before specifying the products themselves.

Once we have the definitions market parties and respective DSOs should find the best solutions, gain experience and develop them in order to foster the development of innovative solutions. This is also important to reflect differences between respective distribution systems. Only after the market is developed we can start discussing possible harmonisation. The market products for the services procured should be defined in a non-discriminatory, technology-neutral way reflecting the needs of the DSOs especially in terms of availability and reliability of the product.

Regarding an EU-wide standardisation of products, this may only be useful in case aggregators or suppliers might want to offer services across different EU member states, an EU-wide product harmonization would require the harmonization of a wide range of regulatory issue. This would include the flexibility of generation and consumption, the incentives set in place for demand response, network tariffs and the regulatory treatment of storage – to name a few aspects. Such harmonization will be overly time-consuming, complex, and premature. Hence, it is questionable if

2 Flexibility Service Providers FSP) are market parties (suppliers, aggregators, ESCOs, ...) with a commercial role to purchase explicit flexibility from grid users and sell it to a Flexibility Requesting Party (FRP)

the limited benefits of a harmonization would justify the high costs of establishing EU-wide standardisation of products. It would definitely slow down the progress a lot if first an EU-wide product definition was to be developed.

For those Member States in which the traffic light concept is likely to be used, it may also be advisable to agree on common definitions of this concept at EU level, especially on the meaning of the yellow light. This definition could be useful because at the moment a number of Member States are starting discussions and will make decisions on market rules related to this yellow state.

For Member States in which other concepts are likely to be used, frameworks that allow DSOs to actively managing the distribution system should be allowed in order to guarantee consistency with other definition and concepts adopted.

DSOs Accessing Flexibility (see section 3.1)

7. Should regulators seek a regulatory framework that can accommodate a range of models that would enable DSOs to access and use flexibility, while ensuring that competition and markets are not unduly distorted?

The regulators should be open to a range of models that would enable DSOs to access and use flexibility (for the reasons explained above) and should evaluate which of these models are useful by considering the opinion of all stakeholders. The models should be developed on MS level in cooperation with the DSOs and concerned parties. The timing and the maturity of the market should be consistent as well as with existing rules in providing incentives for the use of flexibility. It is sufficient to provide overarching principles for this regulatory framework at EU level, whereas details of specific flexibility regulation should be left to the Member State level.

It may be appropriate for the regulatory framework to facilitate a range of models, on the basis that the starting points and the prevailing conditions may vary across the different distribution systems (one size does not fit all). Such variation in conditions may include:

- installed capacity of distributed energy resources;
- degree of observability available within the DSO network;
- short term energy market maturity and liquidity;
- degree of smart meter deployment;
- existing balancing and wholesale markets.

In fact, with such diversity in market conditions, to facilitate a range of models may be beneficial for innovation at the DSO level as discussed in the previous question, standardisation of the products is necessary to enable different models comparison.

Additionally, not all customers will be willing to be flexible if flexibility requires a “too” active engagement. On the other hand, it may be possible to obtain services from these same customers if they are not expected to be so active. Therefore, it is necessary to develop not only active engagement models but also passive engagement models (with a higher degree of automation).

Attention should be given towards ensuring that domestic customers who are not engaged particularly those who are more vulnerable, are supported and able to realise the benefits of these evolving arrangements, thereby minimising any unintended consequences.

Finally, it must be noted that any model should consider financial viability for all concerned parties. Therefore, models have to be designed considering not only the reduction of system costs but also the financial viability of the DSO.

8. What do you consider to be the key benefits and key risks of particular models (rules based, network tariffs, connection agreements, and market-based)?

CEER's description of the different possibilities to use flexibility such as rules, connection agreements, network tariffs and a local market is welcome. This comprehensive approach should also be reflected in the proposed Clean Energy Package which only addresses the market based procurement option for DSOs. Since congestion in the distribution system is mainly a local issue, the best way will probably consist in a combination of different solutions, depending on the local situation. Furthermore, adequate tools should be given to the regulators and DSOs to ensure the most relevant and adapted solutions, without prejudging the best solution.

- **Rules based approach**

  In general, the rules based approach may not be used where a market based approach is viable.

  Not only the customers but other actors will be affected. For example, generators whose production is curtailed should be compensated for the opportunity costs of providing flexibility, which – in such a non-voluntary setting – has to be determined by the regulator. For generators these costs include operation costs, foregone market revenues and potentially the costs for balancing responsible parties. For demand response, these costs are hard to determine. In addition, merely compensating parties with opportunity costs does not provide any specific incentives to provide flexibility.

  The rules based approach might be helpful if it imposes minimum requirements to enable flexibility in the system and provides a framework to allow and promote solutions. For example, the Network Code on Demand Connection already establishes minimum technical requirements for the provision of certain demand response services to network operators. The Network Code Requirements for Generators which could be seen as an enabler for flexibility services of generators since they have to fulfil dedicated technical requirements. Nevertheless, some of these network codes might need to be adjusted to adapt to the emerging realities of the networks.

  A rules based approach might also be justified when there are not enough voluntary offers to prevent a blackout. This resembles the traffic light concept. In the green phase, no flexibility services are required by the DSO and in the orange phase flexibility services from customers and market parties are required. However, if there are not enough flexibility services offered a rules based approach is needed to prevent a black out.

  Benefits:
  - It might give DSOs the tools to assist with the prevention of a black out;
  - It may allow the distribution system operator to manage grid situations with low transaction costs. Low transaction costs can be particularly beneficial in regions with a high share of small scale generation e.g. regions with a high penetration of PV panels.
  - It is transparent and non-discriminatory (all customers have the same duties and rights)

  Risks:
  - This approach is not voluntary for customers.
  - The compensation to concerned actors – in such a non-voluntary setting – has to be determined by the regulator. The societal costs for such a method of demand response are hard to determine.

- In addition, merely compensating parties with opportunity costs does not provide any specific incentives to provide flexibility.

- **Network tariffs**

  Network tariffs should be based on the costs caused by the users of the system. Given the new reality with increasing distributed generation and electrification at the low-voltage level, the current tariffs may not reflect the impact of the user's (consumer, generator or prosumer) behaviour on the distribution system anymore.

  The energy transition will lead to grid investments and in general to higher grid costs. That is unavoidable, but we must continue trying to minimise societal costs. New modern distribution tariff structures can contribute to this, or better, tariffs can incentivise network users to adapt their behaviour in such a way that it prevents problems and unnecessary costs where possible. The right tariff structure at member states' level could also play an important role in preventing problems (the case of 'implicit flexibility'), in addition to only solving problems (the case of 'explicit flexibility').

  Network tariffs could be local or regional or nation-wide but to be effective in order to solve congestions they should be different in different time frames, otherwise there is no shift to time frames when there is enough capacity. When the network tariff is not local (e.g. regional or nation-wide) it is probably not an effective tool to solve a local congestion, nevertheless a global tariff effect could also have a local positive effect.

  A different tariff in different time frames can be static (like day/night tariff, well known as a time of use (ToU)) or dynamic (only when congestion is expected).

  Static tariffs are used for example in France, Belgium and in Czech Republic and they have been used for years, not to solve local problems, but to lower overall offtake peaks and better use the network. ToU network tariffs are locational signals where peak periods vary depending on the location. As an example, DSOs could offer a tariff to the customers in a specific area and in a certain time frame. Perhaps only a small percentage of customers may react to the signal. Therefore, it is more difficult for DSO to solve a locational specific issue.
  This tariff does not distort any market signal but it is worth mentioning that there are potential interactions between network tariffs signals and prices signals from market parties.

  Having network tariffs based on capacity terms could be also very useful. Firm and flexible capacity prices would be different and would also allow ToU differentiation for certain periods. The combination of this type of tariff with the "connection agreement" option described in the next section creates a huge potential alternative.

  The introduction of a local tariff with variable time frames requires a more complex ICT infrastructure. It also requires that customers can receive (automated) tariff signals. The introduction of a (local) tariff with a static time frame is simpler. The customer's response is in both cases relatively uncertain since it is based on a statistical approach. As an example, France is introducing a new dynamic network tariff as from August 2017 for customers connected to 20 kV network.

  In general, we believe that it is important to further investigate and discuss the development of network tariff structures. In the future reality, new tariffs structures will be needed and can be an important tool to prevent a considerable part of the problems and can help to keep the overall network costs as low as possible.

Benefits:

- Network tariffs are an option to incentivize "system-operation-friendly" behaviour and overall behaviour will be determined by a combination of market signals.
- Static tariffs (like day/night tariffs) for a larger region (or nation) wide are relatively easy to implement and are relatively efficient and the customer can participate on a voluntary basis.

Risks:

- Dynamic local tariffs require a rather complex IT infrastructure as well as a complex design. It should be ensured that tariffs do not become too complex to ensure the operational feasibility on the one hand and comprehensibility for providers of flexibility, i.e. producers and consumers, on the other hand. Their effects on the market should also be taken into account.
- Dynamic network tariffs may interfere with dynamic energy tariffs, possibly causing system instability, e.g. in case of surplus of wind energy which may lead to low energy tariffs but high network tariffs and customers' behaviour may become very unpredictable. A better alignment between network tariffs and retail tariffs will therefore be needed.
- With regards to incentivizing flexibility, future changes in network tariff methodologies might be desirable – yet, such changes should be left to the regulators, since network needs might differ from MS to MS due to different network topologies, different levels of renewable energy penetration and generally different regulatory frameworks.

- **Connection agreements**

  The main paradigm change in the system is that today grid users have more options than before. They may not only be firm users, as traditionally all have been (fit and forget), but now they have the option to be partially or totally flexible (fit and manage). DSOs will be in charge of managing this connection capacity of each user in real time. Thus, a new type of flexibility connection concept is emerging or may emerge.

  According to some DSOs that are implementing similar forms of arrangements in some countries today, these models could be called 'variable network access' or might be designated by "flexible network connection agreements" or some other names. In these cases, if the right conditions are applied, they are considered to help reduce network investments, and create a win-win situation between network users and the DSOs. For example: instead of planning the grid to provide generators and consumers with a firm physical connection to the grid 100% of the time, contractual agreements could introduce a variable network access or flexible connection agreement for certain generators or consumers, who would, based on financial incentives, agree to more limited access when the network is constrained. In any case, it should be optional for the grid user to subscribe to such contract. Moreover, the limitations to grid access must be transparent and predictable for grid users. This could be executed either via direct contracts between DSOs and generators/load or indirectly between DSOs and the flexibility service provider who would pay a yearly option premium to generators/load and then offer flexibility to the DSO. The flexibility service provider has to be fully responsible for the contracts, has to ensure that they are available when the DSO needs to make use of that flexibility and is responsible for the consequences if the service fails to be provided. Some forms of variable network access for generators exists e.g. in the UK (known as non-firm access) and the concept is also currently being experimented in France.

  Depending on their national reality, regulators might work together with DSOs to establish general criteria that the DSOs should follow when designing, implementing and contracting such connection agreements, in order to make the process transparent, objective and non-discriminatory. The way to remunerated DSOs and have customers benefiting from them have to

be properly designed by regulators to avoid endangering the economic sustainability of the regulated network tariff system. In doing so, such models of are likely to remain to be beneficial for both the connected user and the DSO and therefore, system overall.

This contract may be mostly useful for large customers who can adequately value the right balance between the service that they can provide to DSOs, firmness, flexibility and price.

If these contracts apply to a large scale of domestic customers a deeper analysis may be needed in order to ensure that the model is well understood in all aspects like, consumer divide, tariff changes and technology deployment.

Therefore, though it seems an easy mechanism to access flexibility, it may prove to be one of the most difficult and risky ones. This model should therefore be carefully analyses as it may bear huge distortions and losses in social welfare. Therefore, though it seems an easy mechanism to access flexibility, it may obey to several technical restrictions and it may prove to be a difficult and risky one to be implemented. This model should therefore be carefully analyses as it may bear huge distortions and losses in social welfare.

Benefits:

- Connection agreements that enable network customers to be more flexible may allow the system operator to manage a critical grid-situation with low transaction costs. In contrast to rules-based approaches, they are voluntary, which is generally preferable.
- As connection agreements can be agreed well in advance before the congestion occurs, it can offer the DSOs predictability, as the DSO will know which users and which amount of flexibility power to count on. This is valuable for network planning and operations and it allows additional capacity of the network to become available.
- This model may allow focusing on local network problems by engaging with the closest grid users.

Risks:

- Predictability for the limitation to grid access could be a critical flaw of this model. This is why this model could endanger BRPs management and make them to increase their business risks.
- It is also difficult to determine the compensation mechanisms in a cost-reflective manner as it requires a long-term projection of flexibility use.
- This model may put the principle of non-discrimination at risk. Some customers could make special arrangements with the DSO due to their location in a congested area while others do not have this possibility.
- Direct contract may hamper the development of market based procurement

- **Market based procurement**

  Market based procurement can deliver cost-efficient and innovative solutions driven by competition for the provision of services. It is via a market mechanism where several players compete to provide the most efficient solutions to the DSOs. This approach has also a large potential to trigger innovation and to benefit from standards established in existing energy markets.

  As a prerequisite, the needs of the DSOs must be clearly defined and made transparent to the market. Moreover, this market-based approach might not be available yet or it might not always be feasible depending on specific characteristics of the grid and evolving market structure (i.e. depending whether the problem occurs in a highly-meshed network area where several flexible

sources are available compared to a very local problem where the number of potential participants is limited to those connected to the affected line).

There are several options to implement it, e.g. via a competitive tender or a market platform. On such a market, different flexibility service providers compete to provide flexibility services to the DSO being the single buyer. In their bids to the DSO, flexibility providers take into account the value of their flexibility in other market segments, such as energy wholesale market.

If market based mechanisms are designed attractively enough for flexibility providers to bring sufficient liquidity on the market, they have the potential to deliver a high degree of transparency and to establish an efficient flexibility source for the DSO.

Market-based implies that no party is forced to offer and no party is forced to buy. This also holds true for the DSO, implying that when some particular situations require technical solutions the DSOs should be able to assess whether to use market-based solutions or other options that can deliver the service at least societal cost (e.g. when there is no local market).

It is also worth mention that once flexibility is used by the DSOs, the market knows where grid constraints are present at that moment. Regulation should be set up to avoid gaming by market parties making unauthorised use of that knowledge.

The application of both non-market based (such as e.g. a bilateral contract between grid user and the DSO) as well as market-based approaches should however be properly justified and approved by the regulator. In any case, it should be understood from the outset that DSO network issues that may or may not be solved by the use of flexibility are, by definition, of a local nature. Therefore simple physics will dictate that not all customers will be in a position to provide the required response.

We support CEER's views that DSOs flexibility contracts should not unreasonably restrict flexibility services providers from accessing a range of revenue streams (including from TSOs, suppliers or aggregators) and valuing their potential where it is more efficient to do so. However, they will need to oversee the impact of flexibility activations as part of their responsibilities. Availability-based commitments (possibly complemented with activation fees) should therefore be preferred for long-term contracts.

Benefits:

- In general, a marked based approach is a favourable coordination mechanism, if complemented by the possibility of overseeing the use of flexibility that can lead to the most efficient outcome if there exists a level-playing field and the market is sufficiently liquid.
- This approach has also a large potential to trigger innovation.

and specifically for bilateral agreements:

- allow the system operator to quickly manage a critical grid-situation, once these agreement are concluded.
- compensation for flexibility provision is not necessarily determined by the regulator, but within the bilateral contracts. Hence, it can be negotiated by the DSO and the flexibility service provider, which allows the free formation of prices and hence, the reflection of true costs.

Risks:

- Market based approach might lead to higher transaction costs if market for flexibility is not liquid enough to achieve a competitive price formation.
- In general, it is a solution which requires some time to develop.
- Possibility of gaming

and specifically for bilateral contracts:

- general compensations would not reflect the true costs of providing flexibility.
- the regulator should be careful not to privilege certain actors at the cost of other system users.

9. What are the relative merits of a contracting strategy (competitive or otherwise) versus a real-time market approach to procurement of flexibility? Is the latter approach practicable?

A distinction should be made between real-time needs and long-term needs. For long time horizons, as would be the case for investment deferral considerations, the use of bilateral contracts is more appropriate. On the other hand, for close to real time horizons, where a DSO must act swiftly to preserve the integrity of the network for all users, a real-time market approach could be more effective. Nevertheless, use of bilateral contracts for real-time needs would also be possible if their fast activation, through physical interfaces, which permits to send activation signals within a very short timeframe, were enabled.

In any case, the strength will be in the combination of bilateral, structured contracts and commoditized short term markets and they are indeed very complementary:

- all activations for congestion are indeed (near) real time
- long-time contracts typically describe capacity availability or reservation options

10. Are there any models that would enable DSOs to improve system flexibility that you think we have missed and should be considered?

- A possible combinations of models.

- Another model could be trading transport capacity (industrial customers) with the advantage that the market value of transport capacity in a certain area will be developed. A trade-off between investment in additional capacity and maintaining shortage in capacity can be made. The disadvantage is an increase in complexity and different treatment of customers in different areas, partly caused by historic decisions of the DSO.

- A model based on use of “congestion spreads”: activating flexibility in a ‘balance neutral’ way. Lowering load in the congested area while at the exact same time compensating this load reduction by an increased load (also market based) in another non congested area. This enables DSOs and TSOs to work together efficiently. The limitation of this method is that it can only be used in (almost) real time or it should be combined with market restriction well in advance.

- A tariff model in which different tariffs are used between "basic grid use" (existing) and "add-on grid use" (e.g. for EV charging and DG feed-in). This would accommodate market parties to develop application specific proposals, while at the same time DSOs have an (explicit or implicit) incentive mechanism for peak shifting and/or load reduction specific for these applications only. This would reduce complexity and also protect vulnerable customers.

- Depending on the existing reality and the needs for active system management in some Member States simplification of the constrains representation such as a traffic light concept as a model for communication of the state of the grid in certain time frames and for specific locations to the market, to enable market based flexibility in a level playing field. The principle is to forecast boundary overflow by the market. This can be done by forecasting congestion in one "zone" and setting a red traffic light. The result will be to prevent flexibility bids in that zone. The question is still the definition of a "zone" and whether a compensation of blocked bids will be necessary (financially or by compensating with compensating actions with another bid).

11. Are there case study examples of approaches to improve flexibility on the system that you think should be considered in this work? If so, please provide a summary of the key information and findings.

The Netherlands:

Enexis (DSO) has conducted a number of Demand Response pilot projects, e.g. Your Energy Moment in The Netherlands: customers were able and willing to shift their load (washing machines and heat pumps), based on time-of-use tariffs. In another pilot, customers shifted the charging of EV, reacting to signals from the DSO, while getting a rebate on tariffs when doing so.

Stedin (DSO) is currently executing a pilot project together with Tennet (TSO) and a market trading platform organization (ETPA) to obtain flexibility orders market based for mitigation of congestion in a balance neutral way (pilot is planned to go live in September 2017 and has also gained interest by the EU commission, as input for the next H2020 work programme).

Alliander, Heerhugowaard project. It consists of a flexibility market which was tested with an aggregator already in 2015. Based on the USEF model a test area was defined where aggregators work together with the DSO to solve congestions based on a market based solution. The USEF model is an industry initiative which enables aggregators to engage with customers to valorise the customers' flexibility. The USEF model is an add-on on top of existing EU market models where the roles and responsibilities are defined to integrate aggregators into the market model and to enable DSOs to procure flexibility from aggregators. It also incorporates the traffic light concept into the roles and responsibilities of all the concerned parties. The USEF model is now the basis for an actual congested area (around the city of Nijmegen) which will be probably go life in Q4 of 2017.

Portugal:

The regulator launched a public consultation to establish the rules and procedures regarding an innovative pilot project on dynamic network pricing scheme, based upon a preliminary positive CBA (benefits clearly outweigh the costs), namely those related with grid losses reduction and distribution investment networks deferral.

This pilot is to be implemented on industrial consumers by the Portuguese DSO, during 2018, and it will have the duration of one year. The goal is to test the market reaction and the output regarding changes in behavioural patterns based on network price signals, using Critical Peak Pricing (CPP).

With Critical Peak Pricing (CPP), DSOs can send much stronger price signals (either capacity or volumetric) to stimulate demand response than with ToU. This is because CPP applies to a limited number of days when the network has a higher probability of being constrained. ToU periods – on the other hand – are fixed in advance.

Germany:

Netze BW (DSO) conducts several smart-grid test projects in their "NETZlabor"-projects (network labs). One of them is conducted in the municipality of Boxberg since 2015 and in another municipality since 2016 (Stockach) and tests the usage of flexible demand provided by steerable heat pumps or storage heaters. In particular, the demand is steered according to market signals, while considering the network situation by means of a quota set by the network operator. The quota determines the share of installed flexible power, which is allowed to be loaded simultaneously and prevents network congestion. First results of a survey conducted with participants in Boxbach are positive: 94% of the customers are happy to have participated in the pilot project and only 8% of participants report to have felt a lower heating comfort.

Belgium:

Eandis (DSO): an interesting case is the Belgian Swift project in the harbour of Antwerp. By adding curtailment systems acting on the real-time calculated capacity they can:

- connect wind generation turbines to the grid one year earlier;
- allow generation even when some network elements were out of service;
- avoid 2M€ of investments.

Please find more information here.

Wallonia

As mentioned in the CEER paper p.33, the Walloon decree[3] concerning new renewables and its impacts on the grid tackles a number of important questions regarding grid development and use of flexibility:

- Are DSO's investments reasonable or not?
- In which case should the DSO compensate financially a potential curtailment?

France:

Enedis (DSO) has been committed to test and develop the two main roles DSOs can play related to flexibilities: neutral market facilitator and user of flexibilities to improve grid management.

Three main projects are focused on flexibilities:

- **Nicegrid** involves customers in active energy management:
  - Five offers to residential customers have been established. Three offers support photovoltaic integration during summer. The two others are designed to reduce peak demand in winter.
  - Two offers were also proposed to the industrial companies: one based on controlled load management via remote control of their energy uses and/or processes, together with remote consumption tracking and the other one on behavioural load management, controlled manually, following load management requests.
- **Greenlys** has tested the key role of the residential customer in an active demand management perspective aiming at controlling and optimizing consumption via "smart grids" technology (equipment, offers and services as well as personalized support). The feedback from the sociological experiments on effective ownership and acceptability of "smart" solutions and offers as well as the engagement of 400 test customers, show a strong adhesion to the Greenlys project. Especially 82% of households declare to be very satisfied or satisfied with the results of the experimentation; 84% are ready to recommend Greenlys' offers and equipment to their close relations. Finally, 63% have chosen to keep the equipment provided at the end of the experimentation.

3 See http://www.ejustice.just.fgov.be//mopdf/2016/12/08_1.pdf

- **Smart Grid Vendee** aims at testing new business models, to enable the DSO to use flexibilities, and in particular a local flexibility market.

Additional work is underway:
Article 199 of the Energy transition law (2015) in France enables local authorities to offer flexibility services to the DSO. After carrying out a study on the service (its capacity to manage local constraints and its potential value), a contract between DSO and the local authority would describe the activation processes and the terms of payment.

United Kingdom: A number of UK projects are funded under the RIIO scheme with funding from the Regulator Ofgem including

- **Power Potential (TDI 2.0)** is a project looking at how transmission and distribution system operators (National Grid and UK Power Networks) can integrate the use of distribution connectected resources for whole system management.

DSOs Enabling Flexibility (see section 3.2)

12. Beyond impartial provision of data to market participants, do you consider that there are any other tasks that DSOs should carry out to enable the competitive provision of and access to flexibility by others?

A vital pre-requisite for any DSO is to achieve a sufficient level of observability of its network in order to have a complete overview of their network. Observability also means that DSOs are taking part in the design, implementation and operation of all processes, overseeing sourcing of flexibility from resources connected to their network. It is independent from the type of regulatory framework or market structure.

Data sharing needs to be done appropriately and in an efficient manner, taking into account data privacy (customers own their data) and data security.
If DSOs impartially provide data and information regarding flexibility procurements and their grid situation according to guidelines ensuring transparency and non-discrimination, the competitive provision of and access to flexibility should be enabled and does not require an independent data management coordinator as suggested by CEER. Today, DSOs already succeed in transparently providing data to all relevant stakeholders. Establishing an entity for data collection and provision would cause high operation and coordination costs with low additional benefits.

Activating customer's assets for flexibility requires reliable communications. DSOs might consider diffusing signals for asset activation as part of their market facilitating service which they could offer to all market participants

The DSO, as neutral market facilitator, should enable the registration of aggregators (and their BRP) on a connection/access point, the same way as is done today for the registration of a supplier.

A proper baseline methodology should be in place to determine the amount of flexibility which is performed and measured. Since the DSO is in most Member States also the metering company, especially where smart meters are rolled out, the DSO is most likely the best positioned operator to act as a neutral party to determine the volumes allocated to the commercial parties (aggregator, supplier).

A new task could be the DSO 'helping' the TSO. Customer 'ownership' between TSO and DSO should be properly defined in a way that the system operator to whose grid the customer is connected,

'owns' the customer. In that case the DSOs recognize that in the future they would also have to perform tasks to support the TSOs in their activities (customer relation management, contracting, and collecting data and exchanging this with TSOs). If this customer 'ownership' between TSO and DSO is not defined, this will lead to parallel and overlapping activities (from both DSOs and TSOs) which will confuse the customers and market parties.

The cost and effort involved in above mentioned tasks should not be under-estimated. It should be understood that for many DSOs the costs will necessarily be socialised amongst all users and these costs should be seen as efficiently incurred by DSOs and allowed by their respective regulators.

Apart from the activities mentioned above, DSOs should look at a smart meter roadmap beyond 2020 which supports future requirements for flexibility, but keeping the economic lifetime of the smart meters in mind.

DSOs Providing Flexibility (see section 3.3)

13. Do you think there are situations where DSOs should be allowed to provide flexibility beyond the distribution network component, where economically efficient to do so? Please provide reasoning for your answer.

DSOs are neutral market facilitators.

If DSOs provide voltage control or reactive power absorption at the DSO-TSO interface, this should be seen as a technical optimisation of the grid not relying on market based approach. To avoid confusion, such activities should not be tagged as 'flexibility' (see definition above) and should not be offered on the market in order to ensure that the DSOs stay in their role as neutral market facilitator. Nonetheless, voltage and reactive power could also be procured via the market and this should be done where more economical.

Whether a DSO should be remunerated for such provision is another matter. It could be argued that if the greater good in terms of overall system costs are minimised by so doing, that this is sufficient but as a minimum, the DSO should be allowed to recover any associated costs.

14. Are there other examples where the DSO could provide flexibility to help to reduce the overall costs of the system?

Generally, we talk about flexibility use in response to congestion caused by either the generation or demand side. Yet, there are other reasons for activating flexibility, such as constructions in the network. Normally, in these cases DSOs apply their 'own' grid resources. For example by diverting energy flows (reconnecting network segments to divide loads) or adding more dynamic components like automatically voltage controlled transformers. In that case, it might also be cost-efficient to activate flexibility on the demand side or generation side.

In same situations DSO will need to rely on grid-scale storage installations to make the distribution system more robust and by this, facilitating market operation. This technical function does not represent a provision of flexibility in the sense of the question, but it is an important way to introduce more flexibility in the distribution system and make its operation, as well as the markets one more cost-effective.

DSO network assets can provide flexibility and there are many UK projects to explore the potential. For example CLASS (Customer Load Active System Services) is a project being run by DSO Electricity North West which has trialled smart voltage control with the aim of seeing if there can be small

reductions to the voltage delivered to homes and businesses in the region without the customers noticing any adverse effects to their service. The CLASS innovation project demonstrated a low cost solution to increasing the capacity of the network.

Regulatory Framework (see section 4.1 and 4.2)

15. In principle, can the regulatory tools listed be used by regulators to remove barriers and facilitate the use of flexibility at distribution level?

In general, the regulatory framework should leave sufficient scope for DSOs to use the most efficient option or a mixture of them in order to keep the system costs as low as possible.

We believe that all the tools described by CEER (price or revenue control, economic incentive schemes for DSOs, smart metering, regulatory framework for tariff structures, contractual arrangements) are important for DSOs in order to remove barriers and facilitate the use of flexibility at DSO level. Depending on the circumstances in the MS different regulatory tools or a mixture of them would fit best to facilitate the use of flexibility at distribution level.

Some reflection on some of the tools:

- **Price or revenue control:** If all sources of revenue are treated equally within the price/revenue control scheme, they can be an effective tool. It should be ensured that all flexibility options as well as network reinforcement are treated equally and DSOs are remunerated for applying the least costly option.
- **Economic incentive schemes for DSOs**: Outside traditional regulation, economic incentives like innovation funds that include costs for smart grids projects and promote DSOs' increasing roles as neutral market facilitators can prove a useful tool. Include incentives for OPEX in order to reflect the growing needs for OPEX related to flexibility in distribution networks. (shift towards more OPEX rather than only CAPEX).
- **Regulatory framework for tariff structures:** Adequate tariff structures can help incentive system behaviour. Costs are mainly driven by capacity installed and simultaneity of usage, which should be reflected by network tariffs. Future changes in network tariffs with regard to incentivising flexibility should be left to the national regulatory authorities.

16. Are there particular tools that you think would be the most effective in achieving flexibility use at distribution level? Please provide reasoning for your answer.

No. All options/tools should be treated equally in the regulator revenue allowance scheme, allowing the DSOs to choose the most cost-efficient solution. The principle of technological neutrality should be respected, as to avoid that certain technologies that carry the risk of being ineffective in some areas are promoted.

17. Are there any other regulatory tools that have not been included and should be considered?

No.

18. Should the regulatory framework allow different solutions and combinations of tools to address the specific needs of the network?

Yes, the regulatory framework should allow different solutions and combinations of tools because there are huge variations across the EU in the use of flexibility and the tools available to each energy system. The regulatory framework should be technology neutral and let the DSOs decide which is the least costly option for an efficient grid management.

Regulatory Principles (see section 4.3)

19. Is a principles-based approach (rather than one-size-fits-all) the correct one for national regulators developing a framework for facilitating flexibility use by DSOs at distribution level?

Yes, a 'principles-based' approach is far better than a 'one-size-fits-all' approach due to the different national conditions at this early stage. The differences across Member States may lead to distinct arrangements and implementation details which prove most effective. It should be left to the national regulators to decide what the best solutions for flexibility are.

20. Are the principles outlined appropriate? Are there any fundamental principles that you think are missing in order to deliver maximum benefit to customers?

All principles outlined are appropriate, however we would like to emphasise some of them:

- Details of flexibility regulation should be left to national regulatory authorities. There should be no principles prescribing to use particular regulatory tools.
- The regulatory framework for DSOs should not hinder development of flexibility. In addition, the option of network reinforcement should not be neglected as in many cases it cannot be fully replaced by flexibility.

Regarding the second question, we consider that the following principles should be also considered:

- Flexibility markets are a nascent reality far from being mature. Reaching enough maturity/liquidity will take time (especially at local level). Therefore, the regulatory framework should comprehend temporal/kick-off measures to trigger these markets and facilitate/enable use of flexibility by network operators.
- Regarding a whole system approach, the DSO is in charge of the system operation of his network. Other actors like the TSO should not be allowed to intervene in distribution system operation. If the TSOs require the activation of flexibility in the distribution system, DSOs and TSOs should determine the way to execute it. TSOs should at least inform the DSOs in a cascading way about the activation.
- Additionally, security of supply and quality of the service should remain the priority of regulators and DSOs and should be the leading principle of their actions. Especially when considering flexibility on the demand side, consumers might incur high costs of being cut off from the energy system and network reinforcement can be economically efficient in many cases. At the same time, the activation of flexibility in distribution systems (i.e. reaction to market parties taking place simultaneously that can cause grid congestions) should not distort system operation.
- With respect to the use of flexibility by DSOs offers need to contain sufficient locational information and need to be correct and market restriction must be possible.