How can the Demand Connection Code facilitate Demand Side Response measures across Europe?

Summary

ENTSO-E's Demand Connection Code is developed in line with ACER's framework guidelines on electricity grid connections and the EC mandate to develop industrial load and DSO connection rules. A portfolio of nine Network Codes is presently being developed, with the target to be finalized as binding European Regulations by end of 2014, and aiding in enabling Europe's energy goals of ensuring Security of Supply, facilitating RES integration and creating an internal energy market.
To enable these targets and within the given legal framework of Network Codes, the DCC puts forward a set of basic, necessary connection rules for DSR measures. The objective of this paper is to clarify the approach taken, in light of possible alternatives, and to emphasize the relation with other initiatives and Network Codes.

Alternative options to deal with Demand Side Response services

Option 1: Do nothing – DSR is not in the scope of connection codes.

The DCC will not mention DSR services or capabilities at all.

Pros:

- Pure market based enabling and delivery of DSR services.
- Consumer has direct choice in all aspects.

Cons:

- Requirements on DSR compliance of users providing DSR are disregarded, which is a risk on the performance of the eventual services.
- Lower market uptake and therefore less user participation, inducing a risk of a lack of reserves and so a risk for the security of the system, or more load shedding in case of emergency situations.
- Risk of market barriers for all users to participate in DSR markets.

Option 2: Focus on market-based incentives to enable DSR schemes, but ensure compliance of DSR capabilities in grid connection rules

A full market-pull approach is taken. To ensure the correct delivery of DSR services, compliance with some basic measures is needed by the Relevant Network Operator. These need to take into account the impact of mass market products and use as much synergies as possible with present available systems (e.g. Network Operator's customer databases). For non-Transmission Connected Demand Facilities, the possibility of having an aggregator as intermediary actor between the customer and the network operator should be retained. It is to be stressed that where the aggregator is responsible for the delivery of the DSR service, the relevant network operator is still the central responsible party for the compliance of DSR capabilities and serves as facilitator of DSR based schemes.

Pros:

- Pure market based enabling and delivery of DSR services.
- Consumer has direct choice in all aspects.
- When the choice is made, the compliance requirements of the DCC ensure the performance of the DSR service.

Cons:

- Lower market uptake and therefore less user participation, inducing a risk of a lack of reserves and so a risk for the security of the system, or more load shedding in case of emergency situations.
- Risk of market barriers for all users to participate in DSR markets.

Option 3: Mandate DSR capabilities for pre-defined devices

A class of devices or a certain technology would be fitted with DSR capabilities (controllability, communication link in the device) and made "DSR-ready". The DCC can identify these devices or prescribe a clear process by which devices can be identified. The latter option is discussed. The DCC also defines the related compliance requirements.

Pros:

- Market based delivery of DSR services.
- Consumer has direct choice to step in a market-based DSR scheme. The barrier will be even lower as devices are DSR-ready.
- It incentives market uptake and therefore user participation.
- Standardization activities are triggered; a clear direction is given.
- The European Network Code can prescribe a European wide process in which devices are identified to be fitted with basic DSR capabilities. The process is transparent, including participation of all relevant stakeholders, and should be further developed in relevant standards. Note: The process needs to be linked to the legislative basis of the Ecodesign implementation measures.

Cons:

- Investments in mandatory DSR capabilities are not market-based, and not based on consumer choice.
- Mandatory investment in certain types of devices carries the inherent risk of not being used in voluntary DSR services afterwards.
- If the Network Code is too prescriptive on how mandatory capabilities are described, or not fully technology-neutral, this may send the wrong market signals or result in a discriminatory approach.
- Costs on delivery of service are partly socialized already over all users without a clear signal of recompense.

Option 4: Mandate autonomous DSR delivery by pre-defined devices

A class of devices or a certain technology would provide DSR services by means of autonomous control, i.e. without the need for market or consumer interaction. The choice of the class of devices or certain technology assures that these DSR services should have no noticeable impact on consumer comfort. The DCC can identify these devices or prescribe a clear process by which devices can be identified.

Pros:

- High uptake of DSR service provided.
- Non-discriminatory approach among users and Europe-wide. Possibility to assess the true socio-economic optimum with less assumptions/uncertainties when identifying devices to deliver the DSR service.
- Clear view on amount of autonomous DSR service provided.

Cons:

- Potential consumer backlash – no direct consumer choice
- Costs on delivery of service are socialized over all users without clear signal of recompense.
- Pragmatic short term solution, but could be seen as a potential impediment for other future smart-grid approaches.

Option 4bis: Mandate autonomous DSR delivery by pre-defined devices, with an option to go to a market based system when possible

A class of devices or a certain technology would provide autonomous DSR services by means of autonomous control, i.e. without the need for market or consumer interaction, as a default setting. The choice of the class of devices or certain technology assures that these autonomously controlled DSR services should have no noticeable impact on consumer comfort. The option of future market based models and standards is kept open by means of a logic interface which can override the autonomous control.
Pros:

- High uptake on DSR service provided.
- Non-discriminatory approach among users and Europe-wide. Possibility to assess the true socio-economic optimum
- Clear view on amount of autonomous DSR service provided.

Cons:

- Potential consumer backlash – no direct consumer choice
- Costs on delivery of service are socialized over all users without clear signal of recompense.
- More complex hardware to be built in all affected devices.

ENTSOE ‘s view regarding DSR and the Network Codes

As Network Codes focus on cross-border issues and European market integration, so can the DCC only focus on DSR services related to cross-border concerns. From the perspective of a single user, DSR implementation would require a set of rules to be followed, regardless of the eventual driver for activating it, e.g. controllability, information exchange, compliance enforcement. As such, DSR requirements in the DCC are drafted in such as a way as to not impede other possible DSR services, but moreover as a facilitator for other DSR services where possible.

Option 1 (DSR out of scope of connection codes) cannot be supported:

- Demand Side Response is acknowledged as a main contributor to more effective markets and to system security with a high penetration of fluctuating generation. As such, DSR is explicitly written down in the policy options taken by ACER in its framework guidelines on electricity grid connections, as well as on electricity balancing. As such, ENTSO-E believes the most fundamental requirements for DSR in the context of cross-border system security and market integration are to be tackled by the entire portfolio of Network Codes.
- In the scope of connection rules, ACER’s framework guidelines foresee the possibility to set requirements at the level of the consumption unit, always taking into account the effect at the physical connection point. In the context of the DCC, the technical capabilities should be prescribed in a functional, technology-neutral and future-proof manner. These basic capabilities focus on controllability and information exchange in case of remote control. Early interactions with CEN/CENELEC, working under Mandate 490 on sets of smart grid standards and processes, resulted in a common understanding on this[1]. Moreover the obligations on compliance enforcement with respect to all relevant actors need to be well specified. DSR for large users is already a reality in various European Member States with various means of implementation. For small scale users, many R&D trials, smart meter objectives and smart grid roadmaps aim at opening up the potential of DSR at a socio-economic cost-effective means. ENTSO-E acknowledges the importance of cost-effective DSR measures in the future power system, and believes basic DSR functionalities and rules for DSR compliance enforcement need to be addressed early in advance. Compliance enforcement of DSR capabilities is key, regardless of whether DSR measures are voluntary or mandatory.
- Autonomous DSR to support frequency regulation in case of extreme events will be efficient only if a large amount of this service is available. ENTSO-E believes the best way to achieve this is via mandatory requirements for a pre-defined list of devices, but also acknowledges the need to preserve the development of future market-based smart grid approaches.

[1] DCC, stakeholder minutes of meetings

Preferred DCC option for DSR services

The DCC identifies five possible DSR services which have a cross-border impact, which aim at a different approach in terms of mandatory/voluntary requirements:

Type	Control method	Voluntary/Mandatory approach	Option
Active Power Control	Remotely controlled	Voluntary service – a process is prescribed in the code by which appliances could be mandatorily fitted with the needed capabilities	2 and 3
Reactive Power Control	Remotely controlled	Voluntary service	2
Transmission Constraint Management	Remotely controlled	Voluntary service	2
Very Fast Active Power Control	Autonomous operation	Voluntary service	2
System Frequency Control	Autonomous operation	Mandatory service – a process is described in the code by which temperature controlled devices could be mandatorily fitted to provide this service	4bis

For DSR System Frequency Control a mandatory delivery of service (Option 4bis) by certain devices is believed to provide the optimal outcome from socio-economic perspective[2] [3]. The Code itself does not put any mandatory DSR requirement on any grid user ex ante. The Cons are to be addressed by the following:

- It has to be taken duly into account that DSR SFC should have no noticeable impact on consumer comfort.
- One needs to clearly underline that this requires no communication link with the consumer and as such poses no privacy issues.
- There is a need for a clear policy roadmap how consumer benefit is being translated (grant schemes, tariffs, …).
- Mandatory requirements are to be implemented via Ecodesign measures which provide a legislative basis already to ensure Europe-wide energy-related appliance requirements.
- Impediments for future market-based smart grid approaches are non-existent, as the DCC prescribes a logic interface to be present in the device which can override the autonomous control and ensure a similar service via other means. Note that Option 4bis comes inevitably at a higher cost than Option 4.

For DSR Active Power Control a combination of Option 2 and Option 3 is taken. The DCC does prescribe a process to mandatorily make devices DSR-ready. The Code itself does not put any mandatory DSR requirement on any grid user ex ante. In addition, users can still provide the same service on voluntary basis. For DSR Reactive Power Control, DSR Transmission Constraint Management and DSR Very Fast Active Power Control, Option 2 is preferred.

[2] DCC Call for Stakeholder Input, April 2012
[3] DCC Frequently Asked Questions, January 2013