Demand Side Response requirements

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entsoe
Reliable Sustainable Connected

Requirements in draft DCC

Principles for DSR in the context of general EC policy

High-level comments received

Changes towards final DCC

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DSR - Consultation Draft Requirements (27 June 2012)

DSR was divided into four service categories that can be grouped into remote or autonomous controlled in Articles 15-18:

Remotely controlled:

- Demand Side Response Active Power Control (DSR APC)
- Demand Side Response Reactive Power Control (DSR RPC)
- Demand Side Response Transmission Constraint Management (DSR TCM)
- [Demand Side Response Very Fast Active Power Control (DSR VFAPC)]

Autonomously controlled:

Demand Side Response System Frequency Control

DSR requirements were either:

- Voluntary for the remote controlled categories, or
- Mandatory for devices defined as significant for remote control and for DSR SFC

DSR - Consultation Draft Requirements (27 June 2012)

Identification process:

Remotely controlled

- TSOs jointly propose devices to be fitted with capabilities to be part of a DSR APC
- TSOs consult with stakeholders
- TSOs adjust proposal post consultation and submit [aligned timing] to their NRAs to make decision on proposal
- NRA National Decision [co-ordinated] then application on devices

Autonomously controlled

- TSOs jointly propose devices to be defined as temperature controlled to be fitted with capabilities to be part of a DSR SFC
- TSOs consult with stakeholders
- TSOs adjust proposal post consultation and submit [aligned timing] to their NRAs to make decision on proposal
- NRA National Decision [co-ordinated] then application on devices

DSR - Consultation Draft Requirements (27 June 2012)

Article 16 DSR APC/RPC/TCM [remote controlled device] requirements

Functional controllability capability

1. DSR must make arrangements to enable commands by the Rel. NO or TSO
2. Frequency and/or Voltage control and pre-alert signal if specified shall be equipped according to the standards and settings defined by the Rel. TSO
3. DSR shall be equipped to receive the orders and transfer information from Rel. NO or TSO, according to the standards and settings defined
4. DSR shall be capable of adjusting its demand within a time period defined by the Rel. NO
5. DSR can not, ignore or interrupt the full execution of an order issued by the Rel. NO and will not modify their demand until instructed by Rel. NO
6. DSR LFDD or DSR LVDD provision by command or pre-alert signal or disconnection or reconnection of static compensation facilities
7. DSR for voltage control shall be able to connect or disconnect its static compensation facilities
8. DSR range must be equal or greater than as defined by the Rel. TSO
9. Instructions for modification of demand usage may have immediate (i.e. less than 1 second) or delayed effects
10. DSR shall notify the Relevant Network Operator in writing each year of its demand capacity and of any modification without delay

- ***Purpose is to ensure adequate information and control to provide an effective service on the network***

DSR - Consultation Draft Requirements (27 June 2012)

Article 16 DSR APC/RPC/TCM [remote controlled device] requirements

Functional network interaction capability

1. TSO shall define based on network location, usage and/or scale of DSR eligibility
2. DSR shall be capable of Frequency and Voltage (≥110kV) ranges in code or operational Voltage range of the Network at the Connection Point
3. DSR rate of change of Frequency withstand capability shall be defined by the Rel.TSO

- ***Purpose is to ensure interaction with and use on the network is robust and does create cause network issues***

Functional safety capability

1. DSR should ensure the security of persons or assets

- ***Purpose is to ensure safe operation***

DSR - Consultation Draft Requirements (27 June 2012)

Article 17 DSR SFC [autonomous] requirements

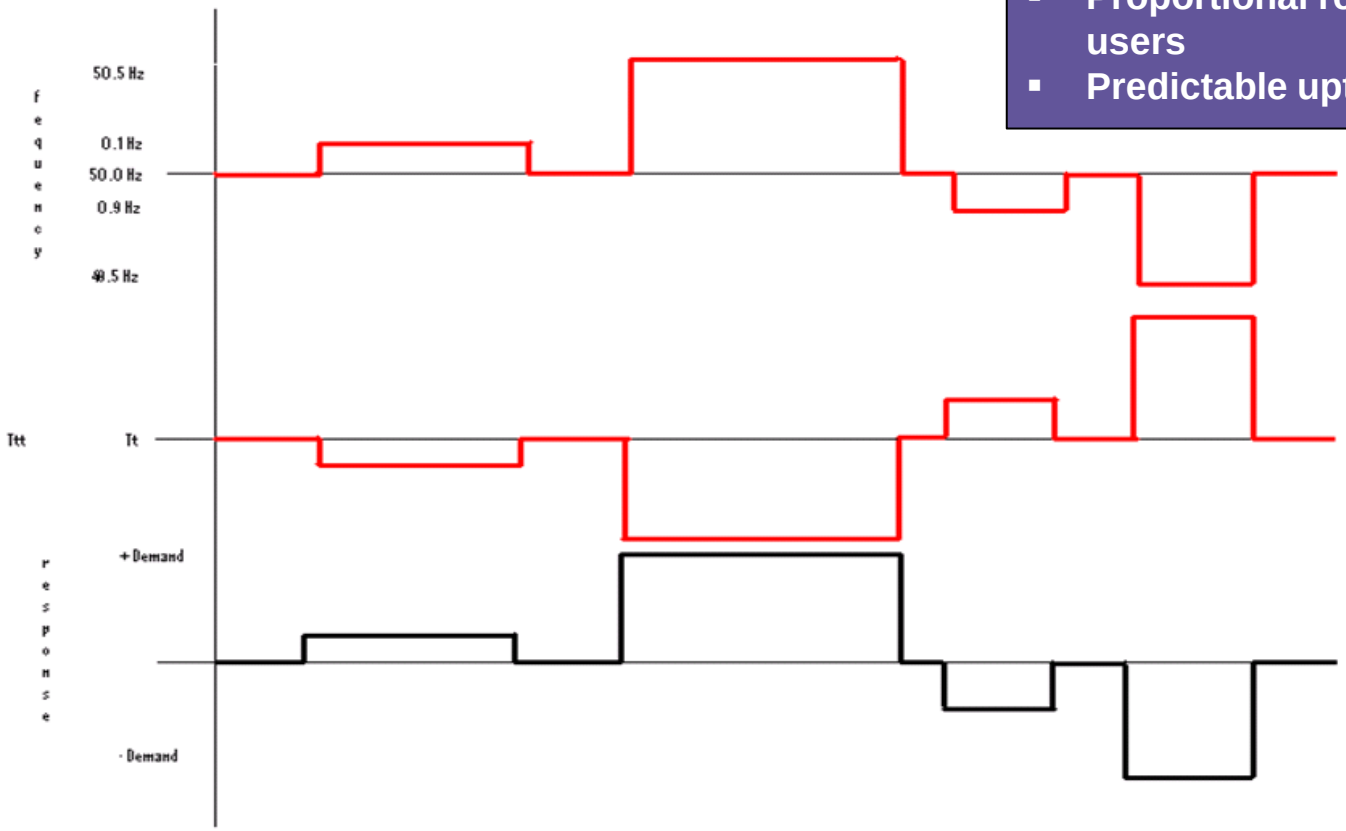
Functional controllability capability

1. Rel.TSO co-ordinated in synchronous area defines deadband around the nominal system Frequency (50.00Hz).
2. The control system of the DSR SFC shall have no influence on the Target Temperature.
3. Hysteresis of the DSR SFC to be utilised , temperature range settings shall not be exceeded by the DSR SFC
4. DSR SFC shall respond to deviations in frequency with a corresponding change to the Target Temperature. The maximum change is at widest when the system Frequency is at the boundary of the system operating range defined by the Rel.TSO
5. Rel.TSO co-ordinated in synchronous area shall define maximum frequency deviation
6. DSR SFC device shall measure the actual system frequency at least every 0.2 seconds
7. System Frequency below the deadband of nominal (50.00Hz) shall be lowered for a heating system and raised for a cooling system
8. DSR SFC random time delay of up to 5 minutes on return to deadband
9. DSR SFC sensitivity and accuracy shall be able to detect a change in system Frequency of 0.01Hz, and an offset in the steady state measurement at or below 0.05Hz.
10. DSR SFC devices unable to provide temperature range =>50% of available temperature deviation range may be given a defined time limited dispensation for production and sale

- ***Purpose is to ensure adequate information and control to provide an effective service to the network***

DSR SFC – principle of response (example)

- No noticeable impact
- No excursion beyond min/max T ranges
- Taking advantage of hysteresis an inherent heat storage
- Proportional response of aggregated users
- Predictable uptake



DSR - Consultation Draft Requirements (27 June 2012)

Article 18 - DSR Very Fast Active Power Control requirements

Functional network interaction capability

1. Rel. NO with Rel. TSO may specify DSR APC/TCM to provide be Very Fast APC (VFAPC)

- ***Purpose is to ensure that interaction with and use on the network is robust and does not cause network issues***

Functional controllability capability

1. Rel. TSO can specify installation in the control system in order to limit the rate of change of Frequency following a sudden generation-demand imbalance
2. The operating principle of this control system and the associated performance parameters shall be defined by the Rel. TSO

- ***Purpose is to ensure adequate information and control to provide an effective service to the network***

Requirements in draft DCC

Principles for DSR in the context of general EC policy

High-level comments received

Changes towards final DCC

Key principles – acknowledged in DCC

- Lock in effect of DSR is to be avoided, i.e. individual demand devices should not be locked into only providing one service and be excluded from any other.
- Preference for a market based solution where one may exist. That is to say via a remote controlled service.
- Notification requirements should be proportionate and therefore typically limited on smaller devices (i.e. DSR SFC).
- Product 'standardisation' should be done through the appropriate methodology, i.e. Ecodesign directive

Option assessment document by ENTSO-E

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

- Pure market based DSR services;
- Consumer choice in all aspects.

- Requirements on DSR compliance of users providing DSR are disregarded, risk on performance;
- Lower market uptake and less participation - Risk of a lack of reserves and to security of the system/load shedding ;
- Risk of barriers user participation in DSR markets.

Option assessment document by ENTSO-E

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

- Pure market based DSR services;
- Consumer choice in all aspects;
- Compliance requirements ensure the performance of the DSR service.

- Lower market uptake and less user participation - Risk of a lack of reserves and to security of the system/load shedding ;
- Risk of barriers user participation in DSR markets.

Option assessment document by ENTSO-E

Option 3: Mandate DSR capabilities for pre-defined devices

- Market based delivery of DSR services;
- Consumer has direct choice in entering market-based DSR scheme. – Barrier reduced as devices are DSR-ready;
- Market uptake and user participation incentivised;
- Clear direction for standardisation;
- European wide process in which devices are identified with basic DSR capabilities is transparent when linked to the legislative basis of the Ecodesign

- Investments in mandatory DSR capabilities are not market-based, and not based on consumer choice. Risk of not being used in voluntary DSR services afterwards.
- If Network Code is too prescriptive not fully technology-neutral
- Costs on delivery of service are partly socialized - no clear signal of recompense.

Option assessment document by ENTSO-E

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

- High uptake of DSR service provided.
- Non-discriminatory approach among users and Europe-wide (socio-economic optimum)
- Clear view on amount of DSR provided.

- Potential consumer backlash – no direct consumer choice
- Costs on delivery of service are socialized - no clear signal of recompense.
- Pragmatic short term solution, - seen as impediment for smart-grid approaches?

Option assessment document by ENTSO-E

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

- High uptake on DSR service provided.
- Non-discriminatory approach among users and Europe-wide (socio-economic optimum)
- Clear view on amount of DSR provided.

- Potential consumer backlash – no direct consumer choice
- Costs on delivery of service are socialized - no clear signal of recompense.
- More complex hardware to be built in all affected devices.

Option assessment document by ENTSO-E

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

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Main comments received Article 15 (Article 21)

DSR requirements not in the scope of this code, and framework guideline does not allow for mandatory frequency services

In FWGL, Section 2.1.2: *"The network code(s) shall set out necessary minimum standards and requirements to be followed when connecting a consumption unit to the grid, to enable demand response and/or participation of consumption units in other grid services, on a contractually-agreed basis. The responsibility for the compliance of the features and performance of the equipment with the requirements set by the TSO or DSO shall be with the consumption unit."*

Small demand does not constitute not a cross border issue

Definition of cross border issue is provided in code. Aggregated impact can cause/support cross-border phenomena.

DSR has not been justified based on 'mandatory' vs. 'voluntary' classification

Supporting document in stage 1 consultation demonstrates socio-economic benefit

Revised process requires second justification in Eco-design implementing measure.

Insufficient time to develop standards from application of requirements

Time allowed will be set by Eco-design implementing measure and may be in range of 2-4 years.

DSR SFC shall aim to be delivered in a socio-economic efficient manner, while ensuring that potential markets are not foreclosed and market arrangements have been evaluated.

Cost benefit analysis on DCC indicated the potential. CBA on specific devices before imposing mandatory requirements is covered in the Ecodesign measure.

Main comments received Article 15 (Article 21)

Expansion of existing requirements may impact on availability of users to provide DSR

Requirements are functional and therefore necessary to ensure a viable service for TSOs to use. Therefore only demand that can meet this is suitable and should be used.

DSR offered demand cannot be used as part of a LFDD or LVDD scheme

As LFDD and LVDD are emergency defence actions all demand is at present already subject to being used. DCC aims at a more efficient implementation by targeting demand already offered for DSR.

Agreement on setting for frequency ranges is not deemed feasible in mass market products.

Synchronous system requirements vary and drive the need for different settings. Different requirements are currently already in place for mass markets for example different plugs which are feasible and systems are in place to ensure this.

Requirement to include other energy storage i.e. Electric Vehicles

Energy storage has been considered but does not have the same properties. Temperature Controlled Devices are deemed to have negligible impact to consumers as specified in code this would not be true for Electric Vehicles

DSR SFC blocks future smart grid solutions

DSR SFC sets out the requirements for temperature controlled devices to perform this service on the basis of the optimum socio-economic solution, it does not preclude the use of devices for other services.

Main comments received Article 15 (Article 21)

Impact on BRP and markets

Code does not specify market structure and is in fact market-neutral.

Requirements in the code are too detailed

Requirements are functional description only and therefore cannot be simplified further

Industrial control systems are already optimized and may be rendered inefficient with this autonomous control.

The primary purpose of any temperature controlled device is ensured and only the hysteresis of the cooling/heating in new facilities would be required and hence should not impact of a industrial control system.

Compliance enforcement will be a burden on DSOs. Complexity of the Installation Document has to be reduced.

Installation document has been simplified to only provide the minimum of info and this may be routed via aggregator. The provision of the information to the Network Operator has also been changed to be required only once the service is offered, and not at the time of installation, even as the installation document is created at the time of installation.

Main comments received Article 15 (Article 21)

Add in more specific reference to aggregators

Although implicitly allowed for in the draft code, reference to aggregators have been added in a number of places

Embedded generation should be able to be used to provide DSR

The Network Code on Requirements for Generators (NC RfG) specifies requirements which do not permit the use of generators operated in parallel to be used, standby generators can be.

Interaction with Eco-design and NRA competence in significance test

Expressed role of Eco-design directive is respected by adaption of identification process in Article 21(4) and (5).

Restriction of DSR eligibility by TSOs is an operational issue

Removed from code, inclusion in relevant operational code or market mechanism

Requirements in draft DCC

Principles for DSR in the context of general EC policy

High-level comments received

Changes towards final DCC

Changes towards final DCC

1. Demand Side Response shall be distinguished by … Voltage fluctuations, namely:
   a) Remotely controlled:
      i. Demand Side Response Active Powe…
      ii. Demand Side Response Reactive Po…
      iii. Demand Side Response Transmissio…
   b) Autonomously controlled:
      i. Demand Side Response System Fre…
      ii. Demand Side Response Very Fast A…

2. For Demand Side Response Active Power Cont… t Management, Demand Facilities and Closed Distribution Networks may voluntarily provide th…

3. Once one of the DSR services set forth in paragraph 1 (a) is offered by a Demand Facility o… losed Distribution Network, the demand offered for the DSR service shall be available for either or both Demand Side Response Low Frequency Demand Disconnection and Dema… ide Response Low Voltage Demand Disconnection.

4. Demand Side Response Active Power Control (DS… Control devices) if this is decided in accordance with the procedure set forth below:

   i. The TSOs shall jointly elaborate and pr… omponent[s], for future application of Demand Side Response Active Power Control (D… ontrol (DSR APC) in a socio-economic efficient manner.
   ii. This list of demand devices shall be su… to DSR APC in accordance with the process set Article 15 of Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy related products. The date of the submission by the TSOs shall be jointly agreed between all the TSOs.
   iii. The European Commission shall review the proposal and inform relevant stakeholders, including the TSOs, of the outcome of such a review within three months as from its submission in light of the criteria set in Article 15 paragraph 2 of Directive 2009/125/EC.
   iv. If the European Commission decides to initiate the process for preparing and submitting a draft implementing measure for the demand devices concerned in accordance with Article 15 of Directive 2009/125/EC, all the TSOs shall jointly provide their input during such a process, and more particularly in the context of the Consultation Forum provided for in Article 18 of Directive 2009/125/EC.
   v. The relevant ecodesign requirement adopted pursuant to Article 15 of Directive 2009/125/EC shall include the requirements set in Article 22 for the relevant categories of Demand Side Response Active Power Control (DSR APC) devices in coordination with the TSOs and the relevant DSOs.
   vi. The TSOs shall, contribute to any subsequent review and amendment of the relevant ecodesign requirement under Directive 2009/125/EC. Article 21(4)(i-iv) shall apply to this review and updating process.

Paragraph 4:
- Process is centred around Ecodesign directive.
- Ecodesign based process remains in objectives similar to previous process.
- TSO proposal with CBA sent for consideration of initiation of process (previously NRA)
- Ecodesign process performs consultation with stakeholders
- Requirements in code form minimum functional requirements that TSOs need to utilise DSR services. (Requirements may of course be supplemented)

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estricted to TSO mandated
due to the speed of
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Paragraph 2:
Voluntary service means consumer choses to invest and hence to meet functional requirements

essential to their needs at that time.

Changes towards final DCC

5. Demand Side Response System Frequency Control (DSR SFC) shall mandatorily apply to new Temperature Controlled Devices identified as significant if this is decided in accordance with the procedure set forth below:

   i. The TSOs shall jointly elaborate and propose a list of significant Temperature Controlled Devices for the application of Demand Side Response System Frequency Control (DSR SFC). This proposal shall aim at applying Demand Side Response System Frequency Control (DSR SFC) in a socio-economic efficient manner.
   ii. This list of Significant Temperature Controlled Devices shall be submitted to the European Commission with a view to making these devices subject to DSR SFC in accordance with the process set under Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy related products. The date of the submission by the TSOs shall be jointly agreed between all the TSOs.
   iii. The European Commission shall review the proposal and inform relevant stakeholders, including the TSOs, of the outcome of such a review within three months as from its submission.
   iv. If the European Commission decides to initiate the process for preparing and submitting a draft implementing measures for the Temperature Controlled Devices Concerned, all the TSOs shall jointly contribute to the identification of the relevant devices, more particularly in the context of the Consultation Forum provided for in Article 18 of Directive 2009/125/EC.
   v. The relevant ecodesign requirement adopted pursuant to Article 15 of Directive 2009/125/EC shall include the requirements set in Article 23 for the relevant Demand Side Response System Frequency Control (DSR SFC) devices in coordination with the TSOs and the relevant DSOs will be implemented by the European Commission.
   vi. The TSOs shall, contribute to any subsequent review and amendment of the relevant ecodesign requirement under Directive 2009/125/EC. Article 21(5)(i-iv.) shall apply to this review and updating process.

Paragraph 5:

- Process is centred around Ecodesign directive.
- Ecodesign based process remains in objectives similar to previous process.
- TSO proposal with CBA sent for consideration of initiation of process (previously NRA)
- Ecodesign process performs consultation with stakeholders
- Requirements in code form minimum functional requirements that TSOs need to utilise DSR services. (Requirements may of course be supplemented)

Changes towards final DCC

DEMAND SIDE RESPONSE - ACTIVE … **ONSTRAINT MANAGEMENT**

1. With regard to either Demand Side Response … anagement, Demand Facilities and Closed Distribution Networks may voluntarily offer … Facilities or Closed Distribution Networks whom offer these services, either individually …

a) The Demand Facility or Closed Distribution Network shall not be involved in the activities specified in Article 21(1)(a), in case providing any type of DSR may put at risk the safety of persons or assets.

b) All Demand Units providing DSR shall be capable of operating across the Frequency ranges specified in Article 13(1)(a)(i.), and extended range specified in Article 13(1)(a)(ii.). A reduced Frequency range can be agreed between the Demand Facility Owner or operator of the Closed Distribution Network and the Relevant Network Operator in coordination with the …

c) Demand Facilities and Closed Distribution … e capable of operating across the Voltage ranges specified in Article 14(1)(a)(i.).

d) Demand Facilities and Closed Distribution Networks providing DSR with a Connection Point below 110kV shall be capable of operating across the normal operational Voltage range of the Network … specting the provisions of Article 9(3).

e) The method of DSR LFDD or DSR LVDD s … d Distribution Network and the Relevant Network Operator, in coordination with t … t may result in:

i. decreasing power consumption by an …

ii. decreasing power consumption with a … or

iii. for Voltage control, disconnection or … ork Operator or the Relevant TSO.

f) Where modification to the power consumption is ordered by command sent by the Relevant Network Operator or the Relevant TSO, each Demand Facility Owner or Operator of a Closed Distribution Network to which the command applies to shall make arrangements that shall enable the modification of a part of its demand responding to an Instruction by the Relevant Network Operator or the Relevant TSO. The demand modification shall be net of embedded generation in the Demand Facility or Closed Distribution Network, which is operated connected to the Transmission Network or Distribution Network.

g) Where modification to the power consumption is specified via Frequency and/or Voltage control and pre-alert signal sent by the Relevant Network Operator or the Relevant TSO, each Demand Facility or Closed Distribution Network concerned shall be equipped to receive the orders from the Relevant Network Operator or the Relevant TSO, to measure the Frequency and/or Voltage value, for DSR LFDD and LVDD respectively, to command the demand trip and to transfer the information. The equipment shall be defined, according to the standards and settings specified by the Relevant Network Operator, while respecting the provisions of Article 9(3).

Paragraph 1 a:

Paragraph 1 b-d:
The need for DSR capability to cover the frequency and voltage range ensures that the services are available when needed, during system disturbance

Paragraph 1 e:
The need for DSR capability to be ensured for a variety of methods of deployment dependant on national infrastructure and market operation.

Paragraph 1 f-g:
- Both paragraphs require capability and are agnostic to structure of how commands are received i.e. direct or via third party.
- Due to RfG requirements embedded generation 'connected' (in parallel) with the network cannot be used in DSR, but standby generation can be.

Changes towards

Paragraph 1 h-k, m:
These paragraphs require capability and are agnostic to structure of how commands are received i.e. maybe via third party.

h) For Voltage control with disconnection or reconnection of static compensation facilities, each Transmission Connected Demand Facility or Transmission Connected Closed Distribution Network shall be able to connect or disconnect its static compensation facilities, directly or indirectly (including but not restricted to via an aggregator), responding to an order transmitted by the Relevant TSO, or in the conditions set forth in the agreement between the Relevant TSO and the Demand Facility Owner or the operator of a Closed Distribution Network

i) The Demand Facility or Closed Distribution Network shall be capable of controlling power consumption from the Network in a range equal or greater than as contracted by the Relevant TSO, while respecting the provisions of Article 9(3).

j) The Demand Facility or Closed Distribut om the Relevant Network Operator or the Relevant TSO to modify its demand and t defined by the Relevant Network Operator, while respecting the provisions of Article

Paragraph 1 l:
The need to ensure that the DSR is capable of can performing operation and awaiting further instruction is essential to be sure of a positive response from the a DSR

k) The Demand Facility or Closed Distribut hin a time period defined by the Relevant TSO, while respecting the provisions of

Paragraph 1 n:
Adequate information exchange is an requirement to place reliance on DSR
DSR status is needed to plan use of DSR
Changes made to include aggregator explicitly - Main requirement is source and final destination of information

l) A Demand Facility or Closed Distributi full execution of an order issued by the Relevant Network Operator, Aggregat ype of DSR. A Demand Facility or Closed Distribution Network, once a modificat red by the Relevant Network Operator or Relevant TSO, while respecting the prov

m) Instructions to modify power consumpti

Paragraph 1 o:
Ensures DSR is available during changes in frequency.
Rate is dependant on synchronous system.

n) The Demand Facility Owner or operator not restricted to via an Aggregator), notify the Relevant Network Operator or Relev s of its DSR capacity at its installation. Any modification of this DSR capacity during the year shall be notified to the Relevant Network Operator or Relevant TSO pursuant to Article 9(3) without any delay.

o) With regard to the rate-of-change-of-Frequency withstand capability, the Demand Facility or Closed Distribution Network shall have the capability to not disconnect from the Network due to the rate-of-change-of-Frequency up to a value defined by the Relevant TSO, while respecting the provisions of Article 9(3). The value of rate of change of Frequency shall be based on a 500 ms average.

Changes towar

Paragraph 1 a:
DSR should not effect primary use of device

1. With Regard to Demand Side Response System Frequency Control on Temp ture Controlled Devices:
   a) The control system of the Demand Side Response System Frequency Control shall have no influence on the target temperature, within a deadband around the nominal system Frequency of 50.00Hz, of a width to be defined by the Relevant TSO while respecting the provisions of Article 9(3) in co-ordination with the TSOs in the synchronous area.

Paragraph 1 c-f, h-j:
Defines the functional methodology and parameters for DSR SFC

   b) The control system shall be designed e fitted into the system to inhibit operation as part of a Demand Side Response sys t to define while respecting the provisions of Article 9(3) the requirements for further equipment to make use of this l cal interface.

   c) The built in hysteresis of the Temperature Controlled Device between its ontrollers on and off temperature range settings shall be designed to be utilised by the Demand Side Response System Frequ

Paragraph 1 b:
Added paragraph to ensure proposal is future proofed for EC long term vision of Smart Grids.
Allows for future inclusion in a remote controlled smart Grid

   d) The Temperature Controlled Devices and Side Response System Frequency Control when responding to Frequency devia

   e) The Demand Side Response System F cy across a Frequency range by corresponding changes to the target temperature i rget temperature shall be at the widest when the system Frequency is at the bound ting the provisions of Article 9(3).

Paragraph 1 g, k:
Defines the functional accuracy of DSR SFC

   f) The maximum Frequency deviation f ination with the TSOs in the synchronous area, while respecting the provisions of Article 9(3).

   g) The temperature controller of the device shall measure and update the actual system Frequency measurement at least every 0.2 seconds.

   h) For system Frequency below the deadband around the nominal value of 50.00Hz, the target temperature shall be lowered for a heating system and raised for a cooling system.

   i) For system Frequency above the deadband around the nominal value of 50.00Hz, the target temperature shall be raised for a heating system and lowered for a cooling system.

   j) On return of Frequency within the deadband of nominal value of 50.00 Hz, a random time delay of up to 5 minutes shall be initiated before normal operation resumes.

   k) With regard to the Demand Side Re y measurement and the consequent movement of the temperature target, the sys rder to give overall linear proportional system response. The system shall be cap An offset in the steady state measurement of Frequency shall be acceptable up to 0.05Hz.

Paragraph 2:
Provides flexibility in interim roll out of DSR SFC devices

2. Temperature Controlled Devices, unable to deliver the turn on and off temperature range equal to or less than half the devices available temperature deviation range, may be given a defined time limited dispensation for production and sale, until it reaches compliance. The time period for this defined time limited dispensation shall be specified in the process set forth in Article 21(5).

Changes towards final DCC

DEMAND SIDE RESPONSE VERY FAST ACTIVE POWER CONTROL

1. The facilitation of a Demand Facility or Closed Distribution Network to voluntarily deliver Demand Side Response Very Fast Active Power Control by a change of Active Power related to the rate-of-change-of-Frequency for that portion of its demand, shall be agreed between the Relevant TSO and Demand Facility Owner or operator of a Closed Distribution Network, in coordination with the Relevant Network Operator, while respecting the provisions of Article 9(3).
2. The operating principle of this control system and the associated performance parameters shall be defined by the Relevant TSO, in agreement with the Relevant Network Operator, while respecting the provisions of Article 9(3).
3. The response time for Very Fast Active Power Control will be defined by Relevant TSO but will not be more than 2 seconds.

Paragraph 1-2:
Provides the flexibility to specify VFAPC from sources

Paragraph 1 g, k:
Defines the functional accuracy of DSR SFC

➢ Demand Side Response requirements

Thank you all for your attention.

Questions?