DEMAND CONNECTION CODE

CALL FOR STAKEHOLDER INPUT

FEEDBACK DOCUMENT

1 GUIDANCE

This feedback document is used in the „DCC - Call for Stakeholder Input“ as published on 5 April 2012 on the ENTSO-E website. It lists all questions raised in this Call and allows to provide answers in a structured format. Please use only this feedback document to formulate your responses which facilitates handling of responses by ENTSO-E and understanding by other stakeholders afterwards.

You are welcome to send additional information that supports your responses. In that case, please clearly refer in the foreseen text boxes to the supporting document where relevant. Please also provide the key message or data which is relevant in the foreseen text box in this feedback document.

Based on your background and your possible interaction with the Demand Connection Code, you are welcome to only respond to those questions you consider to be of relevance to you. In case a joint response is given on behalf of several organizations, please indicate this clearly in Section 2 (Respondent Coordinates).

In order for your responses to be taken into consideration in the further development of the Demand Connection Code, you are requested to send the completed form to consultations@entsoe.eu by **9 May 2012**. All responses will be published shortly afterwards.

On behalf of ENTSO-E, we wish to thank you for your contribution.

RESPONDENT COORDINATES

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Response submission date	10 May 2012 (extension granted)

1 Please try to be as specific as possible, e.g. Association, DSO, Industrial Customer, Research Institute, Regulator, …

QUESTIONS

Section 1.2.2 – Options to increase RES penetration in the System

1.1. What is your view of the high level analysis presented in Table 2?

The rough analysis presented in table 2 may be agreed on to some extent but it must be noted that, while the content of the document is presented as innovative, the adopted approach is very conventional and essentially TSO-centred.

The changes and developments which have occurred in last years represent the result of a global energy strategy which had been conceived, declared and put into operation and not the casual product of the combination of un-coordinated impromptu initiatives, as it seems to be perceived by the document.

DSOs in many European countries have already faced the challenge of transforming their networks to accommodate large amounts of RES and, indeed, they have proven successful, as in these last years the highest shares of PV have been connected to distribution and not to transmission networks.

The process of modernisation both on DSO and TSO side is far from finished, though: networks must further evolve according to innovative approaches to network planning and operation, pursuing the incoming opportunities and taking into account the different needs of the operators.

Within this framework, new solutions must be delivered. The “load follows generation” paradigm, to name one which has become a common expression, must therefore be seen as the way of achieving a better usage of available resources and not merely as a way to grant services to the network. As the electricity world is going to be different in a few years, we should be able to approach it in a more advanced way, which does not seem to be the state of mind behind the document.

The qualitative consideration in Table 2 provides indication but not evidence that the pros and cons which are listed as principles may prove satisfactory in a more detailed analysis in a specific market context. Some options also appear to be deliberately shown positive or negative (for example “100% CO_2 free”). Moreover, it must be noticed that some of the topics included in the table are already in the process of being involved in wide-spectrum Smart Grid projects at a more advanced stage than NCs and that all the functionalities which in the table are related to distributed energy resources (DER), both in the generation and in the demand side, will soon be delivered through a Smart Grid architecture made available by DSOs as neutral market facilitators.

DSOs thus believe that a correct evaluation of the alternatives, not only in terms of demand but also regarding distributed generation, can only make sense if they are seen as a (small but strategic) subset within the Smart Grid environment.

1.2. What is your view of the conclusion that the “Benefits from demand side response (DSR) are clear and that DSR has the potential not only to be relatively inexpensive, but also supports the EU goals to integrate RES and to empower customers to participate in the energy market”?

In the context of a strong intermittent generation development, Demand Side Response appears as a valuable tool to deliver reserves services therefore contributing to system stability and operational security.

The present NC DCC proposals deal mainly with technical capabilities. To offer these reserves as a

service, well-functioning markets from bulk to retail, need to be in place, including customer's full exposure to electricity market prices.

Section 2.2 – Level of Detail

2.2.1. What is your view on ENTSO-E's interpretation of the level of detail required in the NC DCC?

The description of the required "level of detail" is extremely general and can be interpreted in many different ways. Consequently, it is not possible to provide a clear answer to question 2.2.1. It also has to be mentioned that following the European Regulation the relevant Framework Guideline (FG) sets the framework for provisions in the Network Code (NC). In this case the "Framework Guidelines on Electricity Grid Connections" published by ACER on 20 July 2011 are relevant. In this FG it is clearly stated that the NC should "set necessary minimum standards" for achievement of identified targets taking in consideration the significance of grid users. The level of detail in the NC DCC has to be defined in line with this provision.

A classification of Demand facilities and DSO networks in different 'types' (or 'sizes') should be provided, in a similar way as it has been done in the NC on requirements for generators. Not only the degree of detail should be adjusted to the purpose of each requirement, but also the targeted 'type(s)' of facility or distribution network, taking into account the significance of each type relatively to the addressed issue. With regard to focus of the NC DCC on significant users not only the connection to transmission grid in general but also the differences in voltage levels of transmission grids and distribution grids in different countries have to be taken in consideration.

Furthermore, the following affirmations need to be clarified:

- "*the NC DCC, which has its main focus on cross-border issues*". Cross-border issues should not be the 'main' focus, but the ONLY focus of the NC DCC.
- "*Aggregation effect of similar behavior of local Demand Facilities has an important impact on the power system security*". This cannot be an argument for imposing European-wide requirements on demand facilities. Indeed, existing networks are exploited for decades with demand facilities which have partly similar, partly different behaviors. The aggregation effect allows smoothing out the individual behaviors of all loads connected to the networks, which is beneficial for the power system security. If ENTSO-E's argument is founded on the hypothesis that the simultaneity of some behaviors will increase in the future due to, for instance, an increased reactivity of the customers to price signals, this hypothesis should at least be developed and argued.
- *ENTSO-E proposes to facilitate all players to participate in the market place*". It is not clear what exactly is meant by *"to participate in the market place"* and by *"allowed to be significant users"*. It must be clear that the DCC should not define how markets are to be developed in the future and ENTSO-E should not set out the path to the development of a specific market model and requirements for all users who will participate in DSR.
- TSOs must act as neutral facilitators as regards markets and be specific as regards their technical needs to guarantee system security.

Section 3 – Requirements of NC DCC in Light of future Challenges

3.1. Can equitable treatment be assured if the NC DCC includes only high-level requirements, with national legislative required to set specific requirements in each country? If so, how could equality in burden sharing be achieved in synchronous areas and across Europe?

	Yes

	No

DCC is expected to list requirements consumers must abide by in order to be connected. The section 3 of the questionnaire is dealing with capabilities for appliances. We believe that although those capabilities may be of value, detailed standardization requirements for appliances should be defined within the existing European standardization process carried on by CENELEC.

It is not acceptable that a relevant network operator (RNO) will accept or refuse connection of a customer because a given appliance does or does not offer some advanced capabilities. Furthermore, a RNO is very often not informed about the capabilities of the appliances.

If the requirements are applicable to customers entering a DSR program then one should make sure that the DCC is not instrumental, in order to impose requirements that would best fit in a "market" code addressing DSR as a service.

On the other hand, DCC should deal with the possible requirements if any are needed at the connection point for a customer to enter a DSR program: e.g. has telecom connectivity, or measurement provisions, protection settings.

These requirements must be neutral as regards the development of a market-driven dynamic response as set out in our reply under section 1.2.

For details, see response to the question 3.1.1.

3.2. In your opinion, is there any other new topic that should be included in the NC DCC?

	No

As stated in Article 2.1 of the consultation document, the goal of the NC DCC is to ensure effective and efficient development of Demand Facilities and Distribution Network Connections to meet upcoming needs to maintain secure system operation.

In order to maintain secure system operation, we believe that the following issues should be included in the NC:

- Demand facility classification according to peak power.
- Demand Facility connection point selection criteria considering:
  - Peak demanded power and voltage level.
  - Minimum network reserve margins after the connection of the demand facility.
  - Maximum voltage variation at the connection point due to the connection of the demand facility.
- Reactive power compensation at the transmission level, and
- Transmission networks are key to system security; therefore there should be specific compliance articles about them. Most of the value of the requirements towards other contributors (generators, consumers, others network operators) is highly dependent on the

adequacy of the transmission network itself

Both the selection of the connection point and the assessment of the needed network reinforcements are key issues to consider in order to ensure effective and efficient development of Demand Facilities as well as for maintaining secure system operation.

We acknowledge that it is difficult to provide a high level of detail about these topics in the NC due to the different regulations and remuneration schemes across Europe; but, in our opinion, secure system operation depends dramatically on the aforementioned issues.

Section 3.1 – Demand Side Response delivering Reserve Services

Questions based on the different available options put forth in section 7.1.1 in Appendix 1

3.1.1. What is your view of the analysis presented on the challenge ahead associated with reduced availability of reserve services from synchronous generators at time of high RES production?

In this section ENTSO-E analysis concludes that the massive development of RES will create an increasing "forecasting uncertainty" as regards short term load/generation balancing. Load deferral for short period of time is explored as an opportunity.

We agree that it is highly probable that massive RES development lead to a lower predictability for active and reactive power balancing. Due to wind and solar strong dependence on short term weather conditions and considering the important share of rather small facilities under development, it may be very difficult to make other than statistic prediction.

However, the impact on reserves necessary to guarantee the system stability will be very dependent on the size of each synchronous area, the rate of penetration of RES and its structure. Islands with very high level of intermittent RES and strong common modes on generation might be much more exposed than continental system with an intermediate share of RES and a natural diversification of wind regimes and cloud cover. **The system needs and thus the value of the proposed functions can strongly vary according to these parameters from one system to another.**

Furthermore, in **the Smart Grids perspective**, the already on-going development of the dispersed generation and the probable but still undetermined development of flexible demand **open opportunities to manage at a lower level some of the constraints of the electric system** on distribution or transmission network.

The European wide cost-benefit analysis for this requirement should be conducted. It cannot be based on quantification of the GB case alone. **It is absolutely necessary to determine the reserve requirements for the different synchronous areas and countries, taking into account different level of RES penetration**. This analysis could help identifying origination of costs and help solve the question of equitability raised in 3.1. and the related question of economic efficiency (allocation of costs to their originator(s).

In addition, **the cost benefit analysis shall encompass not only manufacturers' costs for appliances but total costs including full possible costs for control and necessary communication links if the function is to be activated from the system, administrative costs for deployment.**

The reserves should be procured via market whenever available where the load and generation will offer their services. The DCC should be neutral to possible market designs.

Last but not least, it must be clearly stated that DSO should have a right to validate DSR and refuse it if

grid stability is at risk (and not only ‘be consulted’).

3.1.2. Is there any class of users that should be excluded from providing these reserve services?

	Yes
	No

The solutions targeting different user groups should compete in a non-discriminatory way in order to encourage the most efficient solution.

Industrial and large commercial users directly connected to transmission networks have been and are likely to be the most accessible to the market signals, which does not imply their participation in the market.

Mass market solutions, like households need a different approach.

Smart Grids and smart meters play and will play a key role to increase demand-side participation in load balancing and eventually in “reserve” markets.

However these solutions will require an increased level of observability and manageability of equipment capabilities on the DSO side for situations when grid stability is at risk. The cost of deployment, communication and monitoring of this service should be taken into account. Manufacturers’ costs represent only a small part of total cost.

3.1.3. What would be the technical and economical limits to the development of DSR for industrial customers, commercial premises and Closed Distribution Network operators?

Any negative impact on Quality of Service for nearby customers must be avoided. Relevant network operator (RNO) shall be consulted beforehand to check for possible limits due to network constraints, RNO shall be in path of the activation process.

3.1.4. In Appendix 1, options for the provision of mitigating the shortfall of reserves are given, are there any comparable alternative options other than the ones provided in Appendix 1?

	Yes
	No

The appendix

1. assumes the obligation to integrate an unlimited amount of unpredictable RES in an island system,

2. assumes that even though those energies may be dominant in the energy mix they will continue to be given a preferential treatment and will not contribute to system services

3. deduces that there probably will be important difficulties in energy balancing and ancillary services

4. sets aside all alternatives that are not DSR related without discussing them (it is not the purpose of a DCC code to discuss non Demand solutions)

5. then deduces that DSR is expected to be a major option and should be implemented in a major scale

Given all these very constraining assumptions the conclusion is highly probable. However, it does not give information about the relative competitiveness of this solution against alternatives.

3.1.5. What would be the typical cost to equip one appliance (e.g. a washing machine or a heat pump controller) under each of the 3 alternatives?

Costs for existing appliances are probably very high (hundreds of euros per unit if not more), costs for new appliances might be considerably less if supported by standards. Costs of observability and controllability must be integrated.

The assumption that the incremental costs might be zero strongly supports a “let the market do it” strategy based on experiments to demonstrate the operability of the solutions and possible acceptance issues by customers.

No evidence is given on how the value of 5 €/unit is delivered, but from the context it appears to be manufacturers costs only without any consideration for the cost of possible connecting infrastructures. A comprehensive analysis including those is necessary. Costs of observability and controllability must be taken into consideration.

In many countries, load- response schemes like water-boilers, electric accumulation heating are already deployed on mass market and have proven to be extremely efficient for non-real time load deferral. These solutions are being adapted to a smart grid environment to provide more flexibility, and thus additional value. They should be integrated in the decision making to make sure the proposed solution has no adverse effect on their value.

3.1.6. What form and level of incentive do you believe is required to encourage consumers not to switch the reserve off under option 1 and 2?

Economic pricing should be the rule. It can be achieved through market schemes albeit at the price of a high volatility. Whatever incentive is determined it should be clearly related to the energy price not the network rate since all frequency related elements are linked to active load balancing and cannot be mitigated by network reinforcements.

The issue of the ex-post control of actual delivery of service does not appear to be analysed nor solved.

3.1.7. Considering the cost and consequences of the alternatives, do you support use of DSR for this purpose?

Considering the analysis in Appendix 1, we believe that there are too many uncertainties to give such a simple answer to that question. It seems wise keeping that option open for the future and further developing it, but not making it a mandatory connection obligation for future appliances.

3.1.8. Which of the 3 DSR alternatives (1, 2 or 3) would be your preferred option to achieve the greatest societal benefit and for what reason?

Alternative 1, i.e. define optional service capability, leave delivery to market, is the less constraining in the short run. It is the most compatible with the principle of open market participation.

3.1.9. If the services proposed here are provided, what further uses of these technical capabilities (see Appendix 1) would be most beneficial and why?

We believe that with respect to Smart Grid deployment, the statement should be reversed: in next years, the development of Smart Grid architectures will make capabilities of this kind available also for the benefit of TSOs.

In any case, once technical capability has become available via development of smart grids, the question of the control of the function that can be used also for this kind of service is crucial, especially if the

margin for reserves is to be kept available and unused by other players.

Section 3.2 – Demand Side Response delivering System Frequency Control

Questions based on the different options outlined in Appendix 2:

Regarding the DSR application related to temperature controlled demand to deliver a smarter, robust and a more user friendly LFDD-capability to avoid frequency collapse and hence contain the impact of rare events with large system frequency excursions:

3.2.1. Do you agree with the conclusion to apply this service universally using European Standards proposed as a result of the initial CBA based on Irish data?

	Yes
x	No

Irish case is clearly too specific and not representative enough to provide ground for general requirement. A thorough assessment should be performed for all European synchronous areas and different energy mix and RES penetration levels. Present defence strategies, based on controlled LFDD, will mostly remain relevant in the coming years. However system management shall evolve in order to adapt this strategy to the increasing share of embedded generation.

3.2.2. ENTSO-E believes this service can be introduced for new appliances (and temperature controllers) without any detectable difference to the primary purpose of the service of the appliance. Can you share any specific knowledge or experience and associated data you may have on this topic?

	Yes
	No

The contribution of DSR to LFDD will depend on presence of appropriate economic signals. To this respect smart grids and smart meters are of major importance to facilitate those signals reaching customers' appliances. Some DSOs have experience in load management of e.g. water-boilers, electric accumulation heating. This management is based on specific signals sent to the appliances. If for technical or other reasons those signals do not reach the customers' appliances, an immediate impact – not very much appreciated by customers – has to be expected (no hot water, no home heating).

Regarding the use of the temperature controlled demand beyond LFDD-capability for frequency response, following assumptions are taken: Primary performance of the temperature controlled function is not effected (operating within the same temperature tolerances);Conditions of near total absence of synchronous generators during windy / sunny conditions; Moderate demand for synchronous areas with extreme real-time RES penetration (initially expected in Ireland and GB)Three DSR alternatives have been identified (with a fourth alternative being 'do nothing'):

- Alternative 1: Voluntary service capability – mandatory usage
- Alternative 2: Voluntary service capability – voluntary use
- Alternative 3: Capability as standard, with mandatory delivery

3.2.3. If this further DSR for temperature controlled demand is introduced should this be arranged by each nation rather than at European level and if so should there be a requirement for **harmonising** within a synchronous area in order to provide burden sharing?

	Yes
	No

Harmonization for appliances is best achieved through standardisation at the EU level. DCC code is not to be used instrumentally to create such a harmonization even if it is considered as desirable after thorough analysis. The purpose of DCC is to set the EU level requirements for demand connection. Such requirements should for example include the description of the conditions necessary to ensure that such services do not adversely impact Quality of Service or safety.

3.2.4. Are the **types of demand** suggested in Appendix 2 the most appropriate to provide this service giving continuous response to system frequency deviation away from the target frequency (50.0Hz)?

	Yes
	No

These functions might be used for energy optimization due to their inherent capabilities, it is unsure that the margins would be available in case of necessity, unless a capacity reservation mechanism is devised.

3.2.5. Please provide comments on the **specific data** used in the initial CBA presented.

For EU level requirement the extent of the need must be assessed in various situations representative of the different synchronous area. It can not only be decided on a single case representing an island with a size of 4 million customers and a very high level of non-controllable RES as a basis for evaluation. Not only the size of the system, the amount of RES and its structure are key assumptions but also the degree of "embeddedness" of the DG that influences the efficiency of present strategies of demand disconnection. Most of the rationale is indeed based on the risks of a decline of the present possibilities of demand disconnection due to proximity of demand and small generation. These risks are known in island systems in presence of high level of LV connected PV generation.

3.2.6. The initial CBA indicates that alternative 1 may be able to provide the required services quicker than alternatives 2 and 3 (due to higher uptake). Do you have any comments about this **conclusion** and the underpinning **assumptions**, including

- 20% uptake for voluntary service capability;
- Increased unit cost for lower volume and supplying more than one option;
- The costs identified.

The conclusion is based on assumptions that are not underpinned by well-proven solutions. Comparable solutions are being tested in Smart Grids demonstration projects throughout Europe for further deployments. We do not share the conclusion.

Section 3.3 – Reactive Power Exchange Capabilities

Questions on general reactive capability based on the Appendix 3:

3.3.1. General questions

a. Do you agree that increasing displacement of synchronous generation is a significant new challenge?

	Yes
	No

The reactive power management issue is different from the frequency issue detailed before. The fact and extent of the "perturbation" that RES development will introduce in reactive power management is unclear. As long as they are subsidized, RES will economically displace conventional generation reducing the amount of controllable reactive power. However they can contribute to reactive power management, with probably less problem of proper stability since they usually rely on versatile power electronics. They can modify the distance between consumption and generation making reactive power issues more or less acute depending on their "embeddedness" level.

b. Do you agree that a review of existing requirements is needed, to take into account the new challenges mentioned above in Section 1.2 and 1.3?

X	Yes
	No

A review of requirement should not be excluded.

Some of the needed requirements are:

- Setting allowed voltage ranges in each voltage level,
- Minimum power factor at the DSO-TSO connection points to be maintained by the DSO,
- Minimum power factor for consumers in each voltage level.

c. Do you agree with the conclusion from the initial CBAs (Ireland & GB) that the societal benefits are greater for reactive management to occur closer to the reactive demand? In either case please provide the rational with supporting evidence where available on the aspects of the conclusion of the CBA that you agree or do not agree with.

	Yes
	No

Compensation of reactive flows at "close range" in a rather decentralised manner is usually considered more efficient given the high costs associated with reactive power transits on the network (increased losses and need for increased capacity of feeders offset rapidly the cost of additional compensation units). However, this does not imply that TSOs should be considered as no longer responsible for providing any reactive power. On-going development of smart grids solutions shows that optimisation of reactive power at "close range" is an acceptable solution on distribution network in the presence of generation. This should serve as a baseline for the evaluation of additional solutions including possible demand contribution.

3.3.2. Question specifically relevant for DSO connections

a. Do you agree that the development of cables and embedded generation introduce further challenges regarding reactive power control, including risk of high voltage during minimum demand?

X	Yes
	No

This effect is already noticeable in certain areas, it is often underestimated due to poor planning studies of reactive exchange at interface. In some cases it is aggravated by the difficulties TSOs are experiencing in developing their own infrastructures. Better coordination of network operation is a must that could lead to requirements for studies and exchange of information coupled with medium term planning consultation by TSOs.

b. Is it reasonable to ask DSOs to avoid adding to the problem of high voltage on the transmission system during minimum demand by avoiding injecting reactive power at these times?

	Yes
	No

It is reasonable to examine between DSOs and TSOs what is the most socially cost-effective solution for relieving the constraints in these situations. If absorption of reactive power is the best solution it must be implemented, if it is not then it must not be selected.

3.3.3. What is your view on the most appropriate way forward, including but not limited to the following options:

- Do nothing. Leave the TSO to sort out reactive balancing. The CBA of the transmission located reactive capability option in the CBA is relevant here.
- General limit on power factor at transmission to distribution interface, e.g. better than 0.90 or 0.95, with the value set in each country by each TSO subject to public consultation and NRA decision or an equivalent process as provided by the applicable legal framework, such as the definition of a limit in MVAr.
- As in the previous point except the power factor limit set on a local (or zone basis) by the TSO following CBA & consultation / NRA decision.
- Total separation between distribution and transmission reactive flows (i.e. 0 MVAr at the interface).
- The DSO at network exit points treated in the same way as generation is treated in network entry points with the DSO expected to regulate voltage continuously. Should this be limited to slow time scales of minutes (e.g. achieved by means including transformer tapping) or extended to fast acting reactive power support for disturbed conditions?
- Establishment of full reactive markets (e.g. in zones) encompassing DSO contributions as exist in some countries with respect to generation today?

Reactive power market might be a solution. However, before introducing local market, the necessity to coordinate between TSOs and DSOs at the connection point for the purpose of treatment of voltage constraints is a must, and could result in requirements affecting both network operators. Decision on the reactive power exchange between TSO and DSO should be based on the result of national CBA as it is not a cross-border issue by definition.

General limit on power factor at transmission to distribution interface with the value set on a local (or zone basis) by each TSO shall be subject to public consultation and NRA decision or an equivalent process as provided by the applicable legal framework, such as the definition of a limit in MVAr.

Section 3.4 – Voltage Withstand Capabilities

3.4.1. Do you agree with the analysis concerning the need of voltage withstand capabilities?

	Yes
	No

One should distinguish the question of dynamic voltage stability in case of incident from the question of reactive power flow in normal steady state, even if the resolution of the second question creates a favourable environment to diminish the risks related to the first question.

The first question is strongly linked with the defence strategies that the TSOs are expected to develop and implement, with the cooperation of DSOs and direct transmission network users. Transmission network development should contribute to reducing regional and supra-regional weaknesses that always play a role in large scale voltage collapse. Such incidents always start in area with important energy transits and scarce transmission assets. The national projections of the TYNDP should assess precisely those risks and the projects the TSOs are developing in order to mitigate them.

The second question is actually under the influence of the evolution of the electric system: increasing usage of underground network in Distribution and Transmission Network, strong to extreme development of intermittent energies with almost non-existent coordination tools as far as regulation is concerned. It can be addressed through technology and regulation, in order to recreate the necessary geographical coordination between network assets, consumption and generation facilities. Present call for input does not seem to envisage technical tools in order to boost coordination between network and, especially, generation assets.

3.4.2. What are the technical limitations to voltage withstand capabilities in your Demand Units in option iii?

Voltage protections are designed to protect units from potentially dangerous voltage excursion, mostly over voltage. Voltage withstand capability cannot be defined unconditionally.

3.4.3. What are the technical limitations to voltage withstand capabilities in your Demand Facility or Distribution Network in option iv?

Voltage protections at DN-TN are designed to protect network components from destruction because of over voltage. Values vary among countries.

3.4.4. What would be the costs induced by such requirements in option ii, iii and iv?

They depend on the value of the requirements.

3.4.5. Which alternative would you prefer? In case of option ii, iii or iv, shall the requirements be defined for all Demand Units/ Demand Facilities/ Distribution Networks or with specific voltage connection levels only?

Option i can be envisaged with a binding requirement for national codes to set detailed requirements and value, including the possibility to modulate according to regional network weaknesses (thus making it a Option ii different from a do nothing strategy.

Option ii links voltage withstand requirements to DSR commitment. The rationale behind this link should be made clear. It is contradictory to expect on one hand a strong development of DSR as a tool for market efficiency and system stability and, on the other hand to be specifically more demanding towards network users committing themselves in such programs.

Whatever requirement is set, it should apply equally to network users of the same significance

regardless of their commitment in DSR programs. It is a necessary (not sufficient) condition for a market development of these tools. Option iii can be made compatible with option I through the setting of minimal capabilities to be implemented Option iv can be combined with option i or iii.

Section 3.5 – Frequency Withstand Capabilities

3.5.1. Do you agree that certainty is required in the performance of elements in the electrical power system to ensure stable frequency operation and to minimise the cost of procuring frequency response?

	Yes
	No

The on-going development of intermittent generation already makes frequency management a critical issue as regards system security, the expected development of DSR, can possibly offer solutions but also create an additional complexity. Dealing with this question will certainly require an increased predictability of the behaviour of the components of the electric system, as long as it is reasonably feasible. It will also need a methodological shift in the operational management of security, since it appears difficult to ensure a complete predictability when major evolutions tend to reduce it. This fundamental change must be acknowledged.

3.5.2. Which option (i or ii) would you prefer and for which reason?

Option ii is inconsistent with a strong development of DSR on a voluntary basis. Whatever requirement is set, it should apply equally to network users of the same significance regardless of their commitment in DSR programs. It is a necessary (not sufficient) condition for a market development of these tools.

3.5.3. Please provide cost information to establish frequency withstand capability over the full range from 47.5 Hz to 51.5 Hz for Distribution Networks and Demand Facilities and explain which typical apparatus are needed.

Varying from one country to another.

3.5.4. Please provide cost information to establish frequency withstand capability over a limited range from 49 Hz to 51 Hz for Distribution Networks and Demand Facilities and explain which typical apparatus are needed.

Varying from one country to another.

3.5.5. Which frequency-sensitive installations do you have in your Distribution Networks or Demand Facility?

Consumption units can have their own frequency sensitive protection. They are beyond connection point and not directly reachable or known by the DSOs. Automatic frequency tripping is usually part of defence plan against low frequency events operated by DSOs in coordination with TSOs.

They do not modify the connection status between DN and TN, but have an action on the connected demand.

3.5.6. Please provide cost information to reinforce frequency-sensitive installations with frequency withstand capability over the full range from 47.5 Hz to 51.5 Hz.

Varying from one country to another. From modification of settings to retrofitting of components.

3.5.7. Please provide cost information to reinforce frequency-sensitive installations with frequency withstand capability over a limited range from 49 Hz to 51 Hz.

Varying from one country to another. From modification of settings to retrofitting of components.

1 ANY OTHER BUSINESS

Are there any other items or suggestions you wish to raise on the topic of the Demand Connection Code?

To be evaluated once a new version of the code is available.

On a general basis, the implicit framework seems to miss the importance of the on-going developments of Smart Metering and Smart grids solutions on Distribution Network. Even though they are not directly in the scope of the DCC, they shape the envelope of possibilities in the next decades.

Smart meter will help developing market solutions on consumers side which will contribute to finding possible answers to the system needs, and smart grids solutions will influence the TSO-DSO interface and give room for possible additional mitigation of problems. Most of the requirements seem to have been designed disregarding these major evolutions.