European Network of
Transmission System Operators
for Electricity

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.

2 Respondent Coordinates

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

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3 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?

Table 2 shows today's main options for providing system services in a very rough analysis. It has to be stated that it is difficult to the reader to comprehend the positioning with pros and cons as the description is quite general and the necessary services the different options should deliver are not clearly described. Also figures and cost benefit analysis are not given. So the qualitative consideration presented in table 2 can only give some indication, but there is no evidence that the pros and cons which are listed as principles may prove satisfactory in a more detailed analysis in any specific market context.

With regard to the evaluation of system services to be contributed by synchronous conventional generators we do not agree with the arguments listed in the cons- column: We do not think that a "Black and White" approach should be taken. In a future system with more variable RES generation conventional generators will be needed to a certain extent to as back-up capacity anyhow. Such generators than can also deliver a certain part of the necessary system services without special disadvantages.

Regarding the option "RES generators to provide their share of system services"we are of the opinion that in future renewable technologies are mature and should also contribute to system services. This refers to large units connected to transmission grids but also to smaller units connected to distribution grids where especially contribution to voltage and reactive power management is necessary for appropriate management of the distribution grid. We therefore do not support the arguments listed in the cons-column.

The same is valid for the evaluation of storage. Hydro storage is already today used and will be developed in future. There will also be new opportunities from decentralised storage and even usage of batteries in Electric Vehicles. So also storage will continue to play a major role in delivering system services.

With regard to the option "Demand Facilities providing a share of system services" it has to be stated that this is already today a well implemented system for larger customers which is with several initiatives under way to be rolled out for smaller customers. We support this development however in our experience it's probably very early to define the contribution and the related cost for system services to be expected from DSR in the mass market.

Also some options appear to have been deliberately shown a positive or negative, for example "100% CO_2 free.

Our summary of table 2 is that in future as today all mentioned options will be necessary to cover the needs of system services. The choice which option to be used to what extent should be kept to markets where all options should have equal chances for competition.

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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"?

Demand side management with large electricity consumers (industry) is already a well established part of measures for frequency management and there is currently a development with several measures to engage also smaller customers in this market. The European Commission, national governments and NRAs all throughout Europe and the industry are all presently supporting specific projects dealing with DSR in the mass market part of electricity supply..

DSR services can be defined within the larger and more comprehensive framework of DSM that are developing; as it can be agreed that DSR may represent a valuable tool to contribute, among other important objectives, to system stability and security as well. However as it is stated in more detail below a statement that "DSR has the potential.. to be relatively inexpensive" for us seems not justified based on the available status of information and development of this method.

The comment "DSOs need to contribute more towards managing a system with high RES (e.g. voltage)" is out of place in this table. As an independent statement this is also skewed, DSOs should be enabled to bemore active in managing their systems to maintain security with a high penetration of Renewables, thus contributing to a better functioning system.

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 in different 'types' (or 'sizes') in a similar way as it has been done in the NC on requirements for generators would be an appropriate. Not only the degree of detail should be adjusted to the purpose of each requirement, but also the targeted 'type(s)' of facility, 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.

In a general manner we agree with "ENTSO-E's initial view. We support the implicit basic assumption that there should be a market place for these services. We think that the statement "all users must be allowed to be significant grid users in the context of DSR" could make sense but is quite sensible for implementation as described further down in the answers.

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?

x	Yes
	No

DCC is expected to set minimum requirements for significant grid users; with clear focus on new connections. Identifying the necessary level of detail for requirements set on European level whilst keeping the necessary flexibility to answer regional/ national specifics to ensure equal burden sharing is the key challenge which has to be fulfilled with the NC DCC. Equal burden sharing can be achieved through obligation for every system to bring the adequate contribution to system services but keep it open which of the available options to chose and to which extent to use it.

The section 3 of the questionnaire is dealing with capabilities for appliances based on an extended approach for supply of system services for frequency management. We believe that although those capabilities may be of value, it is not the purpose of a connection code to induce a mandatory usage of such equipment for appliances. This should be done within the European standardization process (CENELEC) or even based on a well founded political decision.

It is practically impossible that a relevant network operator (RNO) would be in a position to accept or refuse connection of a customer because a given appliance behind the connection point does or does not offer some advanced capabilities.

In addition the principle that the connection codes describe only technical capabilities but do not deal with market design for implementation of services has to be strictly followed. The right place for provisions on market design in this context are the NCs for System Operation and "Market Codes"

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

	Yes
X	No

…

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?

Fundamentally we share the analysis of ENTSO-E in this section stating 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.

As stated above we see a variety of options to cope with this situation (increased interconnection, in-

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crease flexibility of existing synchronous generation, DSR, stronger involvement of dispatchable distributed generation, storage etc.). The market design should motivate the most efficient solution, with respect to ecology as well as economy / societal benefit In our view 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. Furthermore, in the Smart Grids perspective of, the already on-going development of the dispersed generation and the probable but still undetermined development of flexible demand open opportunities it will be possible to manage at a lower level some of the constraints of the electric system on distribution or transmission network. Even if the need and possibilities appear qualitatively sound, a thorough quantitative analysis has to be provided. This evaluation cannot be deducted from the UK case alone. It is absolutely necessary to determine the values at stake 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 originator). On the other hand, the magnitude of costs of the service should be assessed to check if there is really a point in developing and imposing sophisticated requirements in mass market. This assessment 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 have also to be added.

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

	Yes
x	No

Our answer is no in the sense that nobody should be excluded from the opportunity to participate in the DSR/DSM market. The solutions targeting different user groups should compete in a non-discriminating way in order to encourage the most efficient solutions. This competition will bring up the most appropriate solution. Today industrial and large commercial users are already the most accessible markets at reasonable costs. This situation will continue. If mass markets are to be addressed, solutions will probably be based on "automation" (like switch signals being broadcasted towards appliances (e.g. radio-control)). The costs of deployment, communication and monitoring of this service have to be taken into account. Manufacturers costs for the "switch in the application" definitely 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?

The development of DSR in Europe is just at the beginning. We see huge potentials in all European regions. DSR applications have been implemented in the industrial segment since long, In the next step smaller segments, e.g. commercial premises will be included. Technical limits for industrial customers

are clearly set when interferences of DSR measures become unacceptable with their production. This being at the same time an economical limit when negative effects for production are higher than the benefit. Economics also influence possibilities to mitigate negative influence of DSR on production by additional investments. This is a dynamic system. The situation is more or less the same for CDN. Also the same principles are true for commercial premises. But in addition there is a need for an intermediary like an aggregator or an ESCO is higher when it comes to mid-size and smaller premises. Seen from the grid perspective for a large scale roll–out of DSR 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 physical limits of the system due to network constraints which should not be contravened by DSR operations,

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?

x	Yes
	No

As stated by us in 3.1.1 and by ENTSO-E , we see a variety of options which should all play their role in managing the challenge The Appendix 1 is describing a very special and extreme case. It 1- assumes the obligation to integrate an unlimited amount of unpredictable of 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 asides 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- it deduces that DSR is expected to be a major option and should be implemented in a major scale. Given all these assumption the conclusion taken is highly probable. However, it does not give information about the relative competitiveness of this solution against other solutions. Also the question how and to which extent large scale DSR can contribute to securing reserve for up to 4 hours as defined as necessity is not answered

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?

Not being a manufacturer we do not know the exact value. The value of 5 €/unit appears to be manufacturers costs for new appliances only without any consideration for the cost of possible connecting Costs for existing appliances are probably very high infrastructures to ensure controllability (see above). A comprehensive analysis including those is necessary. Results from the EU funded SMART-A project indicate that the costs of having DSR capability can be

much greater than 5 €/unit;.

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.

Load command schemes are already deployed on mass market (water-boilers, electric accumulation heating,...) in many countries and have proven to be extremely efficient for non-real time load deferral in countries where this type of equipment is wide-spread. These solutions are being currently 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.

We strongly recommend to compare the costs for roll out of DSR to mass market to other competitive options (e.g. DSR with industrial consumers)

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?

Option 1 and 2 are leaving delivery of built in service capability to market. As stated above in our view that's exactly the most favourable option. Let the market decide. Economic pricing should be the rule. It can be achieved through market schemes albeit at the price of a high volatility. We agree that there is a challenge: the typical electrical capacity and the electricity bill of a residential consumers is relatively low, compared to commercial or industrial customers. As a consequence, there are limitations regarding potential incentive schemes. One proposed solution to mitigate this challenge is to integrate DSR in full scale DSM together with Home Automation to make this solution more attractive for customers. Such solutions are currently broadly investigated and tested.

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. In our point of view the question of the ex-post control of actual delivery of service does not appear to be solved for only one-way communication..

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

We strongly support usage DSR for reserve services, if the market design ensures a non-discriminating competition between all participants and all available solutions. However for the analysis in Appendix 1 there are too many uncertainties to give such a simple answer to that question. It seems wise to keep that option open for the future and further develop it, but not making it a mandatory connection obligation for future appliances.

Whereas DSR for industrial and large commercial customers appears as a proven area of development with interesting opportunities, the feasibility and interest of setting requirements towards household still remain unclear and should be investigated further in the full picture of DSM and Home Automation. Further industrial demonstrations will be necessary for evaluation.

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?

As a consequence of the variety of options, we see no need for any mandatory action. On the contrary, any mandatory specification e.g. for "wet" white goods could hinder the build up of efficient reserve markets including all possible options. Therefore alternative 1 (Define optional service capability, leave delivery to market) is preferable from our perspective.

It has to be thoroughly investigated which role the NC DCC has to play in deployment of this alternative and which requirements are necessary to be defined in this NC .

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?

If the technical capability is required, the question of the control of the function is crucial. Especially if the margin for reserves is to be kept available for the system it needs to be defined how interaction with DSM and Home Automation which might use the same capability for load reduction/ deferral could be appropriately designed.

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
We support the basic analysis that the increase of embedded power production raises the question how traditional LFDD can be developed in future to answer new challenges. However we are not convinced that a case study of a relative small grid is representative for the interconnected central European grid. A thorough assessment needs to be performed for all European synchronous areas and different energy mix and RES penetration levels to identify additional measures for the future..	

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
X	No
We do not have a distinctive knowledge on this. However we understand that the question of the possible command of the appliance and the definition of the body responsible for activation is not instructed. Some DSOs have a very long experience of programmed activation of loads connected to their network (e.g. water-boilers, electric accumulation heating) especially concerning the impact on distribution network and to a certain extent to the sensitivity of customers to remote activation of their load. This knowledge and experience clearly shows that distribution network impacts are non-negligible, and that customers are usually very well aware of the “hardly detectable differences”. of e.g. water-boilers, electric accumulation heating	

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Regarding the use of the temperature controlled demand beyond LFDD-capability for <u>frequency response</u>, 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?

X	Yes
	No

We are clearly of the opinion that such option should be arranged on a national level to be able to take in consideration substantial national specific conditions in power supply and deman,d etc,. (see statements above).. The purpose of NC DCC is to set the EU level minimum requirements for demand connection. In the context of DSR such requirements should for example include the description of the conditions necessary to be sure that such services deliver what is needed for frequency management , can be operated appropriately and do not adversely impact Quality of Supply or safety. 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.

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)?

x	Yes
	No

In the context of DSR, the most appropriate type of demand is that with associated inherent (or latent) storage. With this in mind there are other types of demand available which have not been considered, e.g. industrial pumping and Electric Vehicles.

As stated above, we see a variety of options for fulfilling reserve needs (increased interconnection, increase flexibility of existing synchronous generation, DSR, stronger involvement of dispatchable distributed generation, storage etc.). The functions described in Appendix 2 might already be used for energy optimization due to their inherent capabilities.

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 areas. 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 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.

We do not agree, such answer seems much too precise at this stage of development of this option. As stated above there are different options available and already implemented to offer the necessary services for providing reserve to the system. These options are operated today in markets which are well functioning and can and should further develop with integration of DSR. Introducing new mandatory services can only hinder and destroy these markets without having enough security that the proposed new solutions will really work and prove the promises made today. Different solutions for solving the challenge are being tested in Smart Grids and DSM demonstration projects throughout Europe for further deployments and need to be assessed to find out the most appropriate solution. In addition it has to be reiterated that the NC DCC should not provide for specific solutions but only list the necessary requirements/ technical capabilities for connection of users and systems for solving this challenge.

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?

X	Yes
	No

Yes we agree that with increase of power production from renewable sources means less synchronous generators might be available. 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 the amount of power production from RES increases following the political will, RES will economically displace conventional generation reducing the amount of traditional controllable reactive power. However RES can contribute to reactive power management, Using the capabilities of RES can make a substantial contribution to reactive power management inn the grid. The remaining question is then the location of such RES power production: if it's close to consumption (in distribution grid) it's less of a problem then when RES production is far from consumption and long distance transport is necessary (in transmission grid).

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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 requirements should not be excluded. However any analysis and review should thoroughly take in consideration specific situations in technical and economical field for every specific connection point. There is no “one- size- fits- all”- solution.

It is also absolutely necessary to take in consideration that issues of requirements and design at the TSO-DSO-interface have a very specific economical and financial component. This implies that only basic rules should be set on European level. In addition it has to be ensured that any new costs for DSOs initiated by switch of responsibility are covered by grid fees.

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.

X	Yes
	No

The general principle of a compensation of reactive flows at “close range” can be agreed in principle. Traditionally it derives from the relative costs of compensation equipment, losses in the network and development costs. However for a specific case it’s absolutely necessary to take the local circumstances in consideration. On-going increase of decentralised power production in some regions and development for smart grids solutions show that optimisation of reactive power at “close range” is an acceptable solution on Distribution Network in the presence of generation offering reactive power capabilities (as required today by national rules or in future by the NC RfG). 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

We are well aware of this effect from our distribution regions where we have to adapt with large increase of power production from RES. The situation is aggravated by the difficulties DSOs are experiencing in developing their grids and in installation of appropriate equipment for voltage measurement and management. In the Smart Grid Framework DSOs are intensively engaged in projects and initiatives to define and develop appropriate solutions and get equipment ready from manufacturers.

Better coordination in network operation and development between TSOs and DSOs is a must.

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. However also here it has to be stated that any change in responsibilities and related costs have to be covered by grid fees,

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?

We see a combination of the option in bullet 3 and the bullet 6 as the most appropriate solution from the given choices. The power factor at the exchange point should be set between DSO and TSO in negotiations taking the local situation into consideration. Grid operators should have a choice to require reactive contribution from generators and (large) customers in a standard range.

Outside this range provision of reactive contribution from generators and customers through reactive power markets might be a solution provided that they are not locally too narrow.

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 to reduce regional and grand-regional weaknesses that are always a component of large scale voltage collapse is among the tools. Such incidents always start in areas 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.

DSOs are currently running major initiatives and projects to identify and deploy solutions to answer this challenge. Present call for input does not seem to envisage technical tools in order to boost coordination and new methodologies for control between network operators and generation asset owners.

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?

Depends 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 seems 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. Also practical implementation would be a substantial problem here.

Whatever requirement is set, it should apply equally to network users of the same significance regardless of their commitment in DSR programs.

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. This was identified as basic assumption for the requirements set in the NC RfG. The implementation of this requirements will already allow for better handling of this challenge. In addition the expected development of DSR, can possibly offer solutions but also create an additional complexity.

However "yes" or "no"- answer is impossible as it is not clear for us what is meant with "Frequency Withstand Capabilities" of a distribution network. Except for the grid connection requirements and their fulfilment by generators and demand we do not see a lever for providing this capabilities in the distribution grid available. Frequency ranges in which equipment has to operate safely are defined by international standards. Such standards are not set by NC DCC.

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

As stated above we do not understand what is meant with "Frequency Withstand Capabilities" of a distribution network. Therefore we can't evaluate the options.

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.

Depends from definition of "Frequency Withstand Capabilities". Varying from one country to another. More detailed information and time is necessary to provide data for a serious CBA on this issue if this is the intention here.

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.

Depends from definition of "Frequency Withstand Capabilities". Varying from one country to another. More detailed information and time is necessary to provide data for a serious CBA on this issue if this is the intention here.

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.

4 ANY OTHER BUSINESS

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

At the end of this questionnaire we want to remind the fact that in the Framework guidelines for Grid Connection issued by ACER on 20 July, 2011 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. This rules have to followed when defining the provisions in the NC DCC:

Also it has to be clearly kept in mind that any kind of market design is not the issue in this Network Code but has to be defined in the related Codes (e.g. NC for System Operation, Market Codes) This rule has to be followed to avoid any problems resulting from difficulties in interpretation when the same issue is regulated in different papers. Avoiding overlaps and gaps and taking care for "synchronization" of the different codes is the task of ENTSO-E.