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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How would you describe your type of organization(s)?[1]	Demand Response Full Service provider
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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?

Residential consumers are specifically mentioned, however, ICI (industrial, commercial, institutional) consumers are not. Our experience from enabling DSR in Germany shows clearly: industrial sites are willing to participate in DR programs now and can contribute effectively and with high reserve energy immediately.

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"?

Entelios acknowledges that DSR has the potential to support the fulfillment of EU goals in an economical manner, providing services in energy markets paid at their real value.

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?

Though market issues may be out of scope of the DCC – ENTSO-E should still take into consideration that existing market regulations – and especially balancing group management issues in Germany may be pointed out – are far more difficult to overcome than technical problems.

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
If these high-level requirements support an equal treatment of reserve energy from generation as well as from DSR / energy curtailment.	

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

X	Yes
	No
Balancing group manager (managing companies), at least in Germany, are currently blocking Demand	

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Side Response to a large degree. Therefore, technical requirements can only be discussed if above issues have been overcome.

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?

none

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

x	Yes
	No
Postponing users with a minor reserve energy contribution and comparatively high installation and operation costs would be advisable.	

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?

DSR for industrial customers requires an analysis of their respective production processes and a consideration of curtailment limitations for each of the industrial DSR program participants. However, this is possible and can be done, as proven by the Entelios approach.

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
Each country in the EU has found ways of dealing with peak over supply from RES. While supply from RES is constantly increasing, the demand for Reserve energy is not (*at least in Germany*) increasing but rather rapidly decreasing, as even a superficial analysis of Reserve energy prices shows. Further analysing WHY this is the case might provide interesting insights in a future DSR market integration.	

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?

Entelios believes this question should also be asked for industrial, commercial and institutional sites (ICI). Costs to equip an ICI site are in the range of 1.000 Euro per site (decreasing) but **can provide between <100 kW and >50 MW of Reserve energy per site**. Note: the wide range of reserve power doesn't significantly influence the costs to equip the site.

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Entelios recommends asking for "equipment costs per MW" and not "equipment costs per participant" only.

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?

Consumers should not be tasked with making energy curtailment decisions on a day-to-day basis. However, they may decide for a "global parameter" and be done. In addition to that, DSR should be fully transparent for consumers as well as for industrial participants. Providing Reserve energy should be nearly "invisible" for all participants, with other words: it should not provide any inconvenience and all actions (curtailment requests) shall be highly automatized.

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

Entelios fully supports DSR for the described purposes but recommends outlining a roadmap putting industrial participants for DSR first, later on Electric Vehicles (if any) and Residential/consumers at a time it becomes economically feasible.

Also, a certain threshold of the actioned reserve capacity shall be reserved for DSR curtailment requests, especially those requests when call durations below one hour are in need (everything below one hour is not really economically feasible to be answered by conventional (gas) peaking power plants.

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?

Entelios believes that market based delivery is the only viable option if the objective is to establish a competitive market for DSR services. Consequently, Entelios advocates options 1 and 2.
However, in line with our remarks made at point 3.1.4., such a new DSR related market would need to be regulated to prevent this market from being manipulated or abused.

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?

Entelios sees an increasing interest in the market for energy demand side forecasting, data analysis and business intelligence, in line with confidentiality and privacy regulations.

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?

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	Yes
X	No
Irish and UK cases are very particular with respect to frequency behaviour of the network. The CBA should be completed with an analysis of interconnected systems, where extreme events are rare and primary and secondary reserve needs (and costs) are lower. Records of past extreme events in each synchronous area would be helpful to assess the potential benefits of the solutions.	

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?

X	Yes
	No
Entelios has extensive experience based on data analysis from industrial temperature controlled appliances in the range of > 1 MW, since 2010. This analysis shows clearly that "catching up" effects from temperature controlled devices might be difficult to integrate in Reserve energy scenarios. Even an effect known as "Resonance disaster" might be drawn into consideration. While the consumer indeed is not directly affected by this new service, the grid as a whole might suffer. Such a service should, in our humble opinion, not be integrated in a fully automatized or even "cybernetic" approach, but has to be centrally managed (or even better "decentralized", but not at "atom" level, since unwanted swarm behaviour, as described above, might occur)	

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)

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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
This might further limit the risk of a global system failure.	

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
ENTSO-E should consider the availability of the DSR resource depending on the period of the year and time. Regarding extreme events, the risk of cold-pick-up effect (every appliance starts consuming full power as soon as the frequency gets back to the normal range) effect should be considered in the case of decentralized local controllers for wet white appliances. If this represents an issue, additional costs should be considered. Regarding frequency response in general, the massive participation of demand units may impose structural changes in terms of the actual frequency control schemes. The potential implications should be considered.	

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

A complete set of assumptions and input parameters is missing; therefore any comment would be pure guess work. However, my personal (and potentially wrong) guess is that gaining Reserve energy from consumers is over optimistically and from industrial sites over pessimistically painted.

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.

Entelios believes there will be a strong and voluntary uptake (at least) by industrial DSR program participants as long as: • they are paid the real market value for the services they provide to the grid • market regulations do not further hinder the growth of DSR aggregators, such as Entelios: ○ Balancing Group Management shouldn't be allowed to "dry out" DSR initiatives

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○ Reserve energy market should be protected against manipulation

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
…	

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
Before reviewing requirements for “significant users”, it is necessary that ENTSO-E provides a quantitative analysis of future needs in terms of reactive power compensation.	

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
X	No
The studies are based on a single bus requiring compensation. In this case, we agree that it would be less expensive to install the compensation closer to the reactive demand. However, this fact cannot be generalized, as planning the compensation at the transmission level also allows benefits of mutualisation. Indeed, in the case of two substations in the same area, one demanding reactive power (a) and the other injecting reactive power (b), the TSO would have to compensate the difference only (a-b) while the DSOs would have to compensate the sum (a+b). The initial CBAs present particular cases of a too restricted area. They should consider at least a regional case with a realistic evaluation of the needs in terms of compensation at the transmission and the distribution levels.	

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

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	No
…	

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?

X	Yes
	No
But ENTSO-E should clarify at what voltage levels the interface is and what are the needs of TSOs in terms of compensation.	

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?

Entelios acknowledges that it would be relevant to have local coordination between DSOs and TSO on the most efficient location of compensation devices.

Section 3.4 – Voltage Withstand Capabilities

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

X	Yes
	No
…	

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

…

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

…

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

…

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?

…

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

…

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

…

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.

…

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.

…

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

…

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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.

…

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.

…

4 ANY OTHER BUSINESS

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

Entelios recommends to rather enable existing (voluntary) markets to function, e.g. by disabling abuse & manipulation and by empowering all market participants to play their respective roles within the established regulations, than making participation in newly designed programs and markets mandatory.

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