

1st Grid Connection European Stakeholder Committee (GC ESC)

Friday, 18 March 2016 from 09:30 to 16:00

ACER, Trg Republike 3, Ljubljana

Draft Minutes

Participants			
Uros	GABRIJEL	ACER	Chair
Paulina	POPLAWSKI- STEPHENS	ACER	
Astrid	ANESTAD	NVA	
Jeremy	VINCENT	CRE	
Michael	WILCH	EDSO for Smart Grids	
Aurelio	TUBILLEJA	EDSO for Smart Grids	
Jonathan	SPROOTEN	ENTSO-E	
Irina Mihaela	MINCIUNA	ENTSO-E	
Helge	URDAL	ENTSO-E	
Stela	NENOVA	ENTSO-E	Secretariat
Christophe	ARNAUD	CECED	
Marc	MALBRANCKE	CEDEC	
Rene	LUIJTEN	CEDEC	
Luca	GUENZI	EUTurbines	
Daniel	FRAILE	EWEA	
Michaël	VAN BOSSUYT	IFIEC	
Brittney	BECKER	EASE	
Patrick	CLERENS	EASE	
Ulrich	FIKAR	ORGALIME	
Klaus	OBERHAUSER	VGB Powertech	
Ton	GERAERDS	VGB Powertech	
Eric	DEKINDEREN	EURELECTRIC	
Jan	RASMUSSEN	EURELECTRIC	
Thomas	LESCARRET	EURELECTRIC	
Garth	GRAHAM	EURELECTRIC	
Srinivasa	RAJU ADDALA	EUGINE	
Alexandra	TUDOROIU-LAKAVICE	COGEN Europe	

1. Opening

1.1 Welcoming address & Draft Agenda

Uros Gabriel (ACER), Chair of the GC ESC, welcomed the participants to the first GC ESC meeting. After a quick tour de table, the draft agenda was approved without additional comments.

The Chair clarified that based on the key points mentioned/identified during the presentations, he will identify topics for further discussion in the afternoon.

2. Functioning of the Grid Connection ESC

2.1. Approval of Draft Terms of Reference (ToRs) of the GC ESC (15 min.)

The Chair explained that GC ESC ToRs are 99% in line with the Market ESC (MESC) ToRs. The ToRs for the System Operation ESC will also be, as close as possible, in line with these to ensure consistency between the ESCs.

A few minor changes were introduced to the GC ESC ToRs. First, the title was amended to reflect the correct abbreviations for the GC ESC so „Network Code“ was removed from the title to ensure consistency. Second change from the draft ToRs relates to paragraph three of point two to stipulate that ACER may review the ToRs from time to time, involving GC ESC members as well.

Third, regarding the second objective, the ToRs are amended to replace „submitting proposals for amendments“ with „discussion on proposals for amendments“ since submitting proposals implies formal powers for the ESC which is not in line with the mandate of the Committee.

Garth Graham (EURELECTRIC) commented that based on the broader Network Code (NC) context, the primary focus is on implementation and identifying problems comes in second place, and suggested splitting the second objective of the ToRs into two separate sentences based on this principle (the amendment suggested refers to the text after the second comma of the second objective).

The Chair explained that all objectives have been approved in the MESC and that all ToRs should be aligned to avoid confusion. It is implicit in the text that implementation monitoring is the first objective of the ESC, and the specific wording is inherited from the MESC.

Marc Malbrancke (CEDEC) expressed support for the changes made and mentioned that this additional part of the sentence is not in the MESC ToRs. He remarked that Article 6 in the GC ESC ToRs on the IT Platform to enable stakeholders to express comments is not available in the MESC ToRs and asked if it is going to be integrated in the new ENTSO-E active library as compared to the ENTSOG functionality platform.

The Chair concluded no additional changes to the ToRs on this point.

2.2. Presentation of the IT platform (ENTSO-E)

Stela Nenova (ENTSO-E) presented the key features of the IT platform which was developed by ENTSO-E to provide technical support to the work of the three ESCs. This platform is hosted on the ENTSO-E website and provides information on the ToRs, composition of the ESCs, past and future meetings' information, and possibility for registration for a specific meeting. The objectives of the IT platform are to facilitate stakeholder access to NC implementation information, allow stakeholders to follow the ESC and participate in ESC discussions, and increase overall transparency and easier access of all interested parties to the documents relevant to NC implementation. The submission of requests to the ESCs and further stakeholder comments can be enabled through an online contact form on the platform. The IT platform allows as well the public broadcast of ESC meetings. The ENTSO-E documentation centre, currently in test phase, will complement the platform by enabling stakeholders to access in one place all documents relevant for NC implementation. To further facilitate the work of the GC ESC, the same process can be followed as for the MESC: stakeholders can submit their presentations and documents to ACER and ENTSO-E so that they can publish all necessary documents ideally two weeks prior to each meeting. All documents will be uploaded to the IT platform and a notification email will be circulated to inform all members about updates to the GC ESC meeting space and documents. To respond to the question of Marc Malbrancke related to the ENTSOG platform on functionality, ENTSO-E noted that the IT platform supports the work of the three ESCs' and is different from the ENTSOG platform (which was developed jointly with ACER).

Garth Graham noted that in order for stakeholders to be able trace back, proper archiving should be ensured for the documents which will be in the documentation centre.

Stakeholders agreed that they would like to receive a notification by daily email with any new documents which are uploaded on the IT platform prior to each meeting.

The Chair further clarified that the IT platform and the gas functionality platform are different, and noted that based on the information from the MESC, the notification platform in the gas sector was set up jointly with ENTSOG to collect stakeholder concerns regarding gas NC implementation and is in trial phase as of mid-February. Feedback on the added value of a similar platform for the electricity sector is being gathered, and a similar platform can be developed and implemented if deemed useful.

Garth Graham noted that it would be useful to discuss how the process of gathering comments from stakeholders on NC implementation should be best undertaken in the future.

The issue of collecting data for the implementation of the NCs would be discussed in the afternoon.

3. Planning the adoption of the Grid Connection Network Codes (European Commission)

The European Commission (EC) could not attend the meeting but the Chair presented the provisional adoption schedule on the slides submitted by the EC: 'network code on requirements for grid connection of generators' (RfG NC) is expected to be adopted in April 2016, the 'network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules' (HVDC NC) and the 'network code on demand connection' (DCC) are expected to be adopted by August 2016.

4. CNCs' (Connection Network Codes) implementation status (ENTSO-E)

4.1. Stakeholders priority on the CNC implementation guidance topics

Ms. Irina Minciuna (ENTSO-E) presented the results of the ENTSO-E survey on Implementation Guidance Documents (IGDs), conducted between 15 December 2015 and 22 January 2016, on the topics across all grid connection NCs taking into account stakeholders' priorities. Stakeholders rated 16 topics in order of importance, and based on the stakeholder input received, ENTSO-E selected three additional guidance topics (harmonization, real-time data & communications incl. redundancy and special issues for type A) to add to the consultation topics as well as the topic of voltage stability in a converter dominated system.

Despite the time spread between the adoption of the three GC NCs, ENTSO-E wants to go ahead with all of them in parallel as planned and finalise the drafting of the IGDs in the spring of 2016. The drafting phase will be followed by a one month consultation set for June/July 2016. The final IGDs are expected to be issued in September 2016.

Considering the difference in time of the entry into force of the GC NCs, ENTSO-E continues to analyse the best approach to having the IGDs publicly consulted (ENTSO-E will probably consult twice on the draft IGDs).

4.2. Outcomes of the workshops on 25 February and 29 February 2016

Helge Urdal (ENTSO-E) presented the outcomes of the ENTSO-E workshop at the Energy Community premises in Vienna on 25 February 2016 dedicated to discussing national implementation of the CNCs. 15 countries from the region (including Ukraine and Georgia) were present, and France and Romania presented their own national processes and plans for CNC implementation. The purpose of the workshop was to meet with representatives from the South East European region working on CNC implementation at the national level, address legal issues (including non-EU countries' specificities) share examples of national processes and future plans and encourage early involvement and implementation in all countries.

Another workshop on CNCs in Brussels on 29 February 2016 focused on the IGDs. The workshop had an interactive nature and all participants had a chance to contribute in small group discussions. The workshop tackled all 20 IGDs. All the stakeholders' suggestions can be accessed [here](#).

Helge Urdal presented the first set of IGDs and the main objectives of each of them.

Set 1 includes Rate of Change of Frequency (RoCoF), frequency-related parameters for non-exhaustive requirements, synthetic inertia for frequency regulation, and interactions between HVDC controllers. Regarding the IGD on RoCoF, the objective is to give advice on what considerations are appropriate before selecting a national value for RoCoF withstand. Specific guidance on related frequency issues are foreseen in other IGDs. Some of the stakeholders' suggestions include clear definition of RoCoF and how to measure it, technology performance differences, and machine and system protection, among others.

Jonathan Sprooten (ENTSO-E) gave an overview of the 2nd set of IGDs, which include general guidance on parameters for non-exhaustive requirements and for making non-mandatory EU requirements mandatory, as well as determination of the thresholds for Types B, C and D generating modules and issues specific to type A generators. More specifically, the IGD on parameters for non-exhaustive requirements aims to provide a general overview of the requirements for the three NCs.

Stakeholders suggested that this IGD contains a list of the non-exhaustive parameters of the three NCs which would need a national choice, including categorization per criteria such as voltage/frequency, as well as the scope of the expected coordination, further clarification on the goals defining the relation between coordination between Member States and harmonized values, guidance on processes for the design and justification of non-exhaustive parameters, among others.

Helge Urdal presented a brief overview on the third set of IGDs, which include voltage related parameters for non-exhaustive requirements covering the three NCs, reactive power requirements for PPMs and HVDC converters at low/zero active power, reactive power on the TSO-DSO interface associated with the three requirements in the DCC for reactive power exchange, and voltage stability in a converter dominated system in light of emerging evidence that very high penetration of converter based power sources may lead to lack of stability. Regarding voltage stability IGD, stakeholders suggested that this IGD contains detailed analysis and characteristics of the problem, evaluation of the impact on TSOs (in case of both normal operation and for rare system split conditions) and the needs, and specification of the first functional requirements which need to be further developed.

The fourth set of IGDs include topics related to post fault active power recovery requirements in the HVDC and RfG NCs and how to implement them, system restoration requirements and guidance on how to define the non-exhaustive and non-mandatory technical requirements, fault current contribution for PPMs and HVDC and real-time data & communications including redundancy and the various flows between TSO-DSO, DSO-DSO and DSO-generating units. Regarding fault current contribution, stakeholders have suggested that this IGD includes justifications on why the requirements are needed, recommendations on permissible time delays, current levels and accuracy of the fast fault current injection, among others.

The fifth set of IGDs includes harmonization, guidance on compliance, testing and monitoring, cost benefit analyses (CBAs), as well as instruments, simulation, models and protection for non-exhaustive requirements. IGDs on harmonization aim to give an overview on the potential for further harmonization as well as limitations via the national implementation processes and the role of standardisation in driving harmonization further where the NC remit may not permit going further, taking into account the NC narrower focus on cross-border impacts and coordination. Regarding CBA, the objective of the IGD is to combine the main considerations when preparing the national processes which implement CBAs and cooperation between parties to complete them.

Stakeholders' recommendations included the development of an independent body for the CBA, further defining the scope and methodologies for the CBA, and validation via consultations and the NRA (national regulatory authority) decision.

Eric Dekinderen (Eurelectric) noted that many of the topics are related to all Member States in a synchronous area (SA) - whenever each Member State defines its own value so this has to be decided on a supranational level and asked what ENTSO-E is doing with regard to defining values. He pointed out that some Member States (ex. FR and BE) have started to define such values already though these can be tackled later in the IGDs and wondered if they have started too early and if their efforts are in vain. Regarding current injection and faults, he pointed out that two aspects have to be distinguished – principles of subsidiarity and the market approach of suppliers who prefer to have one value for all countries in Europe. He asked what the situation is regarding non-EU countries, such as CH, and if they want to define another value than the rest of Europe.

Helge Urdal replied that CH is strongly engaged and even if it is theoretically possible, it might be highly unlikely that it decides to define a value different from the rest of the EU but that if this happens, there are ways to deal with it. Furthermore, he pointed out that harmonization is a very important issue and agreed that the market approach of suppliers is key and that ENTSO-E is conscious of that. ENTSO-E is working with standardisation organisations and made an assessment on interaction between NCs and standards. A separate team is working on resolving challenges that still exist in aligning standards. Regarding the question on currents for PPMs, Helge Urdal clarified that the challenges with subsidiarity are known and ENTSO-E is still working on the IGD on how to evaluate this: possibilities include full harmonization on some issues with no cross-border impact through the process of standards, motivated by drivers other than those behind the CNCs, e.g. efficiency for manufacturers and ease of implementation.

He added that efforts done so far in defining national values for non-exhaustive parameters in some Member States are not irreversible and it is not too early for Member States to start. One limitation for IGDs is that there cannot be a formal consultation on this aspect before adoption of the CNCs and the current compromise tries to combine the best approaches.

Eric Dekinderen asked about ENTSO-E's definition of RoCoF. Helge Urdal clarified that RoCoF was surprisingly prominent in the key topics and ENTSO-E has fully defined RoCoF requirements for HVDC and offshore. However, for RfG and DCC, unlike in case of the HVDC NC a fully exhaustive set exists still needs to be determined. This may end up having some geographical aspects and justifications as per national considerations. On frequency topics, this can be

different for each of the five synchronous areas. For SA Continental Europe (CE) there is a further challenge of achieving a complex coordination among many MSs.

Eric Dekinderen asked, as CE has so many NRAs, whether, the GC ESC would help define the general values. Helge Urdal noted that the starting point now is delivering the guidance as required in the CNCs through the 20 IGDs (which are hard to deliver in the given period of time). This will take things forward, and it is unlikely to be a good time to change the process. Topics can of course be discussed in greater technical detail, in case the Chair decides to go further.

The Chair noted that if topics are of interest to all associations, the discussion can go deeper into the technical items but time is also limited.

Garth Graham suggested that a subgroup of the GC ESC can be dedicated to: considering how much divergence exists from ENTSO-E's guidance on implementation, checking whether it is of practical use and setting up a mechanism to monitor compliance. He suggested that ENTSO-E should see if this would be possible.

Ulrich Fikar (Orgalime) asked how many IGDs are foreseen for publishing and whether ACER will look into them once they are final.

Helge Urdal replied that 20 IGDs are foreseen for publication, 10 may be ready in the first phase but in the interest of all, the aim is to deliver all 20 IGDs at once (going through all phases of approval by all TSOs, consultation, modification and final approval) possibly by September 2016.

Chair indicated that ACER is following up on all developments and NC deliverables and elements. ENTSO-E has its own process, based on stakeholder involvement and ACER will monitor the process and the documents as per common practice.

5. Presentations from European Associations

5.1. CECED

Christophe Arnaud (CECED) presented CECED's organisation which comprises 20 associations across 25 countries, with members active in the manufacturing of home appliances for demand side response (DSR) and distributed flexibility. As households are owners of demand units and their role is expected to increase in the future in light of emerging markets on DSR, CECED plays an influential role at a national level.

The DCC is an important tool for achieving EU energy policy objectives. Fostering DSR and the empowerment of consumers and households are of crucial importance in the energy transition.

Christophe Arnaud emphasized that it is important to have voluntary agreements and remunerated compensation to households participating in DSR schemes and that requirements should be proportionate to the actors involved. Households should be enabled to participate at aggregated level and to fulfil requirements indirectly through a third party (i.e. Aggregator).

CECED's priorities regarding NC implementation issues include the application of internal market rules, such as safety rules/energy performance requirements which should be set at EU level and should be applicable to all actors. In addition, further convergence of national requirements and cooperation with standardisation bodies and the development of harmonized rules for compliance should also be ensured in order to support NC implementation and the emergence of the DR market.

CECED welcomes the GC ESC as a good forum for stakeholder dialogue and monitoring of national implementation. CECED would like to see further clarification of requirements in the IGDs regarding the impact on households. In addition, it is important to make sure NRAs have the same understanding on these requirements, and to correct possible discrepancies.

Garth Graham commented that wider recognition should be given to the fact that there are five types of stakeholders on demand side – TSOs, DSOs, customers, aggregators, and suppliers and it still has to be clarified who does what in some instances (such as cheaper half hour which creates problems for DSOs).

Regarding DCC, Article 1(d), demand facilities in a closed distribution system, if a demand unit at home or a small independent facility providing DSR is not covered by this NC, this can create barriers to provision of DSR in compliance with the NC and it will not be delivered to the network but to the supplier.

Helge Urdal clarified that the half-hourly focus on energy is outside the scope of the DCC. The key issues of interest to households are harmonization and standardisation and there is in NC DCC a simple easy to implement proposal for an autonomous service (DSR SFC, e.g. for domestic cooling and heating) which deals with these, based on all stakeholders' contributing and all stakeholders benefitting (from reduced balancing costs). Unfortunately, a number of stakeholder organisations focused narrowly on their own interest (commercial interests overriding consumers' interests), had made implementation of this more difficult. However implementing DSR SFC could still be done at a national level, in spite of it being less than ideal not doing it across Europe based on NC DCC plus details in standards. The DSR SFC would deliver substantial environmental improvements in addition to its contribution to security of supply at extremely low cost and avoiding inconvenience to end users.

IFIEC indicated that they fully support both the voluntary as well as the remuneration idea but that the voluntary part is essential, as forced participation is out of the question. Furthermore, as the DCC was written with ancillary services in mind, attention needs to be paid as DSR being offered to system operators for participation in ancillary services would have to adhere to more requirements than DSR not being offered to system operators, thus potentially creating an additional barrier. Attention should be paid to that at the national level.

5.2. EASE

Patrick Clerens (EASE) introduced the association which represents the voice of the energy storage community and is quite new. EASE represents the whole chain of the energy storage world across its diverse membership, including equipment and component suppliers, TSOs etc.

EASE promotes the role and benefits of energy storage, supports a fair market design and funding for energy storage. As various new storage technologies have developed, ranging from chemical, electrochemical, electrical, mechanical, and thermal, EASE considers that storage needs to be addressed in a technology-neutral manner. Patrick Clerens presented a comprehensive list of energy storage applications which are classified based on the segment of the energy system that they serve, e.g. generation, transmission, distribution or customer services through enabling system services, DSR, electricity storage etc. Storage can act alongside the chain as a generator, network asset, or a consumer. The added value of energy storage needs to be recognised in all relevant EU legislation and a level playing field for energy storage technologies is necessary for the successful development of the energy storage market at the EU level.

EASE would like to see an EU-wide definition of energy storage to ensure that all Member States will have the same understanding of energy storage. EASE is working on a definition for storage as input to EC legislative work.

Garth Graham agreed that it is very important to have a good understanding of how energy storage fits into the three NCs in light of its different functions, e.g. if storage acts as a generator, it will compete with others in the same category, if it is a consumer device, it needs to have the same characteristics etc.

Patrick Clerens responded that storage could play all roles but the question is about the ownership of storage – if it acts as a generational asset, is it an asset within the market, can it be operated by a regulator?

Garth Graham commented that if storage is determined to be a generator regardless of ownership, the application of it as a generator pursuant to the RfG NC as the device is considered to be a type of a generator.

Patrick Clerens noted that some difficulties were perceived in the network code on emergency and restoration when cutting off energy storage is needed (either automatically or manually) and at the start of restoring. The question is if we should cut off or switch from load to discharge and how to get it into the system and make the system work.

5.3. Engine

Srinivasa Raju Addala (EUGINE) presented Eugene's slides, the voice of European engine power plant industry, with 30 GW installed capacity in the EU. Eugene power business provides emergency reserves with capabilities for high ramp up to restore power where needed, cogeneration to ensure efficient supply of heat and electricity, and flexibility on switching between fuels and RES energy. Engine power plants ensure high reliability, flexibility and availability, as well as flexible backup for renewables.

Srinivasa Raju Addala noted that EUGINE is a new association and has not been part of the CNC drafting process but happy to see some concerns addressed by ENTSO-E and others. Some outstanding CNC topics which directly impact EUGINE include fault ride through (FRT) requirements, reactive power requirements, and compliance processes and derogations. Srinivasa Raju Addala explained that FRT requirements (milliseconds) have not yet been standardized between the Member States. Solutions need be to technology-neutral but have to be seen in the overall interest of the transmission system as they might be too expensive otherwise. Regarding verification methods, Srinivasa Raju Addala explained that EUGINE would like to see further clarification on requirements and standards for compliance including whether a simulation or a real-life test is needed. For FRT, another question is whether reliability is considered on a unit or a plant level basis since losing one engine has less of an impact than losing a whole plant. On reactive power, if the range is too wide, solutions become expensive, and, currently, each Member State has its own requirements for power plants to connect to the grid.

Helge Urdal commented that FRT requirements are strongly linked to fault clearing time. There is ongoing work to making fault clearing time (and therefore FRT) as short as possible but it is also expected that, in a future power system with lower short-circuit power than today, protections may operate slower. He also quoted a recent paper from the International Conference "Developments in Power System Protection" (DPSP2016) which showed that under extreme penetration the protections (notably distance protections) may not detect at all the most common fault, a single phase to earth fault. Upon requests Helge has provided the paper with this further information which is attached with the minutes..

Luca Guenzi (EUTurbines) asked for further clarification on whether it is better to have shorter times for the FRT.

Helge Urdal clarified that the reliability requirement is on the connection point which means the whole plant needs to comply. For the compliance process, this is ensured at a national level, i.e. the type of activity and then, normally, simulation. If on lower end, there is mass testing.

Jan Rasmussen (Eurelectric) commented that the ESC should aim to get a common understanding of the system needs in order to ensure the most efficient implementation of the NCs, as it might be that not all generators need to survive the 250 milliseconds requirement as long as there is a sufficient amount of them that can.

Garth Graham added that based on the GB experience, it is important to consider the risk of stranded generation assets in case banding standards are reduced too quickly. Reducing the level too dramatically increases the risk that new generators built to comply with different standard levels will face different, even higher costs compared to existing generators.

Jonathan Sprooten (ENTSO-E) explained that retroactive changes are expected to result in higher costs. It is important, therefore, to try to foresee the future to decrease overall costs. Furthermore, FRT requirements are non-exhaustive requirements in the code and their cost impact on generating units greatly depends on the profile defined. Therefore, NC allows a certain degree of freedom for finding suitable solutions.

5.4. Orgalime

Ulrich Fikar introduced Orgalime which represents the European engineering industries, including electric and electronic equipment manufacturers across the value chain and all voltage levels and comprises a number of national associations. Key implementation topics for Orgalime include ensuring a clear, swift and harmonized CNC national implementation, ensuring the DCC supports a fair and non-discriminatory DSR market and proper & timely coordination with European and International standardisation work.

Regarding national implementation, he pointed out that it is said that 75% of the requirements are non-exhaustive technical requirements, with further specification delegated at the national level. In many Member States the processes for national specifications are not clear or not defined by CNC and it is not clear yet how the national implementation will work. Sufficient information is needed about the national specification process, including clarifying who is in charge of the processes, which requirement is being specified, the start and end of the process, and the final deliverables, among others. Experience shows different approaches of the implementation process in the Member States but it is important to have an overview about the different approaches to ensure that all Member States are on board. Technology manufacturers should be involved throughout the process on non-exhaustive requirements and a harmonised approach should be pursued when specifying the non-exhaustive requirements and in, including during alignment with existing International and European Standards and coordination with on-going standardisation work.

Furthermore, Ulrich Fikar explained that grid stability and DSR should be seen as mutually reinforcing. CNCs should enable fair access by all consumers to the market for Demand Side Flexibility, and technical requirements should not hamper this. DCC implementation should enable rewarding the participation of all actors accordingly, allow for voluntary agreements between end-user and TSO on providing DSR on a contractual basis, allow for third parties to fulfil the requirements on behalf of the end-user, and allow for workable information sharing requirements for the end-consumer or through third parties.

Some outstanding issues regarding standardisation include the lack of sufficient links between standardisation and establishment of NCs. There were late efforts by ENTSO-E to identify changes which impact existing standards, which could affect existing or new network equipment. The Memorandum of Understanding between CENELEC and ENTSO-E and ongoing work on standards has been highly appreciated.

Additional challenges arise from the fact that CNCs requirements are not meant for existing equipment and failure risks exist in the power supply system as well as in contradicting requirements about information exchange. In that context, Orgalime further recommends that national specifications are aligned with existing European and International standards and ongoing work on such standards, and that Member States, competent authorities and system operators fully implement relevant articles in the NCs that emphasise the need to take standardisation into account.

Ulrich Fikar added that Orgalime offers to provide experiences from its network, including national member associations, on the national implementation process to this group.

Garth Graham recommended that on harmonisation it would be helpful if a NC mapping process could be undertaken to include information on the entire NC line by line, including how the NC is going to be reflected at the national level. Listing all paragraphs and information through publicly accessible web links on a platform to indicate all obligations for all stakeholders in the EU, would be highly appreciated.

In response, Helge Urdal explained that regarding responsibility at the national level, there were several workshops to discuss this issue since last September and all information has been published. He clarified that the responsibility for designing the process cannot be imposed from an EU point of view although the main features of this process can be shared and used. The main concern is that some Member States do not yet have a process. The ENTSO-E active library will help to solve the issue, as ENTSO-E is collecting information for both internal and external purposes, which will be available in the active library for each country and for all countries. 34 countries are currently involved and ENTSO-E is working with additional countries in order to share information on their processes.

5.5. COGEN

Alexandra Tudoroiu-Lakavice presented on behalf of Cogen, which promotes cogeneration at the EU level, and presented its vision for GC NCs implementation. In light of the wide range of CHP technologies and designs in terms of interaction with the grid, the NC presents challenges for CHP manufacturers due to different national regulations which entail additional costs. Further EU standardisation of technical requirements would be key for NC implementation. In addition, national implementation should take into account the need for harmonised requirements at least at SA level, and non-technical provisions should be implemented consistently at a SA level as well. Regarding generator types discussions on the thresholds between Type A and B, there could be possible impacts on non-technical provisions linked to Type A (e.g. emerging technology classification/simplified derogation procedure). Cogen recommends to have common generator type thresholds at SA level, and in case any additional technical requirements are necessary for the larger size low voltage connected units, this should be addressed through appropriate standards.

The earliest deadline in the (RfG NC) relates to manufacturers having 6 months from entry into force to apply for “emerging technology classification”, and it appears that only UK has drafted guidelines on Title VI of the RfG NC. Cogen

recommends that Common Synchronous Area guidelines should apply for “emerging technology” status as this should reduce the burden on both manufacturers and regulators (following the UK guidelines). Further coordination by ACER on this would be welcome. Additionally, depending on how Title VI implementation advances, there may be scope to open discussion on applying the 0.1% threshold at SA level and reallocation of thresholds within a SA.

The Chair noted that the application of guidelines on a Common Synchronous Area level is not prescribed in RfG NC. Ofgem has covered the UK SA but for other SAs this is not the case. The Chair will take the recommendations to the NRAs. As they will probably want to better understand, more information from stakeholders is welcome regarding how many potential requests NRAs should be expecting in relation to this (in case rough number is known.)

Alexandra Tudoroiu-Lakavice clarified that only micro-CHP would ask for the classification but it may be applicable to others. The Chair asked Cogen to send ACER information on these numbers, and noted that it is likely that guidance will have to be embedded at a national level in order to respect national requirements.

Garth Graham asked for further clarification on the definition of emerging technologies and noted that NRAs will need to understand how these technologies will be used, what they are and how they will be defined.

Cogen noted that there is emerging technology flexibility and that all technologies have different impacts. No cumulative impact on the grid is expected and it could be useful to separately consider the technologies that do not have cumulative impact on the grid. Thinking on this has to start now due to early deadlines in the NCs.

Helge Urdal commented that preserving the security of supply in the current environment is a challenge and the loss of in-feed can cause problems. Increasingly, any loss of infeed when the system is disturbed is a cause for concern. He pointed out that there is a method for calculating volume of emerging technology which will be applied in all Member States. This allows equal treatment of all Member States giving a certain allocation split between Member States based upon relative size (total national demand) which is fair and reasonable. If the allowance is not used in some Member States, reallocation between countries is not a good idea.

Jonathan Sprooten noted that the point raised on thresholds levels will be noted and the IGD will reflect that. The approach of the NC is not to lower the thresholds but to keep the global objectives: security of supply, optimizing costs of the system, and taking all into account (energy mix, importing etc.).

5.6. IFIEC

Michaël Van Bossuyt presented IFIEC, the association of industrial energy users, and its main recommendations regarding CNC implementation. IFIEC perceives the criteria and requirements in the DCC and the RfG NC as EU compromises and would like to see further action on European harmonization while taking into account existing national situations.

Regarding DCC, IFIEC would like to see solutions which optimize system costs, as opposed to TSO costs or avoid local grid problems. Further possibilities are needed to go into island mode for some industrial demand facilities and closed distribution systems, and the specifications to connect or disconnect to the grid need to be addressed adequately.

Refurbishments and significant modifications should be defined, since significant modifications of an existing installation could impose new requirements and higher costs, thus leading to closure or at least non-investment and non-modification. Regarding significant grid users in the DCC context, further differentiation between transmission-connected versus distribution-connected users is needed based on a reasonable balance between imposed obligations and costs. Attention should be paid to the specific position and requirements for demand facilities providing DSR.

RfG NC imposes absolute thresholds across EU regarding typologies A, B, C and D, but applying more stringent thresholds may push certain categories out of the market. In addition, some criteria for determination of categories may have cost implications, so complying with requirements may be challenging. Certain risks may exist regarding TSOs' role as a monopoly especially in the derogation process whereby requests must be filed with TSOs. Also, the derogation process is time consuming.

IFIEC would like to see more careful consideration in the CBA during retro-active application of requirements. Frequency and voltage ranges, FRT should be decided based on a pragmatic approach, taking into account the actual system needs, in order to avoid cost increases.

Michaël Van Bossuyt added that CDSOs are different than public grids, with fewer demand and generation facilities. Complex or stringent requirements on CDSOs and their demand and production facilities should be avoided.

Garth Graham noted that in order to avoid perceptions of vested interests, the CBA process can be done through appointing a third party to do the CBA which has no vested interests.

IFIEC pointed out total costs must not increase as a result of the CBA process.

Helge Urdal underlined that TSOs focus on minimizing total costs for the system. Regarding DSR and extra costs for delivering security of supply, he explained that there is a risk, if the service providers do not comply with the NC requirements, that these service providers will not be available when required to deal with a problem on the power system. IFIEC pointed out that only providing DSR to system operators (and not to for example the intraday or day ahead market) implies having to adhere to these additional requirements (and thus costs) based on the DCC, resulting in potentially less DSR volumes being offered to system operators and thus resulting in a higher overall system cost. The CBA will be a challenging issue as information on costs may not be immediately available. Early evidence at national level is showing that stakeholders are unwilling to share cost information. ENTSO-E can either assume therefore that there is zero cost or it can make up its own mind about stakeholders costs. Greater willingness by stakeholders is needed to compliment the TSO work to define the benefits, otherwise there will be no meaningful CBA process.

Helge Urdal clarified that the Swedish case of a FRT of 250 milliseconds is not encouraged by ENTSO-E. Sweden found its own solution using the FRT requirement to ensure that a major power system problem does not happen again.

VGB noted that they would like to see ENTSO-E address both benefits and costs, including where they appear, and identify the responsible parties which will bear the costs.

EUTurbines recommended that other parameters which ensure grid safety should be considered.

5.7. EWEA

Daniel Fraile presented EWEA's position on the current state of play of CNCs and implementation. He noted that there are interpretation risks in translations, and risks in copy-pasting of requirements. Tight deadlines may lead to a reduction in technical focus. Manufacturers face high uncertainty, increased costs and tight deadlines for compliance.

Further work is needed when addressing non-exhaustive requirements in close cooperation with industry to avoid unnecessary and heterogeneous requirements, applying compliance & testing requirements (how does the NC relate to existing standards), clarification on scope (e.g. RfG NC vs. HVDC NC retrofitting measures) and timing for compliance with new rules. The aim should be structural harmonization and clarity at the national level, and formal engagement of national stakeholders as well as a transparent monitoring mechanism.

Key points of importance for EWEA are the non-exhaustive technical requirements with a direct cost impact on the wind industry. The national implementation phase will be crucial (FRT, reactive power). EWEA has developed their own specifications on non-exhaustive requirement including identification of gray zones in the RfG NC, to be ready by end-March.

Regarding compliance and testing, no clearly defined compliance rules exist yet for product testing. As requirements are set at the point of connection (system level), not all individual units may need to have the same capabilities. The wind industry would like to have single testing/compliance standard to optimize cost and time.

Further clarification on scope and inconsistencies is needed with regards to offshore wind plants and criteria that onshore and offshore (DC connected windfarms) need to fulfil. Requirements should not reduce flexibility in running the offshore wind park in the most convenient way.

Daniel Fraile concluded that EWEA would like to see clear and commonly agreed technical specifications in future harmonization of the GC NCs, where all relevant aspects are included ('common utility practice') and where all requirements are specified at the point of connection. As next steps in the process, EWEA would like to see the adoption of its proposals on specifications for FRT and Q within the IGDs, and the setting up of transparent national platforms and processes in coordination with TSOs, manufacturers and developers to support faster implementation of the NCs.

EWEA would further like the application of best practices, not new requirements, and will share their working document and the recommendations once ready. Daniel Fraile pointed out that it would be useful to have an expert group on specific and technical issues.

Eugene shared its common concerns with reactive power and asked about the comparison between testing environments (real vs. simulated), and pointed out that firm guidance is needed.

Helge Urdal responded that there is a high level regime in the RfG and the HVDC NCs. In existing codes at national level the amount of detail varies. GB has the most detailed existing guidance. Regarding reactive power at low P and the difference between synchronous generators with minimum stable generation and others, ENTSO-E is looking at an approach based on system wide view, evaluating the different options, and will reflect this in the IGD.

EDSO for smart grids commented that in the second test approach, each turbine is tested, then a group project is done to check if the power plant itself is compliant with the GC NCs. The German case demonstrates the value and use of this approach. For wind and PV, DSOs have found a solution to manage this and a paper describes this further. A link with documents on the topic can be found [here](#).¹

The Chair asked whether it can be assumed that these practices will find their way into the IGDs.

Helge Urdal noted that the IGD will include the principles not the details but the IGD will contain references to the GB and the German examples.

5.8. VGB Powertech

Ton Geraerts presented the mission and vision of VGB, European technical association for power and heat generation, which includes 488 members in 34 countries with an interest in promoting and optimising the operational safety, environmental compatibility, and economic efficiency of existing plants and future power and heat generation plants. The VGB Working Group on Network Codes has been actively involved in the NC development process since 2011, and currently focuses on national implementation processes in the Member States.

VGB expects the ESC to be a platform for open and constructive discussions, to foster transparent decisions where each stakeholder's opinion has the same weight as ENTSO-E's opinion. The ESC can serve as a platform to identify when different national implementation of e.g. non exhaustive requirements leads to market distortion and to discuss improvements as well as ensure that the IGDs are fair, balanced and clear.

Jonathan Sprooten agreed that ESC discussions should support the drafting of the IGDs.

VGB hopes that all stakeholder views will be part of the process and lead to improvements, and wondered what changes there are since comitology on RfG NC last summer.

Helge Urdal noted that the EC should be asked to provide a comparison of the versions (version in June and the most recent version).

The Chair will ask the EC to provide the ESC with a tracked-changes version of the GC NCs.

5.9. EUTurbines

Luca Guenzi introduced the business work of EUTurbines which is on the interface between grids and Original Equipment Manufacturers (OEMs), in understanding TSOs' needs, converting into generating products, and on the other hand explaining technical challenges for grid stability or balancing concerns, and proposing technical solutions. EUTurbines is active on the underlying technical challenges of NCs and monitoring the development of technical issues

¹ For further information: a third-party certification scheme was introduced in Germany in 2009 to accelerate and simplify - at the same time at reduced costs - the conformity tests of distributed energy generators during the grid connection process in Germany. A brief description can be found in section III in following [paper](#). Current issues of the detailed technical rules describing measurement and validation can be found [here](#).

into socio-economic risks. EUTurbines has actively supported ACER and ENTSO-E activities in the NC drafting process, including RfG NC and the Network Code on Load-Frequency Control and Reserves, among others.

Luca Guenzi explained that the ever evolving grid will need adequate generator capability and requirements, and the right balance should be found between generator, demand, HVDC, system needs and system operation requirements. Requirements should be cost-effective and proportionate.

Topics of key importance for EUTurbines include RoCoF, guidance on compliance, testing and monitoring, post fault active power recovery, frequency related parameters for non-exhaustive requirements, among others. Luca Guenzi pointed out that that the IGD should be compatible with existing or upcoming standards. EUTurbines grid experts work on resolving new technical challenges in the context of ever-evolving grid markets, unstable grids, remote systems, and the team looks forward to supporting the ESC work on technical and technological questions (gas and steam turbines, industrial plant/cogenerations) and to fostering harmonisation of the requirements.

Helge Urdal commented that RoCoF is not specific to gas turbines. He illustrated the importance of generators being resilient with the example of Italy's national blackout, following loss of 15 large generators when the system looked like it would survive. These generators maybe ought to have remained connected and supported the system and hence avoided the national total blackout. Helge Urdal also referred to repeated national blackouts in Malaysia in the early 1990s caused by lack of RoCoF resilience of gas turbines.

5.10. EURELECTRIC

Eric Dekinderen presented Eurelectric, the association representing the electricity industry in Europe, which works on various issues from electricity generation and markets to distribution networks and customer issues. Eurelectric expects the GC ESC to involve stakeholders in the work of EC, ACER and ENTSO-E on NCs implementation. Eurelectric expects the ESC to be a channel for early discussions, to enable the integration of results, to provide an opportunity to influence methodologies, terms and conditions and procedures that will be specified according to the NCs, as well as a forum to identify problems and discuss improvements to the NCs.

Key topics of interest for Eurelectric include further harmonisation at EU level (e.g. national implementation), classification and certification of Power Generating Modules (PGMs), both synchronous power generating modules and PPMs) especially type C and D PGMs, the definition of substantial modification of type C PGMs the respect for international and European standards (IEC-EN), ENTSO-E's non-binding guidance on implementation, and ensuring cohesiveness with other NCs.

5.11. Joint DSO presentation: CEDEC, EDSO for Smart Grids, EURELECTRIC, and GEODE

Marc Malbrancke gave a joint presentation of the DSO associations on their expectations from the GC ESC and from CNC implementation.

DSOs would like to see more clarity on the procedures for collection of information regarding implementation, including how it will collect the information at the national level and responsibilities for collecting information.

Regarding ENTSO-E guidance on implementation, further clarification is needed on the GC ESC's role in the modification of the IGDs.

Marc Malbrancke pointed out that DSOs in Europe are quite diverse at many different levels (voltage, grid connections size etc.), including more than 2400 DSOs, and NC implementation should keep this in mind. Some requirements may have relatively bigger impacts on smaller DSOs. Therefore, implementation should be flexible, including the use of derogations.

Michael Wilch pointed out that the DSOs have increasingly more connection of generation, so they can do active system management of the grid. In Germany, for example, no new conventional power plants are being connected to the transmission system, instead distributed generators are connected to the distribution system. The RfG NC and the guideline on electricity transmission system operation (SO GL) will impact distributed generation and thus operation of distribution systems.

In addition, both RfG NC and DCC impose administrative work on DSOs, in particular for operational notification, compliance monitoring, compliance testing, compliance simulation, derogations, as well as the definition of a number of non-exhaustive requirements (in coordination with the TSO) for RfG NC and the possible installation of additional grid assets (e.g. reactive power requirements) for DCC.

Regarding RfG NC and choice of thresholds between type A, B, C and D PGMs in each Member State, DSOs need to have influence on the progress for defining thresholds in MS, including the used justifications and which standards should be used for implementation of operational notification by DSOs. Attention should be paid to not placing an administrative burden on prosumers and providing clear timelines for implementation (of all Articles in the GC NCs). In addition, a clear link with the scope of the GL SO regarding data exchange has to be kept in mind, to ensure consistency between all NCs regarding the data exchange provisions.

Marc Malbrancke noted that regarding DCC, some important aspects for the DSOs should be considered including reactive power requirements at the T/D interface, range specifications in light of the diversity of DSO voltage level connections, application of the requirements on an aggregated level of connection points and further cooperation on joint analyses as much as possible.

Helge Urdal requested DSOs' support on standards. From experience, routine compliance process may not be to apply. Helge Urdal clarified that the SO GL does not broaden the scope of data exchange. Marc Malbrancke would like to see further evidence of this.

Jan Rasmussen noted that a standard has been developed within the framework of WG 3 of CEN/CENELEC for generators connected to public LV and MV networks. Its compliance with the RfG NC has not been confirmed by ENTSO-E or NRAs. Broad EU standards should be developed in compliance with the NCs. Given the above, Jan Rasmussen encourages ENTSO-E to get more involved in WG 3 of CEN/CENELEC for generators connected to public networks.

Helge Urdal agreed that testing of equipment, based on NCs alone, is difficult and that standardization bodies should be encouraged to move forward. Helge Urdal confirmed that ENTSO-E has a team working on standards and that mapping of the differences has taken place. He will convey Jan Rasmussen's messages to the team leader.

Michael Wilch noted that EN 50438 is already available and shall be followed by LV-connected generation. Information on the increase of renewable distributed generation in Germany can be found [here](#).

Helge Urdal responded that NCs at least cover the basics.

Jan Rasmussen pointed out that according to the System Dynamic Group in ENTSO-E, the standards developed are not compliant. Helge Urdal clarified that ENTSO-E will look into a solution.

Garth Graham noted that compliance testing for DSR should not be forgotten as it represents a significant part compared to generation.

6. Discussion on key implementation topics raised in Associations' presentations

The Chair summarised the five frequently mentioned topics for further discussion: information about national specification, refurbishments/significant modifications, more stringent thresholds for generators and harmonisation at EU level. He noted that out of these, one topic remains insufficiently addressed. It was referred to by several stakeholders using different terms, e.g. information on national specifications, IT platform to collect information on NC implementation, development of an active library linking to national implementation sites, and national specifications implementation.

Garth Graham recommended a database for NC implementation with an exhaustive list of all non-exhaustive requirements and the ability to search against each Member State's national arrangements. Simplest solution could be an excel sheet with links. EWEA would like to see another source indicating timelines on the processes, responsible parties etc. Marc Malbrancke welcomed the idea once all information links are available.

Jonathan Sprooten noted that public consultation in each Member State will provide greater clarification. Helge Urdal underlined the risk of different viewpoints.

Jan Rasmussen asked if TSOs can submit a list of requirements which they must specify to the GC ESC and that the GC ESC communicates the requirements to the relevant stakeholders.

Irina Mihaela responded that responsibility rests at the national level. Visibility on the process, however, is needed. Information will be put on national sites once a consultation starts, and ENTSO-E can provide the respective links.

Ulrich Fikar stressed the importance of visibility and understanding of the implementation process at national level, as well as highlighting problems and providing best practice examples.

The Chair concluded that there is broad stakeholder consensus that additional steps are needed to improve transparency in the implementation phase. The Chair asked ENTSO-E to come up with an ambitious plan to address the need for information on national specifications within the framework of the ENTSO-E active library and present this plan at the next meeting in June.

Garth Graham pointed out that the impacts on DSR must be considered especially at national level, and provided the fridge example. Garth pointed out that too often the focus is on power generators but for DSR the implications are profound when we get further down to the domestic level: if a fridge is helping to provide DSR and providing a service to the network, DSR will be impacted based on what the consumer uses. A question that still remains is in case of a replacement of a fridge or light bulbs (LEDs for CFLs) in a home providing DSR whether would this meet (or not) the substantial modification criteria in the DCC.

Helge Urdal clarified that if the fridge is replaced and if DSR is implemented for frequency control, a standard national fridge from the manufacturer can be used.

Eric Dekinderen noted that if capacity remains the same, the term refurbishment might not be appropriate. IFIEC agreed that the same applies for large scale demand.

The Chair asked about the best approach to dealing with the need for more explanation in the IGDs. Would it be possible to get IGDs finalised within the legally binding deadline and later annexed with additional topics?

Helge Urdal noted that it will be a challenge to finalise the 20 IGDs for ENTSO-E within the legally binding timeline.

Luca Guenzi asked ENTSO-E to consider the case of a cogeneration plant connected to the industrial system in the NC requirements. Helge Urdal replied that ENTSO-E will look into that.

7. AOB:

The Chair noted that it is possible to form expert subgroups but a clear mandate on objectives and deliverables should be given to the group. It can be an ad-hoc group working on temporary deliverables. He welcomed suggestions for subgroups which can be discussed at the next meeting.

Ton Geraerds asked ACER: Having heard in the presentations of several stakeholders on what they expect from this ESC, are these expectations realistic or not. Uros Gabrijel confirmed that the expectations seem reasonable, however the GC ESC will deliver according to the agreed ToR.

8. Next meetings for 2016:

6 June 2016 (Brussels, Belgium), September (tbc), December (tbc)

Summary of decisions & actions:

- Chair will ask EC to provide the ESC with a track-changes version of the GC NCs.
- ENTSO-E to come up with an ambitious plan to address the need for information on national specifications within ENTSO-E's current work on the active library and to present this plan at the next meeting in June.
- Emails of all members of the GC ESC to be shared to facilitate communication.
- Recommendations on expert sub-groups to be sent to Chair, so that they may be considered in next meeting.
- ENTSO-E will look into a solution to the issue raised by Jan Rasmussen (Eurelectric) (the standards developed are not compliant according to the ENTSO-E System Dynamic Group).

Annex I

List of subjects for Implementation Guidance Documents

1. Rate-of-change-of-frequency withstand capability (RoCoF)
2. Frequency related parameters for non-exhaustive requirements
3. Need for Synthetic Inertia for frequency regulation
4. Interactions between HVDC controllers
5. General guidance on parameters for non-exhaustive requirements
6. Determination of the thresholds for Types B, C & D power generating modules
7. Guidance on making non-mandatory requirements at European level mandatory at national level
8. Special issues for Type A
9. Voltage related parameters for non-exhaustive requirements
10. Reactive power requirement for PPMs & HVDC converters at low / zero active power
11. Reactive power on TSO-DSO interface
12. Voltage stability in a converter dominated system
13. Post fault active power recovery
14. System restoration requirements
15. Fault current contribution from PPMs & HVDC converters
16. Real time data & communications including redundancy.
17. Harmonisation
18. Guidance on compliance, test and monitoring
19. General guidance on CBAs
20. Instruments, simulation, models & protection for non-exhaustive requirements