

## 9<sup>th</sup> Grid Connection European Stakeholder Committee (GC ESC) & Joint SO-GC ESC session on cross-code topics

Thursday, 8 March 2018 from 09:00-16:00  
ENTSO-E, Brussels 1000

### Draft Minutes

Participants			
Uros	GABRIJEL	ACER	Chair
Jakub	FIJALKOWSKI	ACER/E-Control	
Jeremy	VINCENT	CRE	
Adriana	GUTH	BNetzA	
Elaine	O'CONNELL	European Commission	
Maria Eugenia	LEOZ MARTIN-CASALLO	European Commission	
Michael	WILCH	EDSO for Smart Grids	
Aurelio	TUBILLEJA	EDSO for Smart Grids	
Ralph	PFEIFFER	ENTSO-E	
Ioannis	THEOLOGITIS	ENTSO-E	
Stela	NENOVA	ENTSO-E	
Alexander	DUSOLT	ENTSO-E	
Thanh-Thanh	LE THI	ENTSO-E	
Alberto	BRIDI	CEDEC	
Marc	MALBRANCKE	CEDEC	
Florentien	BENEDICT	CEDEC	Joint SO-GC ESC
Luca	GUENZI	EUTurbines	
Klaus	OBERHAUSER	VGB Powertech	
Eric	DEKINDEREN	VGB Powertech	
Thomas	LESCARRET	EURELECTRIC	
Sanni	AUMALA	EURELECTRIC	
Sebastien	GRENARD	EURELECTRIC	
Garth	GRAHAM	EURELECTRIC	
Ellen	DISKIN	EURELECTRIC	Joint SO-GC ESC/web
Markus	WATSCHER	EURELECTRIC	Joint SO-GC EC/web
Thomas	SCHAUPP	CENELEC	
Daniel	FRAILE	WindEurope	
Michaël	VAN BOSSUYT	IFIEC	
Mike	KAY	GEODE	
Brittney	BECKER	EASE	
Bernhard	SCHOWE-VON DER BRELIE	EFAC	
Alexandra	TUDOROIU-LAKAVIČĚ	COGEN	Via webstreaming
Toma	MIKALAUŠKAITE	ORGALIME	Via webstreaming

## Joint SO-GC ESC session on cross-code topics

Thursday, 8 March 2018 from 9:00 to 11:30

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### ***1. Opening***

The GC ESC Chair Uros Gabrijel (ACER) welcomes the participants to the joint SO-GC ESC session on cross-code topics. The agenda for the joint session is adopted without comments.

The minutes on the cross-code topic of inertia from the joint SO-GC ESC session on 14 December 2017 are approved (available [here](#)).

The Chair notes that one set of slides from VGB will be presented under AOB at the GC ESC as their scope covers GC ESC topics only.

### ***2. Feedback from the informal brainstorming hosted by VGB and Eurelectric on cross-code issues***

Thomas Lescarret (Eurelectric) presents the outcomes of the informal brainstorming workshop on cross-code issues organized by Eurelectric and VGB on 31 January 2018 as a follow-up of the discussions at the 8<sup>th</sup> GC ESC (slides available [here](#)). Participants identified a number of topics and issues that need further investigation, such as technical issues, technology-related topics (ex. battery storage), regulatory schemes for certain installations, amendments' treatment etc. Two main categories of solutions were identified as needed: precisions (regarding interpretations, definitions, or additional information on requirements) and amendments for improving NCs (as per process based on ACER guidelines and inputs based on wider stakeholder agreement). The proposal as agreed at the brainstorming session is that a formal structure needs to be established to help address those issues in the future – ex. an ad-hoc stakeholder group as per the ToRs.

Ioannis Theologitis (ENTSO-E) explains, that as also discussed during the brainstorming, the idea is to create an EG under the umbrella of ENTSO-E to use the organizational experience ENTSO-E gathered with EGs in the IGD drafting process. The feedback was positive, and ENTSO-E's suggestion is to formalize the EGs under ENTSO-E similar to previous EGs. The EGs would gather the technical knowledge and experience to discuss technical topics and would report back to each ESC.

Marc Malbrancke (CEDEC) notes that the ESCs are in place for relevant discussions, and they should not be duplicated by other groups in parallel. Any such group shouldn't affect the working of the regular ESC and its members' availability in case some ESC members also become members of some EGs.

The Chair notes that the EGs should be created the same way as it was done for the IGDs, through a structure allowing for efficient exchange of expertise by the members for very detailed questions that might come up and which might require some fluctuations in experts from associations. The EGs would provide input to the ESC.

Michael Wilch (EDSO) recommends that the majority of questions are kept with the ESC and discussed in the ESC forum. If there are more technical questions which need special expertise, an ad-hoc group can be formed to get the technical expertise.

Ralph Pfeiffer (ENTSO-E) explains that the proposal from ENTSO-E's side is to avoid parallel working structure, and recommends that single issues should be picked from the list based on priorities identified by a stakeholder questionnaire (in a similar way as ENTSO-E asked stakeholders on the priorities for IGDs and the most important were picked up first).

The Chair explains that different approaches should be chosen depending on whether one looks beyond a particular provision from an expert point of view or more broadly in which way the entire set of provisions should evolve - if detailed questions should be discussed, then an EG can be nominated to work on those and report back to the ESC. If the general direction of development of the RfG is discussed, then this discussion should take place at the ESC.

Thomas Lescarret (Eurelectric) clarifies the formal proposal is to discuss technical issues –EGs report to the ESC and EGs should not take any decision, but work on analysing the topics, like the VGB questions. Such EGs would help deal with such kind of significant requests for precisions. He reminds there is not enough time to deal with such questions in detail in the ESC.

**The Chair concludes that upon the ESC recommendation and according to the ESC ToRs, such expert groups can be created with the organizational support of ENTSO-E and will report back to the ESC. Depending on the questions that need analysis, more than one group might be needed to allow for the relevant experts to be nominated.**

Ralph Pfeiffer (ENTSO-E) reminds that depending on the objective of the outcome of the EGs, attention has to be paid on how to report and in what format, e.g. only ENTSO-E is entitled to issue implementation guidance.

### **3. VGB and Eurelectric's initiatives:**

**Regarding the question on classification of PGMs**, how this applies to and impacts the various types of PGMs, and if there is discrimination between the provisions in RfG and SOGL regarding different types of PGMs, Ralph Pfeiffer (ENTSO-E) explains that according to Article 1 of the RfG, there was no intention to make any difference between plants within industrial sites and plants connected directly to the network (DSO, CDSO or TSO) (slides available [here](#)). From a system engineering approach, there is no difference. The intention during the drafting of the code was to not discriminate. There are different examples across countries on how they try to resolve this. In the DE case, there are 3 categories for mixed plants. If the demand is less than 10%, then the whole plant is to be considered as a generator at the connection point (type D), individual modules are treated according to individual capability (type of A or B); if demand is between 10% and 50%, the plant should comply with reduced requirements at the connection point, and if load is above 50%, then it is demand dominated and is considered as a customer. In all cases, all the units in the plant should comply with the requirements relevant to their size, local voltage and type according to RfG. The class of the individual generators inside the plants depends on the RfG criteria – independent from how the whole customer plant is considered.

Mike Kay (GEODE) notes this case doesn't seem to comply with the law as the law requires compliance at the connection point. He thinks the issue is caused by the 110kV criterion for Type D units – if it were removed, there would be no problem.

Eric Dekinderen (VGB) agrees with Mike Kay and asks if each country can choose its own solution or whether ENTSO-E has the intention to propose a common solution to this problem.

Ralph Pfeiffer (ENTSO-E) explains that based on the subsidiarity principle, any MS can find a solution individually and there are a number of options possible. The CNCs are not prescriptive on this. Another easy solution would be to consider internal networks of customer plants equal to distribution networks; then equal treatment to connections public or closed distribution systems where possible.

Michaël Van Bossuyt (IFIEC) notes that it is not so easy to find a good definition of industrial site internal networks. BE looked at this case and it was decided this is not compliant with law. One may instead use derogations for power generating modules that would be type A otherwise.

Ralph Pfeiffer (ENTSO-E) explains that compliance with RfG was the leading principle for the DE approach. Article 6.3. is about conditions for disconnection from the grid to be agreed on individually. Articles 6.3-6.5 are not infringed by the DE approach.

Garth Graham (Eurelectric) questions whether the RfG is applicable to industrial sites, because according to Article 1 it applies only to interconnected system, also in line with Directive 72/2009 and Article 8 of the Regulation 714/2009. In GB, industrial sites have not been in focus so far.

Michaël Van Bossuyt (IFIEC) notes he likes the DE solution but questions its legality.

Jeremy Vincent (CRE) explains that in FR if an industrial site is a closed distribution system, NCs are applied to PGMs. There is a problem as there are private networks and if one wants to apply NCs to each PGM connected to low or medium voltage, it means all requirements have to apply to the connection point of this private network to a public network. Consequently, for 110 kV, FR would propose a derogation plan.

Ralph Pfeiffer (ENTSO-E) explains that the Belgian approach is a class derogation of the requirements of PGM of type D for high and extra high voltage and maximum capacity smaller than 25 MW. These PGMs would have to meet the requirement of type A or type B depending on their maximum capacity, even if they were otherwise understood as type D in the given context. The FR case is similar to the BE case by type of derogations and releasing from certain requirements.

Ralph Pfeiffer (ENTSO-E) notes that there is a shortcoming in RfG, and the DE example is an attempt to realize the original RfG intention, but a long-term stable solution would require an adaptation of RfG.

The Chair concludes that this topic will be discussed again in the AOB (VGB slides).

**Regarding the question on frequency measurement precision,** Ralph Pfeiffer (ENTSO-E) explains that settings as defined in the SOGL are not easy to change as they would require change of regulation, but the principle is that operational settings can change whilst the technical capability is to be maintained over lifetime (slides available [here](#)). The most onerous operational settings as defined by SOGL for the combined effect of frequency response insensitivity and deadband for CE and Nordic (10mHz) actually require to set the following: frequency response insensitivity of 10 mHz, and deadband of 0 mHz. Both settings are consistent with the technical capabilities as defined by NC RfG. The deadband may be used to effectively deactivate FCR by setting it to a value bigger or equal to the FCR full deployment target (CE:  $\pm 200$  mHz, Nordic:  $\pm 500$  mHz).

Eric Dekinderen (VGB) asks if the a deadband of 9mHz is also possible and whether ENTSO-E's intention is to keep the insensitivity at 10mHz.

Ralph Pfeiffer (ENTSO-E) explains that for this case there is no mismatch between original intention and the final text of the Regulation.

Klaus Oberhauser (VGB) notes that the RfG is for new installations, while SOGL is for existing ones too. In case of 600 generating units in use, and 10mHz band as an SOGL requirement, does it mean that one has to change all existing units as a result?

Ralph Pfeiffer (ENTSO-E) clarifies that it is a different question if by the SOGL RfG is extended to existing generation implicitly. It might not be, since defined technical capabilities are only for new generation so it is not required to establish the technical capability or retrofit technical capabilities to existing generation. If the operational settings as required by SOGL can be achieved by existing generators as they have the capability, then they should do so. He however recommends confirming this upon further consultation with SO experts.

Michael Wilch (EDSO) agrees that according to SOGL one can only ask about operational settings as inside the technical capabilities per RfG, but this discussion regarding retrofit procedures for modules is ongoing also among the DSOs. No such procedure is foreseen for SOGL and whether this applies.

Thomas Lescarret (Eurelectric) explains that in FR during implementation it was considered that a default value should be set for RfG requirements which define a range among which the value can be adjusted. In FR, for each requirement for which there are such ranges, the default value at the commissioning of the unit is negotiated. He regrets that a lower limit of 10mhz for insensitivity for a minimum value is not allowed. The wording of SOGL is much better for generators, i.e. max value of combined effect of both, which would permit to install certain devices. He thinks there should be a possibility to put voluntary deadband and asks if it is possible to remove the minimum value of insensitivity.

**The Chair concludes that ENTSO-E will follow up with a clarification on this question at the next meeting.**

**Regarding the question on max. voltage in 400kV networks,** Ralph Pfeiffer (ENTSO-E) explains that there is a variety of requirements in different countries for the voltage ranges associated with different time periods (slides available [here](#)). Ralph Pfeiffer (ENTSO-E) clarifies that Article 16.2.a.i of RfG's refers to voltage withstand capability in all operating conditions while Article 27.1 of SOGL refers specifically to voltage withstand capability in normal operating conditions. There is no contradiction to RfG Article 1, as argued by Eurelectric. Regarding technical standards, one issue needs to be resolved further – relevant standards do not foresee any test of temporary operation at high voltages.

Regarding current technical standards on equipment tests, ENTSO-E agrees with Eurelectric that they do not adequately cover some aspects of RfG requirements. This gap, however, should not affect the validity of the connection requirements. Equipment testing procedures should be amended to fulfill RfG requirements. The conclusion is that standards need to be adapted rather than the RfG requirements. Authorities need to be aware and should enhance standards to include testing of conditions and situations which are required through regulations.

Ioannis Theologitis (ENTSO-E) clarifies that ENTSO-E has not submitted a request to the IEC to change the standards. It would be useful to cluster all similar requests identified and to move forward. If the ESC agrees, the various points can be clustered, the ESC can formalize a request, and ENTSO-E can offer this liaison opportunity and proceed with submitting a request on behalf of the ESC.

Ralph Pfeiffer (ENTSO-E) clarifies that equipment installed should be first compliant with the RfG, as the hierarchy is the regulation comes first, then the standard.

Thomas Lescarret (Eurelectric) explains that as long as standards are not aligned with the NCs, there are additional costs for generators if they want to buy equipment compliant with NCs. Once ENTSO-E requests updating of the standards, this update might take several years as they are linked with engine standards. He warns that such update process would take much longer compared to CENELEC's work for example. The question is how should generators manage during the period before the update of the standards takes place.

Ralph Pfeiffer (ENTSO-E) explains that from a legal point of view, all standards have a disclaimer - if there is some mismatch and contradiction between standards and legislation, the legislation should prevail.

Eric Dekinderen (VGB) explains that the problem is that if one wants to purchase equipment, each manufacturer will ask specific questions. He asks if TSOs accept that generators buy the same equipment as grid operators.

Ralph Pfeiffer (ENTSO-E) explains that the same would have to apply to the System Operators who operate their own equipment as well. TSOs do not impose higher requirements to other parties than they use for their own equipment. He agrees with the statement that TSOs accept that generators buy the same equipment.

Eric Dekinderen (VGB) notes that in the short term there can be a class derogation or individual derogation as a solution. At the moment when ENTSO-E submits an official request for amending standards, the IEC will ask lots of questions probably.

Ralph Pfeiffer (ENTSO-E) explains that an EG is not needed at this point to define details, as once a request for change is submitted, such technical groups would be established under the IEC and would contribute to clarifying those details.

**The Chair summarizes that the ESC is in agreement that ENTSO-E should ask for the IEC standard to be amended. There might be technical details that need to be agreed (ex. lightning assumptions, overvoltages in switching). When ENTSO-E submits the request, they should circulate the information to the ESC.**

**In addition, ENTSO-E should collect feedback from the TSOs on the question whether TSOs would accept the same type of equipment (voltage-withstand-wise) they use in operating their systems to be installed by generators.**

**Cross-border requirements for battery and pumped storage devices:** Ralph Pfeiffer (ENTSO-E) explains that storage devices are not part of RfG and DCC (Article 3.2.d, except for pump-storage) (slides available [here](#)). Regarding the question on whether SO GL provisions can be imposed on batteries, ENTSO-E will provide an answer after further coordination with system operation experts. Regarding the question on battery storage devices and RfG definitions of SPGM and PPM, Ralph Pfeiffer (ENTSO-E) explains that since RfG explicitly excludes storage, it does not seem necessary to explain/argue whether the current definitions can be applied to storage. If RfG was amended to include storage, it would however be necessary to revise these definitions.

Ralph Pfeiffer (ENTSO-E) explains that storage technologies have grown in recent years with significant improvements in performance, decreasing costs, also thanks to significant research efforts, numerous demonstration projects. The installed capacity is higher than 0,1% annual consumption of a synchronous area. Using the RfG provisions for emerging technologies (as defined by RfG, Articles 66 and 67) as a benchmark, storage devices would have to be considered as significant users already. Based on the expected number of units and size of storage systems in the near future and the different functional applications of storage systems, it can be concluded that storage systems have cross-border relevance, but this initial position is subject to further investigation and confirmation.

Garth Graham (Eurelectric) notes it is important in this discussion to distinguish between electricity storage and energy storage – electricity storage is take off grid, store and return back, energy storage is when the energy is taken and converted into something and used somewhere, i.e. same as demand. Regarding demand response, he warns against creating a situation where DSR might inadvertently be covered by SOGL.

Thomas Lescarret (Eurelectric) explains the generators' request is not to have rules imposed on any sort of battery, but rather to have the opportunity to use batteries within power generating facilities to comply with requirements of RfG and SOGL. For SOGL, it seems batteries can't be used to fulfil such requirements. Generators do not request connection rules for batteries, but need to be certain that batteries can be used to fulfill part of the requirements of SOGL.

Michael Wilch (EDSO) notes that the question on how to assess cross-border relevance will come up with every new technology, so he would like to see a publicly consulted methodology on how to define cross-border relevance. DSOs are also responsively acting on new technologies, and there are already requirements defined by DSOs in some places.

Ralph Pfeiffer (ENTSO-E) explains that a methodology on cross-border relevance is interesting, but the first step is a definition of this. There is a CNC definition, but if it is applied and the benchmark is used, the answer is obvious as given.

Eric Dekinderen (VGB) explains that FCR is a cross-border product, exchanged between several areas, and FCR will be supplied in the future by batteries, so batteries are a cross-border and a market integration issue.

Brittney Becker presents EASE's proposal to set up an ad-hoc stakeholder group on storage and to organize a workshop (slides available [here](#)). The proposal is to have a workshop after summer to address some questions, and technical details, and EASE would like to have such expert group established and to support its work further. EASE needs more time to analyse different approaches and align companies' views and expertise.

Garth Graham (Eurelectric) notes that the timescale should be to set it up sooner rather than later as the forecast is for storage to grow, so it would be a good moment to start discussions regarding possible changes in the future.

**The Chair suggests to organize an EG under the ESC to bring expertise together, and the workshop by EASE to inform the discussions is welcome. He invites ENTSO-E to present a proposal on the establishment of EGs at the next meeting. In turn, the ESC will decide.**

The Chair notes that as the technical details to inform the EG will not be ready by the next meeting, ENTSO-E and Eurelectric are invited to exchange any relevant information so that the EG could be launched shortly after the meeting in June.

Aurelio Tubilleja (EDSO) inquires regarding Article 55 of Electricity Regulation in the clean energy package. Are demand response and early storage topics also on the list or is the EC considering to tackle only market and connection issues?

Elaine O'Connell (EC) explains that the list in Article 55 of the Electricity Regulation recast looks currently different from the various institutions' points of view so it has to be seen what the final version is. There are some market and technical codes – what is listed in Article 55 is about the legal empowerment for the EC to adopt a code or a guideline if deemed necessary and according to the priority list for next year. It will be determined later on where the code would go to. Maria confirms that this article is about empowerment for the future development of the codes.

### **3. Roadmap for updating ENTSO-E stakeholder consultation processes and practices**

ENTSO-E plans to work on the update of its stakeholder consultation process and the consultation process document in the first half of 2018 and will take the feedback already gathered into this update from the previous ESC meetings in December 2017, the input received through the ENTSO-E annual stakeholder survey in January 2018, and through additional feedback from the ENTSO-E Advisory Council.

In order to improve consultations' visibility and facilitate stakeholder planning, ENTSO-E has put together an overview of the upcoming consultations and relevant workshops for all Network Codes for 2018, which is available on the ENTSO-E consultation hub and [here](#). It will be updated on a continuous basis and ESCs will be informed of such updates.

In addition, where possible, the consultation periods for certain consultations have been extended beyond the minimum 4 weeks, taking into account stakeholder feedback (consultations on CBA methodology, CSA, balancing). This request will continue to be considered on a regular basis in the planning of future consultations.

ENTSO-E thanks for the feedback and proposals provided by the stakeholders and welcomes any additional suggestions for further improvements on the consultation process document, which will normally be available in June.

Michael Wilch (EDSO) advises that the update of the stakeholder consultation document takes into account what ACER had stated in the Framework Guideline on the Electricity System Operation regarding DSOs' treatment as system operators and grid users while ensuring that equality of treatment is also ensured regarding all stakeholders.

## **9<sup>th</sup> Grid Connection European Stakeholder Committee (GC ESC)**

Thursday, 8 March 2018 from 11:30 to 16:00

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### **1. Opening**

#### **1.1 Welcoming address and Draft Agenda**

The GC ESC Chair Uros Gabrijel (ACER) welcomes the participants to the 9<sup>th</sup> GC ESC meeting. The agenda is approved with updates under AOB to include VGB proposals for improvements and application for generators.

#### **1.2. Review and approval of minutes from previous meeting**

The minutes of the 8<sup>th</sup> GC ESC meeting are approved (available [here](#)).

Elaine O'Connell (EC) notes that she has provided additional clarification of her statement in the minutes regarding the possibility for application of more stringent requirements than RfG NCs from European standards. This is recorded as addition in the minutes.

*"The Chair recalls the question on whether a European standard may impose more stringent requirements than RfG from EC in 2016, 2<sup>nd</sup> bullet on Art. 7 (available [here](#)), and Elaine O'Connell confirms that the EC view is as previously answered. If a European standard imposes a stricter limitation for a certain requirement than what is specified in the Network Code, Member States should not use that European standard to circumvent the EU legislation. There is a hierarchy in legislation and the Network Code is a directly applicable EU Regulation."*

### **1.3. Follow-up actions from previous meeting (available [here](#))**

*Action 1: Stakeholders are invited to submit to ACER examples discussed in MSs regarding substantial modifications. The item remains open until further feedback is received.*

*Action 2: Establishing the current relevant baseline with regard to the various technologies of type A for RfG for all types of requirements will be further addressed in agenda topic 4 of the GC ESC.*

*Action 3: ENTSO-E will provide an update on the work of the Expert Group on High Penetration under item 2 of the agenda.*

*Action 4: The 4 questions as raised by VGB and Eurelectric have been discussed jointly with the GC ESC and SO ESC in the joint session (the classification of PGMs, measurements precisions, max. voltage on 400kV networks, and battery storage).*

*Action 5: The topic raised by VGB and EURELECTRIC which only pertain to the GC ESC (the pumped storage devices) can be discussed and addressed under agenda topic 6.*

*Action 6: CENELEC will provide an overview on the content of the standards under agenda item 5.*

*Action 7: An update on how the lessons learned have been included in the revision of ENTSO-E's consultation process is provided during the joint session.*

*Action 8: ENTSO-E has taken into account the comments provided by the ESC for the inertia roadmap regarding the stability scenarios and in its upcoming follow-up actions on these scenarios, and into its cross-committee considerations. Opportunities for stakeholder interaction on various studies will be provided through a workshop in May.*

### **1.4. NC High-Level Implementation Group (IMG) updates**

The Chair summarizes the update as provided by Sonya Twohig (ENTSO-E) at the 4<sup>th</sup> SO ESC regarding the NC High-level implementation group, whose next meeting is on 8<sup>th</sup> March. Minutes of the meeting will be published on the website of the EC, ACER, and ENTSO-E, and ENTSO-E will inform the ESC about the publication.

## **2. Connection Network Codes implementation: Update from Expert Groups and Forward planning for activities in 2018**

Ioannis Theologitis (ENTSO-E) provides an overview on the work of the EGs on HP, CBA and CM (slides available [here](#)). The EG on HP has been working since December 2016 till January 2017 on creating a first version of IGD on "High penetration of Power Electronics interfaced Power Sources" (HPoPEiPS), and since March 2017 on improving understanding of "grid forming" features, set up scenarios which features supports needed for the system. A draft report will be released end of 2018, including a draft report for consultation before the summer.

The CBA EG worked in 2017 on further developing the IGD on cost benefit analysis to meet reasonable stakeholder expectations. A public consultation took place on the draft IGD between January 29 and March 2, 2018. The consultation feedback will be discussed with the EG with a view to finalizing the IGD to be published during the third week of March.

The CM EG has been revived and ENTSO-E and CENELEC (TC8X WG3) will work together on compliance monitoring issues with regard to the EN 50549-1/-2 standards to be released, as well as with regard to EN 50549-10. A first call is planned for the second part of April.

Frequency-related IGDs have been published, the CBA IGD will be published during the third week of March, new draft IGDs on HVDC issues are expected to be launched for consultation by third week of March (embedded HVDC systems, interactions with other connections, and HVDC systems default parameters).

A link to the IGDs on frequency stability parameters, including the responses to the comments received to the public consultation is available [here](#).

## **3. RfG - Establishing the current relevant baseline with regard to the various technologies of type A for RfG for all types of requirements**

This item is covered by the presentations under item 4.

## **4. Examples discussed in MSs regarding substantial modifications Joint DSO input: substantial modification; type A baseline**

Mike Kay (GEODE) explains that in GB, there is no current requirement for FRT at LV level, and work is starting on reviewing this, as part of a wider review of FRT. It is clear that more than the voltage profile needs to be specified. Experience in GB is that the vector shift at low voltage from a transmission fault is enough to cause some Type A modules (and units comprising type B or larger modules) to trip. There are no current reactive power requirements. Reconnection conditions are 20s after voltage and frequency have returned within the interface protection settings.

Aurelio Tubilleja (EDSO) explains that in Spain, there are no reactive power requirements either (slides available [here](#)). Existing requirement on re-connection is that the frequency shall be equal or less 50Hz but no minimum amount under this value is required. There are no requirements for FRT at LV level, and no further changes are expected with the RfG.

Mike Kay (GEODE) explains that regarding significant modification, there has been a longstanding approach that current technical rules should be applied on significant modification (slides available [here](#)). No concrete definition exists on “significant” but the approach has been generally accepted in GB. National Grid intends to publish this as guidance by May 2018. As an example, when an existing wind farm gets new turbines and larger capacity, the new turbines would need to be Grid Code compliant. The question is whether existing ones need to comply with the new requirements as well.

Garth Graham (Eurelectric) notes that modification aspects apply to HVDC and DCC as well, not just to RfG (e.g. if a DSO site gets new capacities). A solution should be found that applies to all 3 codes, and the same wording needs to apply across not only CNCs but also SO codes when it comes to notifying relevant modifications vs. significant modification which may mean the generators have to provide more data to network operators.

Mike Kay (GEODE) explains that significant modification has not been a big issue in the past in GB, although the principle has been in GB approach for over 25 years. However, a clear approach is necessary for the future. He provides some examples regarding existing installations and how modifications are treated depending on their size and location. Some modifications to power generating facilities are expected to be approved before May 2018. For synchronous machines for example under EREC G59 and synchronous machines under EREC G99, original and additional PGMs are treated separately. For some other types, e.g. asynchronous generating units, either the whole site has to comply as one if units are aggregated or original and additional units are considered as separate modules, depending on the type of PPM. If the old machine is treated as new, it might need to be replaced as it can't be modernized.

Aurelio Tubilleja (EDSO) explains that in Spain, a simpler approach has been proposed for NRA approval based on thresholds for various PGMs, either synchronous or non-synchronous. If a PGM increases its capacity more than 20% it will be considered as a significant modification. For the other threshold of equipment affected by modification, no consensus has been reached – TSOs and DSOs proposed a 70% threshold, PPM generators – a 90%, CHPs – a 100%. The NRA will decide. For demand facilities, a significant modification is considered if the effect of equipment change is 30% or more of contracted power. For transmission-connected distribution facilities, a replacement of power transformer with a different one purchased after 6 September 2018, would be considered a significant modification.

The Chair concludes that NRAs will be informed of these examples for their further discussions. He asks how any consecutive amendments are considered.

Aurelio Tubilleja (EDSO) explains that in Spain consecutive amendments are considered cumulatively. Mike Kay (GEODE) confirms it is the same as in GB.

Michael Wilch (EDSO) explains that regarding the replacement of a power transformer with a different one is not considered a significant modification in Germany if the characteristics of the new transformer are identical with the previous ones. This case is considered as replacing one asset by another, but not as a significant modification.

Aurelio Tubilleja (EDSO) agrees the technical capabilities are the same, but the manufacturers need to comply with new standards, like transformers to comply with DCC. Michael Wilch confirms this would require a change of agreement.

Garth Graham (Eurelectric) explains that according to Article 4.1.a.1 of the RfG, regarding replacements the change is considered substantial only if a replaced equipment results in a different behaviour. Compliance is considered based on the status quo. Replacing old with new does not need to comply with RfG or HVDC if it has no impact on technical capabilities. A change is substantial only if it impacts the technical capability of the PGM, not of the network.

Eric Dekinderen (VGB) states he has observed that the RfG translations seem to diverge from the original English text.

Elaine O'Connell (EC) notes that if some divergencies are noticed between the English and the translated version, on any codes, stakeholders should inform the EC (through the EC [functional mailbox](#)). As in some instances translations may not match with the intention of the original English version, the EC will then check.

Thomas Lescarret (Eurelectric) explains, that regarding the wording of Article 4, it is understood that the specifications of change depend on to which extent the connection agreement is changed - if you double Pmax of one, the effect on the grid is huge. In FR at the start they considered criteria to declare a change not depending on the connection agreement, but rather on the effect on the power system. The case of replacement of equipment is not considered a substantial change.



Ralph Pfeiffer (ENTSO-E) explains that in DE there is no list of significant modifications in the EHV connection rules – it will be decided on a case by case basis. HV connection rules contain a non-exhaustive list of examples of significant modifications.

### ***5. Standardisation progress – updates on content discussed within the TC8X WGs***

Thomas Schaupp (CENELEC) provides an update on the scope, content and timelines for standards EN 50549-1 (for LV connection and plants up to and including type B) and EN 50549-2 (for MV connection and plants up to and including type B) and how the standards relate to RfG (slides available [here](#)). The assumption regarding Reg 714/2009 and art. 8.7 is that as issues regarding cross border trade of electricity are covered in RfG, topics not covered in RfG are not understood as affecting cross border trade of electricity. MS can establish national codes if they do not affect cross-border trade and defining functions that are then implemented as products. The purpose of the standards EN 50549-1 and EN 50549-2 is to give detailed description of functions to be implemented in products and to serve as a technical reference for the definition of national requirements which are not defined exhaustively by RfG.

Regarding the timelines, documents are in the translation phase, voting is expected on 7 May till 11 July, and the voting result is expected on 15 July. The documents need to be edited before being published and publication is expected in late October 2018. The RfG timelines require the submission of proposals by May 17, 2018, and NRAs should take decisions by 17 Nov. Standards EN 50549-1 and -2 cover all technical (essential) requirements (Title II) of RfG applicable for type A and type B generating modules and as such will support technical requirements of RfG.

Standard EN 50549-10, currently in development, will cover tests to provide compliance with requirements of part 1 and part 2 and as such will support the compliance procedures (Title IV) of RfG. CENELEC and ENTSO-E are exploring the possibility for a joint working group on this. The EN 50549 series does not address general requirements and type thresholds (RfG Title I), procedures (RfG Title III), derogation, classification as emerging technology (RfG Titles V to VII). All RfG articles of Title II relevant for type A and type B generating modules correspond to clauses in EN 50549 part 1 and 2. EN 50549-1 and -2 clauses provide configurability of functions to allow all flexibility of RfG by maintaining verifiability. EN 50549-10 clauses will support conformity assessment to provide evidence of conformity and if a plant is compliant, the function is applicable, including a harmonized but configurable indicator.

Thomas Lescarret (Eurelectric) reminds that standards also contain a range of values for each parameter. If a value is chosen, it must be in the range of the standard.

Ralph Pfeiffer (ENTSO-E) notes that if “configurable” in the CENELEC standard is an equivalent term for “non-exhaustive” in RfG, the RfG further distinguishes between non-exhaustive requirements of general application and of site-specific application. He asks if configuration is general application or it is to be understood as site specific configuration.

Thomas Schaupp (CENELEC) explains that this would be up to whoever uses the standards. Annex C lists all parameters defined in the standards, so MSs can choose to require all plants to have same set of parameters or to allow for site-specific choices. The relevant party should provide the information on how to configure, whoever is responsible according to the legal framework.

Ralph Pfeiffer (ENTSO-E) asks regarding configuration at national level, if there is any freedom of national choice or possible issues can be anticipated regarding this.

Thomas Schaupp (CENELEC) explains it is a freely applicable document and a DSO and a generation unit owner can use the standard to define as they wish (e.g. CHP generator). The DSO can use the same or individual ones. There is no difference between non-exhaustive requirements for generators and site-specific ones. The intention of the standard is not to be limited to the scope of RfG, but to include everything needed to operate the grid safely and stably with embedded generation. It should be assumed that all these are part of the national grid code and are included in the document as they are.

Thomas Schaupp (CENELEC) explains that EN 50549 intends to include all capabilities of generating plants necessary to operate generating plants in parallel to distribution grids, and parts 1 and 2 provide requirements needed for distribution grid management which are beyond the scope of RfG (voltage operation range, reactive power capabilities etc.).

Marc Malbrancke (CEDEC) agrees with Michael Wilch (EDSO) that the NC does not prevent to ask for additional requirements for local issues.

Garth Graham (Eurelectric) explains the idea is to get harmonization and quality across the union to improve welfare. If there are individual arrangements, we end up going back to the same situation as today. There is much more benefit if there are common arrangements in order to achieve harmonization.

The Chair reminds that according to Article 5 of the Directive 2009/72/EC, there can be technical rules establishing the minimum technical design and operational requirements for the connection to the system, as well as, to ensure the interoperability of systems. The question is to which extent these technical rules relate to the standards.

Garth Graham (Eurelectric) explains the obligation of Article 5 lies with NRAs in the MSs. He asks if the EC is notified of the technical rules or any updates to those, as it is difficult to find that MS have submitted that.

Michael Wilch (EDSO) explains that this relates to national level. In DE, when the final version of technical rules is available, the DE government will notify the EC with regard to this process, and make sure all entities are notified in due time.

Elaine O'Connell (EC) explains the requirement on Article 5 is in relation to technical requirements. There is a repository – called TRIS - where technical requirements that were submitted are notified. The obligation is for a MS to notify 3 months before the requirement enters into force. The coverage is patchy however and consistency on this can be further enhanced.

Thomas Schaupp (CENELEC) explains that 50549-1 and -2 provide requirements needed for the stability of the interconnected system not yet included in RfG (OVRT, UVRT, LFSM-U), and exclude aspects of system integration. Annex C and H provide an overview over all described functions and the relevance in view of RfG. He explains that the CENELEC language doesn't know what a generation module is; for type A and B this is a generation facility of RfG language, i.e. every generation module is a generation facility.

Garth Graham (Eurelectric) notes if a TSO is required to specify a number on Article 13.1.b, if they don't specify a number, then it should be considered zero.

Thomas Schaupp (CENELEC) explains it is the task of the TSO to define these numbers, in turn CENELEC provides standardised parameters. Ralph Pfeiffer (ENTSO-E) asks if there is a reason for the difference between CENELEC and the ENTSO-E IGD on the RoCoF value, as the IDG was a result of consensus in expert discussions.

Luca Guenzi (EUTurbines) notes the RoCoF values correspond to values discussed in the first WS on frequency so these were recommended. TSOs are free to indicate their own values.

Thomas Schaupp (CENELEC) explains there were several various inputs from MS and different recommendations. There is no option to change it, but as IGDs are not binding, each MS can choose a different value. Some TSOs say 1Hz/s is acceptable and some others say there are issues. Thomas Schaupp (CENELEC) explains 50549 is intended for the mass market, type A and B plants, as there is a vast number of them to be dealt with. The objective is to ensure that compliant plants are connected. It is a national MS choice to use the EN 50549 as a tool, in view of harmonization requirements. 50549 is made to be used in conjunction with RfG requirements and to support them. Thomas Schaupp (CENELEC) explains that drafts for voting cannot be provided but this can be checked with each national committee. Any European body can go to a national committee and request to get the drafts. National publication is public to everyone and the draft can be found on the homepages of the national committees. Members of European bodies should be able to have access.

Michael Wilch (EDSO) notes he would expect that each European body observer to CENELEC (ACER or EC if observers) could have access to these documents.

Thomas Schaupp explains that CENELEC cooperates with certification bodies and preparing to get accredited for those standards, others are following afterwards, so there should not be issues.

Bernhard Schowe-Von Der Brelie (EFAC) explains that once the published version is ready, the accreditation process starts at national level, and that covers international standards too.

Eric Dekinderen (VGB) notes that on pumped storage, requirements for generators status should apply for pumping status too. All PGMs connected to the grid after 27/04/2019 should be compliant.

Elaine O'Connell (EC) explains that according to Article 7.3.b of the RfG the SO, NRA and MS should ensure transparency when applying the regulations. We have to see what is the practical way to look at that. If there are issues, the EC should be informed. There could be clauses in purchase contracts to also cover such risks.

## **6. AOB: RfG - list of items to improve (VGB proposal)**

Eric Dekinderen (VGB) presents a number of questions that need further clarification in RfG identified by VGB (slides available [here](#)). The most urgent question is regarding the application of RfG to pumped storage in its various modes.

The Chair recommends a similar approach as for the SO ESC: ENTSO-E to consider the questions and provide answers for them next time. The list will be refined further based on the type of issues – either a solution can be proposed next time, through EGs or until availability of expertise is available.

#### **6. AOB: CENELEC question regarding the definition of “new power-generation module”**

Thomas Schaupp (CENELEC) explains an issue that has been noticed regarding smaller generation units and connection requirements in RfG (slides available [here](#)). Article 7(4) of the RfG requires relevant TSOs to submit a proposal for requirements two years after the entry into force, May 17, 2018. RfG Article 7(6) requires the competent entities to decide upon the proposal within 6 months after, i.e. by November 17, 2018, which means connection requirements will be available afterwards.

Michael Wilch (EDSO) explains the EC notification is after approval at national level, i.e. 3 months after.

Mike Kay (GEODE) understands that according to Article 7(4)(b), the NRA has to make a decision by 17 May, not by 17 November.

Thomas Schaupp (CENELEC) notes that the problem is that everything bought after May 2018 and commissioned right away has to be retrofitted before 17 May 2019, based on the RfG as all units will have to be compliant with the RfG, and this would be an issue. Article 4(2)(b) may potentially offer a solution. CENELEC encourages MSs to put up such measures.

Garth Graham (Eurelectric) notes that according to Article 4(2), a final binding contract is 2 years after entry into force – by May 2018, one has to have entered into this contract, and to have signed it by 17 May 2018.

Michael Wilch (EDSO) notes the problem is that it can be up to 1 year before ones knows what the final requirements can be. For small plants, they can be connected in less than 2 weeks, and it has to be ensured that they are compliant. There cannot be a gap of 1 year of non-installed capacity.

Thomas Schaupp (CENELEC) explains a potential solution to resolve it, based on Article 4(2)(b), would be that MS define existing power generating modules as: either generators that have presented a complete request for connection to DSO before May 2019, or as generators whose Power-Generating Module(s) was already connected to the DSO's distribution network before May 17, 2019. The MSs that have not decided yet upon requirements, should consider similar solutions.

Eric Dekinderen (VGB) warns that if each MS applies that last sentence, then there is a breakpoint in 2019, as that is for compliance and equipment will be manufactured in the meantime.

Ralph Pfeiffer (ENTSO-E) explains DE is aware of this issue and there are discussions with the Ministry and the NRA how to resolve this. The problem has been understood by the Ministry but there is not automatic NRA decision. Article 4(2)(b) means a legal act by the Ministry is necessary, and the Ministry requested more detailed arguments and justifications, including facts and figures on volumes. The Ministry would be the one to act here.

Garth Graham (Eurelectric) notes that the full Article 4(2)(b) and 4(2)(c) look at the whole context: the PGM has to do something, this allows the MS to do something, but it is not sure the MS can give power to the NRA to do a blank release, perhaps on a station by station basis.

Thomas Schaupp (CENELEC) notes the GB solution is a positive decision on this. Everything connected before 17 May 2019 is considered existing.

Mike Kay (GEODE) explains that Ofgem has received all requirements and documentation from the TSO and DSOs – they intend to give an opinion by the end of April 2018, this gives manufacturers a year to ensure compliance. Ofgem has agreed with the interpretation of the TSO and DSOs of compliance dates. RfG partially defines existing installations; it does not define new ones.

Elaine O'Connell (EC) explains that the RfG is already in force, different requirements and obligations apply. There is a range in the RfG, and this was discussed by MSs at the Cross-border committee - MSs considered the issue with the dates, and considered that 3 years would be too late to apply the requirements. A pragmatic solution needs to be found.

**The Chair concludes that the ESC acknowledges there is a problem for the mass products PGMs that can be installed very quickly and for those units, the application of articles provides some uncertainties and can affect RES penetration across the EU. The ESC members should inform the MSs and NRAs of the issue and of some possible solutions discussed today to raise awareness. The ESC should follow the unfolding of this issue.**

## **6. AOB: other items**

Luca Guenzi (EUTurbines) notes that Article 6(4) and cogeneration has not been assessed in many of the grid codes, except requirements as referred to in Article 13 and further clarification is needed on whether this is stated explicitly or not and what is applicable to cogeneration units.

The Chair concludes on the interpretation on how to read this article – the question will be logged in the issue logger and everyone is invited to contribute ahead of the next meeting.

## **7. Next meeting dates**

The proposed meeting dates for the June meeting are approved: SO ESC on 12 June, ACER premises, and GC ESC on 11 June, ACER premises. The common GC-SO ESC part should preferably take place on 12<sup>th</sup> June but this would be confirmed in due time closer to the meeting. A later start on 11 June would be preferred to accommodate for travel options.

GC ESC	SO ESC	MESC
11 June, ACER	12 June, ACER	8 June, CEER, Brussels
14 September, ACER	13 September, ACER	4 September, ENTSO-E, Brussels
13 December, ENTSO-E	14 December, ENTSO-E	5 December, CEER, Brussels

## **8. Follow-up actions:**

1. **Joint SO-GC ESC:** As per the ToRs of the GC ESC, expert group(s) to address the technical topics identified can be created with the organizational support of ENTSO-E. ENTSO-E will provide updates on the creation of the EGs at the next meeting in June.
2. **Joint SO-GC ESC:** Regarding the question on measurement precision of the frequency and the definition of insensitivity in SOGL and RfG, ENTSO-E will provide additional clarifications on the outstanding issues upon further consultation with the system operation experts.
3. **Joint SO-GC ESC:** question on max. voltage in 400kV networks: ENTSO-E should send a request to start the process for the standard regarding max voltage in 400kV networks to be amended on behalf of the ESC. ENTSO-E should inform the ESC when the request is submitted.
4. **Joint SO-GC ESC:** ENTSO-E should collect feedback from the TSOs on the question whether TSOs would accept the same type of equipment they use in operating their systems to be owned by generators in order to see what the understanding is.
5. **Joint SO-GC ESC:** regarding the question on whether SO GL provisions can be imposed on batteries, ENTSO-E will provide an answer after further coordination with system operation experts.
6. **Joint SO-GC ESC:** ESCs will be updated regarding any updates of the consultation overview.
7. ACER will inform NRAs of the examples provided regarding substantial modifications.
8. Stakeholders should inform the EC if they notice some divergencies between the English version of the NCs and the translated version into national languages. The EC fill follow-up on any such notifications received.
9. ENTSO-E should consider the questions raised by VGB, refine the list based on the type of issues, and propose either a process for finding a solution or a response, pending upon availability of expertise to answer the relevant questions.
10. So as to raise the awareness, the ESC members should inform the MSs and NRAs of the uncertainties of application for the mass products PGMs after 17 May 2018 and of possible solutions. The ESC is to follow the unfolding of this issue.
11. The question regarding the interpretation of RfG Article 6.4 and how it applies to cogeneration will be logged in the issue logger. Everyone is invited to contribute an answer on how to read and understand it.