

ENTSO-E 2st User Group meeting on “Network Code for Requirements for Grid Connection applicable to all Generators” (NC RfG)

2 May 2012 - 10:30 h – 17:00 h
ENTSO-E offices (6th floor)
Avenue de Cortenbergh 100
1000 Brussels

FINAL MINUTES

ATTENDEES

<i>Association</i>	<i>Representative</i>	<i>Affiliation</i>
CEDEC	Herman Poelman	Alliander
COGEN Europe	Arnaud Duviolguerbigny	COGEN Europe
	Gary Heaton	BDR Thermae Group
EPIA	Thomas Schaupp	KACO
	Alexander Rausch	EPIA
EUR	Jaakko Tuomosto	Teollisuuden Voima Oyj
	Francois Luciani	EdF Energy
Eurelectric DSO	Jacques Merley	ERDF
	Siegfried Wanzek	EON
Eurelectric WG Thermal	Joerg Kerlen	RWE
	Giuseppe Lorubio	Eurelectric
EUROMOT	Mats Östman	Wartsila
	Lukas Welser	General Electric
EUTurbines	Peter Norris	Alstom
	Luca Guenzi	Solar/Turbomach
EWEA	Paul Wilczek	EWEA
	Frans Van Hulle	EWEA
Geode	Mike Kay	ENWL
	Johan Lundqvist	Swedenergy
IFIEC	Jean-Pierre Becret	Solvay
VGB Powertech	Joerg Kaiser	VGB
	Philippe Lebreton	EdF Energy
ENTSO-E	Anders Danell	Svenska Kraftnat
	Edwin Haesen	ENTSO-E

	Ralph Pfeiffer	Amprion
	Helge Urdal	National Grid
	Wilhelm Winter	Tennet GMBH
observers	Lena L Jaakonantti	ACER / NRAs
	Tadhg O'Briain	EC – DG ENER
	Gunnar Kaestle	CENELEC
	Wouter Vancoetsem	CENELEC

AGENDA

10:30	Welcome
10:30	General status NC RfG
10:45	General feedback User Group participants on progress and proposals for clarification and discussion on items not explicitly in the agenda
11:00	Definitions <ul style="list-style-type: none"> - Power Generating Module / Power Park Module - Connection Point - others
11:15	New and Existing Power Generating Modules <ul style="list-style-type: none"> - Criteria for units not yet under construction - Timeline for implementation - Operational Notification for Existing Power Generating Modules
11:30	Type A-B-C-D classification <ul style="list-style-type: none"> - Tresholds and decision process - Overview of all requirements and applicability per type
11:45	Industrial sites and CHPs
12:00	Frequency requirements type A units <ul style="list-style-type: none"> - Frequency ranges - LFSM-O - Maximum active power reduction with falling frequency
12:30	Lunch
13:30	Type C requirements on system restoration
13:45	Type D requirements <ul style="list-style-type: none"> - Voltage ranges - Excitation systems

14:00	Fault Ride Through implementation <ul style="list-style-type: none"> - Curve parameters - Asymmetrical faults - PPM fault clearance time
14:30	Reactive power capabilities <ul style="list-style-type: none"> - Point of compliance - Step-up transformer - PPM below Maximum Active Power
14:45	Operational Notification Procedure <ul style="list-style-type: none"> - Process streamlining - Type testing and certification
15:15	Compliance responsibilities/testing/simulations
15:30	AOB (as listed in second agenda item)
16:45	Summary and next steps
17:00	End of Meeting

1. *Welcome*

All participants introduce themselves shortly.

The agenda is approved, no additional topics are suggested.

2. *General status NC RfG development*

A latest working draft version of the code was sent to all user group participants prior to the meeting on 27 April. This document is still work in progress. It covers the initial assessment of about 5000 of the 6000 received comments in the web-based consultation, of which about 40% resulted in changes to the draft code.

VGB notes that due to the short time for evaluating the latest working document sent by ENTSO-E, the position and the comments formulated by VGB in this meeting shall not be considered nor complete nor definitive.

3. *Definitions*

In past meetings as well as in the public consultation, the question was often posed to give a more precise definition of the terms Power Generating Unit / Power Generating Facility / Power Park Module, as well that

of Connection Point. Misunderstandings existed, mainly because of a wide variety of terminologies in various codes.

In the latest working draft, the definitions of these terms have been revised to avoid ambiguity. Also the term Power Generating Unit itself has been replaced by Power Generating Module, to bring it in perspective to Power Park Module and avoid the many interpretations nowadays of what is a 'unit'.

EWEA has no comment on the revised definitions, but asks how this impacts single wind turbines in a wind park. ENTSO-E states that requirements for any Power Generating Module (PGM) within a Power Generating Facility always refer to the Connection Point of the PGM, which leaves freedom to the developer how the facility is to be designed and requirements are to be implemented.

CENELEC asks for more alignment with IEC standards (referring to electropedia) and notes that the definition of PPM still refers to 'one or more units' without a definition of a 'unit'. CENELEC considers there to be discrimination between Modules and Facilities.

Eurelectric DSO acknowledges the intention to solve this clearly addressed critical point, but still sees legal uncertainties on the definition of requirements at the Connection Point between generation and the public network which is the normal point of interface and responsibilities. This has not been clarified with the switch to the "Module"-definition. ENTSO-E notes that these comments have been taken into account in the review of the code, and that in terms of streamlining requirements for small Modules a clear evolution can be seen.

Eurelectric DSO has a concern on the definition of Connection Point still and how to interpret the application with respect to cases where a private line and other equipment are connecting several "Power Generation Modules". Such lines are not to be considered as a Closed Distribution Networks. Eurelectric DSO considers the definition for CDN as referred to in article 28 of the directive 2009/72/EG to require "consumption" as a key element. Can different Modules in such a structure be seen as a single Module based on the sum of maximum capacities? How are wind turbines connected by a private line without local consumption treated? ENTSO-E takes note of the proposal of the DSO Technical Expert Group for having requirements to be complied with at the Connection Point of the private network to the DSO or TSO network. ENTSO-E improved the clarity in the latest draft by referring explicitly to the connection with the transmission, distribution and closed distribution network in the definition.

With regard to this discussion Geode asks if it possible to provide some typical schemes of a Power Generating Module and Power Park Module configurations in supporting documentation. ENTSO-E will take this proposal into consideration.

CENELEC asks why the definition of Network does not explicitly refer to transmission, distribution and closed distribution. ENTSO-E notes that this implication is made clear by the definition of Connection Point. The definition of what is a Network is not made more explicit than other existing legislation where this topic already resulted in lengthy discussions.

Eurelectric DSO asks for clarification which storage devices are to comply with the NC RfG and in what operation mode (pumping mode, reactive power injection)? Also how will reactive power storage through

compensation facilities and synchronous units acting as compensators be taken into account? ENTSO-E points to the definition of Synchronous Power Generating Modules. Non-synchronously connected devices (e.g. batteries) are not covered by the RfG which is questioned by some of the User Group members. Storage which is operating in load-mode is covered by the Demand Connection Code. Pumped storage is specifically addressed in the NC RfG. Electric generation mode (as referred to in the definition of Synchronous Power Generating Module) does cover synchronous compensation which is also a defined term in the latest draft.

Eurelectric WG Thermal questions if the term Power Generating Facility is still needed. ENTSO-E will cross-check the latest draft to check its relevance (e.g. in case of protection schemes, control systems). EUTurbines proposes to use the term Power Generating Facility for industrial sites. EUROMOT proposes to only use the Module level as it is the most convenient for manufacturers.

4. New and Existing Power Generating Modules

ENTSO-E takes note of the point raised by manufacturers and project developers that the NC RfG is not a design manual. Many requirements leave options for national implementation. As such it is acknowledged that it may not be possible to set a complete design at the moment the code enters into force. For this reason a time frame of two years has been set after the code enters into force during which a Module can still be considered an Existing Power Generating Module in case a final and binding contract is made for the main plant during this period (and confirmed within 30 months after entry into force). The user group participants have no comments or questions on this concept.

Article 32 on the operational notification of Existing Power Generating Modules (i.e. the process including CBA, consultation, NRA approval) has been revised. Some points have been made clearer. Also more prescriptions on allowed timeframes in the process have been added.

Eurelectric DSO asks if this revised Art. 32 can cope with redesigns in mass market products. ENTSO-E notes that if there is a need for retro-active application on type A units, this discussion will likely be ahead of the NC implementation and its related operational notification process. Eurelectric DSO asks if there may be a problem during the transition period since Art 3 asks for a specific contract to be presented which is not relevant in mass market deployment. EPIA notes that the two year transition period in itself is no problem in terms of design cycles as the industry moves forward much faster. ENTSO-E takes the points noted in consideration for further review.

Eurelectric WG Thermal asks to verify that Art. 31.1 and its reference to Art. 3 and defined terms leave no room for ambiguity. Eurelectric WG Thermal also appreciates that the definition of CBA mentions specifically the comparison with alternative solutions and proposes to duplicate this as well in Art 32.4.

5. Type A-B-C-D classification

In the type classification, the lower bound of 400W has been raised to 800W. ENTSO-E argues that a lower bound which is higher than 0W is needed anyway to avoid confusion. Units with a maximum capacity as low

as 1 kW need to be included for significance with regard to type A requirements as well and cannot be exempted a priori, based on potential increases of certain technologies if incentives schemes are created.

COGEN Europe sees a similar rationale possible for kW size units to be exempted as for industrial sites (Art 3.6.h). COGEN Europe also considers the impact of microCHPs to be low as there are no incentives yet and gives the example of GB where only a few hundred installations are connected. ENTSO-E argues that this technology and its size cannot be ignored as there are already manufacturers in GB with a market prognosis of 200.000 units to be installed. Eurelectric WG Thermal agrees that 200.000 is a number which has an impact and refers to a similar magnitude of units discussed for retrofitting in Germany.

COGEN Europe states that these requirements will result in a complete redesign for microCHPs based on linear stirling units (inverter interface, noise reduction).

ENTSO-E clarifies the possible re-assessment of type thresholds which is more in detail explained in the latest draft. E.g. a shift of the threshold to a lower value will not automatically result in a Module which is already connected to the network having to comply with additional requirements of the higher type, but would be subject to the procedure of retroactive application as prescribed in Art 32.

ENTSO-E presents a table of all requirements in the draft code which indicates which types have to comply with which requirements for a better overview of the whole code.

CENELEC notes that the requirement on additional reactive current injection during faults applies as of type B Modules. However, in reality these may be connected to LV grids in some cases where this capability has little useful impact. ENTSO-E acknowledges the concern raised and notes that comments received on this article are still under review with further changes to be expected.

COGEN Europe asks how remote control of type A Modules is seen as there is no link made with heat demand. ENTSO-E notes that the capability is intended to be activated in emergency situations only, not as a routine operation.

CENELEC asks for clarification on the term “I/O port” used for remote control of type A Modules (Art. 7.1.a.f). An output port (e.g. for confirmation signals) is not state of the art, while an input for remote control (e.g. by a controllable switch) is common practice. ENTSO-E agrees that remote controllability in terms of on/off switching is the main intention and takes the comment in account for further consideration. The need for further communication capabilities are taken into account in the clause on information exchange which applies as of type B onwards (Art. 8.4.c).

6. Industrial sites and CHPs

A new clause (Art 3.6.g) is introduced which considers the specific situation of industrial sites and the possibility of islanding of the Power Generating Module to secure production processes. IFIEC welcomes the evolution in the draft code. For clarity, IFIEC asks to revise the clause slightly to allow for islanding of the critical load together with the Power Generating Module. The aspect of a critical load being present is considered by ENTSO-E and other user group participants as a crucial element for allowing the exemption.

7. Frequency requirements type A units

Maximum active power reduction at underfrequency has been shifted from type C to type A Modules. It is noted that shift is to be seen as a relaxation, rather than a more stringent requirement. EUTurbines notes that this requirement potentially poses a problem for larger gas turbines where specific measures are needed to meet this (water injection, increased firing temperature, ...). In addition EUTurbines notes that the Power versus frequency characteristic and specific measures are sensitive to ambient temperature meaning that a solution developed for northern Europe may not be possible in southern Europe. Also, it cannot be tested on site which poses a reliability risk. EUTurbines asks to consider alternative solutions. ENTSO-E notes that to cope with this the last sentence in the requirement was introduced stating: "Acceptance of this reduction is limited to a selection of affected generation technologies and may be subject to further conditions decided by the Relevant TSO pursuant to Article 4(3)." This should allow bringing the implementation of the requirement in line with what is possible, reasonable and already a practice today. ENTSO-E also clarifies that the range allowed for in the code is based on an envelope of present applicable requirements for maximum active power reduction at underfrequency. However, the upper boundary of the range (i.e. theoretical most stringent application) is nowhere a requirement in itself today.

On the general requirement for frequency ranges, ENTSO-E states that the unlimited operation range for 49 to 51 Hz is maintained in the latest working draft as it is in line with the IEC standard on rotating electrical machines. VGB Powertech agrees that for the unlimited time range the draft code is in line with the IEC standards, but notes that for the wider frequency ranges ENTSO-E made a deliberate choice on the time durations. VGB Powertech also notes that for all requirements leaving room for national implementation a maximum value is given, while for frequency ranges only a minimum level is given.

EUROMOT notes that the remote on/off switching within 5 seconds (Art. 7.1.f) is not reasonable for larger Modules. For type C and D the clause is not applicable and controllability is specified in more detail by Art. 9.2.a. However, Art. 7.1.f applies also to type B Modules which can be in size as large as 50MW. For these Modules the requirements of instantaneous tripping are difficult.

EPIA asks why active power reduction in the LFSM-O requirement relates to maximum active power and not actual active power output. ENTSO-E argues that the reference to maximum active power output is common practice for larger Modules as it gives the desired proportional response from a system perspective. EPIA considers this to result in a disproportionate shift of power output in regions with lots of small-scale renewables.

CENELEC proposes the option to have an LFSM-O implementation with randomized disconnection of Modules (referring to VDE-AR-N 4105) to avoid Modules having to run at partial load which is not always technically possible. ENTSO-E states that randomized disconnection introduces an additional complexity. In addition it is not considered a long-term future-looking solution. Also Modules are allowed to trip as soon as the minimum operating level is reached.

8. System Restoration

Art 9.5 on black start capabilities has been revised by granting the Relevant TSO the right to obtain a quote for the service from the Power Generating Facility Owner instead of the right to impose it. Eurelectric WG Thermal asks for clarification on the legal implication of 'obtaining a quote'. ENTSO-E clarifies that it aims at an obligation for Power Generating Facility Owners to provide the quote, rather than a right for the Relevant TSO to ask for it. However, more than likely not all Modules will be asked to provide this as the relevance of the service depends also on the geographical location. ENTSO-E takes the comment in consideration to revise the legal wording.

EWEA asks to make a specific exemption for wind and solar from this requirement as it states this generation can never provide the capability. ENTSO-E disagrees as it is technically possible in some cases and might be relevant under certain conditions, making an exemption a priori not justifiable. A quote can still be requested after which it is up to the Relevant TSO to make the appropriate risk assessment for requesting the capability.

Eurelectric WG Thermal asks for clarification why Frequency Restoration Control is relevant in this code. ENTSO-E notes that this clause is still subject to internal discussion whether there is a specific capability addressed in this clause. The high level wording aims at capturing a service which has different implementations throughout Europe for the moment.

EUROMOT asks why the compliance simulations tests are so stringent. Art 46.4.2 mentions frequency drops of max 1Hz with 10% load block changes. ENTSO-E argues that robustness and controllability are essential in system restoration.

A general question is discussed whether this code is the correct place for a process on how to decide on black start capability from a Power Generating Facility Owner. Eurelectric DSO proposes that as they consider it not to be linked to a capability it might be better suited in a code on connection procedures. VGB Powertech notes it has no concerns over detailed black start capability requirements as long as it is clear that the capability is not mandatory. ENTSO-E states that the step on posing an obligation on Power Generating Facility Owners to provide a quote aims at giving more clarity on the process. A link between it not being mandatory and the functional capabilities in case it is implemented, is a relevant element to include. It is noted that the capability requirements themselves raise no concerns.

9. Type D requirements

Requirements on the excitation system are significantly less detailed in the latest version of the code. EUR proposes to change the wording "PSS" by "PSS function" to put more focus on the functionality, leaving the specific implementation (e.g. by the AVR itself) open. ENTSO-E takes the proposal into consideration, but notes that it is key that compliance can be demonstrated which is for some technical solutions challenging today.

10. Fault Ride Through requirements

FRT requirements in the code are mainly changed in the following respect:

- Representation is changed by including one parameterized figure and four tables of parameter values where the FRT requirements are set in the code. These parameter ranges allow to re-establish the shaded areas of previous versions of the code. The new representation aims at avoiding misinterpretation.
- For type B-C PPMs the fault clearance time is limited to 250ms (with 400ms in earlier version)
- Requirements on FRT for asymmetrical faults are to be dealt with at the national level.

EPIA notes there are no compliance test prescriptions on FRT. There is a simulation requirement on FRT without a test to validate this. ENTSO-E notes that FRT tests on-site will be impractical. Type testing is an option, but then assumptions are needed in order to take compliance at the connection point into account. Also pre- and post-fault conditions are to be set at national level in line with given local grid conditions. As such, the implementation on how FRT tests can take place is left to national choice as well. This was already described in one of the RfG FAQs.

EPIA also notes there is a general requirement on simulation models for type C units (Art 9.6.d) which also refers to type B compliance simulation tests. ENTSO-E acknowledges the gap and proposes to shift the requirement on providing simulation models to type B Modules.

Geode notes that with the new representation of a parameterized graph which is given once and to which is referred in three other clauses, a cross-reference is made between requirements on synchronous and asynchronous Modules. An option is to include the general parameterized graph and the common requirements in the articles on general requirements.

EUROMOT restates its earlier concern that a maximum fault clearance time of 250ms in an FRT requirement is too excessive. ENTSO-E restates that an assessment whether an FRT requirement is too excessive or not cannot be made without having the national implementation specifics.

EUR refers to the GB grid code which states a 140ms fault clearance time and allows shorter time frames if local grid protection scheme studies justify this. As such, a 150 ms minimum range would be more stringent. This remark will be looked into in further detail.

11. Reactive power capabilities

Requirements on reactive power capabilities refer to the connection point without reference to HV terminals of a step-up transformer anymore. Limitations on the number of tap changes within a given timeframe of an OLTC transformer (if any) have been removed as it was considered an operational issue. The design of how to implement the requirement is still left to the Power Generating Facility Owner.

Reactive power capabilities for PPMs below maximum active power output have been redrafted.

VGB Powertech considers the representation with the inner/outer envelopes to reflect an idealistic rectangular capability with high costs and asks for a justification of the values chosen. VGB Powertech considers the definition of realistic requirement in each TSO area would generate useless activities unless TSO state that existing requirements are satisfactory. ENTSO-E gives a similar response as to the concern

on the FRT requirements, namely that a discussion on justification can only be held after national choices are made. The RfG requirement itself sets no incentive for TSOs do set more stringent requirements that what is reasonably justifiable.

12. Operational Notification Procedure

The Operational Notification Procedure in the draft code published Jan. 2012 prescribed a three stage process (EON / ION / FON) for all four types of Modules. For type A units the process has been significantly simplified taking into account its mass market deployment, but guaranteeing an adequate compliance test process with respect to this code. This process allows for type testing by accredited laboratories, referring to Regulation (EC) 765/2008. For type B and C Modules, the three-stage process is streamlined to one stage. Relevant new definitions in this context are Authorised Certifier, Equipment Certificate, Installation Document, MD&PTC and Power Generating Module Document.

The relevant Articles and definitions in this code have been redrafted, based on agreement with the DSO Technical Expert Group on its main principles (meeting of 17 April 2012).

Eurelectric DSO acknowledges the improved, simplified process, but asks for more clarification whether and Equipment Certificate is considered a new type of document or the certificate issued on basis of standards is meant. ENTSO-E agrees to provide the possibility to add the operational notification statement with respect to requirements of this code in another existing standard certificate.

EPIA proposes to make an explicit reference in Art. 4(3) to take relevant European standards into account when taking decisions or setting agreements when referred to this clause. Eurelectric DSO states that testing against a high-level functional requirement in this code is not possible if there is no detailed technical implementation standard. ENTSO-E argues that a network code cannot enforce a standard to be legally binding; simply mentioning that it has to be taken into account has no added value either.

13. Compliance responsibilities/testing/simulations

There are no major changes with respect to the tasks and responsibilities. The title on compliance has mainly been revised to align it with the other requirements in the code.

14. AOB

Some editorial comments are made, e.g. on providing full numbering of all clauses to make the structure of the document clearer.

CENELEC asks for clarification why frequency requirements are not set in a coordinated manner among TSOs but are left to national decisions. ENTSO-E supports the idea of coordination at synchronous area level from an engineering perspective. Legally is difficult to set this process, mainly on how to settle a coordinated NRA decision. In line with ACER's framework guidelines' prescriptions on the significance test, the notion of 'coordination with adjacent TSOs' is taken over in Art 3(6).

EPIA mentions it is performing a legal assessment on the potential consequences of third party certification. Eurelectric DSO states that in the interest of system security DSOs continue to ask for third party certification by approved bodies. Self certification (CE-mark) cannot be used as this does not cover functional requirements. Eurelectric DSO also asks why their request for adaptation of Art. 34(1) prescribing a regular compliance assessment of the Power Generating Module by the Relevant Network Operator for Type A- “units” has not been taken into consideration as Eurelectric DSO deems this obligation cannot be fulfilled given the large number of installed units. ENTSO-E argues this is directly in line with ACER’s framework guidelines on ‘Compliance testing, compliance monitoring and enforcement’.

15. Summary and next steps

Further comments by the user group participants on the changes introduced in the latest working draft of the code and which were not already expressed during the web-based consultation, are welcome by Tuesday 9 May.

All participants are thanked for their contribution.