

# Amendments to ENTSO-E Network Code for Requirements for Grid Connection Applicable to all Generators following ACER's Opinion

Justification of the Significant Deviations from existing standards and practices

- *Type B Fault Ride Through*
- *Industrial CHPs*

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# ACER's view on significant deviations from existing standards and requirements

## ACER Opinion acknowledges ENTSO-E justification method, including

- Classification into Exhaustive & Non - Exhaustive requirements
- Analysis of practices across Europe provided by ENTSO-E for often debated requirements
- The difficulties in replicating this for Non-Exhaustive requirements.

## ACER Opinion for justifications of Types A and B

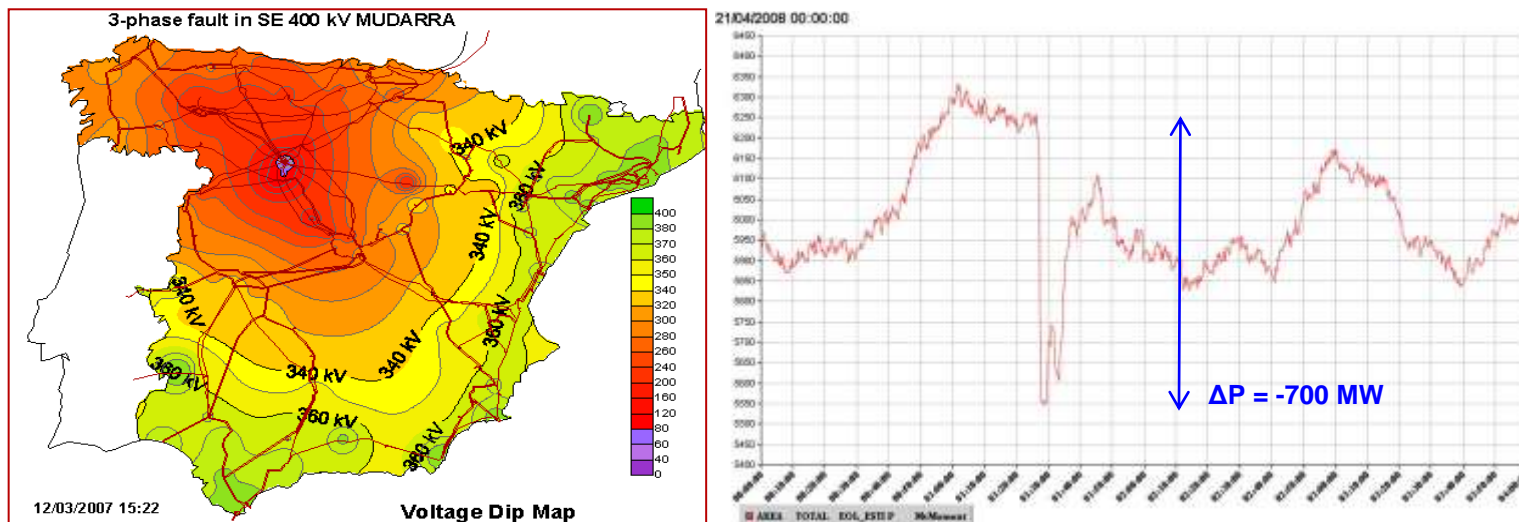
- It is reasonable to expect a justification where a Non-Exhaustive requirement is applied for the first time.
- ENTSO-E has provided less detail on requirements applying to PGMs of Types A and B
- ACER indicates further analysis of requirement is restricted to two areas of specific concern
  - *Mandatory nature of FRT requirement for Type B PGMs as defined in Article 9 (3) (a)*
  - *Exemption to Combined Heat and Power Units on industrial sites as defined Article 3 (6) (h) and possible discrimination for rigid coupling with heat production*

# Mandatory nature of FRT for Type B

- ENTSO-E considers the capability of PGMs to stay connected as a **Frequency** related issue.
- The focus in the requirements is to stay connected for **Transmission level faults** which propagate widespread into multiple distribution systems.
- Failure to remain connected is a **common mode weakness** across very large areas.
- Such widespread failures for a single fault can result in generation losses greater than the **largest loss capability**.
- It should be noted that simultaneous loss of a large transmission connected PGM is possible, depending upon the exact fault location

# Mandatory nature of FRT for Type B

## Illustration of real event: Spanish disturbance in 2008



- Both figures (left and right) correspond to a real disturbance: 3ph short circuit in a main 400 kV bus in the central part of Spain.
- Left figure shows the propagation of the voltage dip and right figure shows the sudden wind power loss (700 MW) due to this voltage dip.
- This is a past situation, currently overcome, in which a huge amount ( $>1 \text{ GW}$ ) of wind power could be lost due to voltage dips.
- Since 2008 it is mandatory for all WTGs to comply with the current FRT Spanish grid code.
- In the year 2012 almost all wind farms will fulfil the current grid code, except for a remainder of approximately 800 MW .

# Mandatory nature of FRT for Type B – alternatives?

- ENTSO-E has examined with the DSO Technical Expert Group the possibility suggested by ACER's opinion for an alternative requirement expressed at the Transmission – Distribution Interface.
- Joint conclusion reached that this alternative is not feasible to cover this specific system need:
  - The RfG requirement on FRT does not relate to faults on the distribution network (out of scope)
  - The Type B FRT requirements is linked to faults on the Transmission system causing voltage depressions on the distribution system irrespective of T-D interface.

# Mandatory nature of FRT for Type B – Conclusions

- The requirement is a frequency related issue.
- The requirement is **not amended**.
- Further **justification** has been provided to align to ACER's opinion, confirming the cross border character of this requirement at this voltage level, with no valid alternative.

# Further thoughts on non-exhaustive requirements

B/C

D

## Synchronous

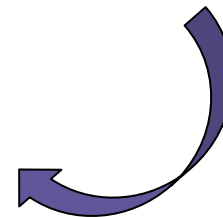
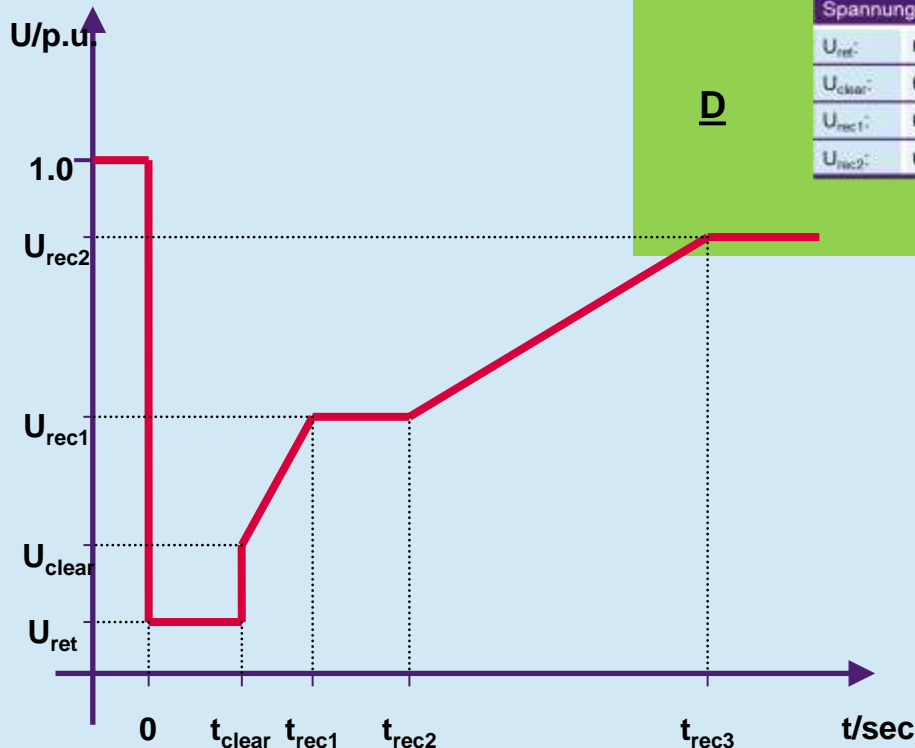
Spannungsparameter [pu]	Zeitparameter [sec]
$U_{ret}$ : 0.05 – 0.3	$t_{clear}$ : 0.14 – 0.25
$U_{clear}$ : 0.7 – 0.9	$t_{rec1}$ : $t_{clear}$
$U_{rec1}$ : $U_{clear}$	$t_{rec2}$ : $t_{rec1} - 0.7$
$U_{rec2}$ : 0.85 – 0.9 und $\geq U_{clear}$	$t_{rec3}$ : $t_{rec2} - 1.5$

Spannungsparameter [pu]	Zeitparameter [sec]
$U_{ret}$ : 0	$t_{clear}$ : 0.14 – 0.25
$U_{clear}$ : 0.25	$t_{rec1}$ : $t_{clear} - 0.45$
$U_{rec1}$ : 0.5 – 0.7	$t_{rec2}$ : $t_{rec1} - 0.7$
$U_{rec2}$ : 0.85 – 0.9	$t_{rec3}$ : $t_{rec2} - 1.5$

## PPMs

Spannungsparameter [pu]	Zeitparameter [sec]
$U_{ret}$ : 0.05 – 0.15	$t_{clear}$ : 0.14 – 0.25
$U_{clear}$ : $U_{ret} - 0.15$	$t_{rec1}$ : $t_{clear}$
$U_{rec1}$ : $U_{clear}$	$t_{rec2}$ : $t_{rec1}$
$U_{rec2}$ : 0.85	$t_{rec3}$ : 1.5 – 3.0

Spannungsparameter [pu]	Zeitparameter [sec]
$U_{ret}$ : 0	$t_{clear}$ : 0.14 – 0.25
$U_{clear}$ : $U_{ret}$	$t_{rec1}$ : $t_{clear}$
$U_{rec1}$ : $U_{clear}$	$t_{rec2}$ : $t_{rec1}$
$U_{rec2}$ : 0.85	$t_{rec3}$ : 1.5 – 3.0





# Further thoughts on non-exhaustive requirements

- FRT parameters have been defined as Non-Exhaustive.
  - The ranges are broadly consistent with existing national FRT values.
- Specific and persisting Stakeholder concerns are noted and understood, e.g.:
  - with respect to impact of long clearance times for synchronous generators – challenge linked to low inertia of Type B generators.
  - with respect to available national choice of very fast reactive current injection for PPMs.
- In the national processes to follow it is therefore important that these processes recognise these concerns in their selection of well justified parameters
  - National processes themselves are not specified in the NC RfG, but follow the implementation of Directive 2009/72/EC (Stakeholder concern related to uncertainty about implementation?)
  - ENTSO-E believes high standards of justifications, consultation and decision making process will be delivered.
  - **ENTSO-E intends to continue/coordinate activities at European/national level to specify requirements further, in preparation of the formal national processes when the code enters into force**



# Specific exemptions for industrial CHPs

- Reference is made to specific exemptions given to CHP units whose primary purpose is to produce steam for the production processes of the industrial site.
- **ACER Opinion**
  - Potential for discrimination and a lack of proportional requirements for industrial processes, whose output is also tightly coupled to the production of heat
  - Acknowledgments of the need to ensure that heat-coupled processes, where the heat provision is not critical (e.g. district heating requirements), are not excluded from these requirements of the Network Code.
- **Conclusion**, based on constructive input from industry
  - The request is well justified and can be accommodated without undue system risk.
  - The same exemption applying to steam for CHP can be extended to heat for facilities in which the primary purpose of these facilities is to produce heat for production processes of the industrial site.
  - Article 3 (6) (h) is amended – replacing “steam” with “heat”.



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# BACK-UP

# Aligned Proposals, Justification & Manufacturer Capabilities

## Fault Ride Through Capability: Retained Voltage in a Windfarm during a Transmission System Fault

