



Proposal for categorization of Significant Users

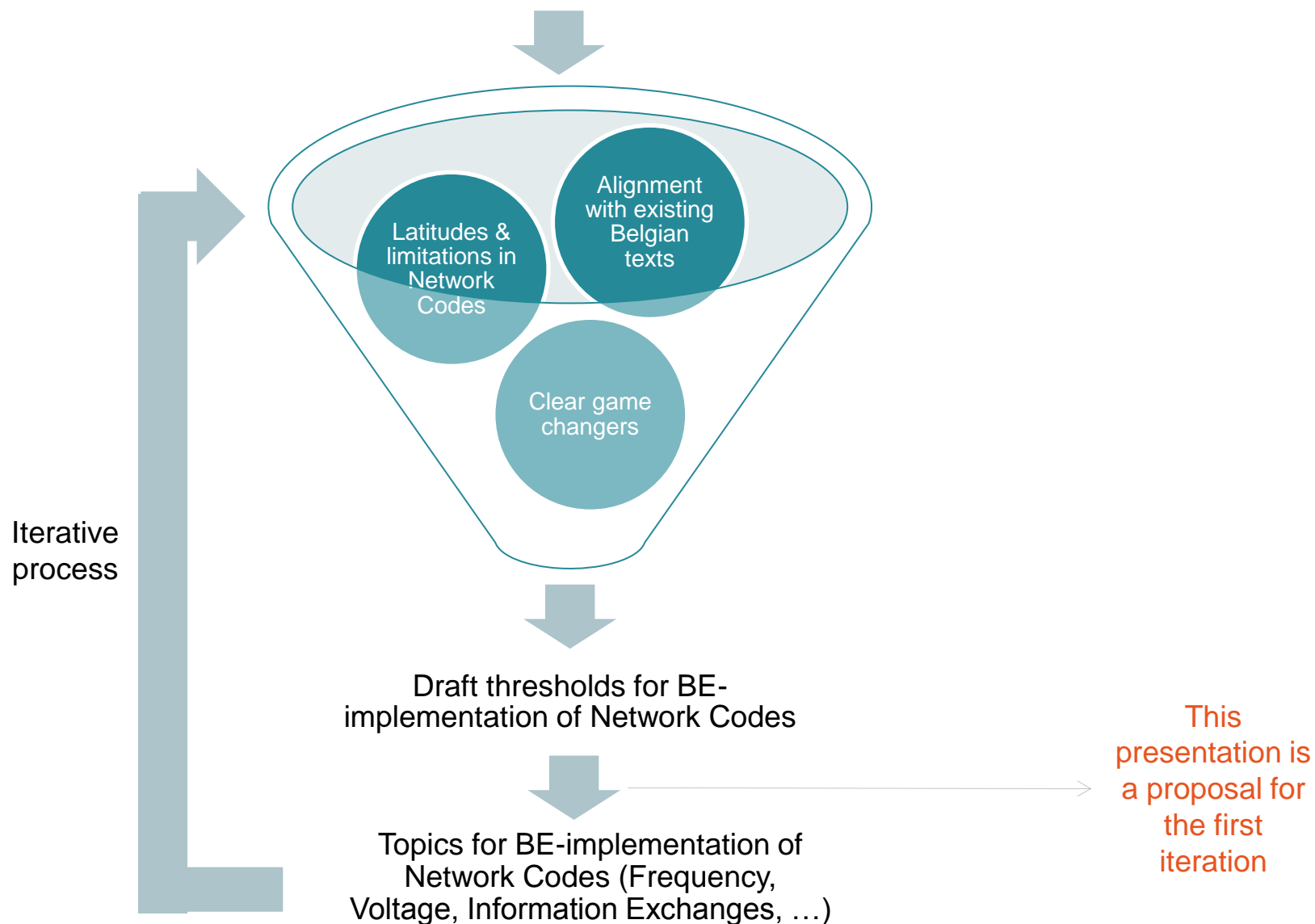
First step of the iterative process
Experts Group - Implementation NCs (session 1)

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- **Overview of proposed methodology**
- **Categorization of users in European Network Codes**
 - Categories in Network Codes
 - Role of Categories in Network Codes
 - Threshold for categories
- **Thresholds for categories of users in existing Belgian texts**
- **Assessment of thresholds between type A & B generating units**
 - What should a type B generating units do (in addition to A generating units)?
 - Proposed threshold and motivation
- **Assessment of thresholds between type B & C generating units**
 - What should a type C generating units do (in addition to B generating units)?
 - Proposed threshold and motivation
- **Assessment of thresholds between type C & D generating units**
 - What should a type D generating units do (in addition to C generating units)?
 - Proposed threshold and motivation
- **Conclusions**

Overview of proposed methodology



Categories of grid users in Network Codes



| Network Codes | Existing / New | Generator type (A, B, C, D) | Connection Point above 110kV | DS- /TS-connected | Affected parties or Specific Users | User providing System Services |
|----------------------|----------------|-----------------------------|------------------------------|-------------------|------------------------------------|--------------------------------|
| NC RfG | X | X (each) | X | | | |
| NC DCC | X | | | X | | X |
| NC HVDC | | | | X | | |
| NC OS (now GL SO) | | X (A vs others) | | X | | |
| NC OPS (now GL SO) | | X (A vs others) | | X | X | |
| NC LFC&R (now GL SO) | | X (A vs others) | | X | | |
| NC E&R | | X (A vs others) | | X | X | |
| NC CACM | | | | | | |
| NC FCA | | | | | | |
| NC EB | | | | | | |

- The following categories do not need further definition:
 - Distribution System Connected vs Transmission System connected (i.e. Elia Grid)
 - Voltage at connection point above 110kV
 - User provided System Services
 - Affected party or specific users
- Application of NC to new users but modernization, de-commissioning, future context evolutions and related CBAs should allow the NCs to apply to all units in the future.
- Therefore, only thresholds for categories of generating units of type A, B, C & D should be defined.

Threshold for categories of generating units



| Types | Conditions in Continental Europe (NC RfG) |
|--------|---|
| Type A | Maximum Capacity $\geq 800 \text{ W}$ & PoC $< 110 \text{ kV}$ |
| Type B | Maximum Capacity $\geq \text{XX}$ but max 1MW & PoC $< 110 \text{ kV}$ |
| Type C | Maximum Capacity $\geq \text{XX}$ but max 50MW & PoC $< 110 \text{ kV}$ |
| Type D | Maximum Capacity $\geq \text{XX}$ but max 75MW OR PoC $\geq 110 \text{ kV}$ |

Example of issue, a 5kW PV installation within a client facility (not being a CDS) and with connection point in 150kV should be type D unit. It doesn't seem realistic!

⇒ Proposal to deviate from the Network Code for conditions of type D (derogation to be asked by the Elia to the regulator) – see proposal in later slides.

Note that for an islanded grid (Ireland), it has be considered as cost-justified requirement the application of the following maximum thresholds (800MW<Type A <100kW, 100kW<Type B <5MW, 5MW<Type B <10MW, 10MW<Type D or PoC $\geq 110 \text{ kV}$)

Role of Categories of grid users in Network Codes (1/2)

- *Extract from NC-RfG – Article 5.3 :*
 - “Proposals for maximum capacity thresholds for types B, C and D power generating modules shall be subject to approval by the relevant regulatory authority or, where applicable, the Member State. **In forming proposals the relevant TSO shall coordinate with adjacent TSOs and DSOs** and shall conduct a public consultation in accordance with Article 10. A proposal by the relevant TSO to change the thresholds shall not be made sooner than three years after the previous proposal.”
- **Coordinate:**
 - Some characteristics are widely shared such as frequency topics may require coordination across a synchronous area.
 - Others such as voltage related characteristics may benefit from coordination at a Regional or immediate neighboring country level.
- **Harmonization:**
 - With ranges defined for the categories and structure of the requirements, the NC RfG has reached:
 - Harmonised rules for grid connection for power generating modules
 - Different synchronous electricity systems in the Union have different characteristics which need to be taken into account when setting the requirements for generators.
 - Different generation technologies have different inherent characteristics which need to be taken account
 - Regional specificities need to be taken into account by TSOs and DSOs when defining the requirements for generators.

Role of Categories of grid users in Network Codes (2/2)



- Role of each category in the NC RfG:
 - type A
 - No large-scale loss of generation over system operational ranges,
 - Necessary requirements for widespread intervention during system-critical events
 - type B
 - Greater resilience to operational events with better dynamic response to system events and higher level of system operator control and information.
 - type C
 - Provision ancillary services
 - Real time system response needed to avoid, manage and respond to system events.
 - Sufficient capability, information and control to respond to both intact and system disturbed situations.
 - type D
 - Stable operation of the interconnected system
 - Allowing the use of ancillary services from generation Europe-wide.

Categories in existing Belgian texts



| Belgian Texts | Stirling below 30kVA | User above 5kVA | Generator above 10kVA | User above 25kVA | User above 56kVA | User above 250kVA | Generator above 400kVA | User above 630kVA | Generator above 1 MVA | Cogen above 1MW | User above 2MVA | Generator above 2.5MW | Generator above 4MW | User above 5MW | User above 10MW | User above 15MW | Cogen below 20MW | Generator above 25MW | Generator above 75MW | Generator above 100MW | Nuclear / Not Nuclear | DS / Local TS/ TS | Above 70kV | Cogen | RES | Local Generation | DSO | CDS | Mobile Load | |
|----------------------|----------------------|-----------------|-----------------------|------------------|------------------|-------------------|------------------------|-------------------|-----------------------|-----------------|-----------------|-----------------------|---------------------|----------------|-----------------|-----------------|------------------|----------------------|----------------------|-----------------------|-----------------------|-------------------|------------|-------|-----|------------------|-----|-----|-------------|---|
| Electricity Law 1999 | | | | | | | | | | | | | | | | | | X | | X | X | X | X | X | X | | | | | |
| Federal Grid Code | | | | | | | | | | | | | | | | | X | X | X | | | | | X | X | X | X | | | |
| Walloon Grid Code | | X | | | X | X | | X | | | X | | | X | | | | | | | | X | | X | X | X | | X | | |
| Flemish Grid Code | | | X | X | | X | X | | X | X | | | | X | | X | | | | | | | | | | | | | X | |
| Brussels Grid Code | | | | | | | | | | | | | | | | | | | X | | | | | X | X | X | | | | |
| MD Afschakel Plan | | | | | | | | | | | | | | | | | | | | | | | X | | | | | X | | |
| Connection Contract | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| Access Contract | | | | | | | | | | | | | | | | X | | | X | | | | | | | | | | X | |
| ARP Contract | | | | | | | | | | | | | | | | X | | | X | | | | | | | | | | X | |
| CIPU Contract | | | | | | | | | | | | | | | | | | | X | | | | X | | | | | | | |
| Tariff methodology | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | X |
| Synergis C10-11 | X | X | X | | | | | | X | | | X | X | | X | | | | | | | | | | | | | | | |

Categories in existing Belgian texts – Connection to Local Transmission Grid or Distribution Grid



Walloon Grid Code (Art. 46-5 and 46-6)

- $5\text{MVA} < P_{\text{inst}} < 25\text{MVA} \Rightarrow$ If possible Distribution Grid at the MV bus bar of the MV/HV substation.
- $P_{\text{inst}} > 25\text{MVA} \Rightarrow$ Local transmission Grid (HV)

Flemish Grid Code (III.2.1.1 § 1 & 2)

- $15\text{MVA} < P_{\text{inst}} < 25\text{MVA} \Rightarrow$ If possible Distribution Grid
- $P_{\text{inst}} > 25\text{MVA} \Rightarrow$ Local transmission Grid (HV)

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What should a type B generating units do (in addition to A generating units)? 1/3



| Network Codes | | Belgium | |
|--|--|--|---|
| What? | Which doc? | Existing threshold in BE | Which doc? |
| Remote control of active power | NC RfG – PGM – Art. 11.2 | 250kVA 1MVA or lower | Walloon Grid Code Flemish Grid Code |
| Low Voltage Ride Through | NC RfG – PGM – Art. 11.3 | 1MVA | Synergrid C10/11 |
| Conditions for reconnection after tripping | NC RfG – PGM – Art. 11.4 | 10kVA | Synergrid C10/11 |
| Authorization for reconnection during restoration | NC RfG – PGM – Art. 11.4 | Connection in Local Transmission or Transmission (ie. 5MVA, 15MVA or 25MVA) | SOK (within clearing of Feeders) Walloon Grid Code Flemish Grid Code |
| Details of control schemes and settings | NC RfG – PGM – Art. 11.5 | Connection in Local Transmission or Transmission (ie. 5MVA, 15MVA or 25MVA) | Annex of Orientation Study for Federal and Regional Grid Codes |
| Details of electrical protection schemes and settings | NC RfG – PGM – Art. 11.5 | 0kV | RGIE Synergrid C10/11 |
| Operational notification procedure for connection & compliance verification – equipment certificate & detailed data | NC RfG – PGM – Art. 28.1, 29.1, 29.2, 29.3, 29.4, 29.5 | 0kV with equipment certificate Connection to MV (no simulation) (i.e. 56kV or 250kVA) | Synergrid C10/26 Federal Grid Code Walloon Grid Code Flemish Grid Code |
| System state monitoring, frequency, voltage, Scc, stability, congestion management, protection, SA, Notification in case of non-compliance and modification. | NC OS & NC OP&S | | |

What should a type B generating units do (in addition to A generating units) 2/3



| Network Codes | | Belgium | |
|---|-------------------------------------|---|--|
| What? | Which doc? | Existing threshold in BE | Which doc? |
| Data exchange for DS-connected users directly between user and TSO if economically and efficient | NC OS | Not Existing | / |
| Reactive Power Capability to be defined by RNO | NC RfG – PPM– Art. 17.2 | 1MVA | Synergrid C10/11 |
| Can request Fast current injection | NC RfG – PPM– Art. 17.2 | Belgian Offshore Grid (i.e. above 75MW) | Annex for wind generation of Federal Grid Code |
| Low Voltage Ride Through – Post fault active power recovery | NC RfG – PPM– Art. 17.3 | - 1MVA for LVRT - Belgian Offshore Grid (i.e. above 75MW) for post fault active power recovery | - Synergrid C10/11 - Annex for wind generation of Federal Grid Code |
| Limited Frequency Sensitive Mode – Over-Frequency – Test or Equipment Certificate | NC RfG – PPM– Art. 43.1, 43.2, 43.3 | 0kVA with Equipment certificate | Synergrid C10/26 |
| Limited Frequency Sensitive Mode – Over-Frequency – Simulation or Equipment Certificate | NC RfG – PPM– Art. 50.1, 50.2 | 0kVA with Equipment certificate | Synergrid C10/26 |
| Fast current injection – Simulation or Equipment Certificate – if requested | NC RfG – PPM– Art. 50.1, 50.3 | Belgian Offshore Grid (i.e. above 75MW) | Annex for wind generation of Federal Grid Code |
| Low Voltage Ride Through – Post fault active power recovery – Simulation or Equipment Certificate | NC RfG – PPM– Art. 50.1, 50.4, 50.5 | Belgian Offshore Grid (i.e. above 75MW) | Annex for wind generation of Federal Grid Code |

What should a type B generating units do (in addition to A generating units)? 3/3



| Network Codes | | Belgium | |
|---|---------------------------------------|--|------------------|
| What? | Which doc? | Existing threshold in BE | Which doc? |
| Reactive Power Capability to be defined by RNO | NC RfG – SPGM– Art. 14.2 | 1MVA | Synergrid C10/11 |
| AVR controlling alternator terminal at constant value | NC RfG – SPGM– Art. 14.2 | Not Existing. More advanced voltage control from 25MW | / |
| Low Voltage Ride Through – Post fault active power recovery | NC RfG – SPGM – Art. 14.3 | - 1MVA for LVRT - Not Existing for post fault active power recovery | Synergrid C10/11 |
| Limited Frequency Sensitive Mode – Over-Frequency – Test or Equipment Certificate | NC RfG – SPGM – Art. 40.1, 40.2 | 0kVA with Equipment certificate | ?? |
| Limited Frequency Sensitive Mode – Over-Frequency – Simulation or Equipment Certificate | NC RfG – SPGM – Art. 47.1, 47.2 | 0kVA with Equipment certificate | ?? |
| Low Voltage Ride Through – Post fault active power recovery – Simulation or Equipment Certificate | NC RfG – SPGM – Art. 47.1, 47.3, 47.4 | Not Existing | / |

Proposed threshold and motivation : Type B from 250kVA



- Arguments for proposed threshold are taking into account both DSO and TSO aspect.
- See presentation of Synergrid for more details.

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What should a type C generating units do (in addition to B generating units)? 1/5



| Network Codes | | Belgium | |
|--|--------------------------|---|---|
| What? | Which doc? | Threshold in BE | Which doc? |
| Capability of participating to frequency restoration reserve and restoration reserve | NC RfG – PGM – Art. 12.2 | CIPU (Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) except Nuclear, WKK & Wind) | CIPU, Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Limited Frequency Sensitive Mode – under-frequency | NC RfG – PGM – Art. 12.2 | Not Existing | / |
| Voltage deviation protection devices | NC RfG – PGM – Art. 12.3 | 0 kVA | Synergrid C10/11 |
| Frequency, Voltage and Power quality withstand capability | NC RfG – PGM – Art. 12.4 | 0 kVA | Synergrid C10/11 |
| Can be requested to provide black start offer inline with black start tender | NC RfG – PGM – Art. 12.5 | CIPU (Connection in Local Transmission or Transmission (ie. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations)) | CIPU, Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Instability protection, fault recording & dynamic models | NC RfG – PGM – Art. 12.6 | Connection in Local Transmission or Transmission (ie. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |

What should a type C generating units do (in addition to B generating units)? 2/5



| Network Codes | | Belgium | |
|--|--|--|--|
| What? | Which doc? | Threshold in BE | Which doc? |
| Reactive Power Capability to be defined by RNO inline with limits defined in NC | NC RfG – SPGM – Art. 15.2 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Can be requested to provide synthetic inertia | NC RfG – PPM – Art. 18.2 | Not Existing | / |
| Reactive Power Capability to be defined by RNO inline with limits defined in NC | NC RfG – PPM – Art. 18.3 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Annex for wind generation of Federal Grid Code and Regional Grid Codes |
| Operational notification procedure for connection & compliance verification – simulations and test | NC RfG – PGM – Art. 28.1, 29.1, 29.2, 29.3, 29.4, 29.5 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Tests – modulation of active power | NC RfG – SPGM – Art. 41.1, 41.2 | Not Existing except for R3 contracts | AS production contracts |
| Tests – Frequency Sensitive Mode | NC RfG – SPGM – Art. 41.1, 41.3 | Not Existing except for R1 contracts | AS production contracts |
| Tests – Frequency Restoration Control | NC RfG – SPGM – Art. 41.1, 41.4 | Not Existing except for R2 contracts | AS production contracts |

What should a type C generating units do (in addition to B generating units)? 3/5



| Network Codes | | Belgium | |
|--|--|--|---|
| What? | Which doc? | Threshold in BE | Which doc? |
| Test - Black-start, if requested | NC RfG – SPGM – Art. 41.1, 41.5 | All black-start units | AS production contracts |
| Test - Tripping to houseload | NC RfG – SPGM – Art. 41.1, 41.6 | Not Existing | / |
| Tests - Reactive Power Capability | NC RfG – SPGM – Art. 41.1, 41.7 | Not Existing (only ex-post verification in MVAr Contract) | / |
| Simulation – Limited Frequency Sensitive Mode – Under-frequency | NC RfG – SPGM – Art. 48.1, 48.2 | Not Existing | / |
| Simulation – Frequency Sensitive Mode | NC RfG – SPGM – Art. 48.1, 48.3 | Not Existing | / |
| Simulation – Tripping to houseload | NC RfG – SPGM – Art. 48.1, 48.4 | Not Existing | / |
| Simulation - Reactive Power Capability | NC RfG – SPGM – Art. 48.1, 48.5 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Operational notification procedure for connection & compliance verification – simulations and test | NC RfG – PGM – Art. 28.1, 29.1, 29.2, 29.3, 29.4, 29.5 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |

What should a type C generating units do (in addition to B generating units)? 4/5



| Network Codes | | Belgium | |
|--|---------------------------------------|--|-------------------------|
| What? | Which doc? | Threshold in BE | Which doc? |
| Tests – modulation of active power | NC RfG – PPM – Art. 44.1, 44.2 | Not Existing except for R3 contracts | AS production contracts |
| Tests – Limited Frequency Sensitive Mode – Under-frequency | NC RfG – PPM – Art. 44.1, 44.3 | Not Existing | / |
| Tests – Frequency Sensitive Mode | NC RfG – PPM – Art. 44.1, 44.4 | Not Existing except for R1 contracts (if any for PPM) | AS production contracts |
| Tests – Frequency Restoration Control | NC RfG – PPM – Art. 44.1, 44.5 | Not Existing except for R2 contracts (if any for PPM) | AS production contracts |
| Tests - Reactive Power Capability | NC RfG – PPM – Art. 44.1, 44.6 | Not Existing (only ex-post verification in MVar Contract) | / |
| Test - Voltage control, if selected | NC RfG – PPM – Art. 44.1, 44.7, 44.10 | Not Existing (only ex-post verification in MVar Contract) except pilot test for 1 Wind Farm in BE | / |
| Test - Reactive power control, if selected | NC RfG – PPM – Art. 44.1, 44.8, 44.10 | Not Existing (only ex-post verification in MVar Contract) | / |
| Test - Power factor control test, if selected | NC RfG – PPM – Art. 44.1, 44.9, 44.10 | Not Existing | / |

What should a type C generating units do (in addition to B generating units)? 5/5



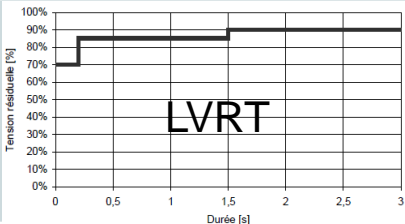
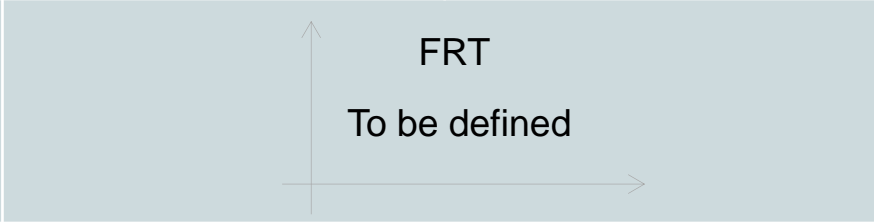
| Network Codes | | Belgium | |
|---|---------------------------------------|--|--|
| What? | Which doc? | Threshold in BE | Which doc? |
| Simulation – Limited Frequency Sensitive Mode – Under-frequency | NC RfG – PPM – Art. 51.1, 51.2 | Not Existing | / |
| Simulation – Frequency Sensitive Mode | NC RfG – PPM – Art. 51.1, 51.3 | Not Existing | / |
| Simulation – Tripping to houseload | NC RfG – PPM – Art. 51.1, 51.4 | Not Existing | / |
| Simulation - Synthetic Inertia, , if requested | NC RfG – PPM – Art. 51.1, 51.5 | Not Existing | / |
| Simulation - Reactive Power Capability | NC RfG – PPM – Art. 51.1, 51.6 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation (with simulations) | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Simulation – Power Oscillation Damper | NC RfG – PPM – Art. 51.1, 51.7, 44.10 | Belgian Offshore Grid (i.e. above 75MW) | Annex for wind generation of Federal Grid Code, Walloon Grid Code, Flemish Grid Code |

Proposed threshold and motivation : Type C from 25MW

- Current practices in BE are not fully inline with the approach taken by the EC with the package of requirement found in the “type”
- Several approaches are therefore possible:
 - Approach 1:
 - A less stringent threshold than current practices in BE: Threshold at P=25MW
 - And additional requirements defined in regional technical reglements
 - Approach 2:
 - A more stringent threshold than current practices in BE: Threshold when units are connected to (Local) Transmission grids
 - And some derogation for some requirements of the NC for units below 25MW
- Example for threshold B/C:
 - Field tests (requirement of type C) are not considered needed for units below 25MW
 - Simulations of compliance is considered needed for units connected to (Local) Transmission grids
- Examples for threshold C/D:
 - OEL, UEL & PSS are requirements from Type D but are requested in BE for all units above 25MW to avoid the black-out of 04/08/1982 to happen again.

Proposed threshold and motivation : Type C from 25MW

- Proposals
 - Units above (25MW) should follow the requirements of C and the requirements of AVR, UEL, OEL & PSS of type D units (inline with current practices in BE)
 - And for units connected in (Local) Transmission
 - Equipment Certificate could be replaced by simulations of compliance
 - Values for Low Voltage Ride Through profiles may differ (DSO vs Local Transmission)
 - Additional simulations and test of compliance for Users of type B wishing to provide MVar, FCR, FRR or RR services. This should be specified in Ancillary services tenders.

| | | | Units above 25MW |
|----------------------------|---|--|---------------------|
| | DSO grid | Local Transmission | |
| Compliance for LVRT & LFSM | equipment certificate | Simulations or equipment certificate | Simulations & tests |
| LVRT profile |  |  | |

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What should a type D generating units do (in addition to C generating units)? 1/2



| Network Codes | | Belgium | |
|-------------------------------|---------------------------|---|---|
| What? | Which doc? | Threshold in BE | Which doc? |
| Voltage withstand capability | NC RfG – PGM – Art. 13.2 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Fault-Ride Through capability | NC RfG – PGM – Art. 13.3 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Synchrocheck / Synchrocoupler | NC RfG – PGM – Art. 13.4 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| AVR, UEL, OEL, PSS | NC RfG – SPGM – Art. 16.2 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |

What should a type D generating units do (in addition to C generating units)? 2/2



| Network Codes | | Belgium | |
|---------------------------------------|--|--|---|
| What? | Which doc? | Threshold in BE | Which doc? |
| Energization Operational Notification | NC RfG – PGM – Art. 30.1, 31.1, 31.2 | Not explicit | / |
| Interim Operational Notification | NC RfG – PGM – Art. 30.1, 32.1, 32.2, 32.3, 32.4, 32.5 | Connection in Local Transmission or Transmission Simplified below 25MVA 5years/15years in local transmissions | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Final Operational Notification | NC RfG – PGM – Art. 30.1, 33.1, 33.2, 33.3, 33.4, 33.5, 33.6 | Connection in Local Transmission or Transmission Simplified below 25MVA | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Simulation – POD & PSS | NC RfG – SPGM – Art. 49.2 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Simulation – Fault Ride Through | NC RfG – SPGM – Art. 49.3 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |
| Simulation – Fault Ride Through | NC RfG – PPM – Art. 52.3 | Connection in Local Transmission or Transmission (i.e. 5MVA, 15MVA or 25MVA) & Local Generation | Federal Grid Code Walloon Grid Code Flemish Grid Code |

Proposed threshold and motivation : Type D from 75MW



- Nowadays several peak units or co-generation power plants have difficulties to fulfill fault-ride-through capabilities of the federal and regional grid codes.
- All units delivering Black Start services, independently of their size, should follow all requirements of type D units. This should be specified in Black Start tenders.
- About voltage conditions for Type D units
 - Need to impose the same Fault Ride Through profile for all large units connected in 380kV, 220kV and 150kV (i.e. PoC \geq 110 kV) as the grid is highly meshed and grid impedance is low. => This is a reason for a voltage-based criteria.
 - Need to avoid unjustified discrimination between CDS-connected and local generation for small units.
 - Therefore, proposal to modify conditions proposed in the NC from (PoC \geq 110 kV) to (Pinst \geq 25MW & PoC \geq 110 kV)

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 - Categories in Network Codes
 - Threshold for categories
- **Thresholds for categories of users in existing Belgian texts**
- **Assessment of thresholds between type A & B generating units**
 - What should a type B generating units do (in addition to A generating units)?
 - Proposed threshold and motivation
- **Assessment of thresholds between type B & C generating units**
 - What should a type C generating units do (in addition to B generating units)?
 - Proposed threshold and motivation
- **Assessment of thresholds between type C & D generating units**
 - What should a type D generating units do (in addition to C generating units)?
 - Proposed threshold and motivation
- **Conclusions**

Proposal for categorization of Significant Users – Generating Units First Iteration



| Types | ENTSO-e Latitude | Draft Proposal | Main Arguments |
|-------------|---|---|--|
| Type A | Maximum Capacity $\geq 800 \text{ W}$ & PoC $< 110 \text{ kV}$ | $800\text{W} \leq P_{\text{inst}} < 250\text{kVA}$ | |
| Type B | Maximum Capacity $\geq \text{XX}$ but max 1MW & PoC $< 110 \text{ kV}$ | $250\text{kVA} \leq P_{\text{inst}} < 25\text{MW}$ <u>for units connected to DSO grids</u> (Equipment certificate & LVRT) | Increase capabilities to provide congestion management, voltage control and balancing reserve |
| Type B/C | | <u>for units connected Local Transmission grid</u> (Equipment certificate or simulation of compliance & FRT) | Avoid compliance physical test below 25MW |
| Type C/D | Maximum Capacity $\geq \text{XX}$ but max 50MW & PoC $< 110 \text{ kV}$ | $25\text{MW} \leq P_{\text{inst}} < 75\text{MW}$ Or FCR, FRR, RR services (With AVR, OEL, UEL & PSS of Type D) | Mainly type C + AVR, OEL, UEL & PSS of Type D Need for tests for units providing services |
| Type D | Maximum Capacity $\geq \text{XX}$ but max 75MW Or PoC $\geq 110 \text{ kV}$ | $P_{\text{inst}} \geq 75\text{MW}$ Or Blackstart Or $P_{\text{inst}} \geq 25\text{MW} \text{ \& \ PoC } \geq 110 \text{ kV}$ | Avoid 0V-FRT for co- generation and peak units |



Proposal for categorization of Significant Users

First step of the iterative process
Experts Group - Implementation NCs (session 1)

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