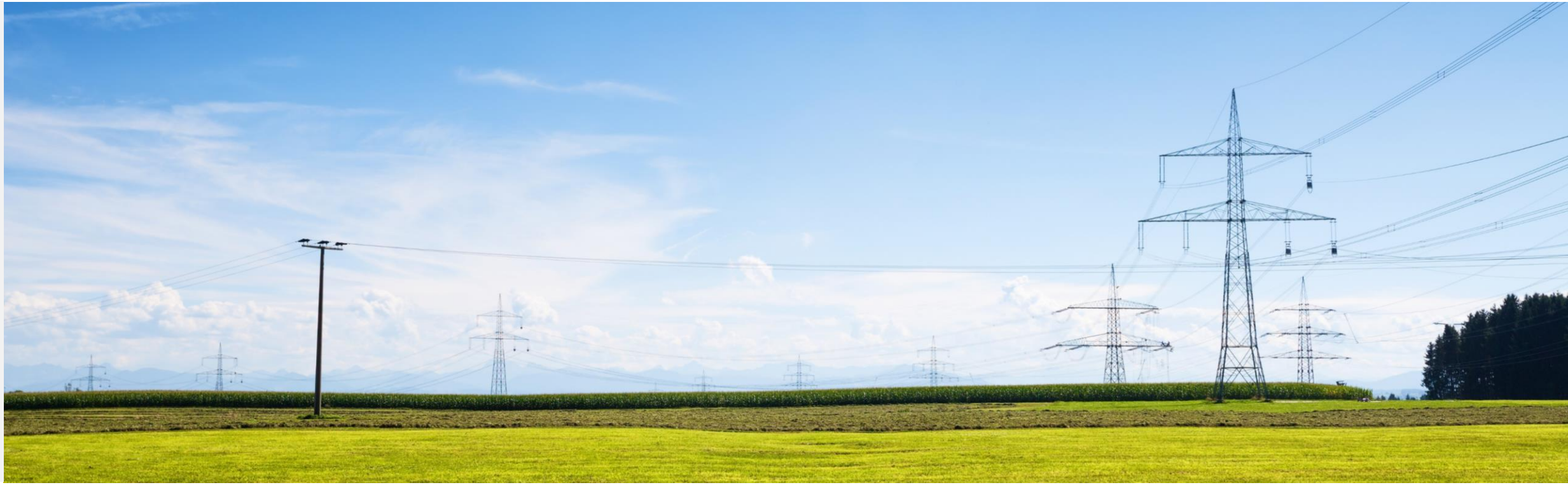
Report from the Expert Group ‘Mixed Customer Sites with generation, demand and storage and definition of system users’ (EG MCS)

Phase 2

18th GC ESC meeting, 04 June 2020



Robert Wilson, Chair of EG MCS

entsoe

Reliable Sustainable Connected

EG MCS structure

ACER Agency for the Cooperation of Energy Regulators

entsoe

Expert group: Mixed customer sites with generation, demand and storage, and definition of system users (EG MCS)

Approved by the GC ESC on September 14, 2018
Subject to possible updates on the list of members

Revised version including phase 2 work was approved by GC ESC on December 12, 2019

Chair: ENTSO-E, Robert Wilson

Vice-Chair: Paul de Wit, CEDEC on behalf of DSO Associations

Problem Statement

On 11 June 2018, the Grid Connection European Stakeholder Committee (GC ESC) decided to establish an Expert Group (EG) to clarify the requirements on mixed customer sites (MCS), where these could be a combination of generation, demand and/or storage facilities. The creation of this EG was proposed by ENTSO-E to elaborate on connection network code (CNC) issues which had been raised by stakeholders during CNC implementation. The ENTSO-E proposal was based on the findings of a stakeholder survey to identify priority topics.

Part 2 of this work, as approved by the GC ESC on 11 Sept 2019, is aimed to finalise the proposals and determine text that could be used in a future revision of the Requirements for Generators code.

Target (objectives)

Phase 1 – October 2018 to June 2019

The objectives of the EG MCS are:

- to provide clarification regarding the application of the Network Code on Requirements for Generators (NC RfG) Demand Connection Code (NC DC) and HVDC (NC HVDC) to MCS with generation, demand and storage (to the extent that storage might in future be classed as separate from generation or demand);
- identify differences and similarities of mixed customer sites which are CDSOs and non-CDSOs;
- in the context of MCS:
  - assess types of MCSs to be considered;
  - to assess the MCS case against the current definition of system users, found in the Directive 2009/72/EC;
  - to review the definitions of Synchronous Power Generating Module (SPGM)/Power Park Module (PPM); and
  - to provide clarification in terms of the type A-D categorisation or applicability of RfG for mixed or novel sites addressing cases such as:
    - mixed generation only sites where a small PGM (e.g. PV) is installed within the connection site of a larger generator;
    - small PGMs connected to a ≥110kV network due to unavailability of lower voltage connection points
    - combined heat and power generating facilities connected at ≥110kV (where type A-C would be excluded from certain RfG requirements)

Chair: ENTSO-E; Robert Wilson
Vice-Chair: CEDEC on behalf of the DSO associations; Paul de Wit

ToRs updated to include phase 2 activities

Public space:

EG MCS

Mixed customer sites with generation, demand and storage, and definition of system users.

Final Report - phase 1

Annex

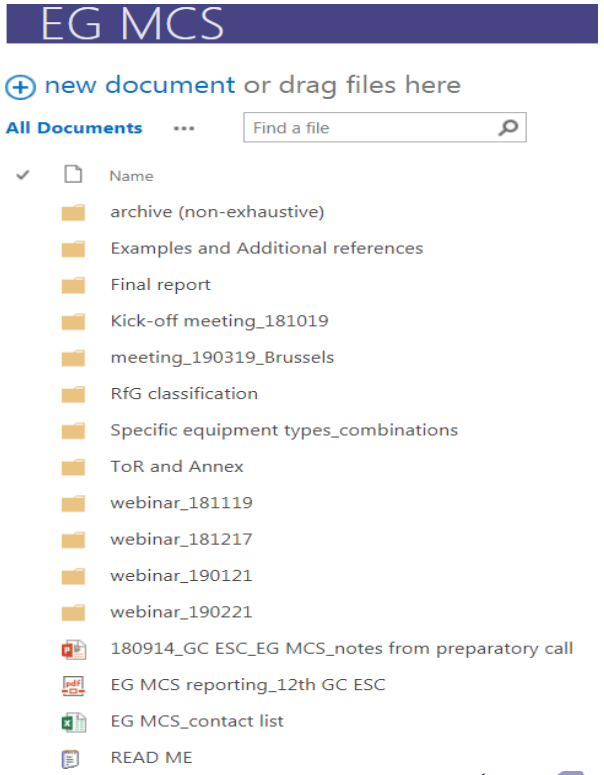
EG MSC Reporting 16th GC ESC

EG MSC Reporting 14th GC ESC

EG MSC Reporting 13th GC ESC

EG MSC Reporting 12th GC ESC

Internal EG space:



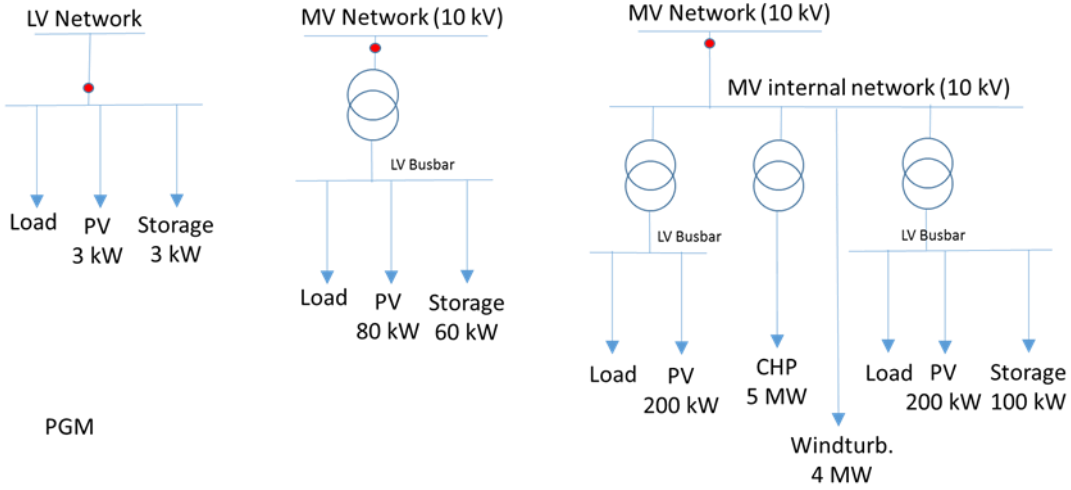
EG MCS meetings – phase 2

- October 31 – 13:30 – 16:30 (webinar)
- November 20 – full day meeting in Brussels
- December 6 –13:00 – 16:00 (webinar)
- January 29 – 13:00 – 16:00 (webinar)
- February 24 – 13:00–16:00 (webinar)
- March 20 – 10:00-13:30 (webinar)
- April 3 – 14:00 – 16:00 (webinar)
- April 23 – 14:00 – 16:00 (webinar)
- June 2020 GC ESC – report back

- 25 listed members for phase 2
- 16 different representative organizations
- 50% participation of members
- >80% participation of organizations

- Continued good collaboration among the members, with useful discussions and presentations
- Good input in accordance with agreed actions
- Relatively simple solution but quite a few options!
- Case studies carried out to provide evidence

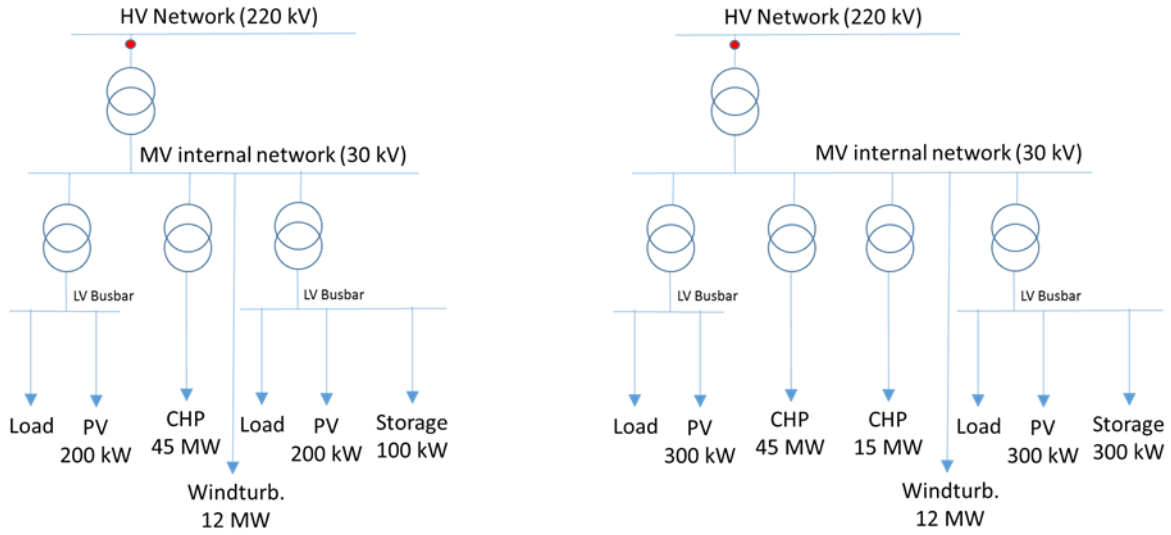
Examples of ‘Mixed Customer Site’ issues



Mixed sites connected to LV and MV networks .

Each of these generators is assessed as type A-D on the basis of their capacity

Connection point at the network of DSO or CDSO



Mixed sites connected at HV network via internal (= private) MV grid

Each of these generators is assessed as type D because the connection point is at a voltage level of ≥ 110kV

Connection point at the network of TSO

ACER Instructions for Phase 2

Specific ACER requests for the Mixed Customer Sites group are to deliver:

a) a more detailed assessment of the policy options (including economic metrics);
b) a proposed wording for network codes; and
c) the agreement and determination of a single policy option.

Should the expert group fail to agree on the preferred policy option, the proposed wording needs to be developed for all but do-nothing policy option.

Broad Outcomes of Part 1 Work

Option	Need to revise capacity thresholds	Acceptable to ACER	Acceptable to TSOs	Acceptable to stakeholders	Take forwards/comment
Remove voltage criteria completely	Yes, in some member states	No – ruled out	No	Yes	No – doesn't respect framework guidelines and requires some member states to reset capacity thresholds
Remove from A & B, national choice to remove from C	Yes, in some member states	No - potentially same as total removal	No, can't remove from B entirely	No	No – potentially same as total removal and requires some member states to reset capacity thresholds
Remove from A, national choice to remove from B	Possibly	Possible	No, B is too broad in some cases	No	No – need to keep voltage criteria for larger type B in some states
Interface point	No	Advise this appears complex	No – legal and technical issues	Mixed opinions	No - complex change with wider impacts than scope of expert group
Remove voltage criteria from a threshold (eg 10MW)	No	Possible	Possible	Possible	Further work needed
Remove from A & B, try to mitigate impact	No	Possible	Possible	No – unlikely to solve issues	No – shopping list of issues to mitigate becomes too complex
Do nothing	No	Only if all other options exhausted	Yes	No	Only if all other options exhausted

Key Criteria to Consider

- Solution must not require any member states to reset their capacity thresholds
- Solution must respect the voltage requirement in the ACER framework guidelines
- Ideally avoid setting a new threshold, or use an existing threshold, to keep the solution as simple as possible
- Including smaller generators in types A-B is a given. Allowing flexibility for smaller generators in type C is desirable
- The lack of a harmonised position in the setting of capacity thresholds across member states greatly increases the challenge
- Some harmonisation across member states in any new arrangements is desirable

Options to add a threshold to the voltage criteria

Option for Removing Voltage Criteria	Need to revise capacity thresholds	Harmonised?	Need to set threshold for voltage criteria nationally	Can cover type C	Comment & will it work?
Remove up to a threshold of 5 or 10MW	Unlikely	Yes	No	No	Does this work in all member states and can a harmonised value be acceptable? Saves national setting requirements.
Remove up to a default threshold of 5 or 10MW which can be set higher or lower within a member state's thresholds for type B&C	No	Somewhat	Possibly	Yes	Flexible solution with a default harmonised value
Remove up to a default of the threshold from which a power generating module is type C which can be set higher or lower within a member state's thresholds for type B&C	No	No	Possibly	Yes	Not harmonised; some member states will have to lower starting value as type B is too wide a category

Conclusions and Recommendation

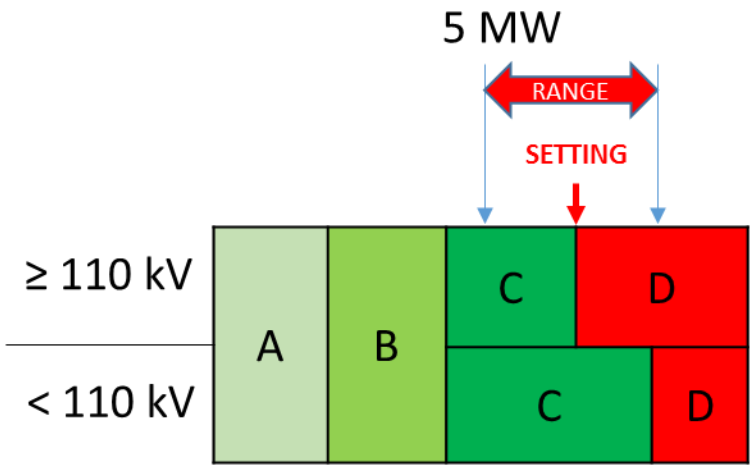
- Generally agreed that any solution needs to apply to generators below approx. 10MW in size
  - These are seldom connected to the transmission system
  - Backed up by results of case studies and selection of B/C thresholds – most common values are 5 or 10MW
- Using a default starting point would help minimise work by member states in setting another threshold and aid harmonisation
- Given the wide variety of national thresholds the solution needs to be flexible enough to work in all cases.
- The interface point solution did have merits but was to complex to deliver within the scope of the group

The recommendation of the group of a single solution to take forwards as set out in the 'part 2' terms of reference is the removal of the voltage criteria for smaller generators up to a threshold with the following steps being followed to set this:

- **a default value of 10MW being set in the code**
- **national flexibility being allowed to amend this though a process similar to the setting of the capacity thresholds either**
  - **Down to the higher of 5MW or the member state's B/C boundary; or**
  - **Up to the member state's C/D boundary**
- This combines the potential for harmonisation and flexibility and respects the capacity thresholds already set by member states of which the most common for B/C are 5 or 10MW.

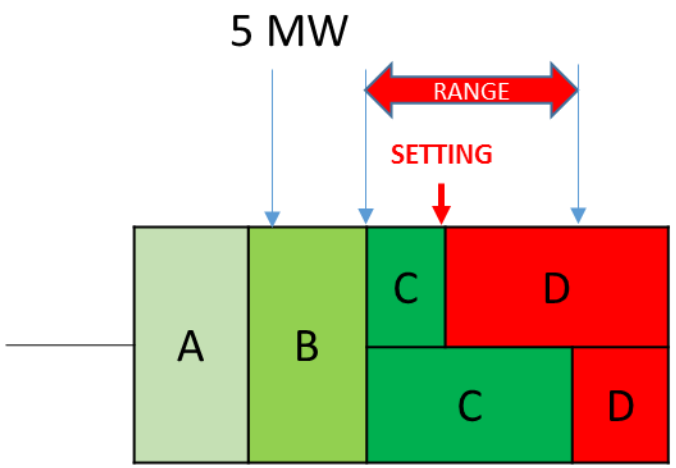
Scenarios to Illustrate Recommended Solution

Country 1:
B/C ≤ 5 MW



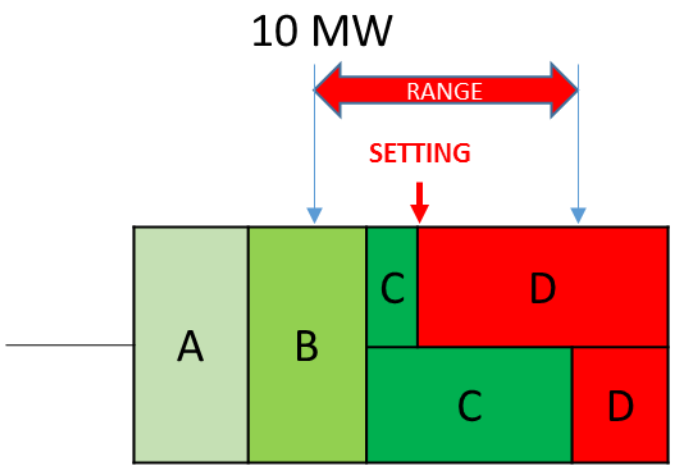
Threshold can be defined in the range 5MW to C/D boundary

Country 2:
5 MW < B/C < 10 MW



Threshold can be defined in the range B/C boundary to C/D boundary

Country 3:
10 MW < B/C



Threshold can be defined in the range 10 MW to C/D boundary

Proposed Legal Text

Article 5 – Determination of Significance

1. The power generating modules shall comply with the requirements on the basis of the voltage level of their connection point and their maximum capacity according to the categories set out in paragraph 2.

2. Power generating modules within the following categories shall be considered as significant:

   (a) maximum capacity of 0.8 kW or more (type A);

   (b) where the capacity of the power generating module is less than the threshold at which the connection voltage at its connection point will also be considered, as specified in accordance with the procedure set out in paragraph 4:

      (i) maximum capacity at or above a threshold proposed by each relevant TSO in accordance with the procedure laid out in paragraph 3 (type B). This threshold shall not be above the limits for type B power generating modules contained in Table 1;

      (ii) maximum capacity at or above a threshold specified by each relevant TSO in accordance with paragraph 3 (type C). This threshold shall not be above the limits for type C power generating modules contained in Table 1; or

      (iii) ~~connection point at 110 kV or above (type D). A power generating module is also of type D if its connection point is below 110 kV and its~~ maximum capacity ~~is~~ at or above a threshold specified in accordance with paragraph 3 (type D). This threshold shall not be above the limit for type D power generating modules contained in Table 1.

   (c) where the capacity of the power generating module is greater than or equal to the threshold at which the connection voltage at its connection point will also be considered, as specified in accordance with the procedure set out in paragraph 4:

      (i) connection point below 110 kV and maximum capacity at or above a threshold proposed by each relevant TSO in accordance with the procedure laid out in paragraph 3 (type B). This threshold shall not be above the limits for type B power generating modules contained in Table 1;

      (ii) connection point below 110 kV and maximum capacity at or above a threshold specified by each relevant TSO in accordance with paragraph 3 (type C). This threshold shall not be above the limits for type C power generating modules contained in Table 1; or

      (iii) connection point at 110 kV or above (type D). A power generating module is also of type D if its connection point is below 110 kV and its maximum capacity is at or above a threshold specified in accordance with paragraph 3. This threshold shall not be above the limit for type D power generating modules contained in Table 1.

[TO INSERT: TABLE 1]

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.

4. The capacity threshold from which the connection voltage of a power generating module will also be included in the determination of significance as set out in paragraph 2 will be set initially at 10MW. Where the relevant TSO wishes to amend this threshold, such a proposal may be made:

   (i) To decrease the threshold from 10MW down to a value greater than or equal to the higher of either 5MW or the capacity threshold at which a power generating module is of type C as set in paragraph 3; or

   (ii) To increase the threshold from 10MW up to the capacity threshold at which a power generating module id of type D as set in paragraph 3

Agreement from Group

Agreement that the solution while a compromise achieves most of the requirements and is the most viable option available.

IFIEC Europe in particular commented as follows:

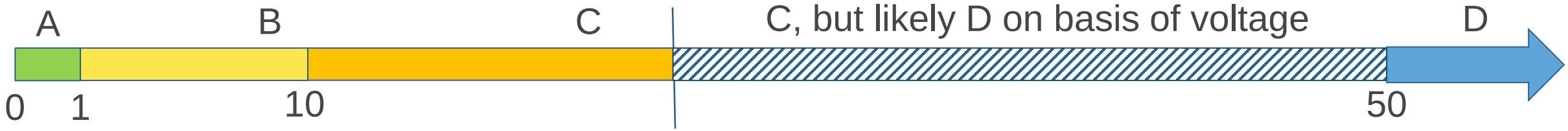
'Although IFIEC Europe appreciates the efforts done by this expert group and has actively participated in its functioning, it wants to express clearly that the proposed compromise solution is only partial and does not completely solve the problem, in particular for those generation assets on sites connected above 110kV that are above the threshold to be defined according to the proposal in this document. IFIEC Europe thus strongly wants to urge the European Stakeholder Committee, the Agency and the National Regulatory Authorities as well as the European Commission to monitor the potential negative impact for these installations compared to similar installations that are connected to the grid in alternative constellations and remediate any undue negative effects, as these could lead to undue underinvestment in such assets.'

Back-up slides

What is the possible impact? (eg GB)

Existing RfG thresholds:

Likely 110kV connection above this size; assumed about 20MW, but depends on geography



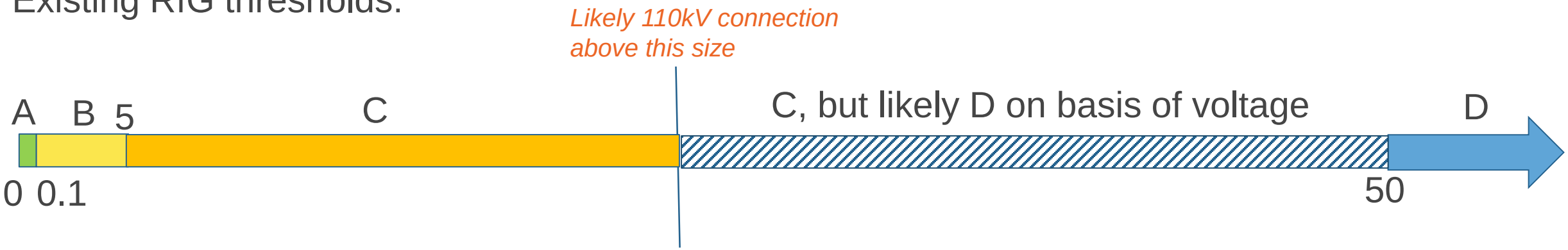
Remove voltage criteria entirely:

In GB, if the voltage criteria was removed entirely then, based on the projections used during the work to set the GB thresholds:

- Roughly 2.9GW of generation connecting in the future at 132kV would change from type D to type C, 30MW would become type B.
- This seems low but is not that surprising…given that the threshold in GB for connection at 132kV seems to be about 20-30MW. Only small numbers of generation projects are in the size range 30-50MW which will therefore connect at 132kV and be impacted by a removal of the voltage criteria.

What is the possible impact? (eg Spain)

Existing RfG thresholds:



Remove voltage criteria entirely:

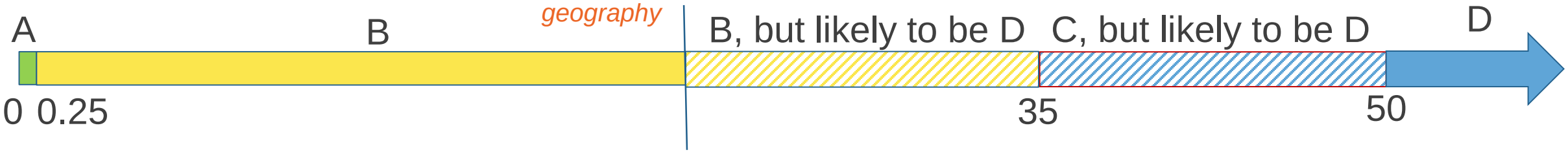
In Spain, if the voltage criteria was removed entirely then for generators connecting to the transmission system (i.e. from 220 kV to 400 kV) then:

- Generators already in service: 16GW would become Type C instead of Type D. 48 MW would become Type B.
- Generators not in service but that have access permission: 35.5 GW would become Type C. 90 MW would become Type B.

What is the possible impact? (eg Austria)

Existing RfG thresholds:

Likely 110kV connection above this size; up to 35MW due to geography



Remove voltage criteria entirely:

Remove voltage criteria from type B:

If the voltage criteria was removed completely, following replanting then of all type D generation (35 TWh) in Austria 45% would move to Type B and 10% would move to Type C. This equates to, of 15.2GW installed type D, 3.7GW would become Type B and 1,4 GW would be type C.