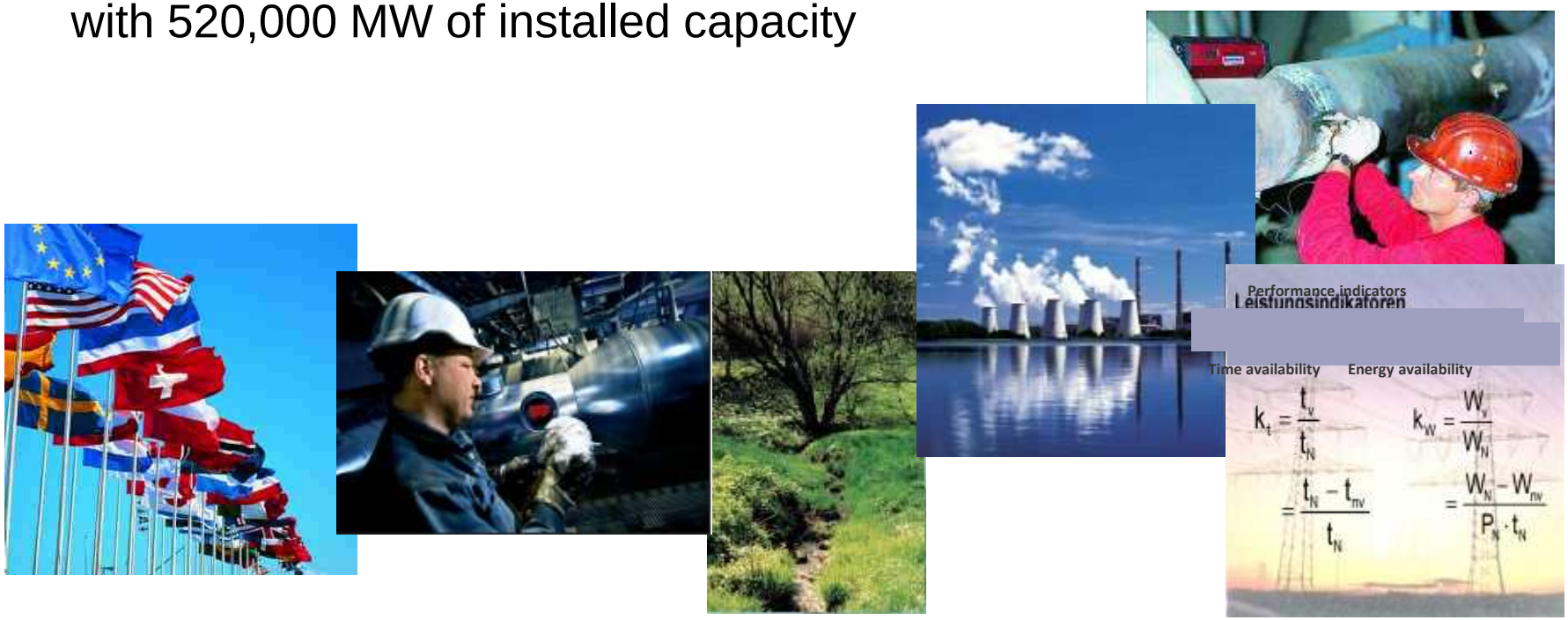
Requirements for Grid Connection Network code First Stakeholder Group

- VGB
- Unit definition and categorisation
- Frequency and voltages ranges

VGB is an European technical association of companies, for which power plant operation and the appropriate technology are the most important basis of its existence. The goal is to promote and optimise

- the operational safety and environmental compatibility
- availability and economic efficiency

VGB represents 499 member companies from 36 countries with 520,000 MW of installed capacity



Generating Unit Definition

- Generating Unit can generate electricity and which has a connection point to a TSO or DSO network.
- If there are several generators within a Power Generating Facility, that cannot be operated independently from each other or can reasonably be considered in a combined way, then each of the combinations of these generators shall be considered as one Generating Unit.
- A storage device operating in electricity generation mode is considered to be a Generating Unit.
- Hydro pump units shall comply only with Demand Connection Code during pumping.
- When a Generating unit comprises several interdependant generators, the capabilities required of it shall be reduced pro rata to the capacity of the generators actually in service.

Unit Categorisation

- The current definition rises ambiguity for a generation unit embedded in an industrial site. To define at the internal private connection point or at the connection point with the TSO? What should be the FRT? What if the operator of the industrial network is also owner of the generating unit and wants to apply the code according its own interest?
- No need of voltage threshold in the table according a clause restricting 13.3.a to units type D connected to “transmission” grids (> 170 kV)
- No link between category (requirements to apply) and voltage level at the connection point.
- The thresholds are fixed to avoid competion distortion in the synchronous area.

Synchronous Area	Type A capacity threshold	Type B capacity threshold	Type C capacity threshold	Type D capacity threshold
Continental Europe	1 kW	1 MW	50 MW	200 MW
Nordic	1 kW	1 MW	50 MW	100 MW
Great Britain	1 kW	1 MW	50 MW	50 MW
Ireland	1 kW	0.1 MW	15 MW	50 MW
Baltic	1 kW	1 MW	15 MW	100 MW

Frequency Ranges

- Unlimitted ranges
  - Generators are highly sensitive to frequency distribution
  - IEC 60034 recommends the purchaser to specify the duty (non-periodic load and speed variations) but consultation for RfG code has not been publically coordinated with SO codes

  ➔ NO CHANGE unless full CBA
- Limited ranges
  - Issues are specific for each synchronous area (limits, durations)
  - Operational Coordination (TSO-TSO and TSO-Stakeholders) within each synchronous area is necessary
  - To make room for frequency of occurrences

  ➔ To set unlimited frequency ranges and frequency of occurrences according to Article 4(3) within each synchronous area.

Voltage Ranges

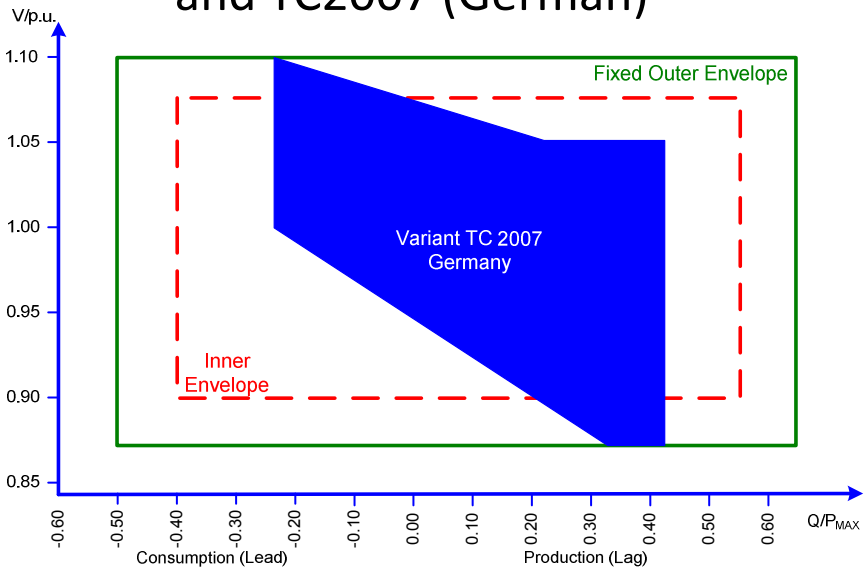
Valid within steady state Frequency range according Article 7.1

Synchronous Area	Voltage Range	Maximum time period for operation
Continental Europe	0.85pu - 0.95 pu	30 minutes
	0.95pu - 1.05pu	unlimited
	1.05pu - 1.0875pu	30 minutes
	1.0875pu - 1.10pu	to be agreed
Nordic	0.90pu - 1.05pu	unlimited
	1.05pu - 1.10pu	30 minutes
Great Britain	0.90pu - 1.05pu	unlimited
	1.05pu - 1.10pu	15 minutes
Ireland	0.90pu - 1.05pu	unlimited
Baltic	0.90pu - 1.05pu	unlimited
	1.05pu - 1.10pu	60 minutes

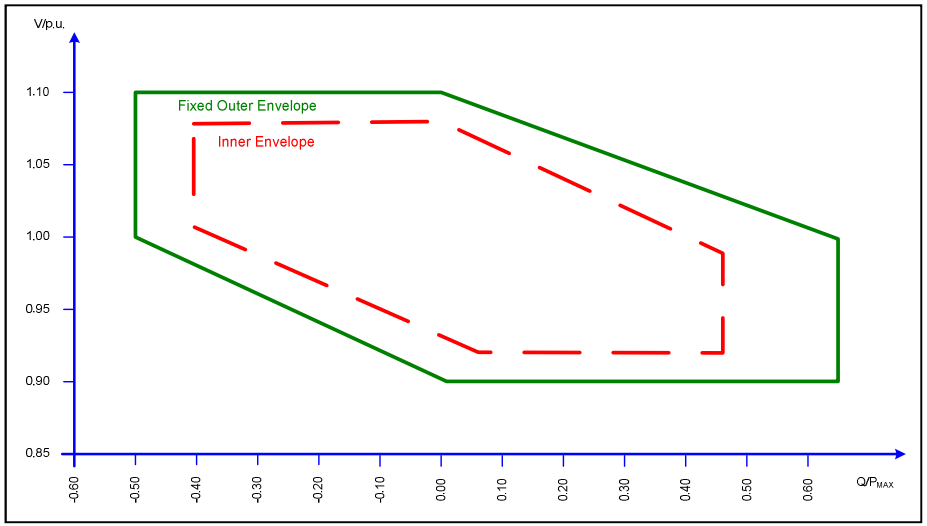
Values represents the state of the art of optimized units.
Any significant deviation from the current practice has to be justified according CBA

UQ Profiles

ENTSO-E's profile compared to with limits for Central Europe and TC2007 (German)



VGB Proposed U-Q-Profile



ENTSO-E's proposal needs on load tap changers => impact on plant reliability

UQ profile has to be realistic and appropriate considering plant reliability, costs and grid needs.