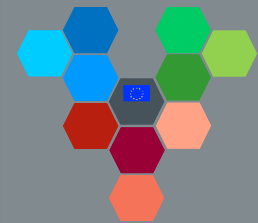


# ENCODE

## Topic frequency management



- Introduction of the topic to Belgian Grid
- Approach in Expert Group

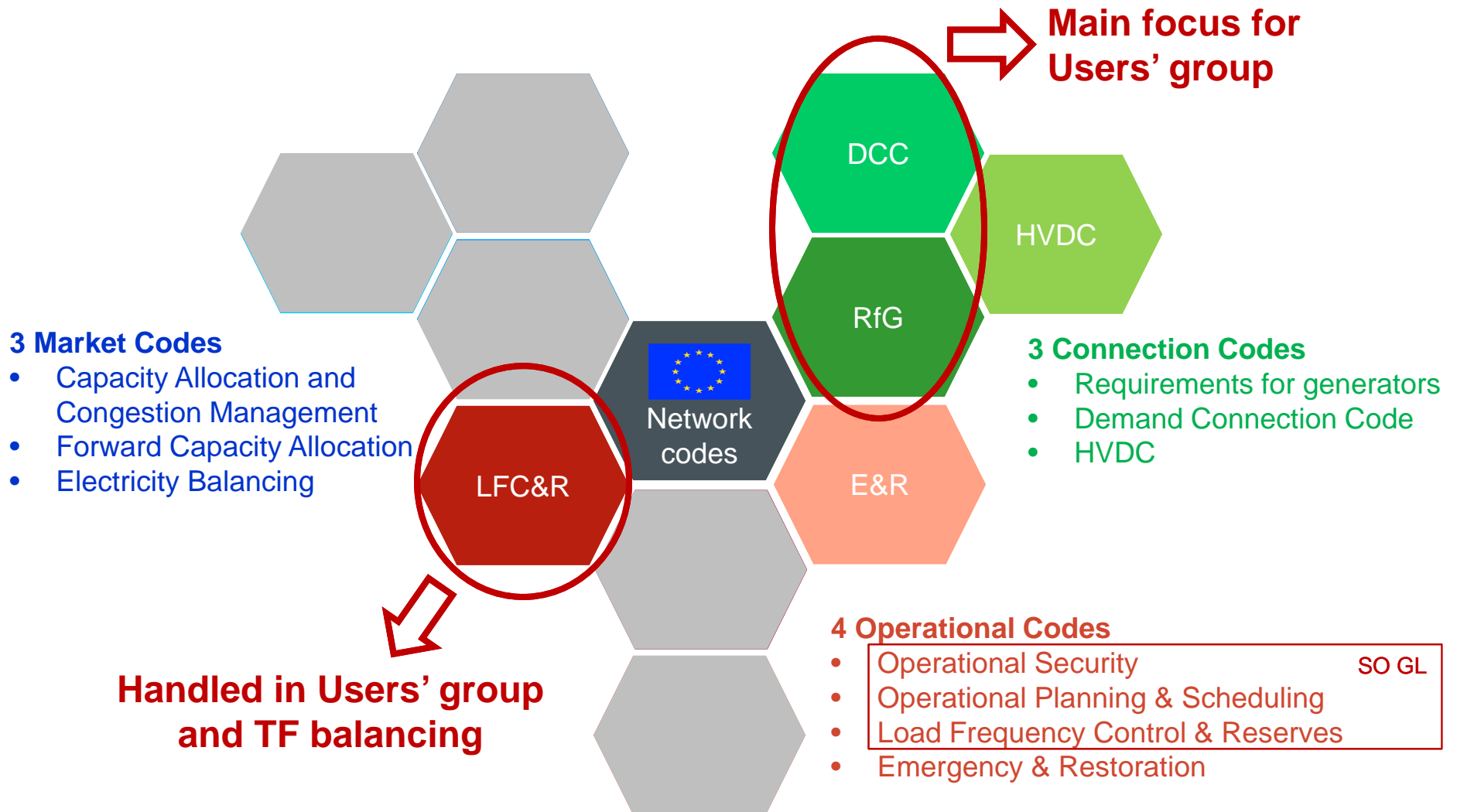
19 May 2016

Brussels

Benjamin Genêt

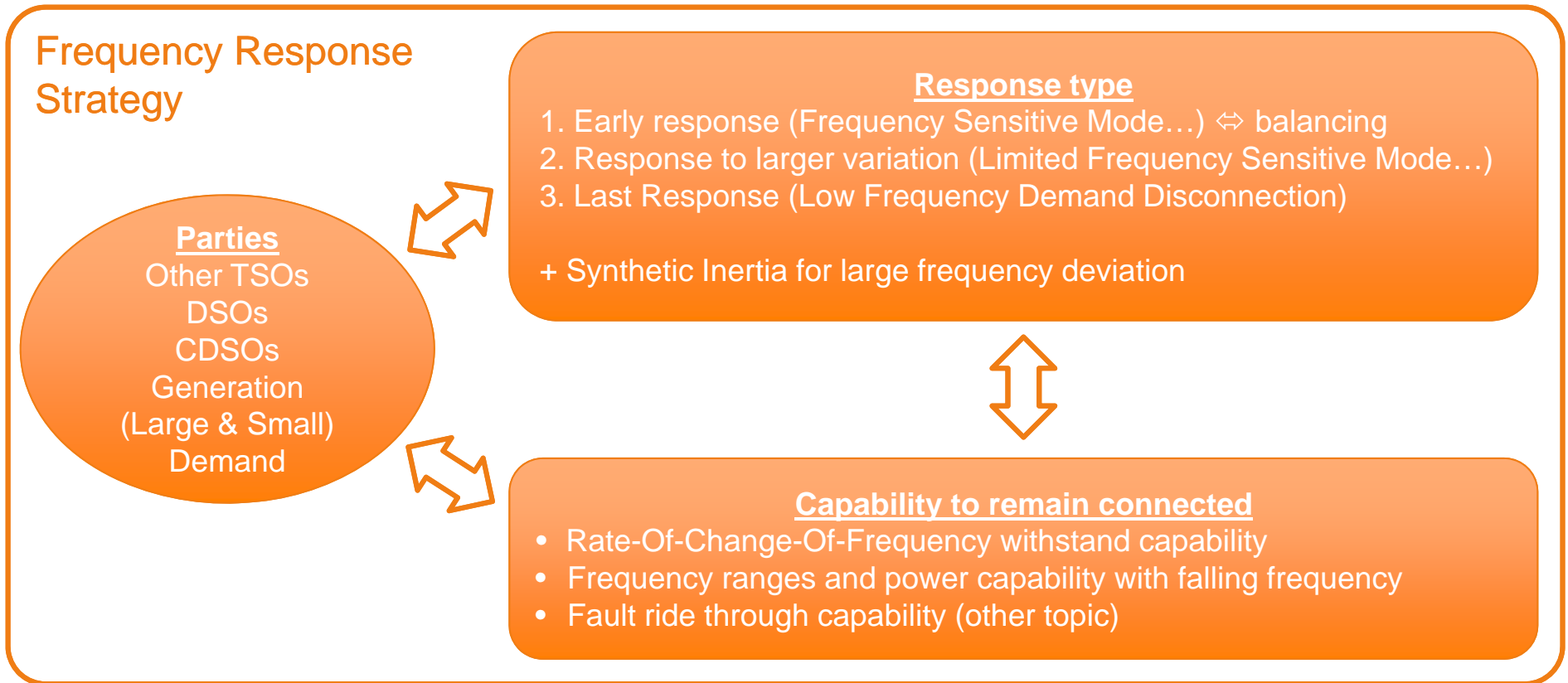
# Topic frequency management – related NCs

- Scope: frequency related articles in 5 NCs



# Context regarding frequency

- A stable frequency is an essential common good for all involved parties
- Evolving context due to change in generation mix and new technical capabilities
  - Historically: frequency maintained by large generators
  - Increasing importance that all parties contribute to maintain constant frequency
- Frequency is essentially a system-wide feature → **need for a coordinated strategy**





# Requirements for Generators

Topic with national definition and related articles

## Main topics to address

- Type A and above
  - Time period for operation in low frequency ranges (47.5 Hz – 49 Hz)
  - Rate-of-change-of-frequency withstand capability + RoCoF protection req.
  - Limited frequency sensitive mode in over-frequency + impact on power output + (only type A) automatic disconnection/reconnection
- Type B and above:
  - Requirement for remote operation
- Type C and above
  - Limited frequency sensitive mode in under-frequency
  - Frequency sensitive mode (R1 – FCR providers), including monitoring
  - Islanding detection
- Power Park Module (PPM) of type C and above: synthetic inertia
- Transversal questions:
  - When do we consider modernization?
  - Specific issue for CDSO?

## Related articles

Art. 13 (General requirements for type A power-generating modules): 1.a.i, 1.a.ii, 1.b, 2.a, 2.b, 2.c, 2.d, 2.f, 4, 5, 6, 7

Art. 14 (General requirements for type B power-generating modules): 2.b

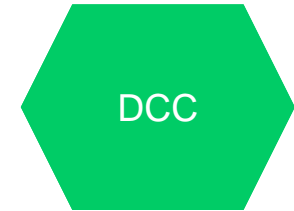
Art. 15 (General requirements for type C power-generating modules): 2.c, 2.d.i, 2.d.iii, 2.d.iv, 2.d.v, 2.g, 5.b.iii

Art. 21 (Requirements for type C power park modules): 2.a, 2.b

Note: requirements are mostly additional (requirements for type A apply to type A, B, C, D and valid for Synchronous Power Generating Module, PPM and Offshore PPM (see Art. 16 to 29 for more details and exceptions)

## Current Belgian requirements to be found in:

- Règlement technique fédéral Art. 62, Art. 65, Art. 77, Art. 233, Art. 234, Art. 235, Art. 236, Art. 241, Art. 242, Art. 243.
- Equivalent in Regional grid codes
- Contrat de raccordement
- Synergrid C10/11 - 2.13.2, 3.3.3



# Demand Connection Codes

Topic with national definition and related articles

## Main topics to address

- Time period for operation in low frequency ranges (47.5 Hz – 49 Hz)
- Demand disconnection/reconnection
  - Based on low frequency/Rate-of-Change-of-Frequency/remote
  - (Automatic) demand reconnection conditions
- Rate-of-change-of-frequency withstand capability
- Specific provisions
  - For system frequency control (R1 – FCR providers)
  - For synthetic inertia
- Transversal questions:
  - When do we consider modernization?
  - Specific issue for CDSO?

## Related articles:

Art. 12 (General frequency requirements): 1, 2

Art. 19 (Demand disconnection and demand reconnection): 1, 4

Art. 28 (Specific provisions for demand units with demand response active power control, reactive power control and transmission constraint management): 2.k

Art. 29 (Specific provisions for demand units with demand response system frequency control): 2

Art. 30 (Specific provisions for demand units with demand response very fast active power control): 1, 2

# Other NCs

## Topics and related articles

### LFC&R

- Ramping period obligation/limitation for generation and demand to alleviate deterministic frequency deviation
- Additional requirements for FCR providers to ensure operational security + monitoring
- FCR and FRR prequalification processes

Related articles: 137.4, 154.3-4, 155.1, 159.2

### HVDC

- Mostly similar to RfG and DCC topics:
  - Frequency ranges, active power ramping limitation, synthetic inertia
  - (Limited) frequency sensitive mode
  - Frequency stability requirements

Related articles: 11.1-4 & Annex I, 13.1, 13.3, 14.1-2, 15 & Annex II, 16.1, 16.2, 17.1, 17.2, 39.2 & Annex VI, 39.10, 47.1, 47.2

### E&R

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Frequency management during defense                             <ul style="list-style-type: none"> <li>• Frequency deviation management procedure</li> <li>• Automatic under-frequency control scheme</li> <li>• Automatic over-frequency control scheme</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Frequency management during restoration                             <ul style="list-style-type: none"> <li>• Frequency management procedure</li> <li>• Appointment of frequency leaders</li> <li>• Frequency management after Frequency Deviation</li> <li>• Frequency management after Synchronous Area split</li> </ul> </li> </ul> |
|--|--|

Related articles: 13-16, 26-29

# Proposed approach in Expert Group

- 1<sup>st</sup> Expert Group: June 7<sup>th</sup>
  - Detail NC requirements and relate them to existing Belgian legislative and contractual requirements (rough overview and focus on articles with national definition)
  - Gather attention points & motivations of stakeholders on selected articles of the five related NCs
- Beginning September: sharing of the material for the 2<sup>nd</sup> Expert Group
- 2<sup>nd</sup> Expert Group: September 14<sup>th</sup>
  - First Elia proposal taking into account the input from the stakeholders and coordination with neighboring TSOs
  - Debate with stakeholders
- 3<sup>rd</sup> Expert Group (if needed)
  - Consolidation of proposal
- **Important note:**
  - NCs require that the TSOs aligned their frequency related requirements with other TSOs of the synchronous area
  - Expert group's debate will serve as input for the discussion with TSOs of continental Europe