



DER integration as driver for market, operational and infrastructure measures

IRED 2018

It all started with distributed generation

- > Small island networks as nucleus of electrification
- > RES already: hydro

Larger interconnected networks developed

- > For reserve sharing and increased security of supply
- > As platform for exchange/market
→ rules needed for the complex system

Combine best of both

- > DER: Sustainable, smart, SoS
- > Grid: Market, competition, exchange, SoS



‘Needless to say that the higher level of ambition that we have just agreed for renewables will make it all the more urgent to come to a rapid and ambitious agreement on modernised market rules.’

Commissioner Cañete, Hamburg, 25.09.2018

3rd Package

- > Network codes and guidelines
- > Pan-EU network planning (TYNDP)

Infrastructure regulation (TEN-E)

- > Projects of common interest (PCIs)
- > Related methodologies and measures (CBA, CBCA, CEF)

Clean Energy Package (under negotiation)

- > Electricity regulation/directive, risk preparedness
- > RES, EE

**Moving Target
Model ?**



Regulators

- are independent authorities (NRAs, under the umbrella of ACER) to shape the electricity system
- aim for security of supply, market integration and sustainability
- control network tariffs and system operators revenue streams
- enable market driven approaches
- ensure maintaining or improving the quality of supply
- enable smart solutions that can more efficiently meet network users' needs
- harmonise, if cost-benefit ratio is positive (money, SoS, sustainability/decarb.)

DER/RES as driver for change



Different types of plants

- > Size
- > Behaviour (FRT, PQ, ...)
- > Services (Q, ...)

Resource driven operation

Importance of forecast quality

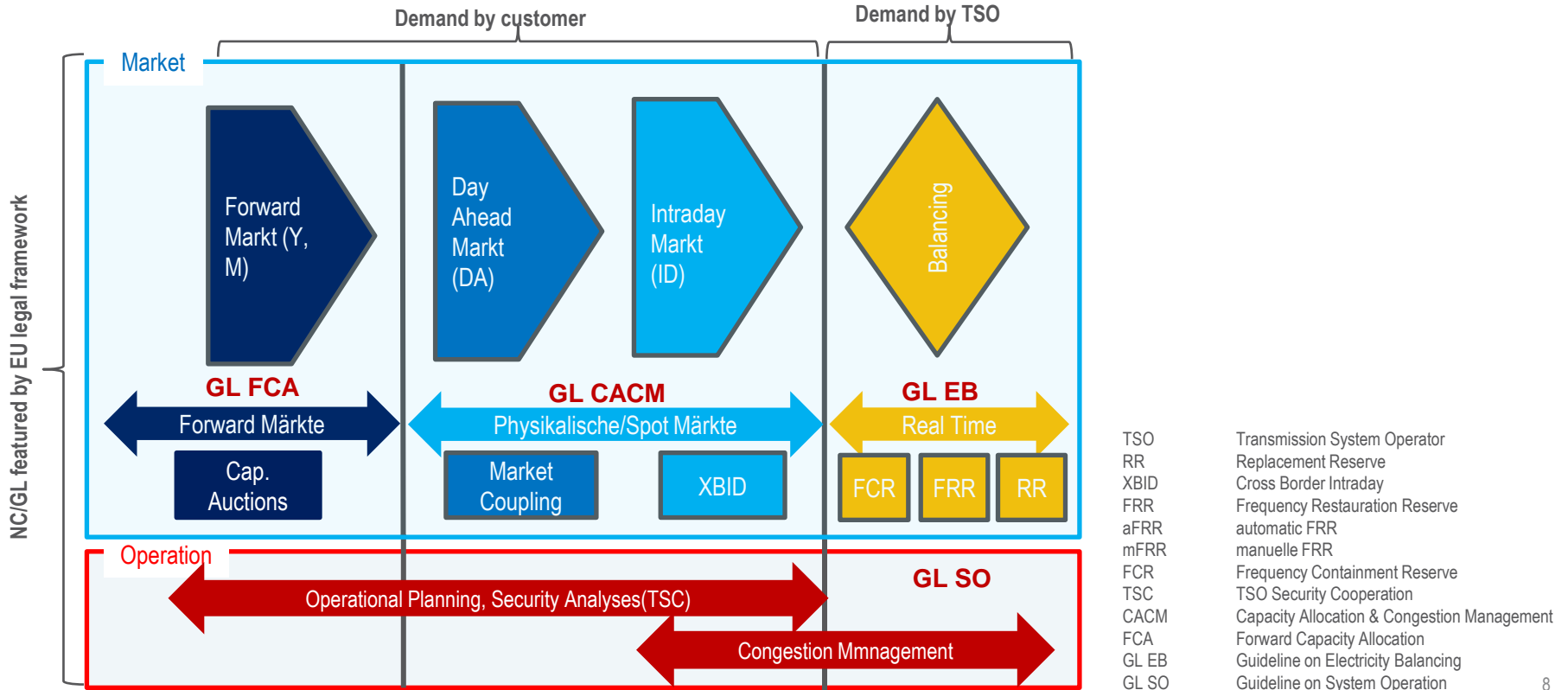
Data exchange requirements

Intensified TSO-DSO cooperation

- > Congestion management
- > Scheduling



Energy market design



- TSO Transmission System Operator
- RR Replacement Reserve
- XBID Cross Border Intraday
- FRR Frequency Restauration Reserve
- aFRR automatic FRR
- mFRR manuelle FRR
- FCR Frequency Containment Reserve
- TSC TSO Security Cooperation
- CACM Capacity Allocation & Congestion Management
- FCA Forward Capacity Allocation
- GL EB Guideline on Electricity Balancing
- GL SO Guideline on System Operation

Energy only market?

- > How can RES/DER be a significant part?
- > Strengthen short term markets
- > Transit for least cost generation

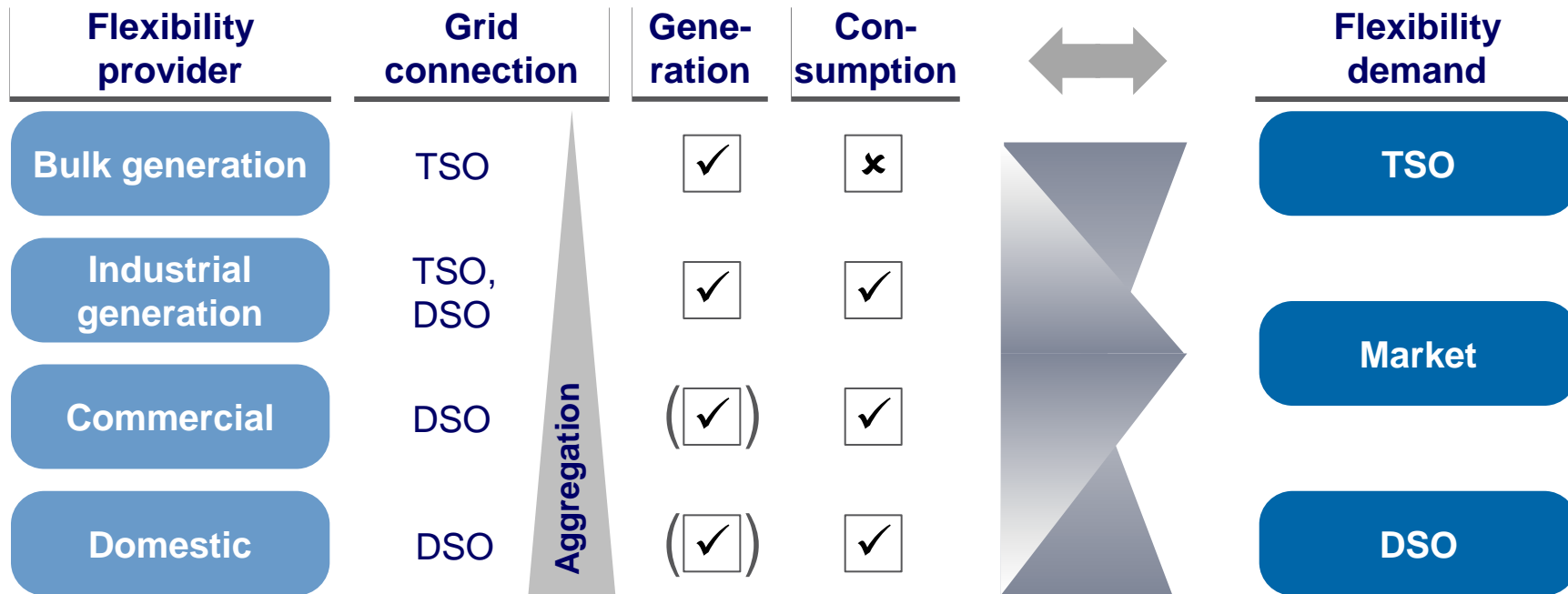
Security of supply provided by the market?

- > Need for secured generation (adequacy, redispatch) → CRMs?

Balancing and flexibility

- > Value of and access to flexibility
- > Coordinate producers, consumers, flexibility providers (locational data needed?)

Providers and consumers of flexibility



1	Market arrangements (procurement conditions, market rules, market processes etc.) should not create undue barriers for efficient provision of flexibility.
2	Product requirements (bid size thresholds, duration etc.) should not create undue barriers for efficient provision of flexibility.
3	All national market systems should allow the metering and settlement of all grid users (independent from size) at the same time resolution as the imbalance settlement period.
4	Aggregation should be supported to the level considered as efficient and secure, independent from connection (DSO and TSO) and size of unit.
5	All explicit sale of flexibility must be subject to proper verification , meaning that measures are put in place to assure the proper delivery of the sold flexibility.
6	All consumers should have the right to share information to parties needing this information. If necessary to avoid negative effects of activated flexibility efficient methods for sharing of information exchange between market parties should be implemented.

Source: Principles for valuation of flexibility, CEER, Ref: C16-FTF-09-03, July 2016

Grid connection

- > DSO level → impact on TSO
- > Requirements versus services
- > Delayed need for grid investments?

Regional exchange

- > Generation mix impacts load flows
- > Interconnection capacity (x-b, internal)

Tariff schemes

- > Insurance principle? (capacity is cost driver)



Interlinked regulation

RfG NC:

- > Type A-D: different size
- > Requirements for new plants

SO GL:

- > Data exchange requested from existing and new plants from type B on

TYNDP, NDP and scenarios

Storylines, visions

- > RES development
- > Related: consumption, storage

Development plans:

- > Identification of needs, adequacy
- > Projects (lines, substations)

- > Smart & innovative solutions should be promoted since they are likely to **increase efficiency**.
- > Innovation is a broad concept (technology, process, network operations, market elements). TSOs are not necessarily in the best place. Academia, research institutions, manufacturers might have a natural mandate to **drive innovation**.
- > TSOs have a key role in implementing **pilot projects**.
- > **R&D incentives** do not have to come only from the NRA as (T)SOs can sometimes also apply to other national innovation funding available to businesses.
- > Hence regulators are interested in research and innovation, they are reviewing their regulatory frameworks regularly, but most regulatory frameworks are fit for these challenges due to their **technology neutral design**. (noting that a 'one size-fits-all-solution' is unlikely to exist)
- > **Dissemination** of project results among the TSO community is crucial for success.

Source: ACER presentation at the EC's Copenhagen Infrastructure Forum 2018



? Electrification of additional areas/appliances

? Adequacy assessment and measures

? Sector coupling gas-electricity

? System stability / inertia

? Flexibility issues

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