Standardization and Network Codes

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Smart Grid Standardization Achievements
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Reliable Sustainable Connected

Agenda

- Network codes under development
- Network Codes and / or / versus standards?
- Standards implementing network codes on grid connection
- A word on research and development

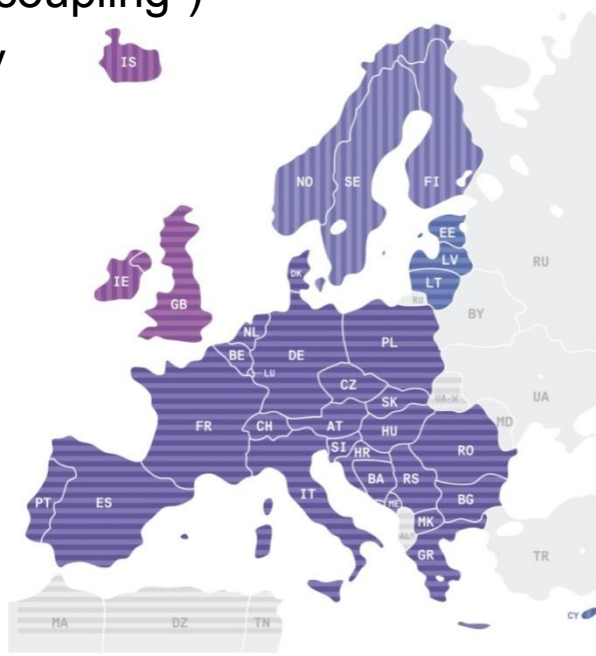
Background: ENTSO-E

Key activities set out in Regulation 714/2009 (on cross-border electricity trade, part of the 3rd Internal Energy Market Package)

- Deliver **network codes**
- Deliver **network plans** European / regional view of system needs (“TYNDP”)
- Deliver crucial aspects of **market integration** (“market coupling”)
- **R&D Plan** (fully included in EEGI – European Electricity Grid Initiative, part of the SET Plan)

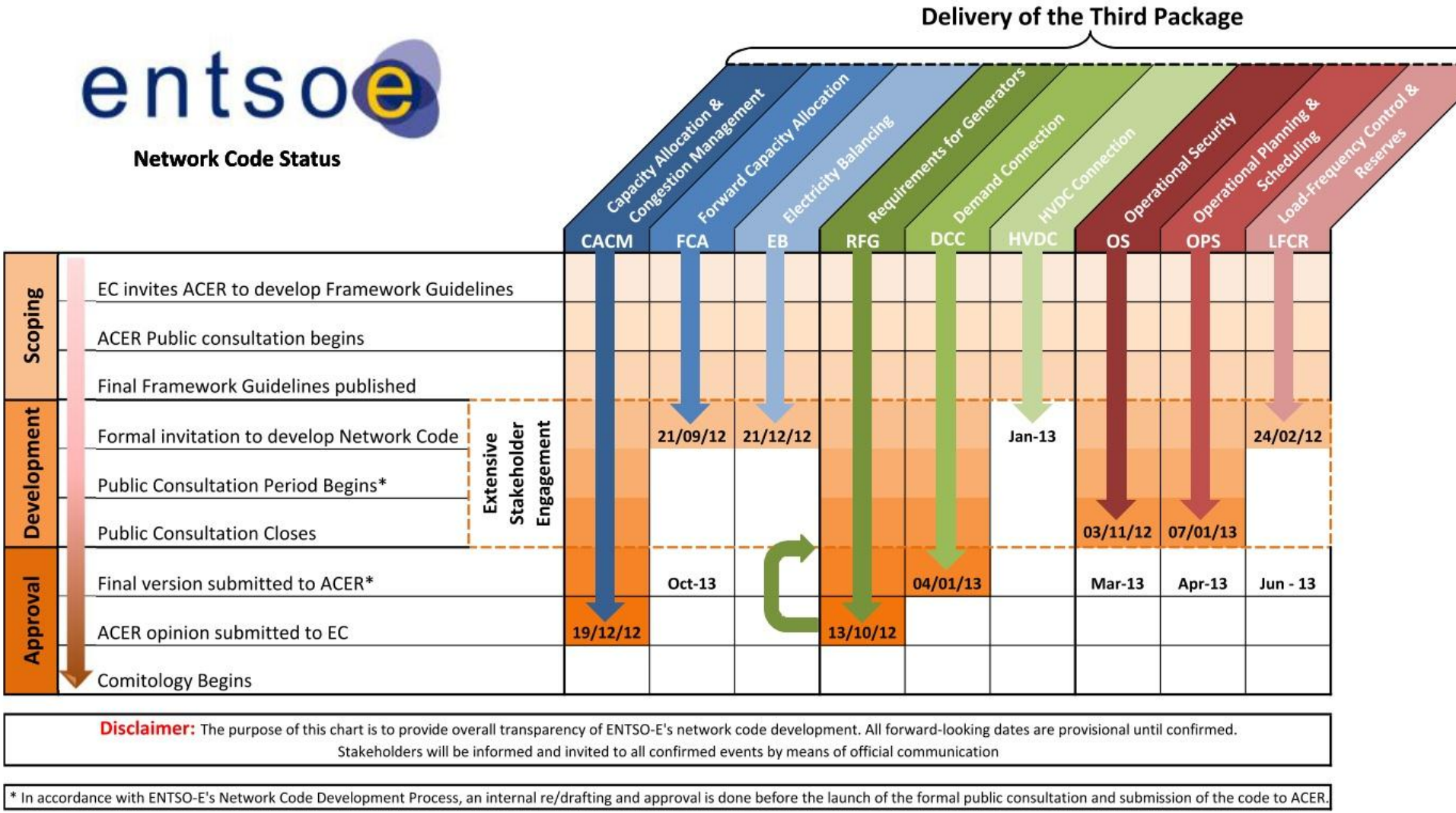
Through its members deliver the **infrastructure** to:

- enable markets to function,
- secure energy supply,
- meet climate change objectives through connecting RES



Represents **41 members from 34 countries**

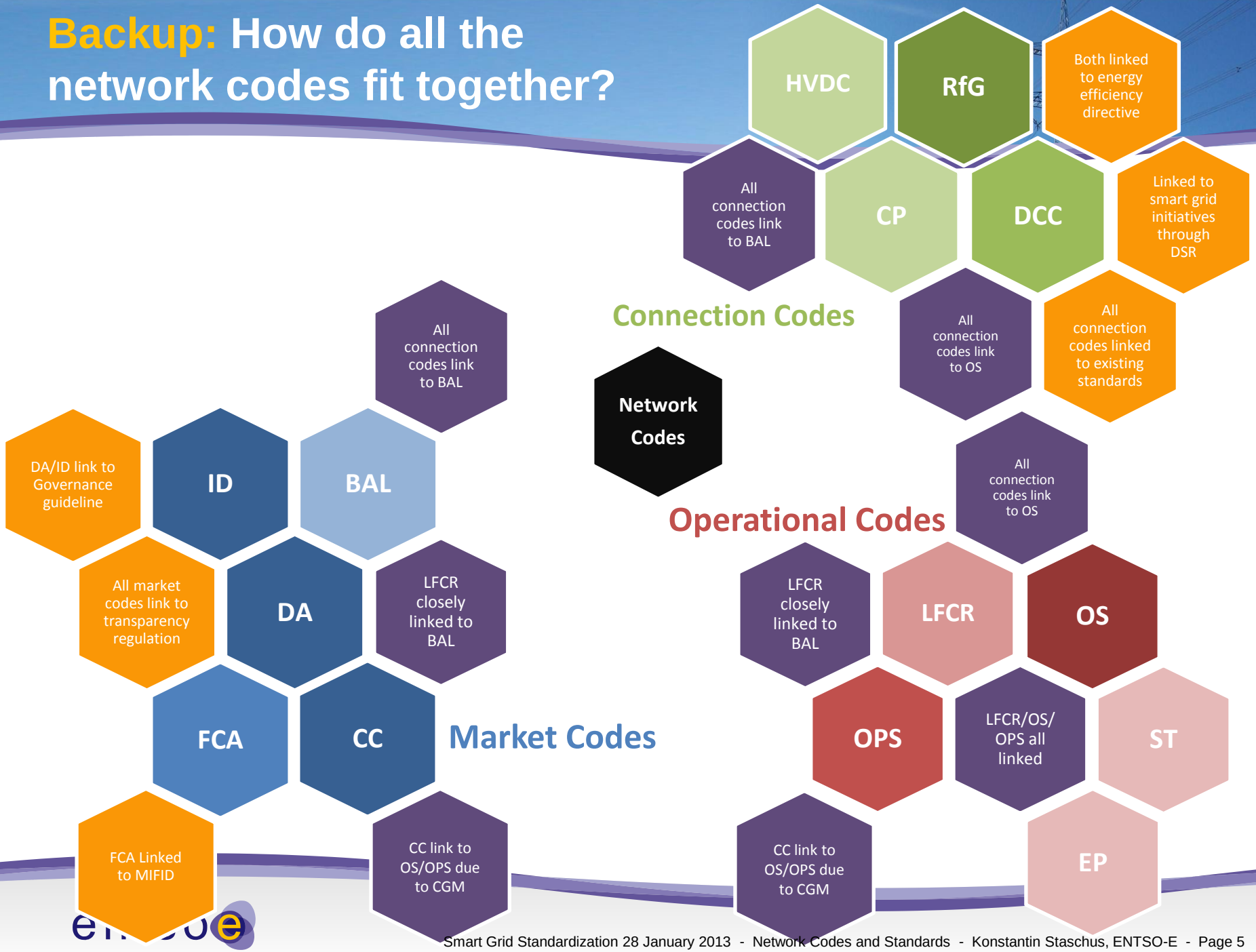
Network codes on electricity under development



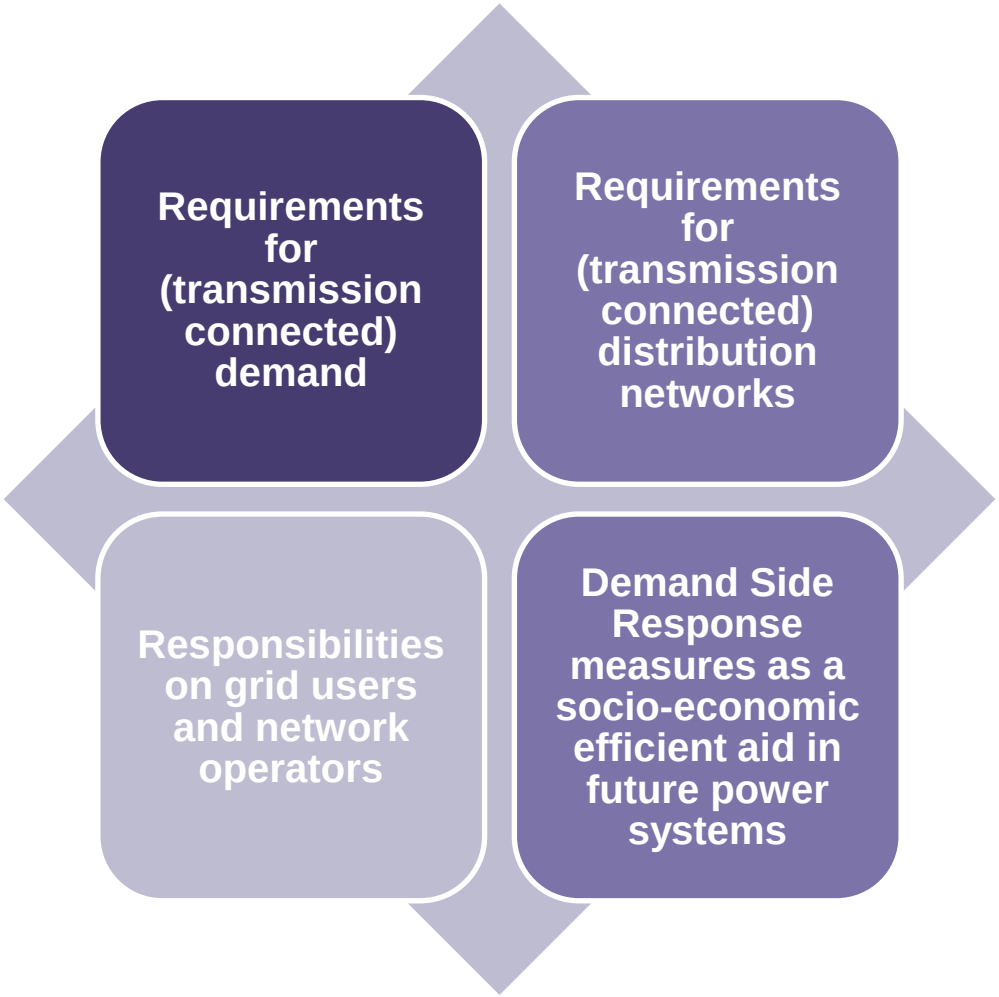
Disclaimer: The purpose of this chart is to provide overall transparency of ENTSO-E's network code development. All forward-looking dates are provisional until confirmed. Stakeholders will be informed and invited to all confirmed events by means of official communication

* In accordance with ENTSO-E's Network Code Development Process, an internal re/drafting and approval is done before the launch of the formal public consultation and submission of the code to ACER.

Backup: How do all the network codes fit together?



For example: Demand Connection Code



Limited number of non-exhaustive requirements for transmission connected demand

Functional capabilities for Demand Side Response measures

- To be further specified in detail and for specific appliances

Demand Connection Code - Demand Side Response

DSR for active/reactive power control and transmission constraint management

- If a user volunteers to provide this, the DCC prescribes basic functional capabilities (e.g. need for communication, time delay constraint, controllability)
- Procurement of the service: out of scope of this code, but can be captured in LFC&R or Balancing NC or other mkt mechanisms
- The code gives a process by which appliances could be mandatorily fitted with these capabilities to facilitate mkt uptake, in line with market based, consumer focused vision of smart grids
- Further technical specifications expected by standardization

DSR for system frequency control

- Mandatory capability for temperature controlled devices with inherent heat storage to react to frequency disturbances
- The code gives a process by which appliances could be addressed
- In the context of increased intermittent generation, and stronger needs for ancillary services, this offers a pragmatic, mature solution to partly address this change.

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Network Codes and / or / versus Standards?

CENELEC website:

… **voluntary** standards, which help facilitate trade between countries, create new markets, cut compliance costs and support the development of a Single European Market,

Standards are **driven by business**, and drafted by technical experts in the field. In building European consensus, industry, trade federations, public authorities, academia and NGO representatives are invited to contribute to the standardization process.

Regulation 714/2009:

The network codes **shall** be developed for **cross-border** network issues and **market integration** issues and shall be without prejudice to the Member States' right to establish national network codes which do not affect cross-border trade.

- **Can an industry driven consensus ensure security of supply?**
- **Should a European law aim at cutting compliance costs?**
- **A European Regulation cannot refer explicitly to an external standard which is to be developed still as this would circumvent Comitology.**

Network Codes and / or / versus Standards?

Network Code sets framework in terms of cross-border requirements and procedures

Standards can complement with additional specifications & allow for cost-efficiencies in compliance testing

Additional TSO specifications set out national diversities in non-exhaustive requirements which are needed to cope with local grid conditions

Industry / Standardization bodies are involved in NC development via various consultation processes

NC development guides ongoing standardization efforts.

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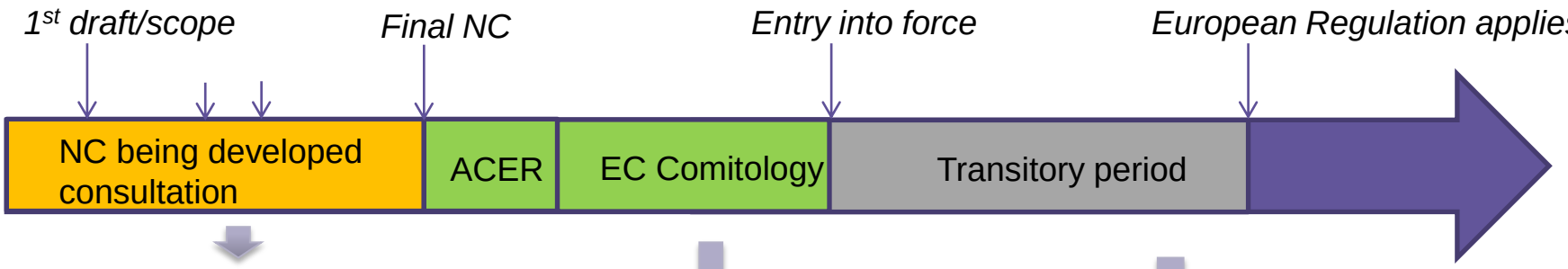
Network Codes on Grid Connection



Comparison with existing practices (among which standards) is a **continuous exercise** for ENTSO-E and all affected stakeholders

The NC evolves **continuously**. So do standards. Standardization already have the possibility to build on the NC frame before it enters into force.

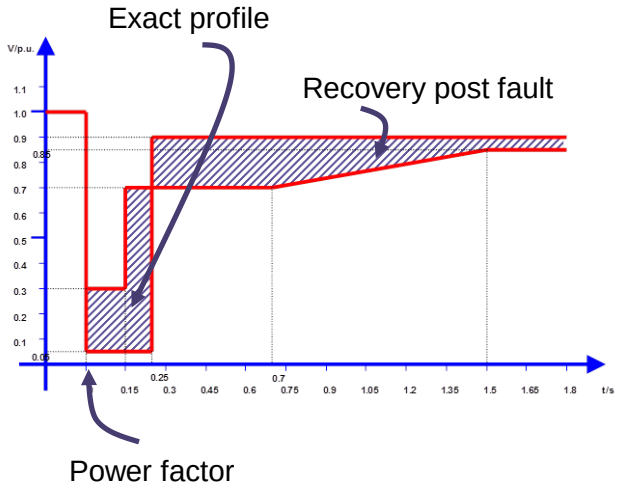
- European Regulation **supersedes** standards.
- When the NC applies, **non-exhaustive requirements** have to be specified in line with national legal framework.
- When the NC applies, many Network Operators have urged for the need to have the means to **test for compliance**.

⇨ How do standards fit in?

Backup: Examples from Network Code on Requirements for Generators

Fault Ride Through for smaller units (type B)

- NC asks for Voltage-against-time profile, pre-fault conditions, post-fault active power recovery, to be specified by the Relevant TSO, taking into account local system specificities. All relate to the network Connection Point and are specified by the TSO.
- How can a generator be type-tested at unit level?
- Does the industry wish to go for smaller sizes than type B only?



Information exchange

- Standards on how to transmit information to be defined at national level

Examples from Demand Connection Code

- DCC Art 22/23 specifies a set of functional capabilities for Demand Side Response that could also be mandatorily fitted into appliances in the European market
- DCC prescribes a process on how appliances are identified – including consultation open to e.g. standardization bodies and implementation in line with Ecodesign directive
- More detailed technical specifications for product design needed
- DCC requirements developed to not lock-in certain demand response solutions
- Ongoing standardization in general demand response schemes (not only cross-border) can use DCC requirements as an enabler

Network Codes – Key messages

- **Development of a wide set of network codes is ongoing with the aim of becoming binding European Regulation in the coming years**
- **Network codes are urgent tools to ensure systems security and European market integration in a rapidly changing power system.**
- **The process of network code development counts on input from the wider industry and welcomes the contribution of standardization bodies to take up this role.**
- **Standards can complement network codes in various areas, e.g. compliance, non cross border issues, harmonization for cost efficiencies.**
- **Coordination between network codes and standardization activities is key to ensure both tools reach their objective.**

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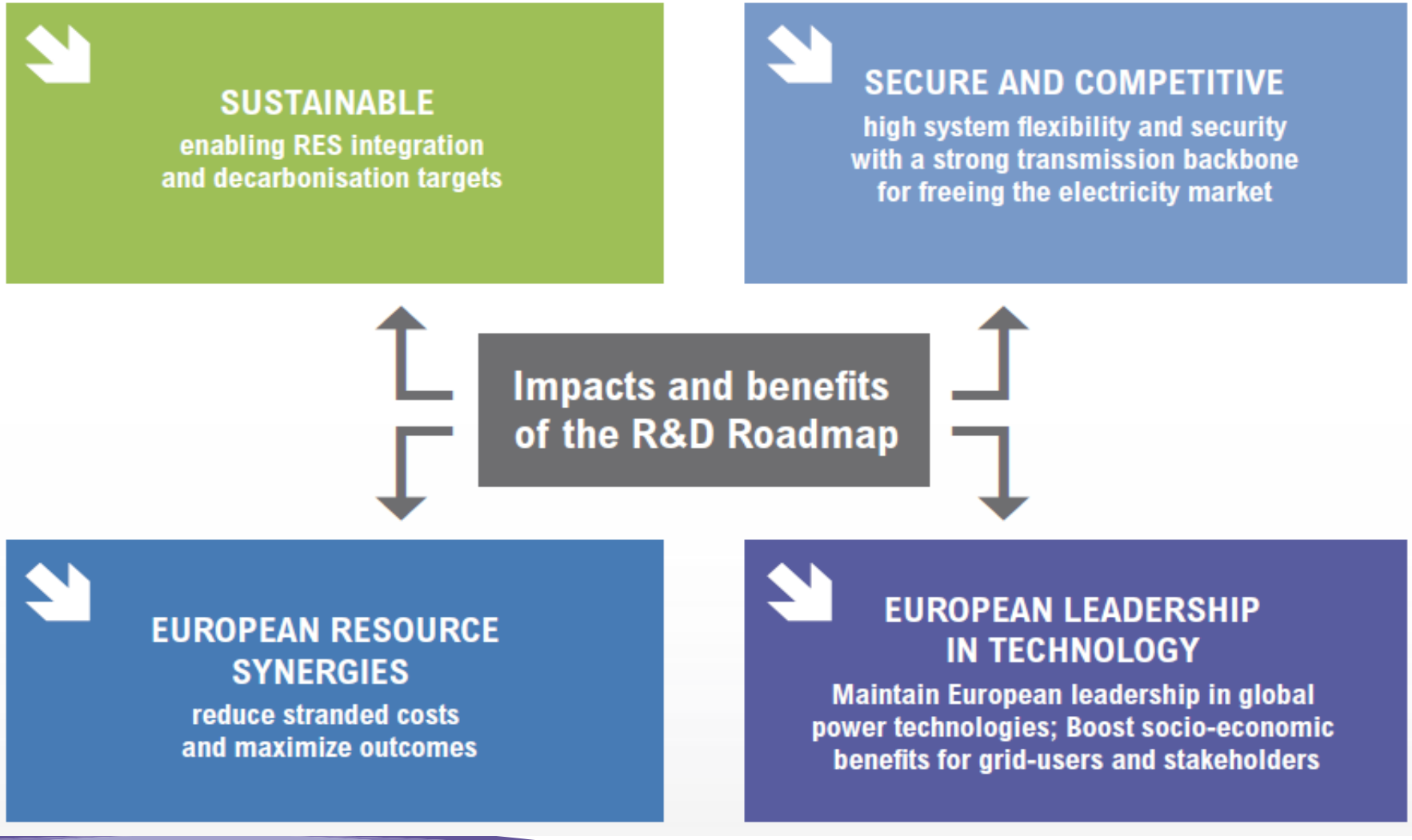
ENTSO-E R&D Roadmap 2013-2022: Published in Dec 2012 - outlines a methodology to achieve the European "20-20-20" and Roadmap 2050 targets - total R&D budget estimated € 1005 million for next 10 years

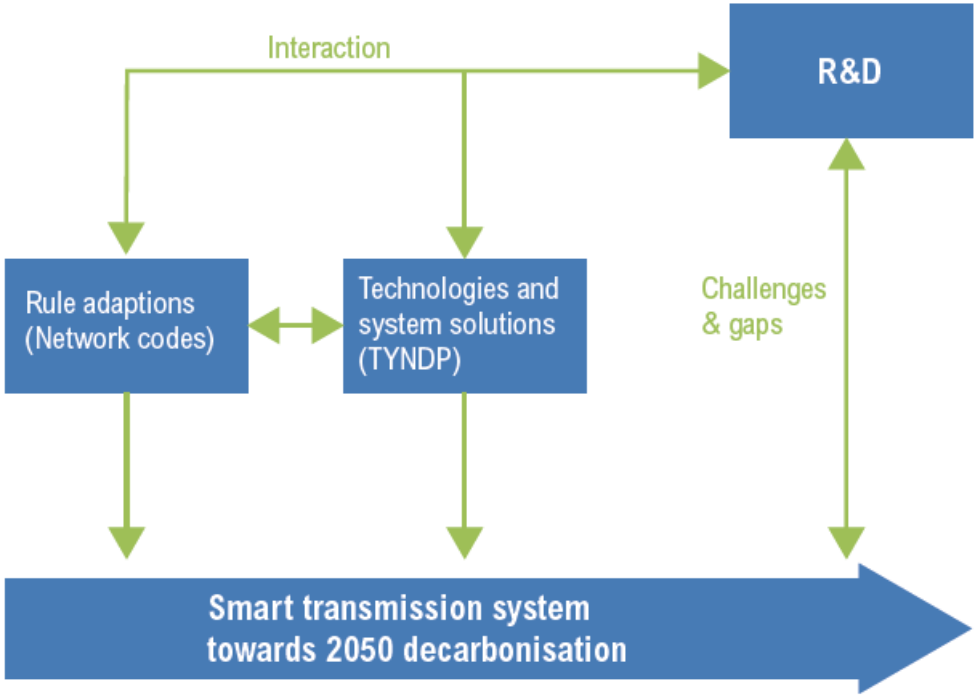


R&D Roadmap in relation to other ENTSO-E mandates

Roadmap complements the NCs the TYNDP

TYNDPs concentrate on hardware issues (technologies and system solutions)

NCs on “software” (rule adaptations)



Smart grid standardization is a complementary aspect so that smart grids enable demand response to bid into Europe-wide intraday and balancing markets.

Conclusion
InnoGrid2020+, 20-21 Feb 2013

The European Research and Development Dissemination Seminar

Organized by ENTSO-E, ESDO for Smart Grids and GRID+ project

On 20-21 February 2013, in Brussels

Direct registration link: http://www.gridplus.eu/news/innogrid2020-registration-form

Thank you for your attention

Questions?

More info on Network Codes?
⇨ **https://www.entsoe.eu/resources/network-codes/**

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Backup: Why a Network Code on Requirements for Generators is needed today

4th November 2006 – *UCTE system split*

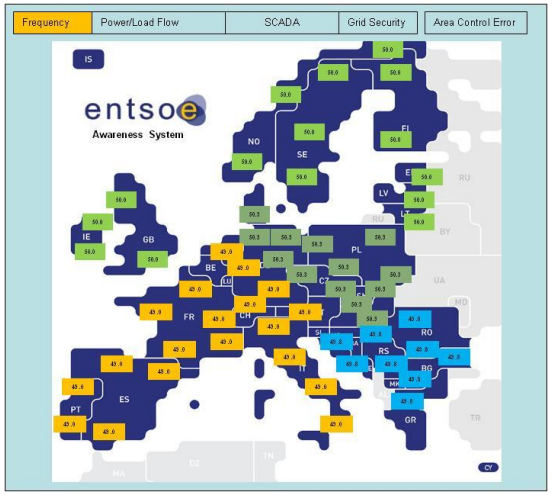
- need for wider frequency ranges and
- reduction of power at high frequencies

27th May 2008 – *GB near system collapse*

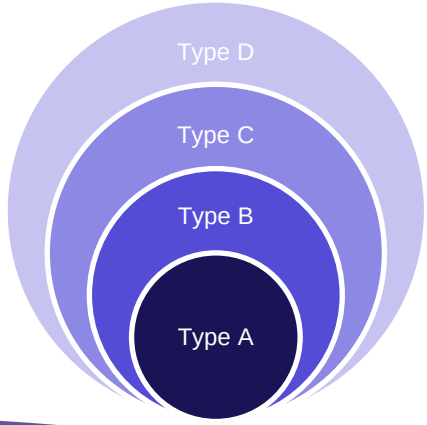
- need for wider frequency ranges and
- increased compliance testing for all generation

28th September 2003 – *Italian black-out*

- need for requirements for maintaining voltage stability



In a proportional, non-discriminatory and technology-independent manner – covering small to large scale users



Wide-scale network operation and stability including EU-wide balancing services

Stable and controllable dynamic response capabilities covering all operational network states

Automated dynamic response and resilience to operational events including system operator control

Basic capabilities to withstand wide-scale critical events; limited automated response/operator control

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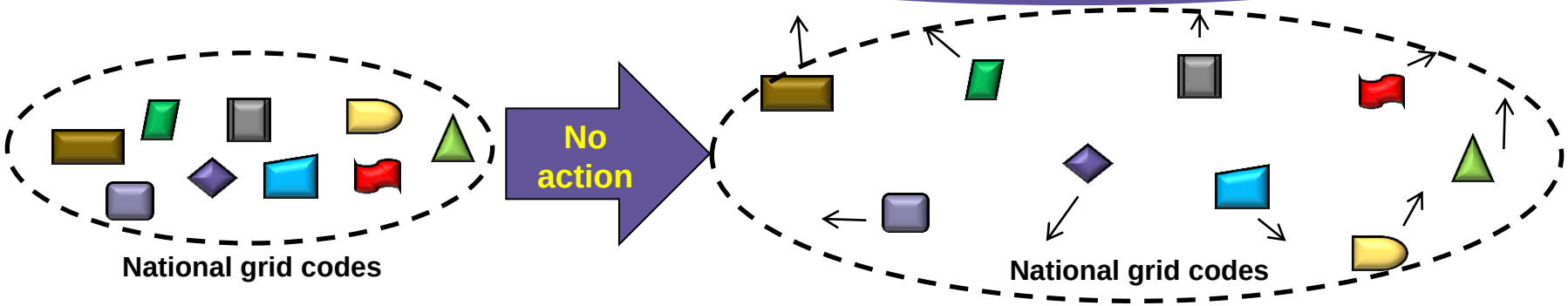

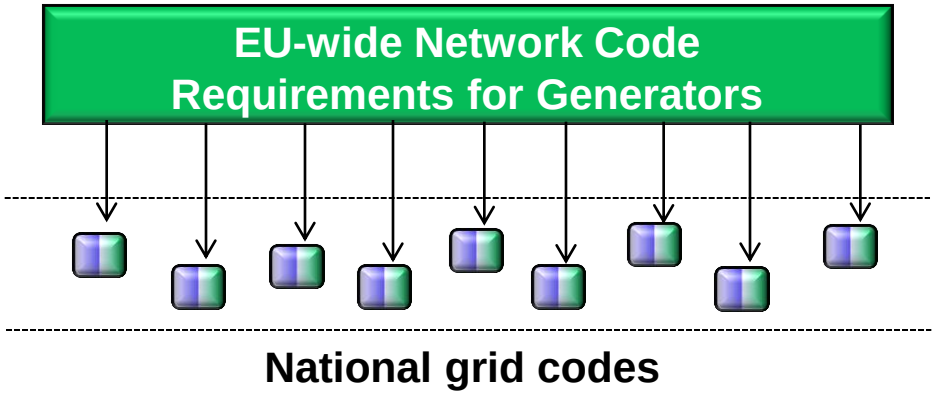

53 requirements, of which

- 9 non-mandatory
- 32 non-exhaustive