Operational Security Code

1st Workshop

20. April 2012

entsoe

Reliable Sustainable Connected

Highlights

- Rationale and framework
- Roadmap
- Operational Security Code contents

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System operation and security

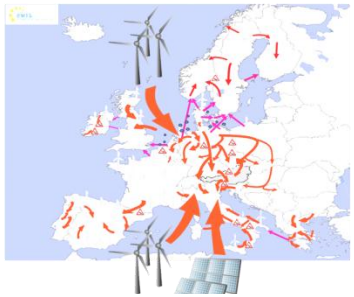
System Operation

Activities and processess to operate power system securely and efficiently: „keeping the lights on“, enabling electricity market, integrating conventional and renewable generation.

Operational Security

Measure of the power system capability to retain normal operating state or to return to the normal state as soon and close as possible; characterized by the operational security level which is a function of constraints like e.g. thermal, voltage and stability limits

Key impacts



Intermittent generation (wind, solar power) with low predictability

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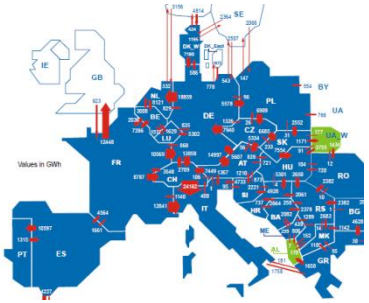

Massive growth of cross-border trade and transits

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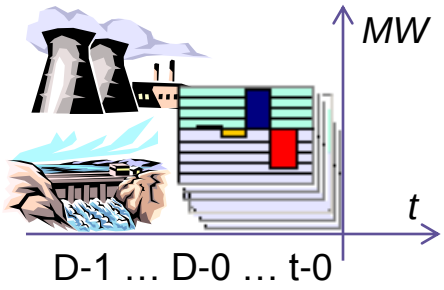
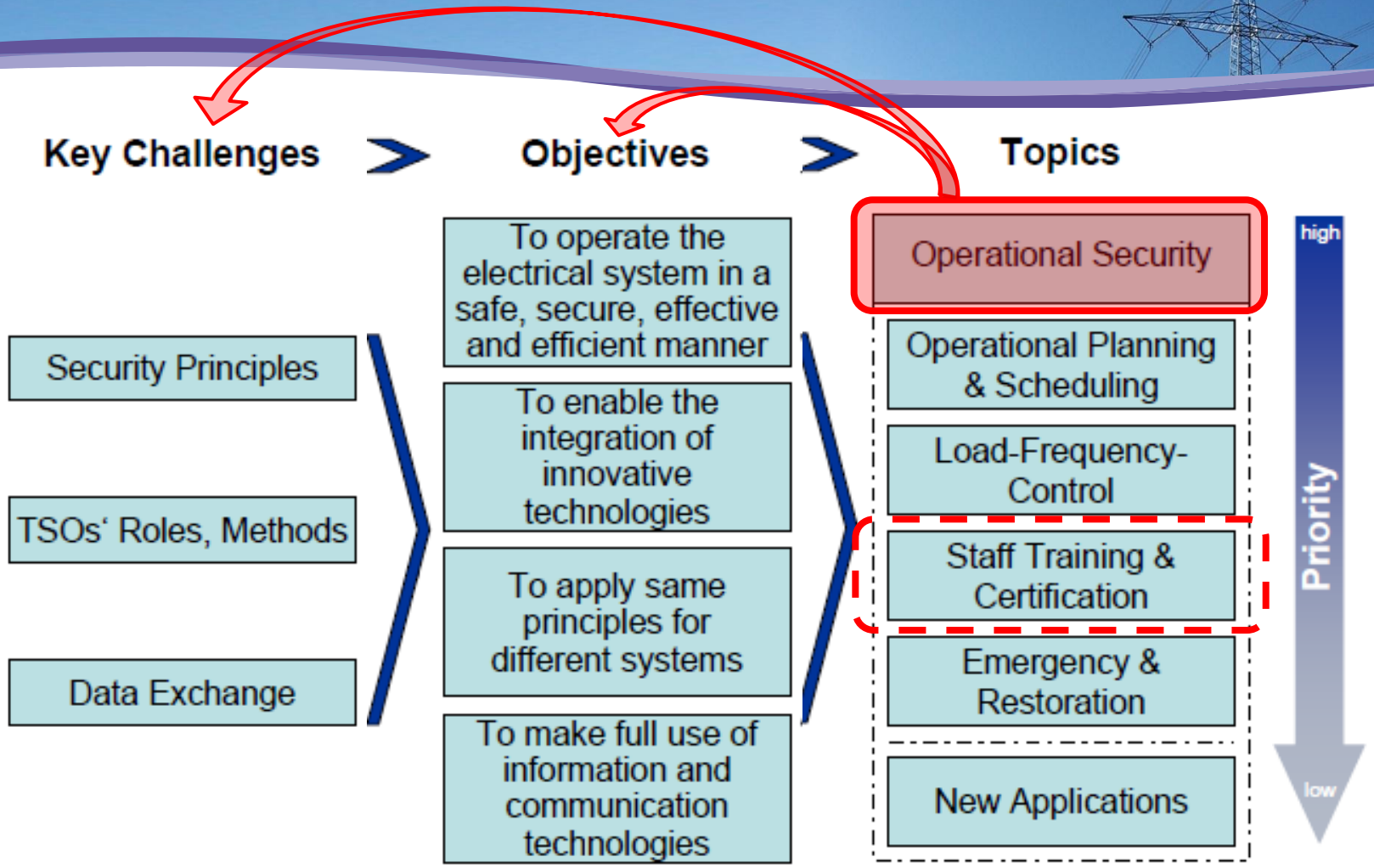


Generation allocation close to real-time and continuously changing

Operational Security Framework



Source: ACER Framework Guidelines on Electricity System Operation (Fig.2, p.8)

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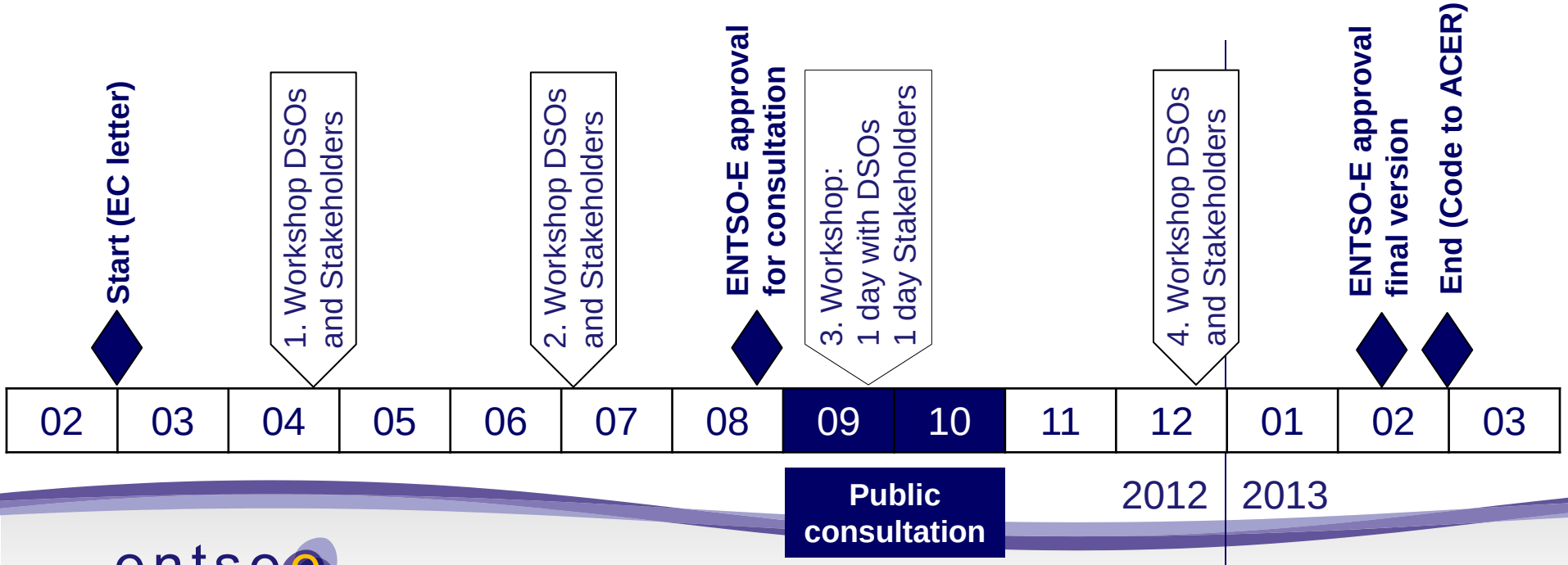
Roadmap and stakeholders‘ involvement

- Start 03/2012 → end 03/2013
- 4 workshops, public consultation
- Active & early involvement, transparency, commitment



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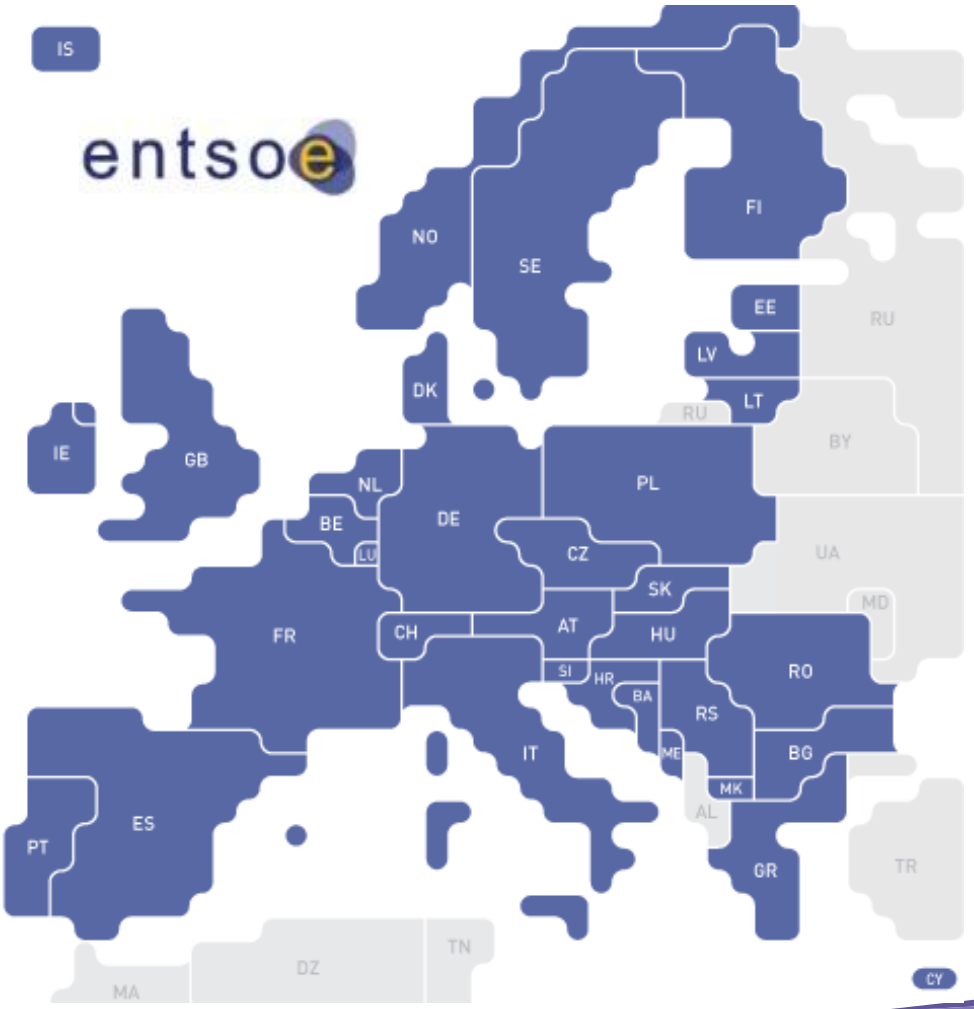
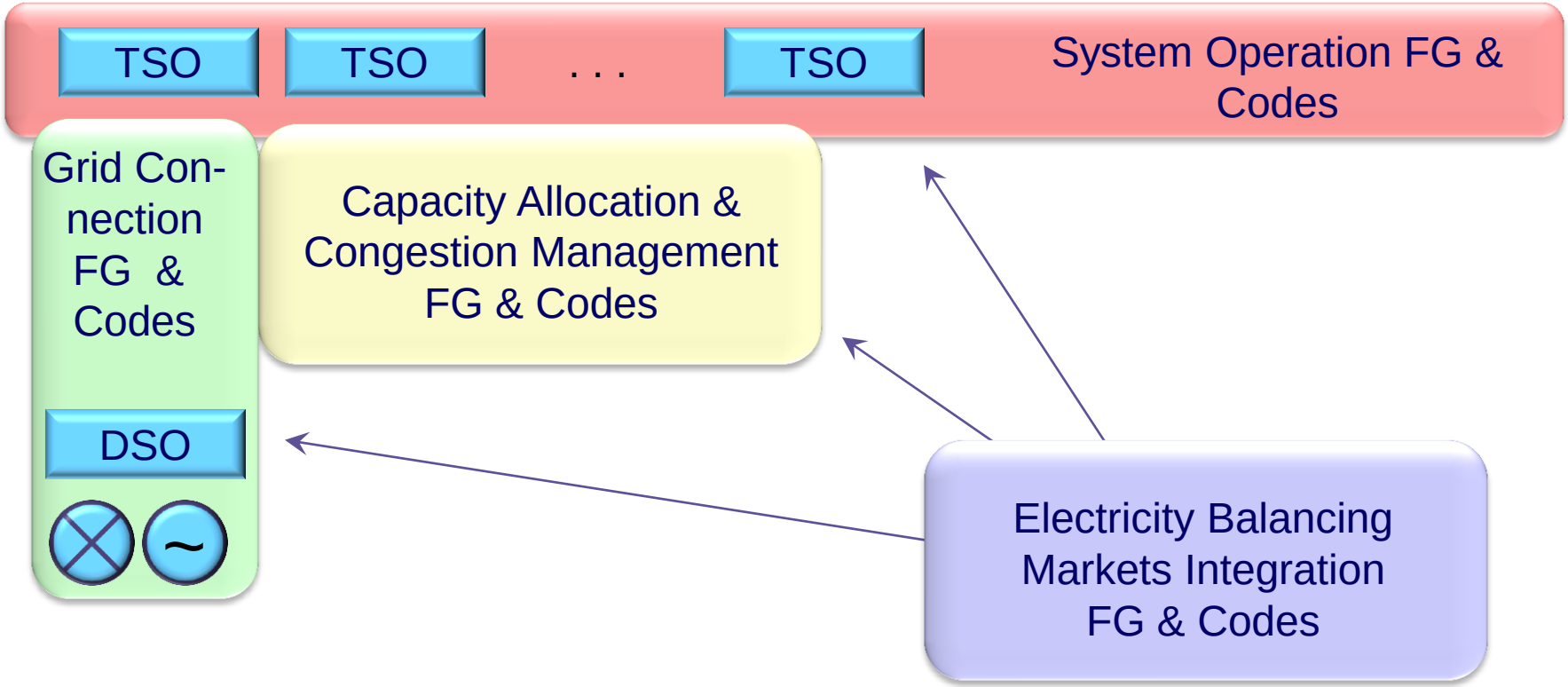
Reminder: synchronous areas & common system operation rules in Europe

- **UC(P)TE since 1951** → ENTSO-E 2009 (RGCE)
- **Nordel since 1963** → ENTSO-E 2009 (Nodic)
- **UKTSOA since 1999** → ENTSO-E 2009
- **ATSOI since 1999** → ENTSO-E 2009
- **BALTSO since 2006** → ENTSO-E 2009



Relations among the different codes

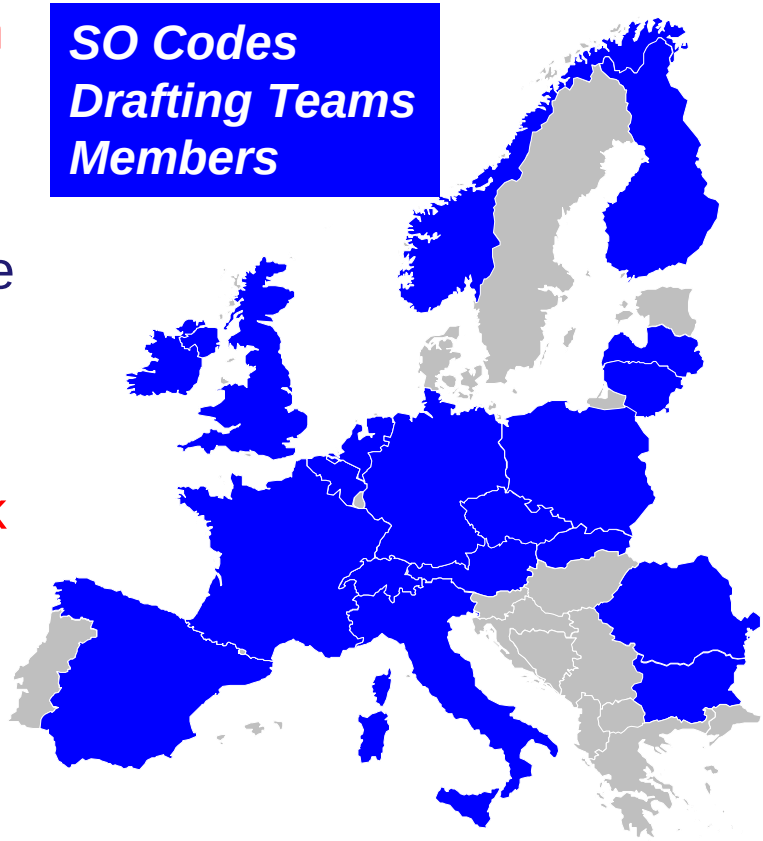
Source: ERGEG presentation on FG and Codes for System Operation, XIX Florence Forum, 13-14. December 2010
http://ec.europa.eu/energy/gas_electricity/doc/forum_florence_electricity/meeting_019.zip



OS Code guiding principles & Drafting Team
(„how we do it“ and „who is doing it“)

- Setting out clear and objective minimum requirements for the real-time operational security
- Defining goals to be reached to keep the transmission system in continuous operation
- Contributing to a harmonised framework for cross-border exchange of electricity
- Supporting non-discrimination, effective competition and efficient functioning of the Internal Electricity Market

SO Codes Drafting Teams Members

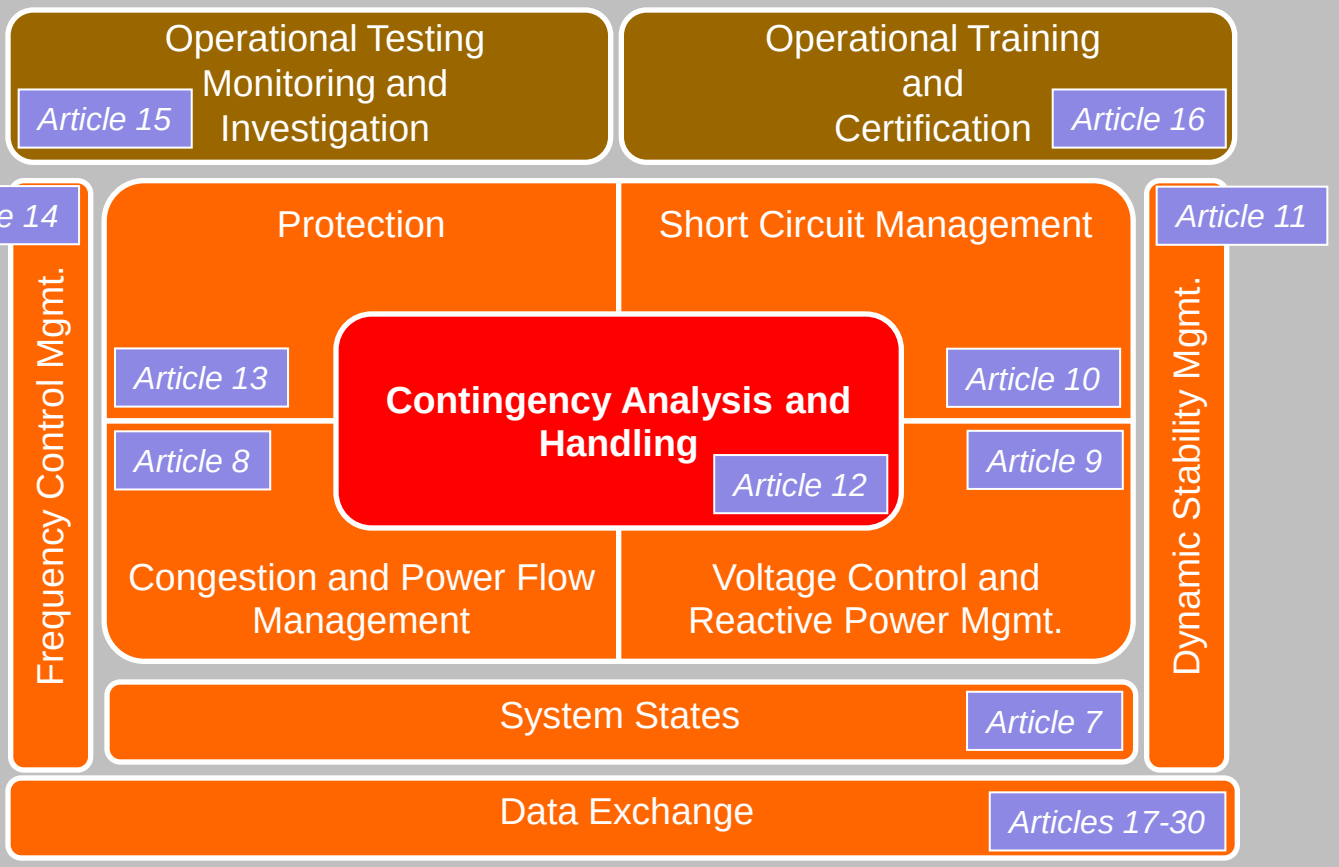


Operational Security Code Structure

Articles 1-6

General Provisions: Subject matter, Definitions, Scope, Regulatory aspects, Confidentiality, Relation with National Law

Requirements

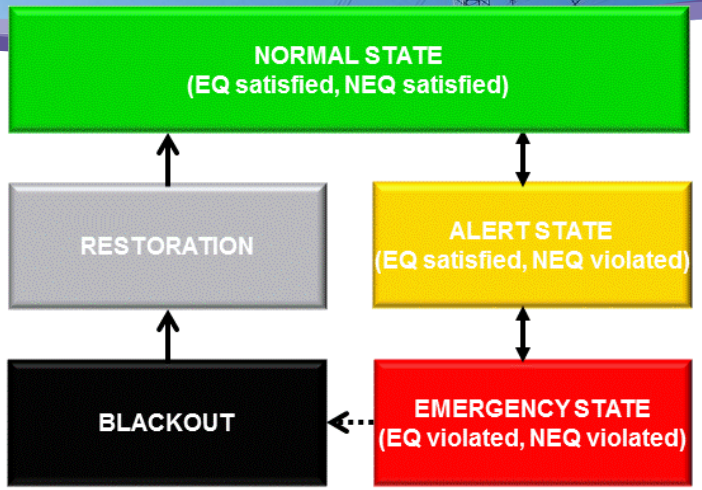


Articles 31-41

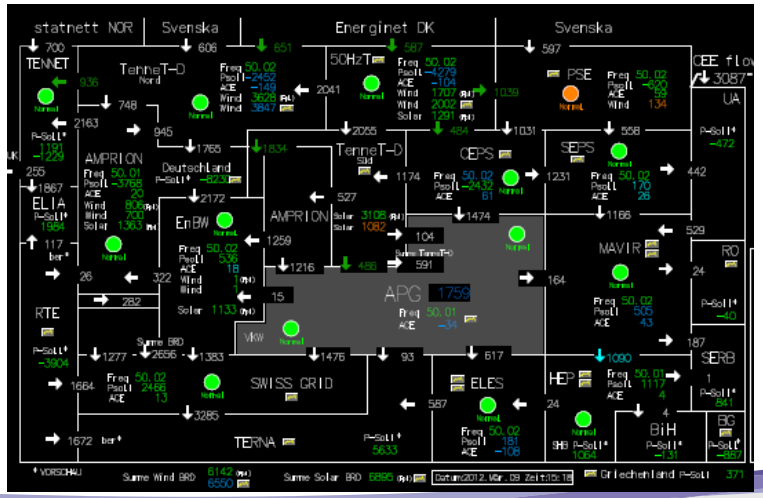
Compliance **Derogations** **Liability** **Final provisions**

Article 7: System States

- System States‘ monitoring, determination, description
- Operational security limits
- System operation tools & facilities
- Security analysis
- Information → awareness
- System users‘ support

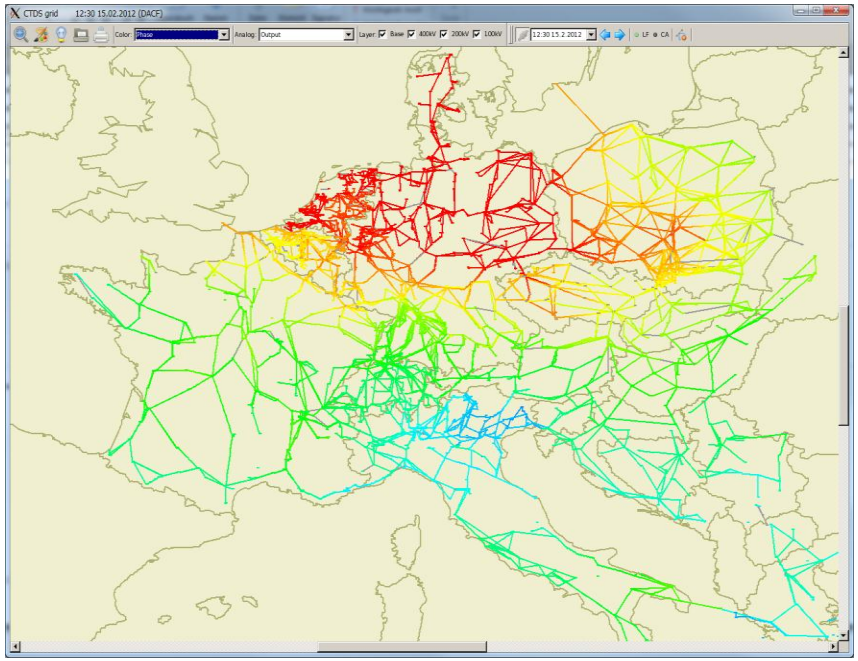


EQ=Equality contraints (e.g. generation/demand balance)
NEQ = inequality constraints (e.g. voltage thresholds, (n-1)-violations)



Article 8: Congestion and Power Flows Management

- Coordination, forecast and real-time analysis
- Common methodology for reliability margins
- Preventive and remedial actions incl. re-dispatch
- Active power reserves, possible adjustments & info
- Transmission system model
- Observability areas



Article 9: Voltage Control and Reactive Power Mgmt.

- Voltage stability and reactive power „household“
- Reactive power reserves in the Transmission system and from system users
- Reactive power limits at the connection to system users
- Automatic and manual measures
- Preventive and remedial V/Q-control actions

Article 10: Short Circuit Current Management

- Current limits: circuit breakers capability vs. protection selectivity
- Short-circuit calculation including generators / information
- Considering other Transmission and Distribution Systems
- Prevent / relieve violation of short-circuit limits
- Information and communication to other TSOs and system users

Article 11: Dynamic Stability Management

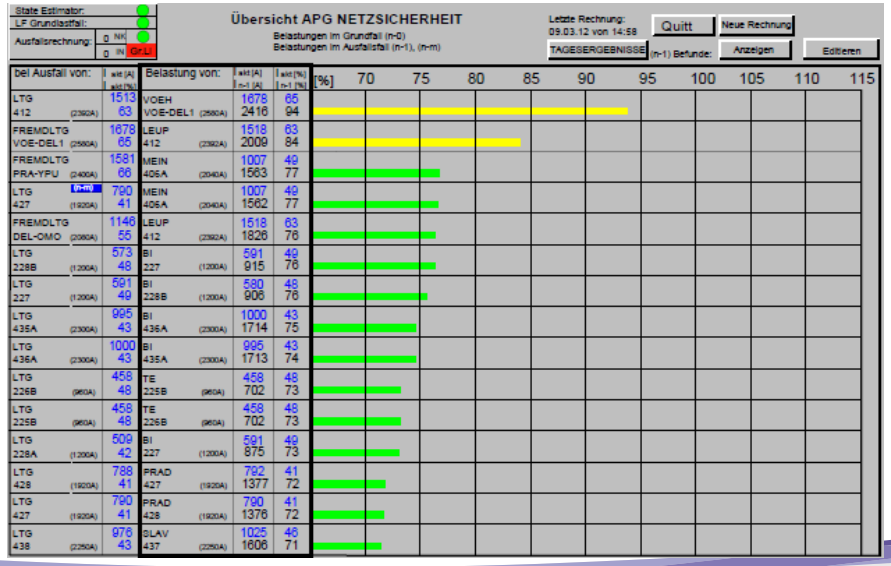
- Dynamic stability assessment offline studies on:
  - Voltage
  - Rotor angle
  - Frequency
- Dynamic stability influences → coordination with affected TSOs
- Dynamic stability vs. steady state operational security limits:
  a) Offline
  b) In Operational Planning when needed
  c) In Operational Planning periodically / daily

Article 13: Protection

- Verify & update protection settings
- Selectiveness, backup, coordination
- System and Special Protection Schemes
- Under-Frequency Load Shedding scheme development and implementaiton with DSOs (cf. Demand Connection Network Code)

Article 12: Contingency Analysis and Handling

- (N-1)-criterion and operational security limits
- Forecast and real-time parameters, topology
- Preventive and remedial actions + coordination and consideration in/outside of the own system
- Contingency list (int./ext.): ordinary, exceptional, out-of-range
- Common Grid Model
- Re-synchronisation



Article 14: Frequency Control Management

(To be lined-up with the P/f Code)

- Sufficient active power reserve for demand / generation unbalances + procurement in and out of the own control area
- Frequency containment, restoration & replacement reserve
- P/f monitoring, balancing, coordination
- Preventive and remedial actions: control, reserves‘ activation, load shedding
- Technical framework (e.g. ramping) for system users

Article 15: Operational Testing, Monitoring and Investigation

- Monitoring, investigation, testing of system events
- Test plan, standards, compliance at the grid connection point
- Minimize impact on operational security and economic operation
- Always keep normal state!
- Monitoring of provisioning of the ancillary services
- Additional tests and post-incidents investigation

Article 16: Operational Training and Certification

- Normal & exceptional operation
- Continuous training programme, contents & plans
- Training coordinator: qualification, training, documentation, certification, on-the-job training
- Annual review / update
- Coordinate with DSOs and system users to reflect latest development
- Certification, exchange with other TSOs, training in interoperability

Chapter 2: Data Exchange

Essential provisions for Operational Security, Operational Planning, Scheduling, Capacity Calculation:

- Structural, forecast and real-time data between TSOs (Articles 18, 19)
- Structural and real-time data between TSOs and DSOs (Articles 20, 21)
- Structural, scheduled and real-time data of the directly connected system users (Articles 22-24, 29)
- Data between TSOs, DSOs and system users connected to the Distribution System (Articles 25-28, 30)

Thank you for your attention !

Discussion

- Is anything important for Operational Security missing ?
- How do you address the Data Exchange provisions ?
- Which provisions specifically address your organisation ?