

Stakeholders Workshop on System

Operation

Operational Planning and Scheduling



Reliable Sustainable Connected

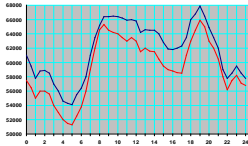
Planning outages : a new context



Renewable
energy
sources



Demand sensitivity : cooling, heating



Uncertainties on Market behaviour and
level of cross border exchanges



difficulties to build new lines

high level of uncertainties

increased and fluctuating
international flows

network operated closer to its
limits

with the necessity to maintain the
reliability level of the system

As to answer to new needs :
capacity available for cross
borders exchanges

The new context involves a strong coordination TSO to TSO and TSO to grid users in order to :

Take into account needs for works on the whole interconnected system and associated flexibilities



Perform coordinated security analysis

Coordinate remedial actions



constraints



- ❑ **Making compatible in a technical and economical way the needs for maintenance of Grid elements and Grid Users facilities under system security constraint, this involves:**
 - Information Exchanges procedures between TSO and Grid Users on given timeframes to identify the needs, the flexibilities and to explore the envelope of opportunities
 - Agreements on period of works and flexibility capacities
- ❑ **Assessing the security of the interconnected system:**
 - In term of congestion forecast
 - In term of adequacy monitoring
- ❑ **Setting up remedial actions**

Outage planning : a coordinated process between TSOs and Grid Users



Coordination between all parties for specific projects:
Focus on sharing available information, on a **best effort** basis,
without a firmness obligation
*building of new power plant, main substation works, large power plant
maintenance works*

Creating a **reference outage plan** for the coming year,
including significant generation, load and grid outages

Changes to the reference outage plan can be **requested by TSO or
Grid Users**,

These are subject to respect power system security constraints as
taking into account economical consequences

At this stage, “forced events” may have to be taken into account

> Year ahead

Year ahead

Year –
Before real time

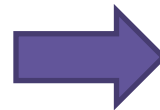
Real Time

Security analysis in operational planning



In order to

- ensure normal System operation
- limit incidents and avoid major incidents
- limit the consequences of major incidents



Needs to simulate the interconnected power system behaviour

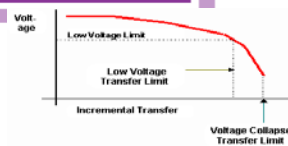
Taking into account

- ☐ Scheduled outages
- ☐ Forced outages according to OS
- ☐ Uncertainties :
 - Load level (temperature)
 - Renewable Level
 - Generation dispatch

protection must be provided against:

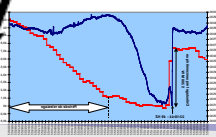


• cascade tripping

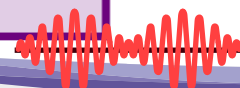


• voltage collapse

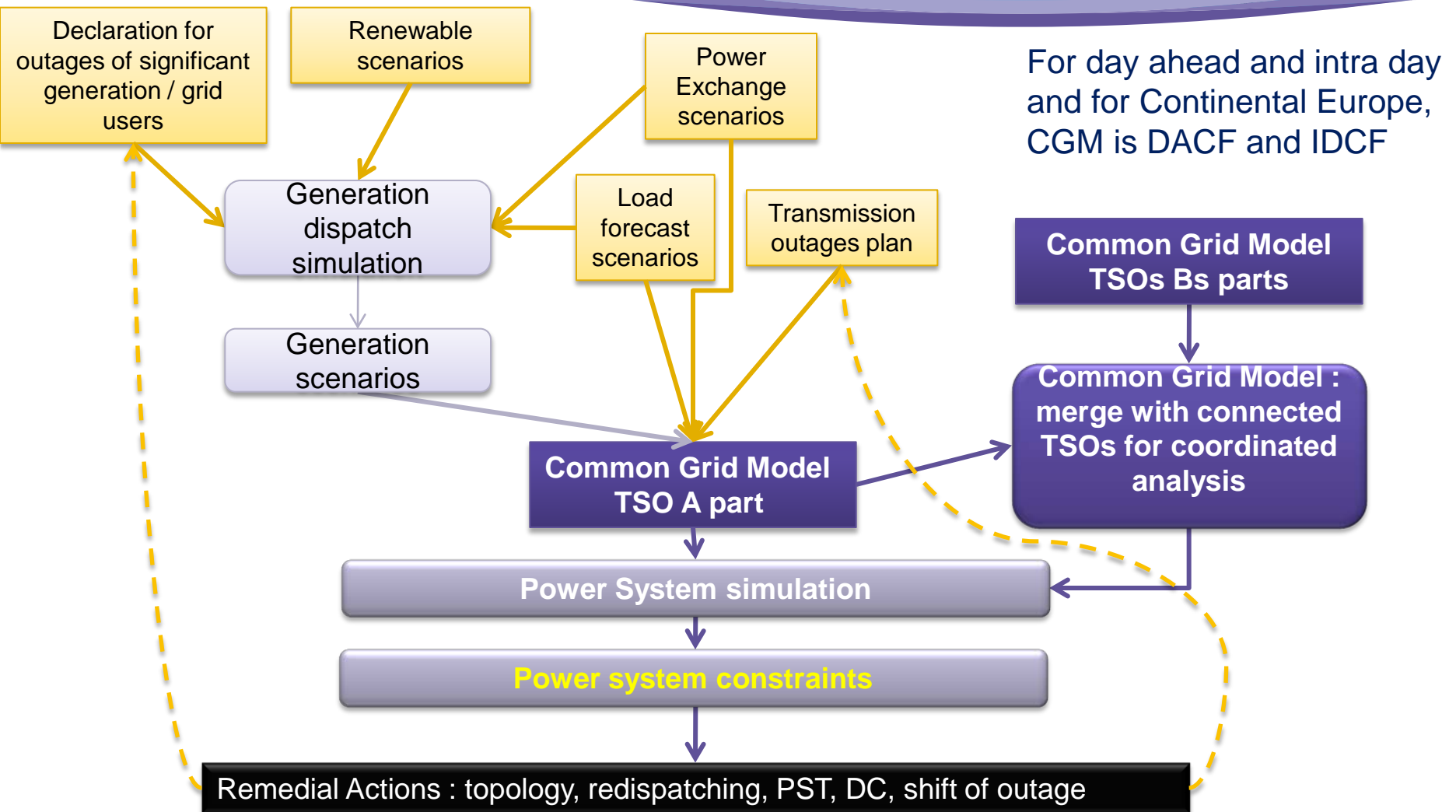
• frequency collapse



• loss of synchronism



Taking into account network security constraints in operational planning : coordinated process description

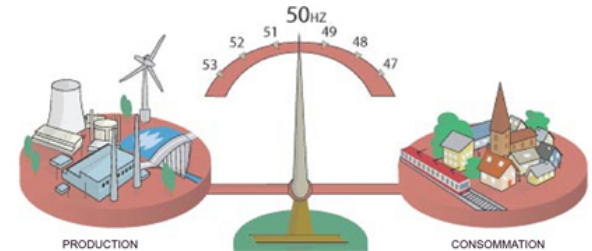


Key Generators Data required for system security analysis

- ☐ Information related to technical data
- ☐ Information related to availability
- ☐ Information related to scheduling of generation units (Day ahead and intra –day)
- ☐ Information related to price estimation (establishing generation scenarios)

Short term Adequacy

- ❑ Short term system adequacy deals with detecting, in all time frames of operational planning, whether or not sufficient 'products' are available regarding :
 - ❑ load/export versus generation/import,
 - ❑ Ancillary Services for balancing, frequency, voltage control...
- ❑ Taking into account
 - ❑ planned outages
 - ❑ uncertainties : level of renewable, load
 - ❑ Capacities of cross border exchanges
- ❑ Sufficient meaning as defined by operational security standards



Use of probabilistic/statistical methodologies

For seasonal analysis, moving towards more regional analysis

Assessing seasonal system adequacy of interconnected systems



Data per system

Generation forced outages statistics per system

Declaration of outages for significant Generation/ grid users per system

Windpower and Solar generation statistics per system

Load statistics per system

Exchange capacities between systems

Probabilistic simulation of Load and Generation balance taking into account exchanges capacities

System adequacy publication



➤ **Scheduling is the data exchange process between**

❑Market participants and TSOs

- in order to bring together information about production (generation), consumption (load), internal and external trade schedules for each relevant area.

This process is defined in local market rules.

❑TSOs

- in order to verify the coherency/consistency of external trade schedules on area borders. (SO-SO-matching)
- in order to facilitate the achievement of processes that are based on the results of scheduling. (Reporting)
- in order to facilitate exchange programs for TSO purpose . (Emergency Exchanges)

Scheduling

❑ A Schedule is a notification that defines a set of values related to a time period, representing either energy or power related to :

- an exchange between Market Participants (within or between areas)
- an input, e.g. for generation units (Production schedule)
- an output, e.g. for consumptions units (Consumption schedule)
- a TSO related data exchange (“Emergency Exchanges”...)

❑ Scheduling process begins latest in Day ahead and is updated until real-time

