

ENTSO-E Ten Year Network Development Plan 2012

Regional Group Continental South West (RG CSW)

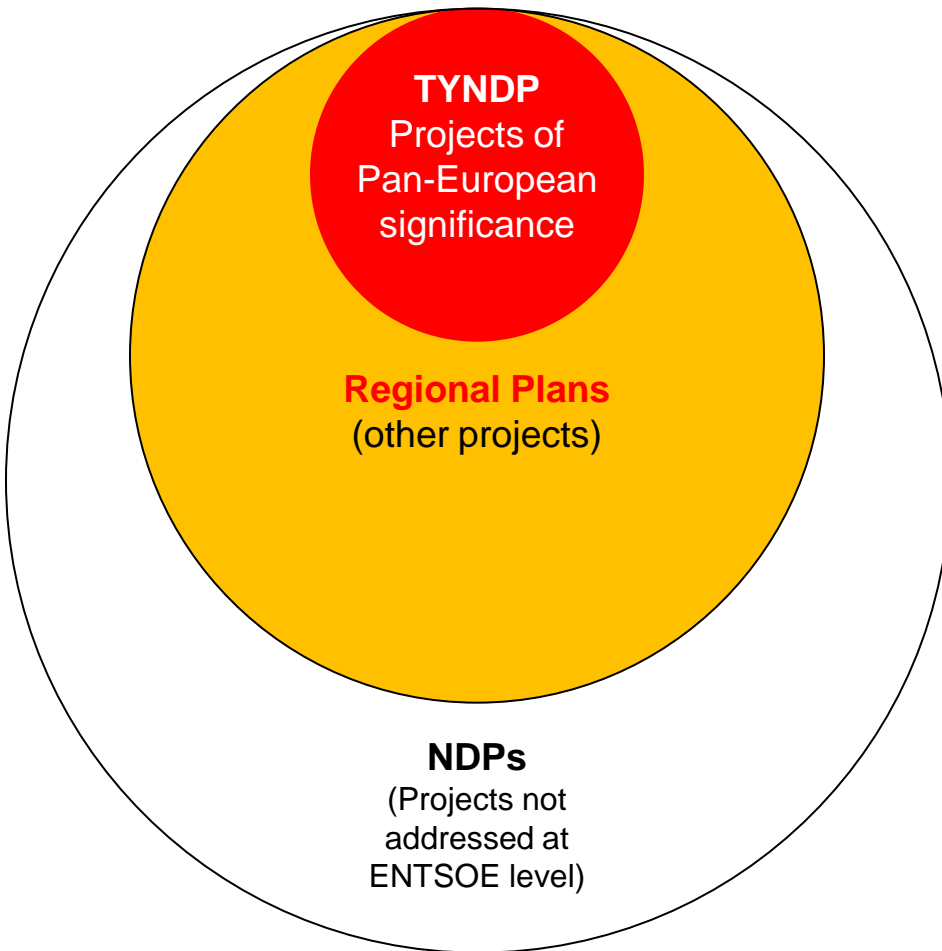
Network studies and project assessment methodology

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Projects of Pan-European significance



- Projects of Pan-European Significance
 - Meeting the EU energy targets: RES (20-20-20 objectives), SoS, Internal Energy Market (IEM).
- Projects can be from TSOs & 3rd parties
- Basis for further selection of Projects of Common interest

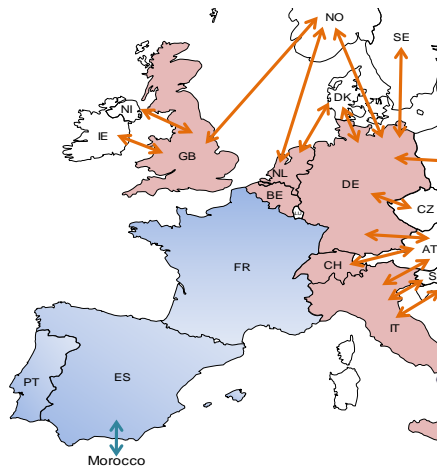
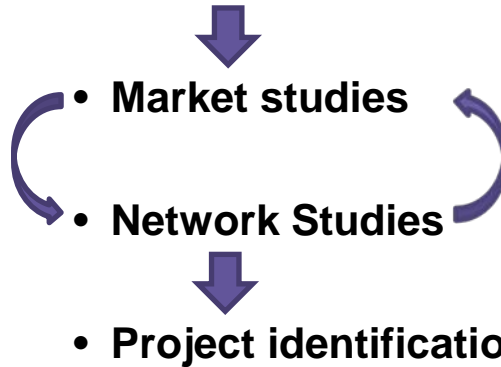
Projects of Pan-European significance - Definitions



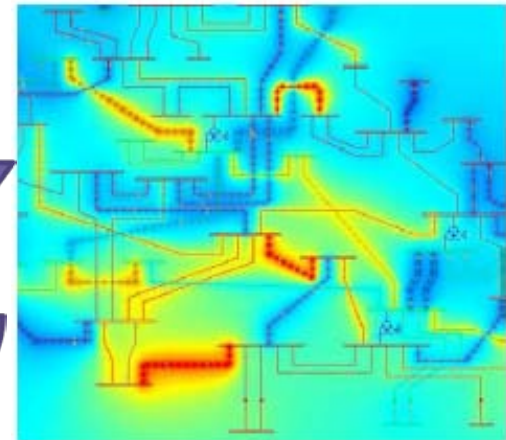
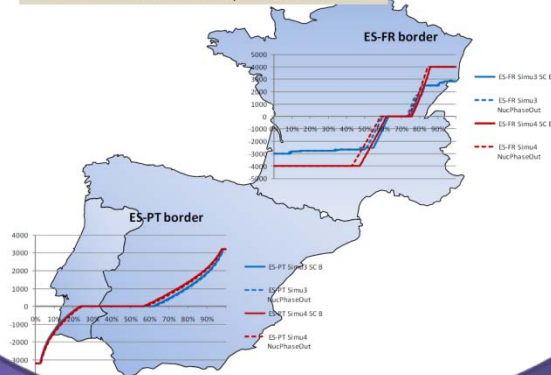
- **A Project of European significance is...**
 - ... a set of EHV assets (with at least one part in Europe);
 - ... all contributing to a same grid transfer capability increase across a grid boundary, valuated in MW;
 - ... matching the following thresholds:
 - *Main equipment > 220 kV for OHL AC and > 150 kV else*
 - *Grid Transfer Capability Increase, either*
 - *enabling > 500 MW of additional NTC; or*
 - *enabling or securing output of > 1 GW/1000 km² of generation (new and/or existing); or*
 - *securing for > 10-year load growth for an area > 3 TWh/yr.*

From Market Studies to Network Studies (1/3)

- Scenario elaboration & validation



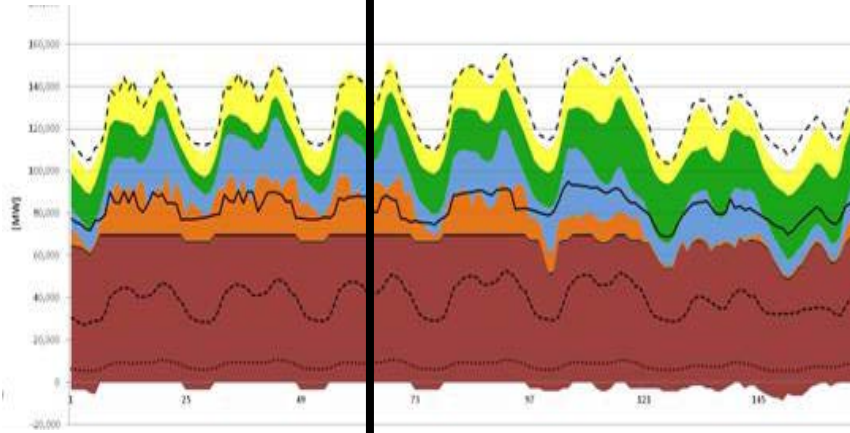
Nuclear Phase Out Results: impact on borders flows



From Market Studies to Network Studies (2/3)



Point in time



Market studies give statistical information, used to choose the most representative **reference planning cases in the region.**

- Generation mix : MW by technology & country
- Demand in each country
- Possible power exchanges between countries in the Regional Group and with ROW



Network studies allocate power output to particular generators in the grid in each snapshot.



From Market Studies to Network Studies (3/3)

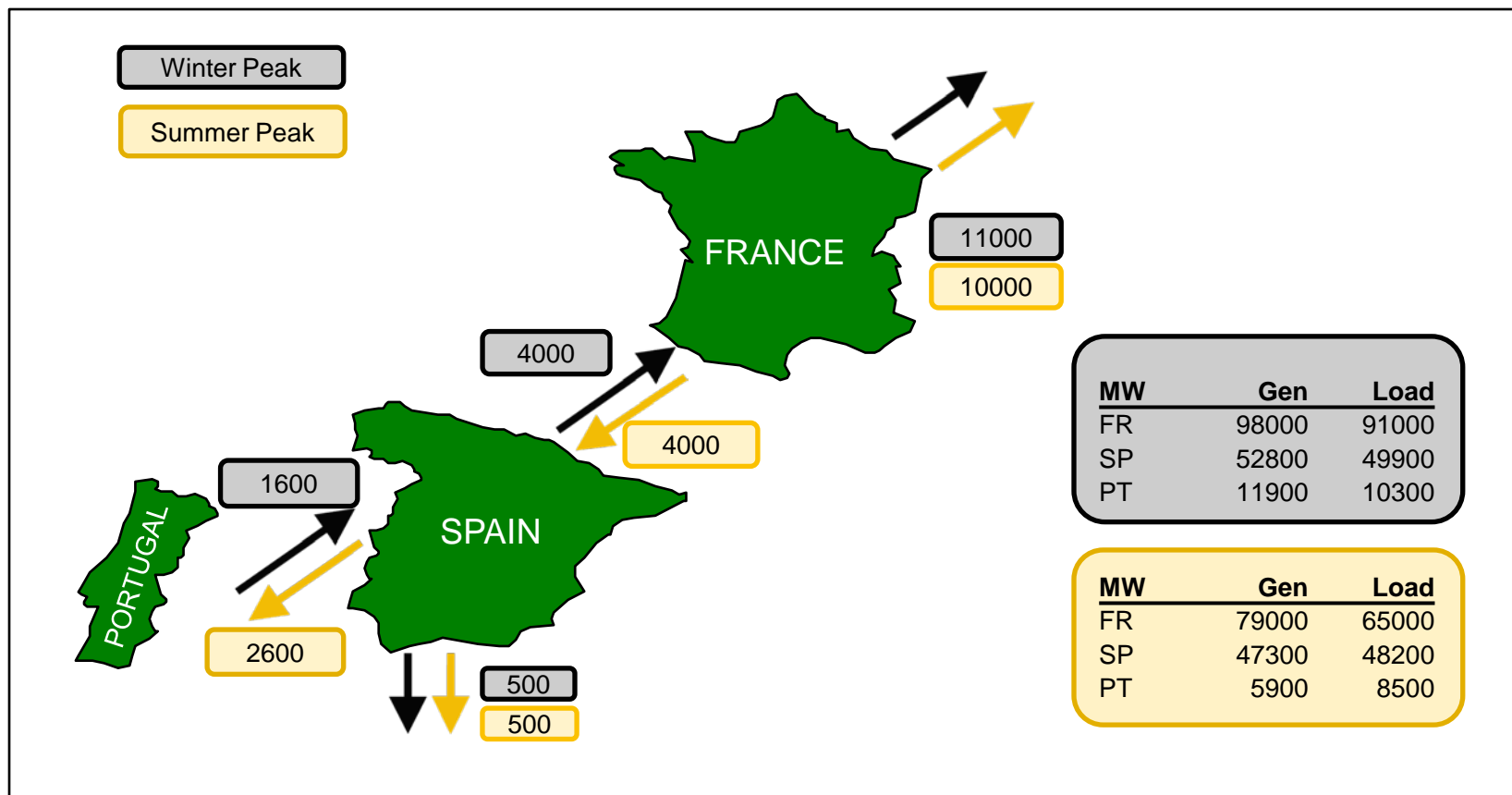


Reference cases (1 winter peak and 1 summer peak) with ROW simulated with panEU network models

	Case	Season	Peak or Valley	RES Iberia	PT-SP exchange	SP-FR exchange
probable	1	Winter	Peak	High	1600 PT>SP	4000 SP>FR
extreme	2	Winter	Peak	High	3000 PT>SP	4000 SP>FR
extreme	3	Winter	Peak	Low	2800 SP>PT	4000 FR>SP
probable	4	Summer	Peak	Low	2600 SP>PT	4000 FR>SP
extreme	5	Summer	Peak	High	2200 PT>SP	4000 SP>FR
extreme	6	Summer	Valley	High	1400 PT>SP	4000 SP>FR

Additional cases for analysis of interconnections

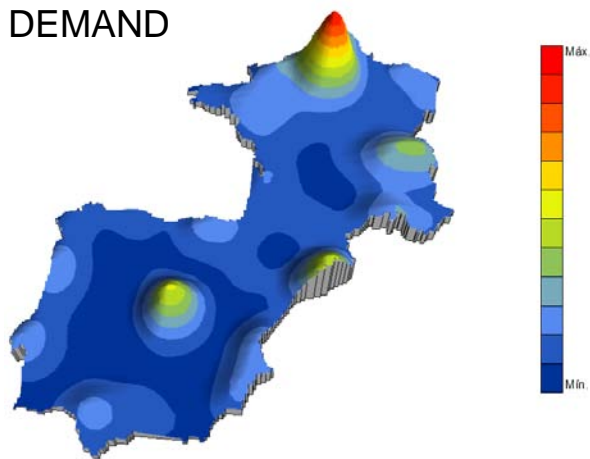
Models for network studies (1/2)



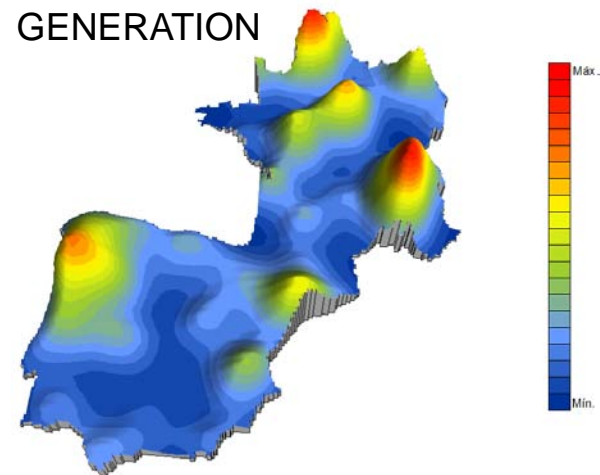
Models for network studies (2/2)

Snapshot of Winter Peak 2020 Scenario 3x20

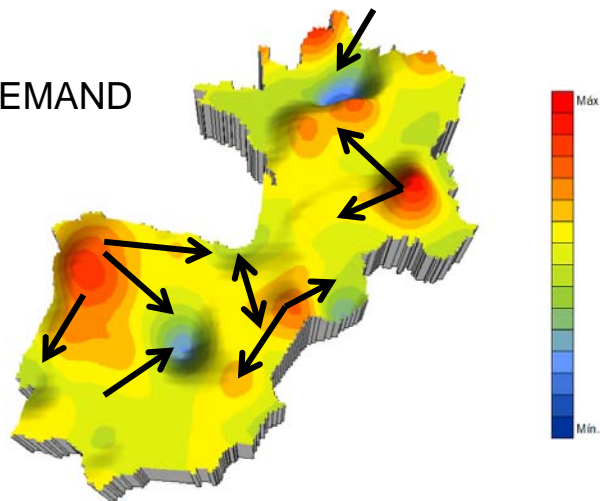
DEMAND



GENERATION

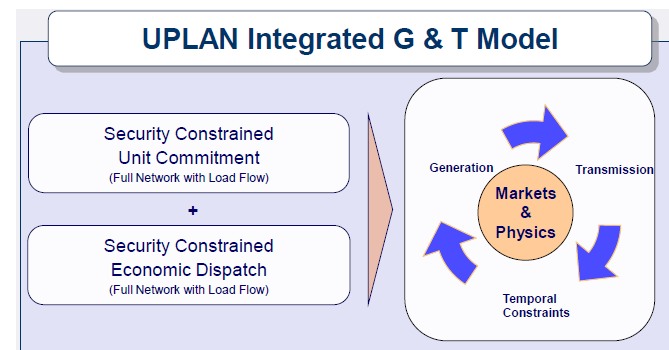


GENERATION - DEMAND



Analysis performed with 3 simulation software's:

- **CONVERGENCE model**, developed by RTE, used for load flow analysis
- **PSSE model**, commercial model used by REE and REN, used for load flow analysis.
- **UPLAN model**, commercial model used by REE, used for a joint market and load flow analysis for internal network



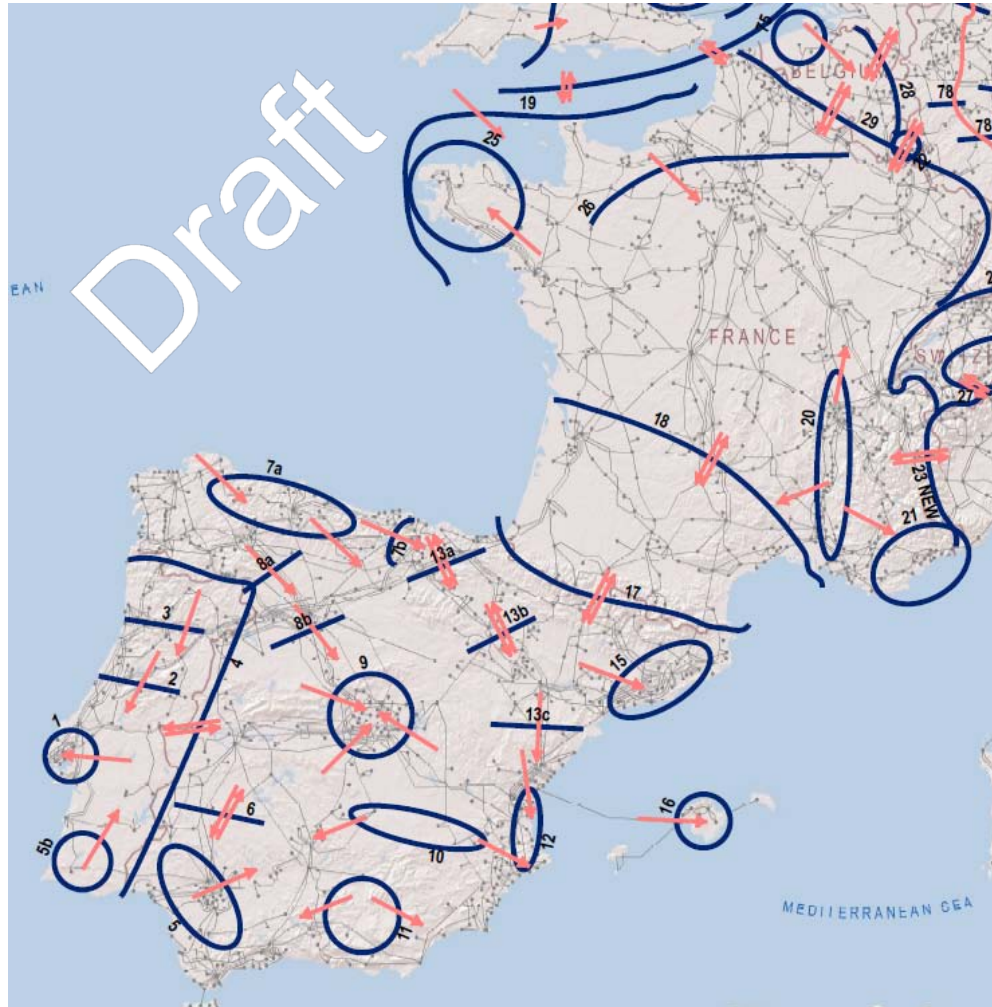
Project Assessment

The goal of project assessment is to characterise the impact of transmission projects, both in terms of added value for society (increase of capacity for trading of energy and balancing services between price zones, RES integration, increased security of supply....), and in terms of costs.

- Grid Transfer Capability Increase (GTC)
- Social Economic Welfare (SEW)
- RES integration
- Security of Supply (SOS)
- Losses variation
- CO2 emissions
- Technical Resilience
- Flexibility
- Social and Environmental impact

Assessment done with/without each project in a 2020 planned situation

Project Assessment - Boundaries





- **Grid Transfer Capability (GTC)** is the ability of the grid to transport electricity across a boundary, i.e. from one area (price zone, area within a country or a TSO) to another.
 - Maximum grid transfer capability across a boundary between two areas is found, in a certain direction, assuming that the flow is to be maximised in the direction of the net flow across the boundary in the reference condition.
- **Social Economic Welfare (SEW)** on electricity markets is characterised by the ability of a power system to reduce congestions and thus providing an adequate grid transfer capability, reflecting to the needs and willingness to pay of market players and consumers
 - The social and economic welfare benefit is calculated from the reduction in total variable generation costs associated with the GTC variation that the project allows.




- **RES integration** is defined as the ability of the system to allow the connection of new RES and unlock existing “green” generation, while minimising curtailments.
 - RES integration is facilitated by increasing the GTC between an area with excess of RES generation and another area where this production can be consumed by reducing other type of generation.
- **Security of Supply (SOS)** is the ability of a power system to provide an adequate and secure supply of electricity in normal conditions.
 - Benefit is evaluated by the reduction of proportion of time that the system is at risk due to constraints in transmission system following ENTSO-E standards.

Project Assessment – Losses variation/ CO2 emissions

- **Losses variation** has been considered as the ability of a transmission grid to minimise thermal losses in the power system.
 - The energy efficiency benefit of a project is measured through the reduction of thermal losses (MW) in the system.
- **CO2 emissions** is a result of **SEW** (unlock of generation with lower carbon content) and **losses variation**.
 - CO2 emissions are calculated using standard emission rates (CO2 emission) for each power plant given in the Pan European Market Data Base.

Project Assessment – Technical Resilience / Flexibility



- **Technical Resilience** is the ability of the system to withstand extreme system conditions (rare contingencies).
- **Flexibility** is the ability of the proposed reinforcement to be adequate in different possible future development paths or scenarios.
- **Social and Environmental impact** characterises the project impact as perceived by the local population, and as such, gives a measure of probability that the project will be built at the planned commissioning date.

Project Assessment – Example of results



Project/ cluster	GTC	Social and Economic Welfare	RES	SOS	Losses variation	CO2	Technical Resilience	Flexibility	Social & Environmental
Project A, Name, description... MW								
Project B, Name, description... MW								



Thank You!