

# ENTSO-E Ten-Year Network Development Plan 2012

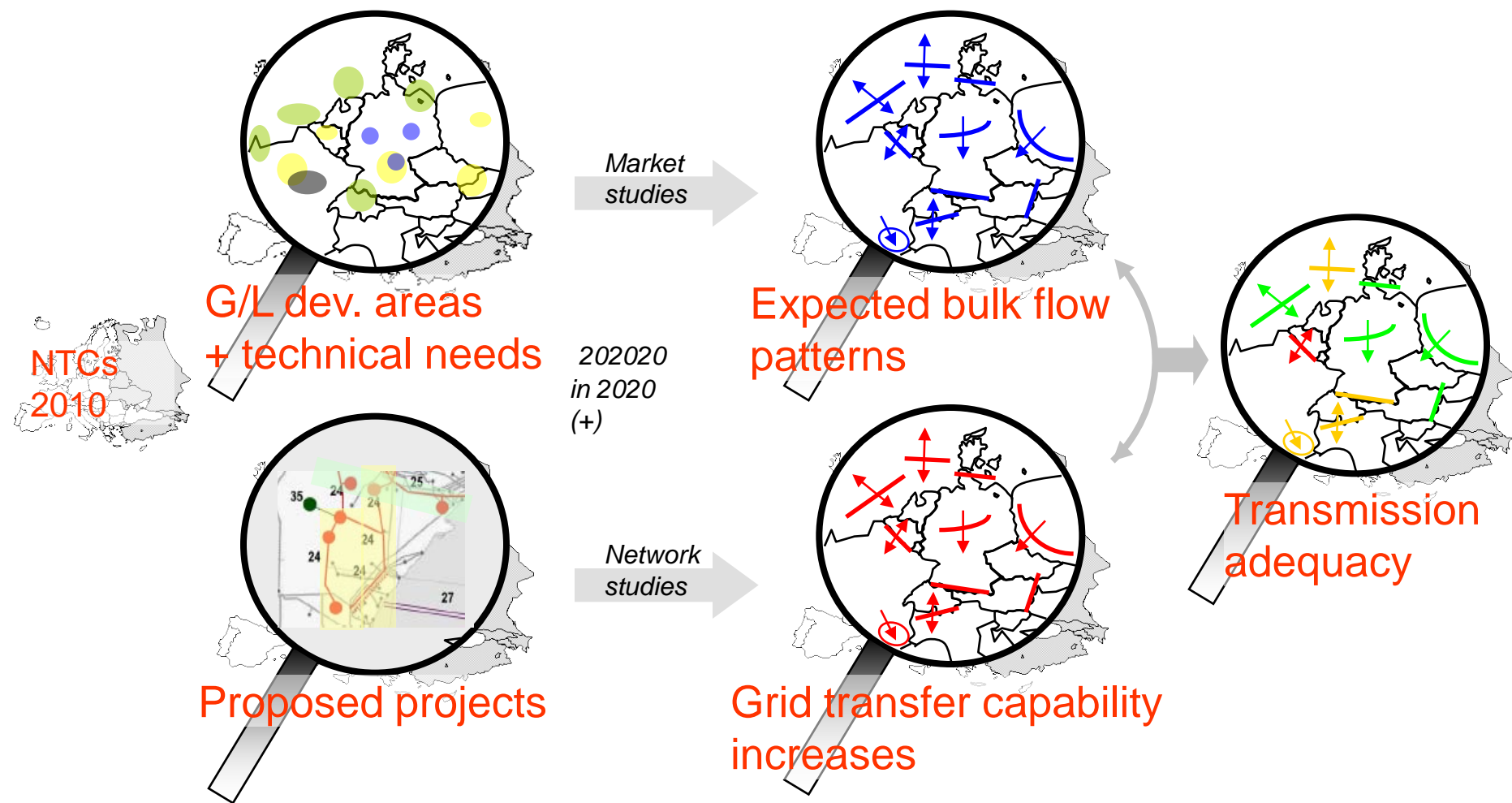
## Regional Group Continental South West (RG CSW) Results

Patricia Labra  
REE

ENTSOE RG CSW workshop  
Madrid, 29 November 2011



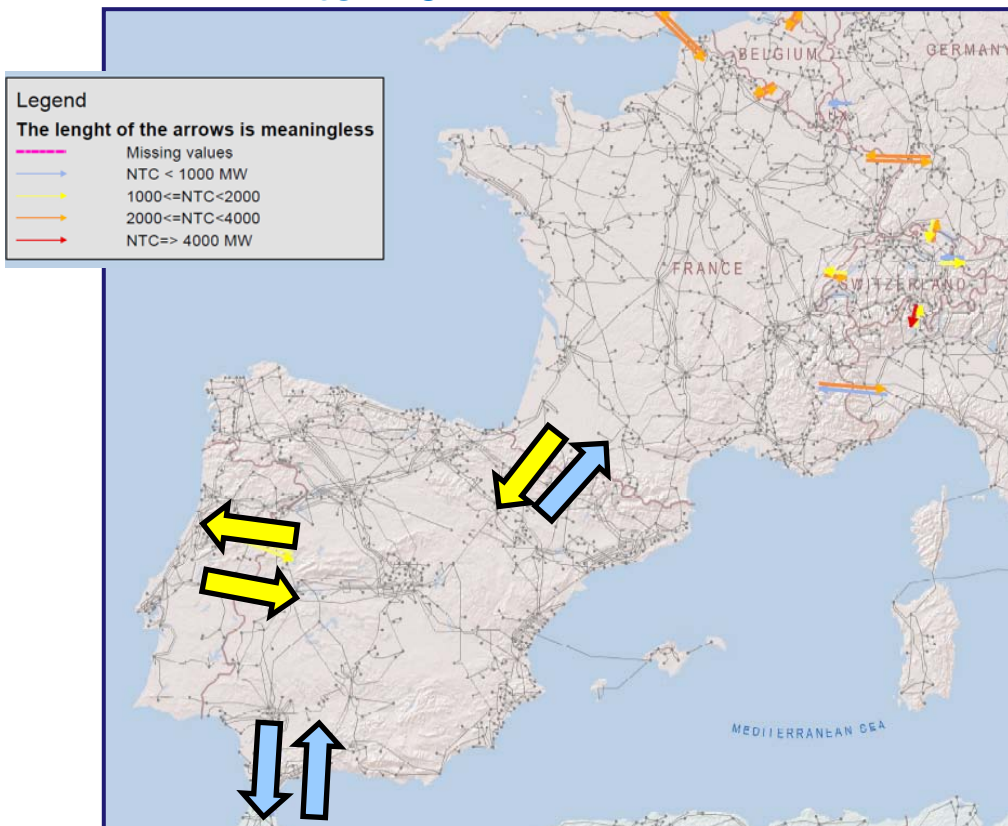
# Main Deliverables



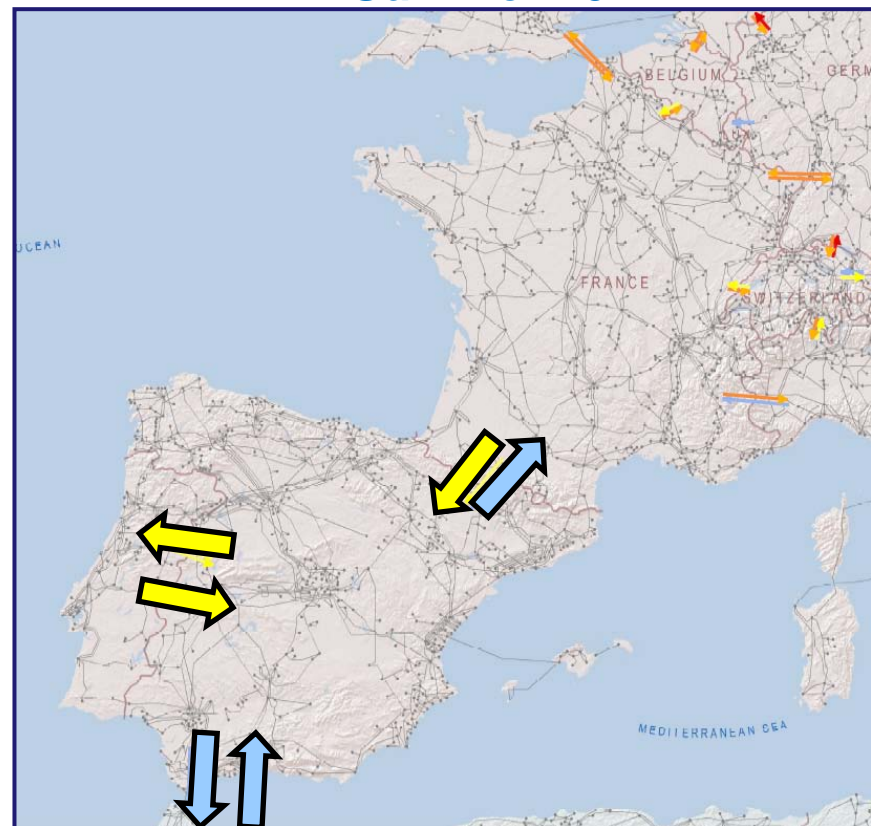
# Starting point :Net Transfer Capacity 2011

Situation today

## Winter 2011



## Summer 2011



Interconnection ratio objective set in  
EC Council Barcelona 2002 =10% ➔

Portugal

Spain

France

11%

4%

9%

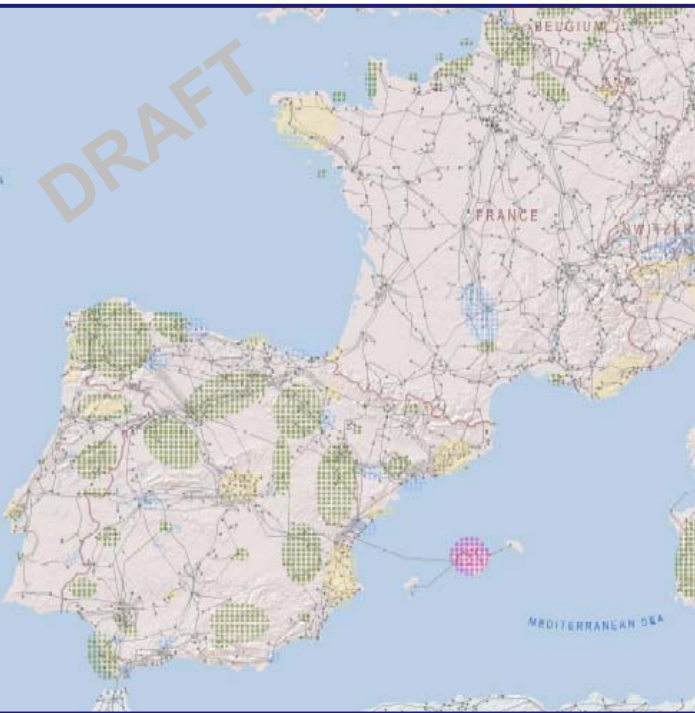




# Map of drivers-CSW

Where will problems arise?

**Midterm = 2012-2016**



## Legend

- Existing generation evacuation
- Future generation evacuation
- Reliable grid operations issues
- Aging/obsolescence of network equipment
- Generation decommissioning
- Isolated systems to be connected
- Growth demand

**Longterm = 2017-2022**

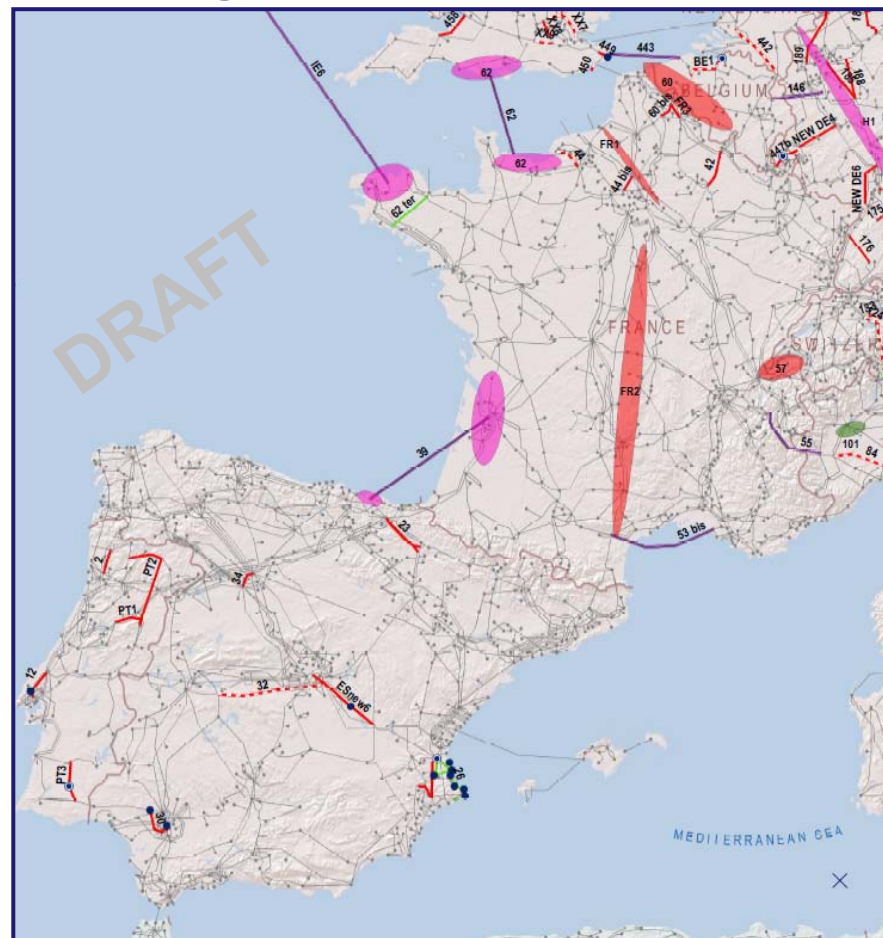
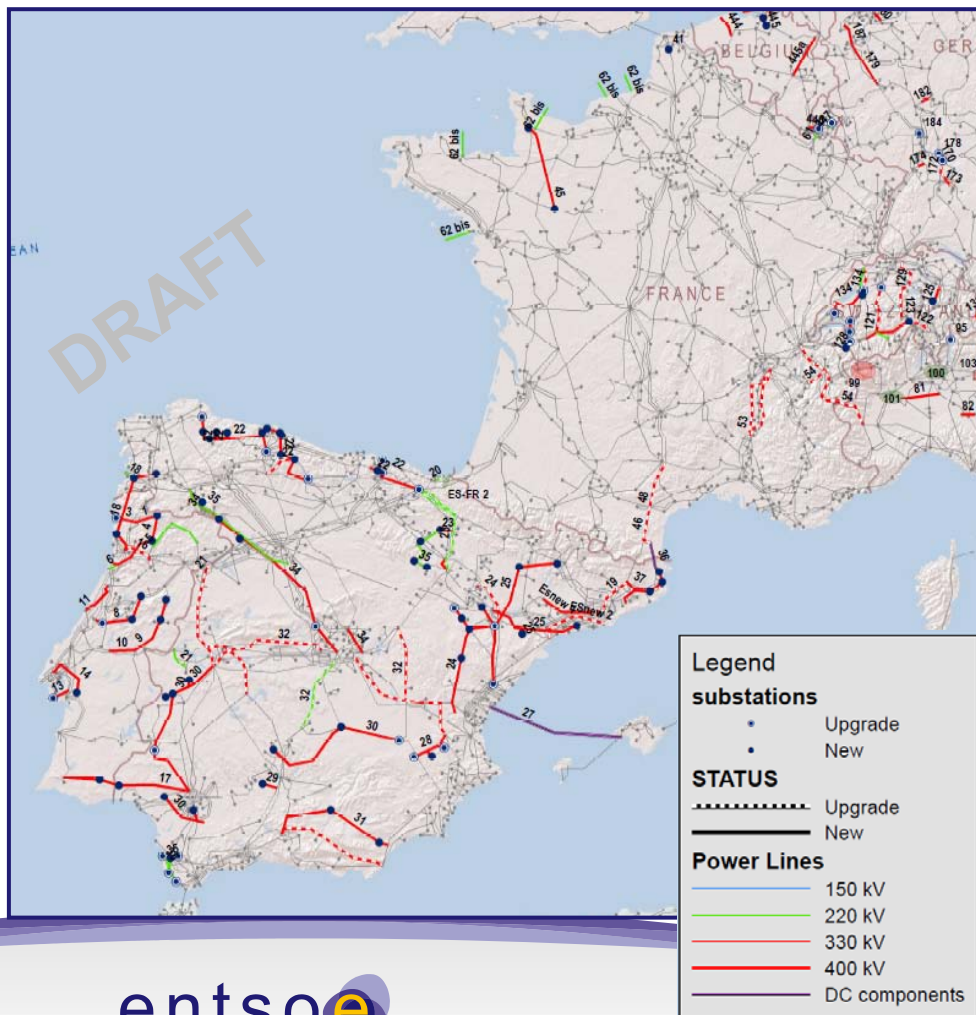


# Transmission investments -CSW

Which investments  
are required?

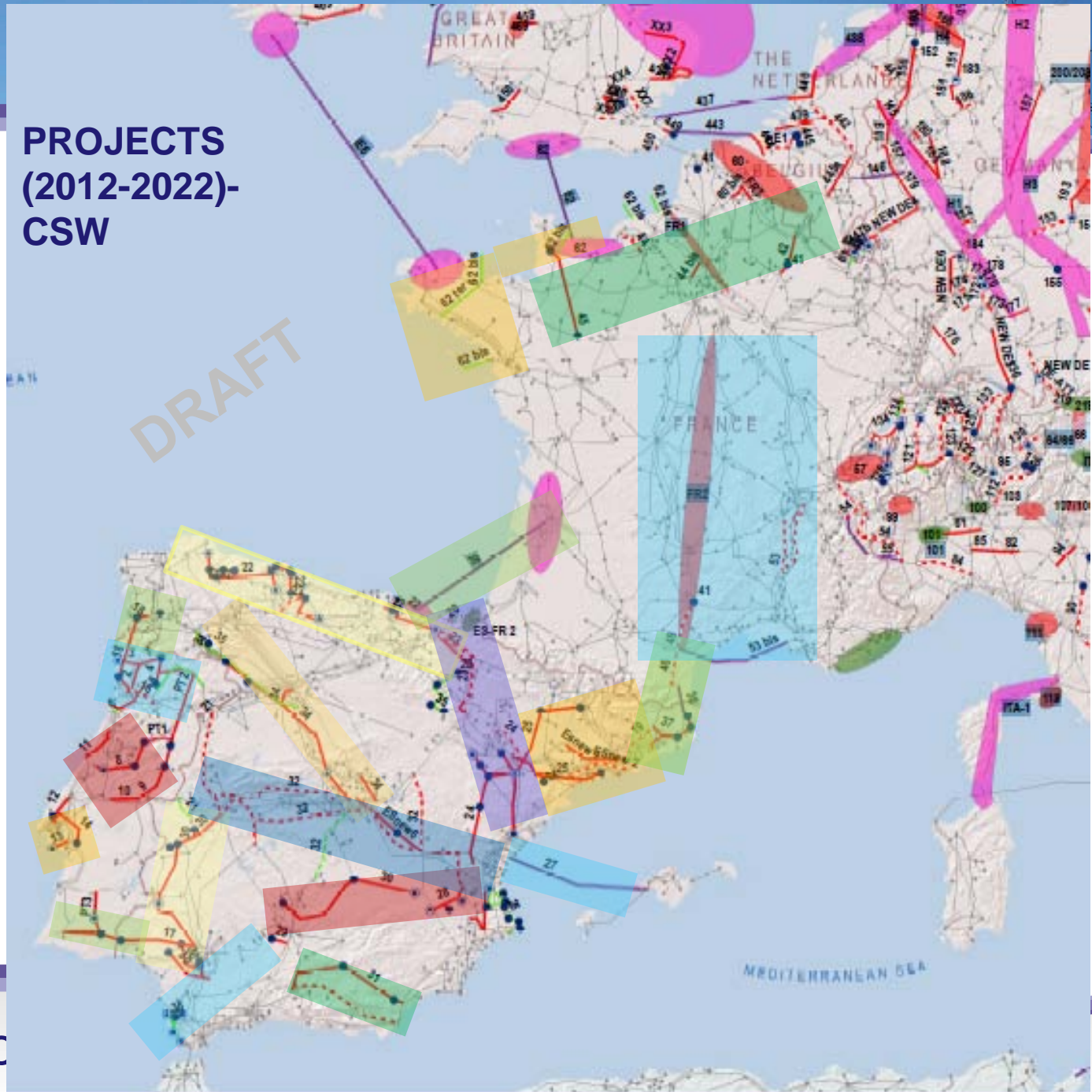
Midterm = 2012-2016

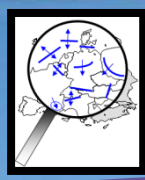
Longterm = 2017-2022





## PROJECTS (2012-2022)- CSW

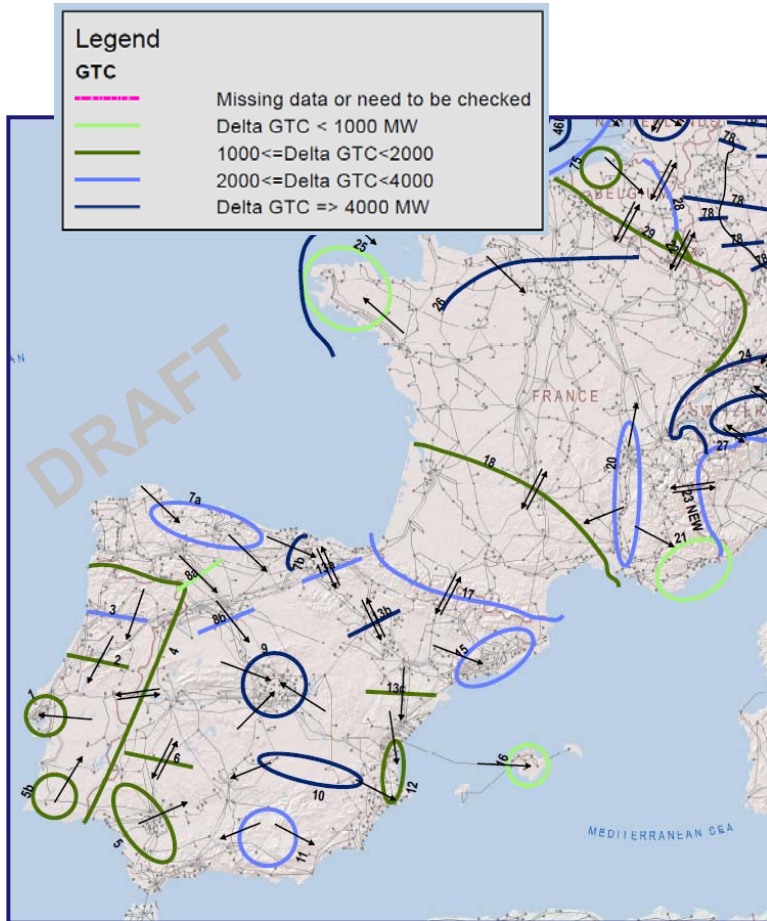




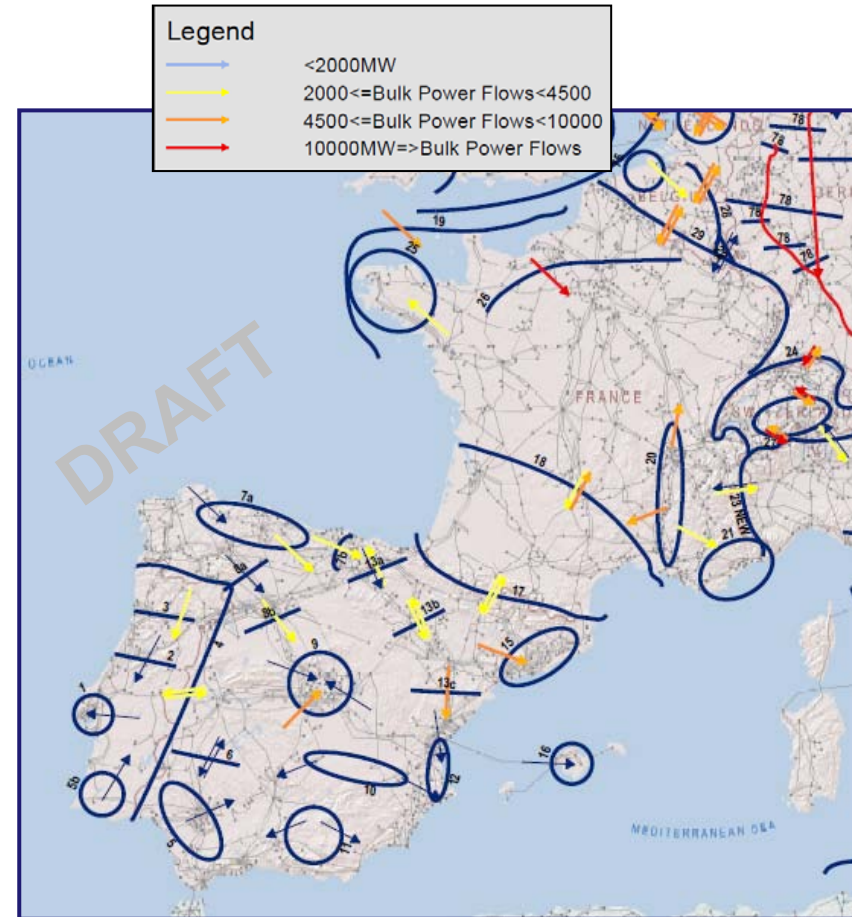
# GTC Increase & Bulk Power Flows by 2020 horizon

2020 Situation

## GTC increase (MW)



## Bulk power flows (MW)



Portugal

Spain

France

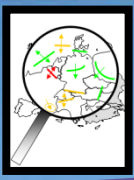
Interconnection ratio

12%

6.5%

12%





# Transmission Adequacy Indicator-CSW

Will network stand  
2020 situation?

In the analyzed scenarios, with  
all projects in the plan...

## GREEN

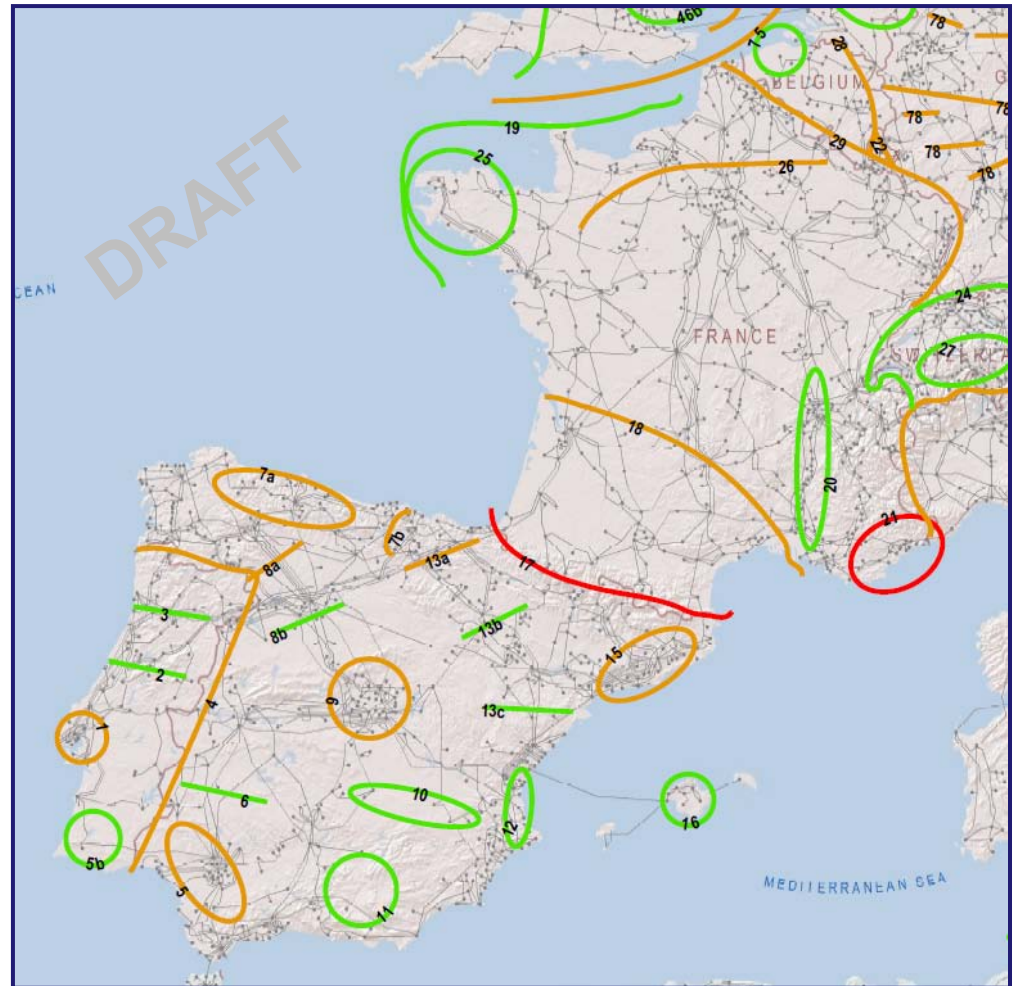
No further investment will be  
reported to this boundary in the  
next 5 years

## YELLOW

Problems are solved in most  
cases but some situation or  
adverse future can cause some  
problems

## RED

Additional investments will be  
needed to cope congestion on  
this boundary





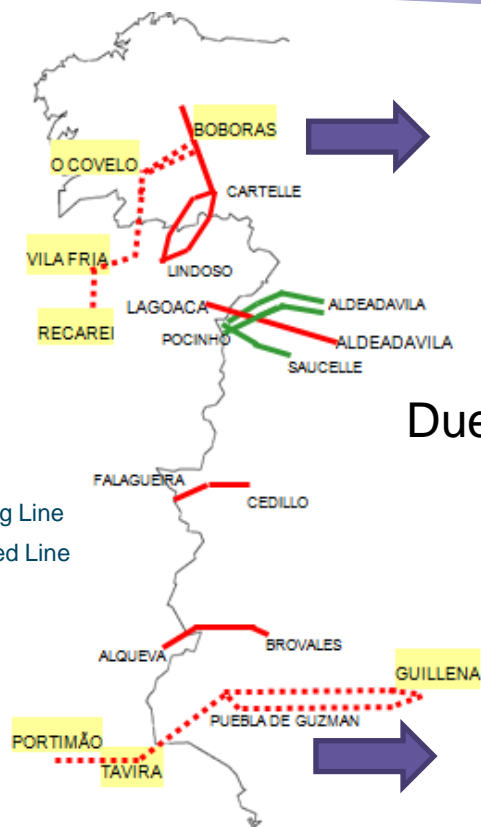
# Table of projects of European Significance



Project n	TYNDP-2010-investmt index	RG	TSO/TSOs in charge	Brief description of the project	Grid Transfer Capability increase MW	SEW	RES indicator	SoS	Losses variation	CO2 indicator	technical resilience	flexibility	Social and environmental indicator	Present status TYNDP 2012	Update 2012 date of comissioning
1					1800										
2					P>E 1700 E>P 1400										
3					Up to 1200										
4					2400										
5					1840										
6					2600										

DRAFT

# PT-ES project



New Northern interconnection : 2014

Status: Permitting

Duero interconnection  
2010



New Southern interconnection : 2012-2013

Partly in operation

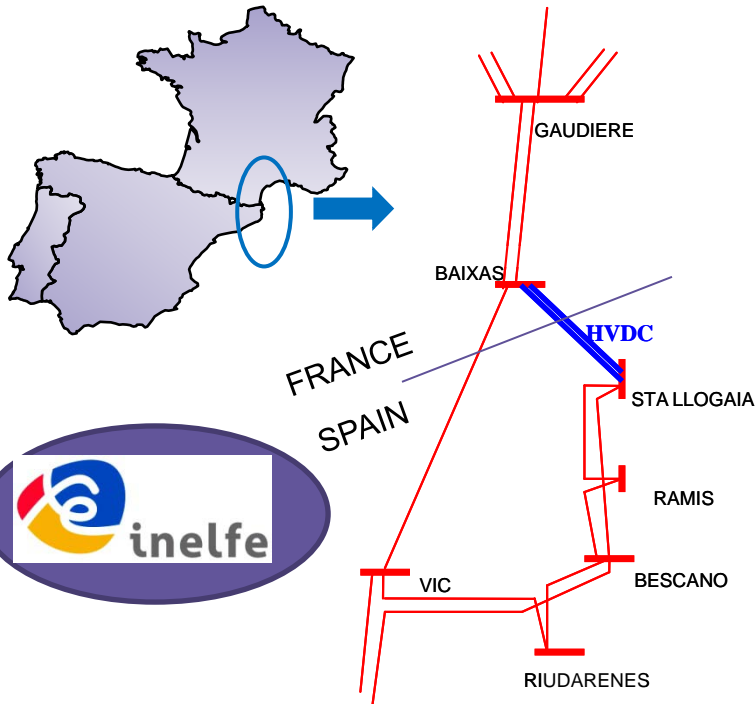
Cross Section Status: Permitting/Under construction

## Project Assessment

$\Delta$ GTC	SEW	RES	SoS	Losses variation	CO2	Technic. resilienc	Flexibility
P>E 1700 E>P 1400							



# FR-ES projects : Eastern reinforcement (I)



Governmental agreement since 2001: 2.600 MW exchange capacity in the short term and 4.000 MW in the long term



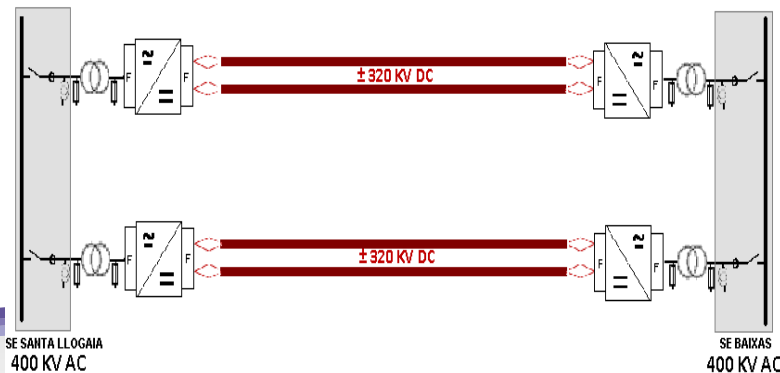
After being blocked during many years, the project was boosted in 2007 with the intervention of the European Coordinator (Prof. Mario Monti) under the TEN-E Guidelines regulation

## 2 HVDC bipoles

- 2 x 1000 MW
- 2 x ( 300 Mvar)
- 2 independent bipoles 320 kVdc
- Maximum failure: 1000 MW

## Converter stations (AC/DC)

- Baixas 400kV (FR) & Sta.Llogaia 400kV (SP)
- VSC with MMC (Modular Multilevel Converter) technology



# FR-ES projects : Eastern reinforcement (I)

PERMANENT OCCUPATION = 4 ÷ 7 m

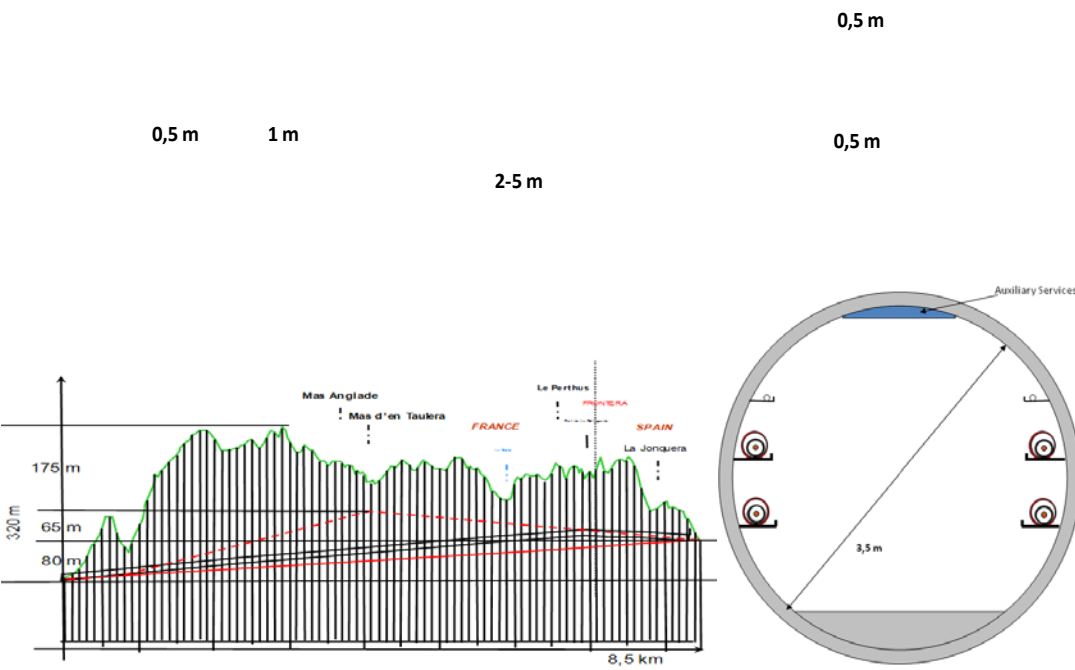
- ❑ **Extruded cables.** Dry insulation copper cable with aluminium tube screen.

- ❑ Cross section=2500 mm<sup>2</sup>

- ❑ **64 km** length (32 km Spain + 32 km France)

- ❑ **Tunnel:** 8.5 km length, 3.5 m diameter and [80, 300]m depth

- ❑ **Trenches:** 55.5 km length



**Commissioning 2014**  
**Works already started**

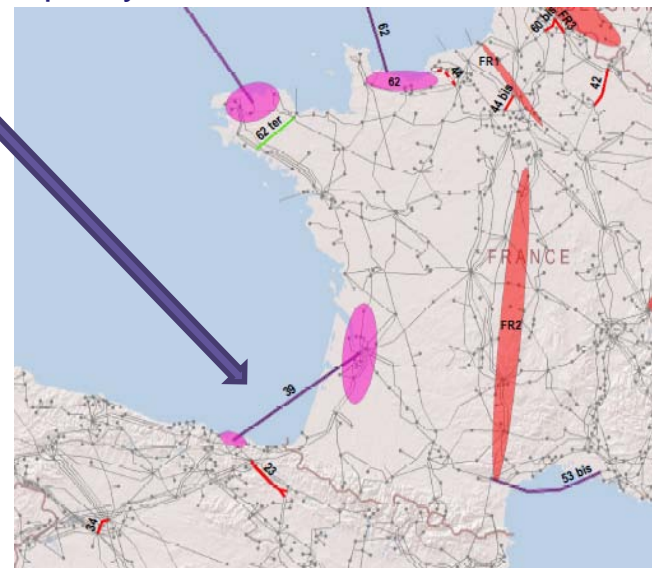


# FR-ES projects

The long term reinforcement for the long term objective exchange capacity is in TYNDP 2012 better defined after joint studies  
A Submarine option in Biscay Gulf is being considered



European Coordinator Master Plan 2008 and ENTSOE TYNDP 2010



Long term TYNDP 2012

## Project Assessment

	$\Delta GTC$	SEW	RES	SoS	Losses variation	CO2	Technic. resilienc	Flexibility
ES-FR Eastern	1200-1400							
ES-FR Western	FR>ES 1200 ES>FR 2000							

# The support to EU2020 policy: 2020 objectives

## Renewable Energy Sources:

- More than 70% of the projects contribute to integrate RES
- Projects of EU significance integrate **~30.000 MW of new RES** in the region  
Not all the National Master Plans are included in RegIP,  
Not all RES National plans are attached to projects of EU significance.

**Security of Supply:** SoS is enhanced with projects of EU significance.  
However in general, local investment of national relevance are required

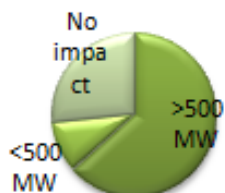
## Contribution to Internal Electricity Market

- More than 60% of the projects have important effect in variable generation savings

**Losses variation:** Effect in losses is not always positive:  
Long distances between RES location and load centers

### RES

RES :



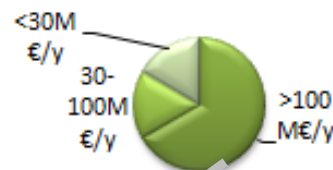
### SoS

Security of Supply :



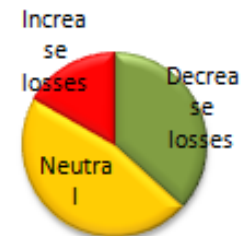
### IEM

Social & Economic Welfare



### Efficiency

Losses variation





# The support to EU2020 policy: Environment affection

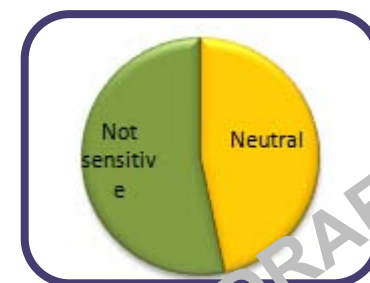
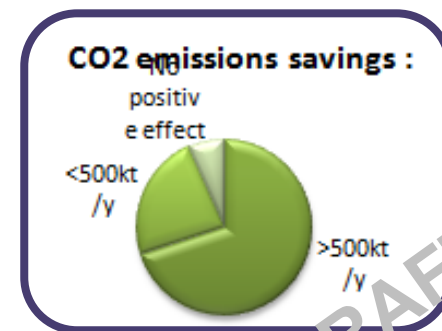
**CO2 emissions savings : 35 MtonCO2/y** =annual emissions of 15 millions cars (85% of cars in Spain)

## Right Of Way :

- 13700 km of projects.
- updates and new : **34% are updates** and 66% new routes
- AC projects: **89%**
- Midterm projects : 55%

## Social & Environmental indicator

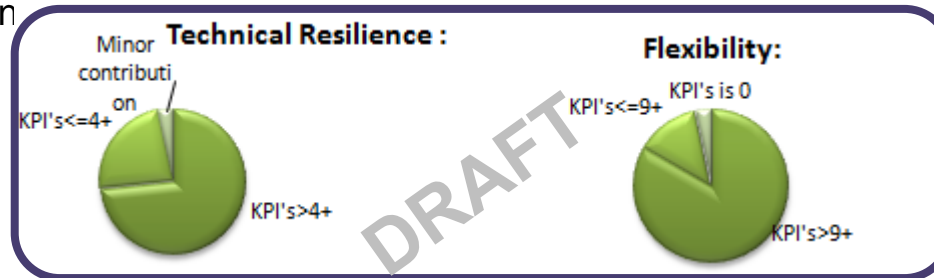
- 55% project has high probability of being commissioned at planned date, 45% are realistic but have some uncertainty
- There is no project considered that affects heavily to the environment
- Projects pass a prefeasibility study and national SEA in the NDP framework..



# Assessment of Resilience

## Technical Resilience and Flexibility indicator:

Proposed projects fulfill highly the network codes and are able to be adapted to different future situation



- **Economic performance justified by market & network studies**
- **Security of Operation and Supply guaranteed**
  - According to grid studies all the operational requirements are fulfilled in normal operation and under contingencies
  - TSO use special security criteria where necessary
- **Big effort to make the best of existing assets in order to minimize grid extension**
  - High enhancement of existing infrastructures (uprating, upgrading, HTC) 34% of projects
  - FACTS: CRSS and SSSC in Spain
  - Phase Shifters: 1 in Spain, 1 in FR-ES
- **New/efficient technologies applied**
  - HVDC projects (connection to Balearic islands, projects FR-ES, internal project in FR)
- **Compatibility with longer run challenges**
  - Although new investments will be required

# Costs and monitoring

## COSTS

**~8400 M€** investment in CSWRG  
~25% just for interconnections

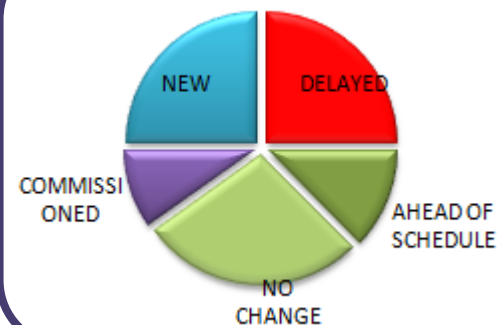
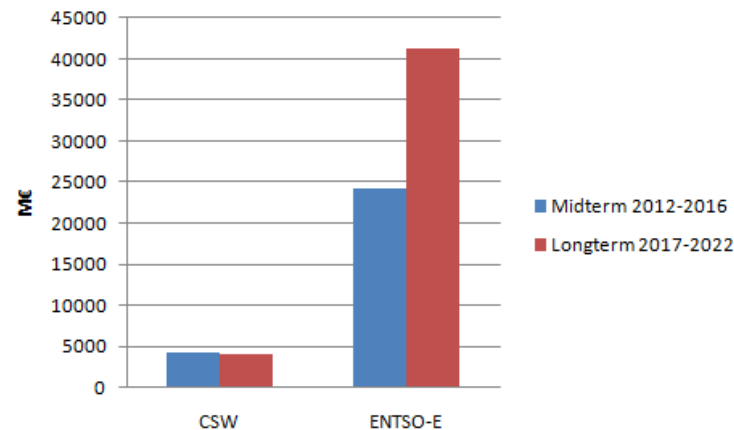
National Development plans include much more infrastructure and have higher costs

## MONITORING: status in 2012 compared to planned 2010

1400 km **commissioned**

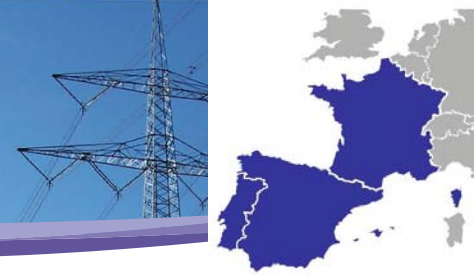
**27% of projects in TYNDP 2010 have been delayed**

27% of projects are new





# Key Drivers and Challenges



## Massive renewable integration

- Onshore wind and solar in the Iberian Peninsula → investments in Midterm
- New hydro generation including pumping storage (north of Portugal, and different areas in Spain)
- Certain Offshore mainly in France → investments in Longterm
- More flexible conventional generation is needed

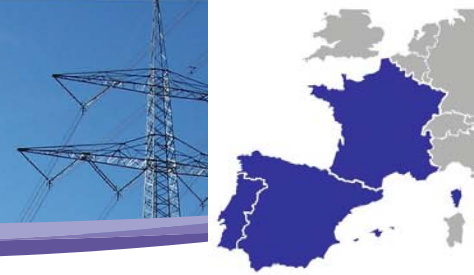
## Security of Supply

- Reinforcements will be needed and could become an issue for some cities or areas in the region
- Increasing of cross-border capacity enhances national security of supply while it increases mutual support possibilities

## Market Integration

- Increasing of cross border capacity to accommodate predominant power flows: 3 projects within CSW RG, 5 projects with other RG
- Integration of MIBEL with continental Europe is one of the main keys for the region
- Internal projects that allow a lower total variable generation cost

# Key Drivers and Challenges



## Increasing complexity of Grid Operation

- Large number of decentralised RES requires monitoring and control requirements (CECRE)
- New equipments of active control of power flows (HVDC, FACTS, PSTs...)
- More complex studies
- More coordination at every level

## Permitting Procedures and social acceptance

- Required grid may not be in time if there are delays in permitting procedures and RES targets are met as scheduled

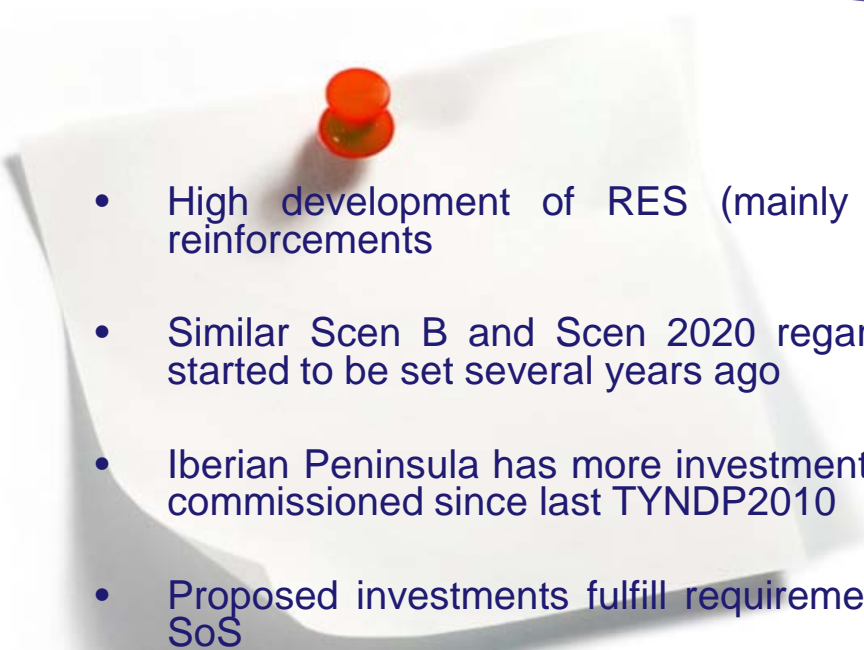
→ EIP proposals are welcome (onestop shop, deadline of 3 years for authorization...)

## Uncertainties

- Uncertainties regarding decommissioning, and materialization of agents portfolio (volume, type and location) is a challenge for grid development

→ Bidirectional information and more consultations with stakeholders

# Conclusions

- 
- High development of RES (mainly onshore in Iberia) is the main driver of 400kV reinforcements
  - Similar Scen B and Scen 2020 regarding RES in Iberian Peninsula, as RES plans have started to be set several years ago
  - Iberian Peninsula has more investments in MT than in LT and that a big % has been already commissioned since last TYNDP2010
  - Proposed investments fulfill requirements of both Scen B and Scen 2020, including also SoS
  - Interconnections mainly but also internal projects enhances Market Integration, and have a big social welfare as allows the production with more sustainable and cheaper power plants
  - Priority in the region is the reinforcement of FR-ES border, which is the main bottleneck in any scenario
  - Proposed projects will be an input for PCIs in the North-South West Initiative (EIP)



Thank you for your attention

