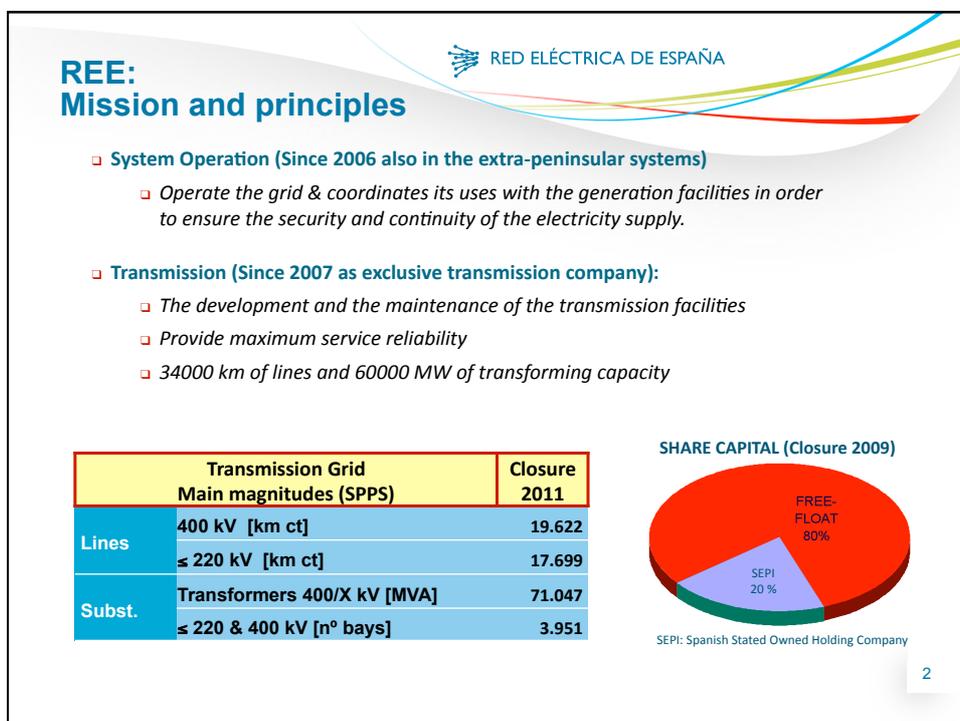


RED ELÉCTRICA DE ESPAÑA

The CECRE: Making renewable energy technologies compatible with the security of the system

Need for Grids Workshop
Hannover April 22nd 2012

1985-2010



REE: Mission and principles

RED ELÉCTRICA DE ESPAÑA

- **System Operation (Since 2006 also in the extra-peninsular systems)**
 - Operate the grid & coordinates its uses with the generation facilities in order to ensure the security and continuity of the electricity supply.
- **Transmission (Since 2007 as exclusive transmission company):**
 - The development and the maintenance of the transmission facilities
 - Provide maximum service reliability
 - 34000 km of lines and 60000 MW of transforming capacity

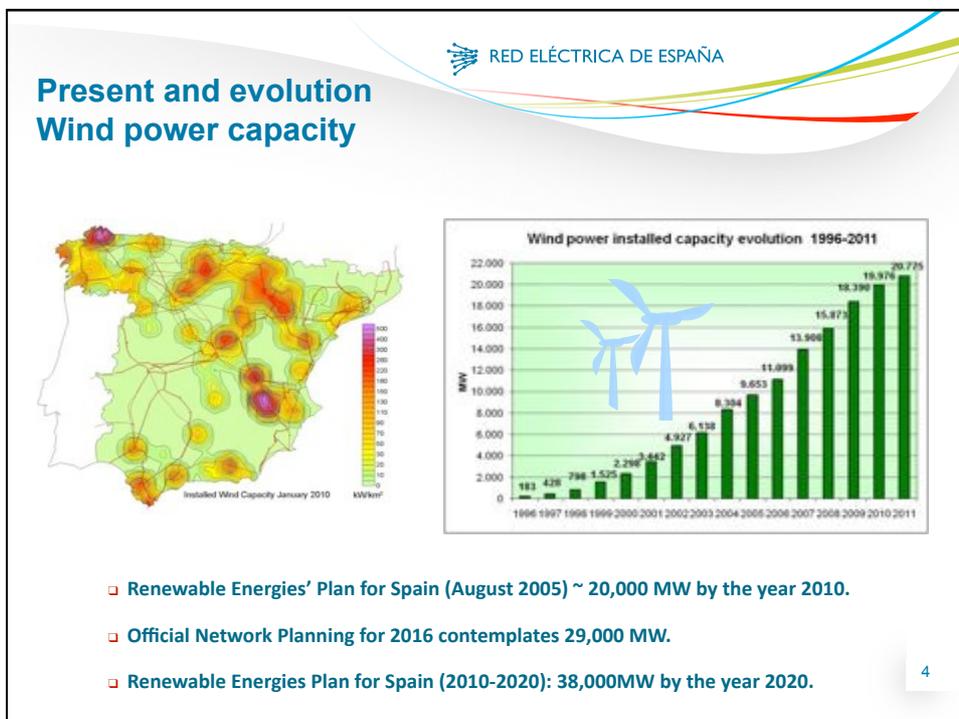
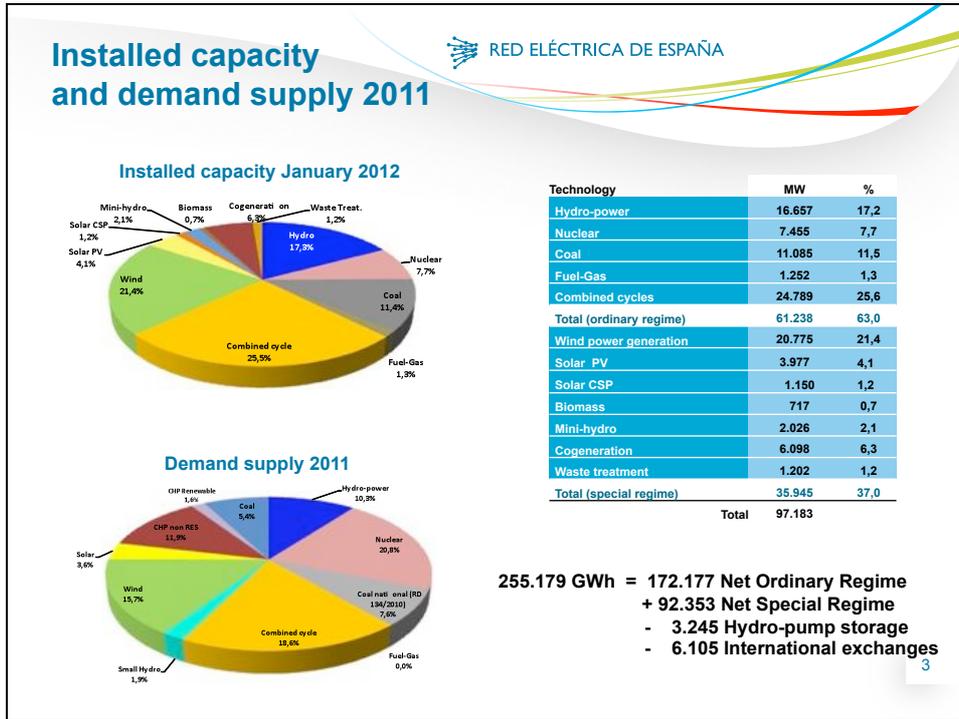
	Transmission Grid Main magnitudes (SPPS)	Closure 2011
Lines	400 kV [km ct]	19.622
	≤ 220 kV [km ct]	17.699
Subst.	Transformers 400/X kV [MVA]	71.047
	≤ 220 & 400 kV [nº bays]	3.951

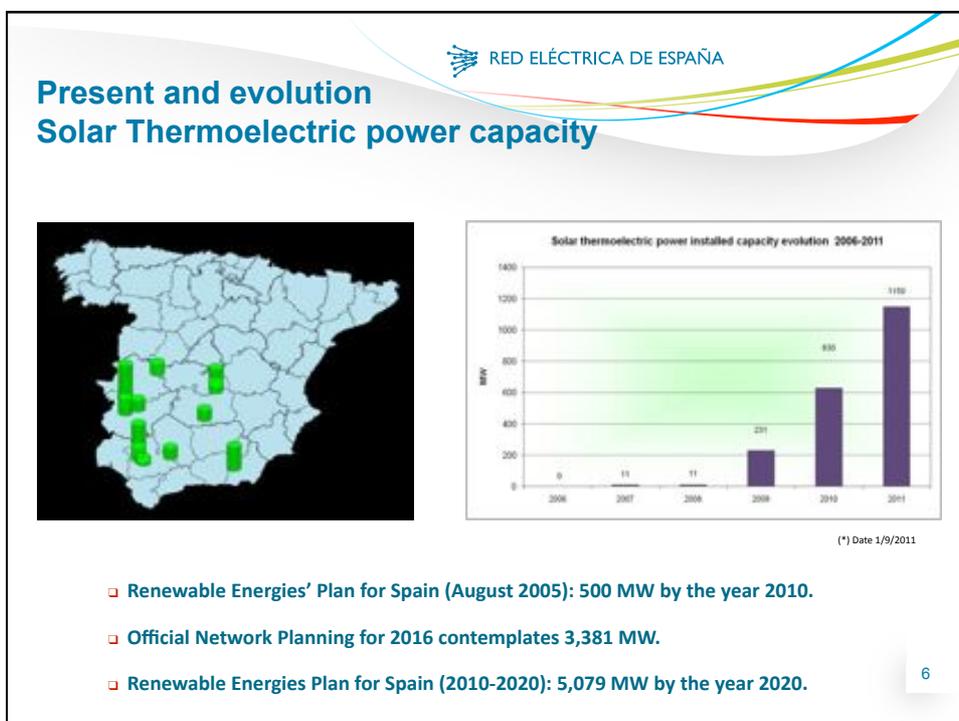
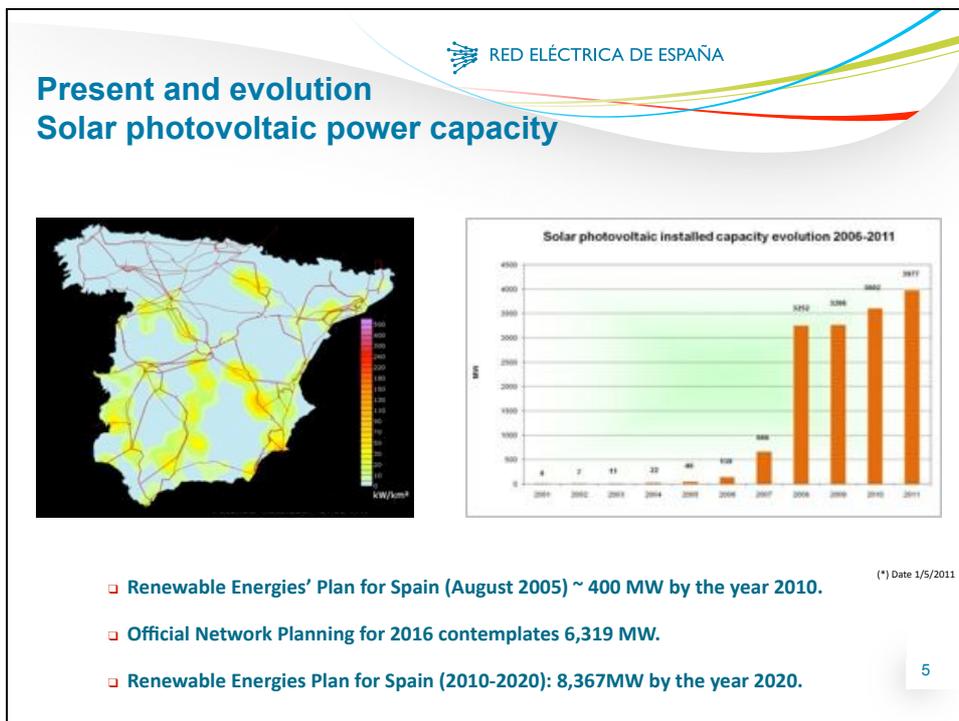
SHARE CAPITAL (Closure 2009)

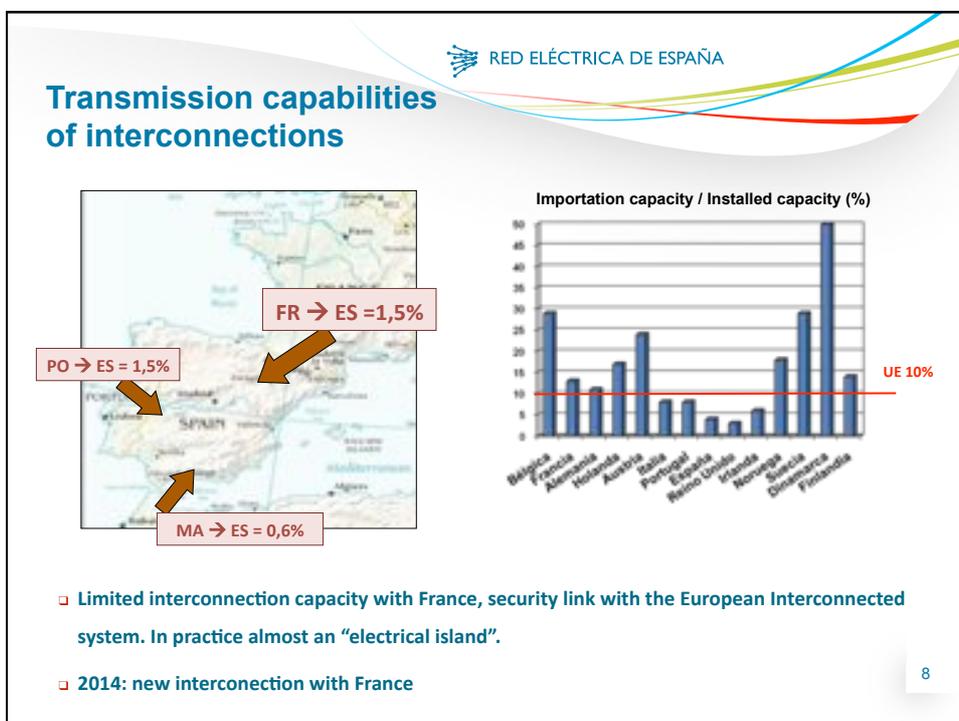
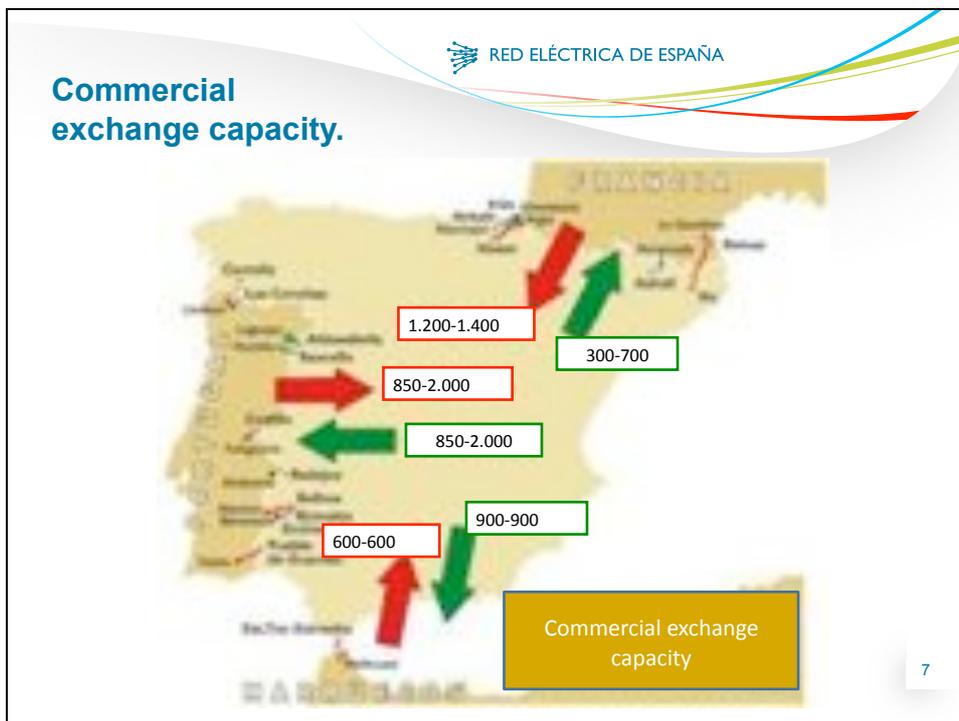


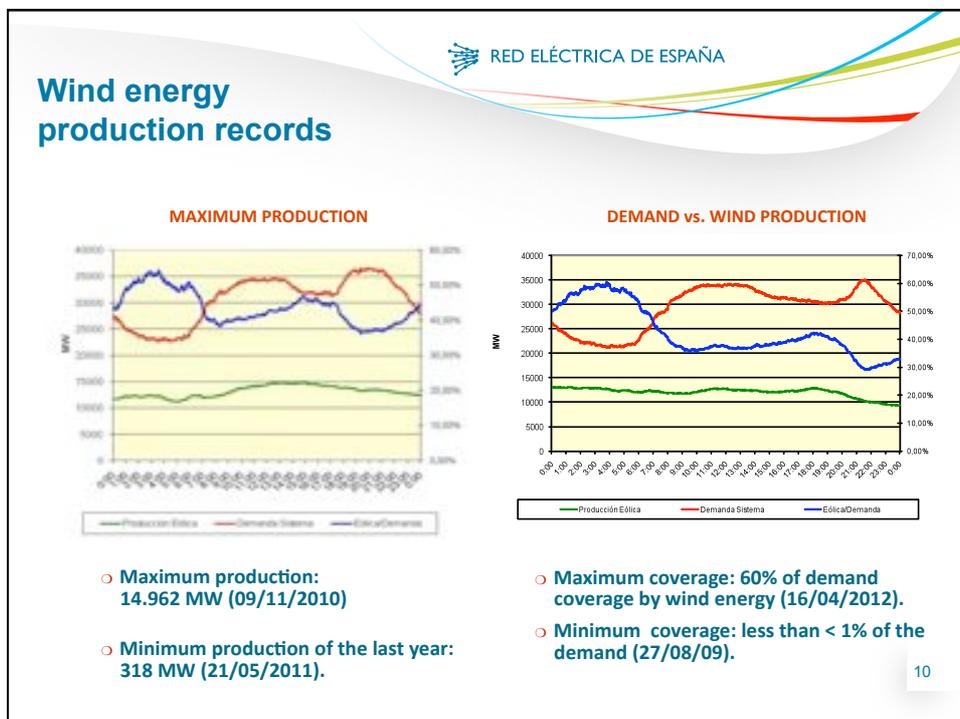
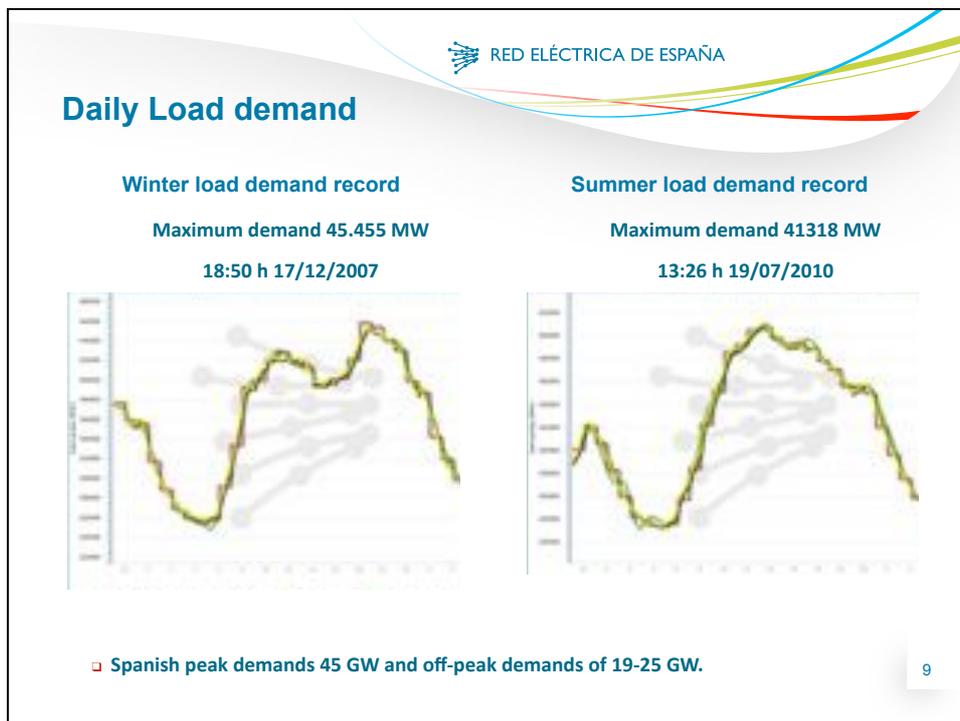
SEPI: Spanish Stated Owned Holding Company

2







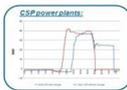
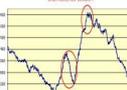
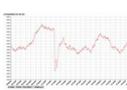


RED ELÉCTRICA DE ESPAÑA

Challenges and Pillars to success

CHALLENGES

- Demand Coverage
- Variability
- Technology limitations
- Distributed generation


PILLARS TO SUCCESS

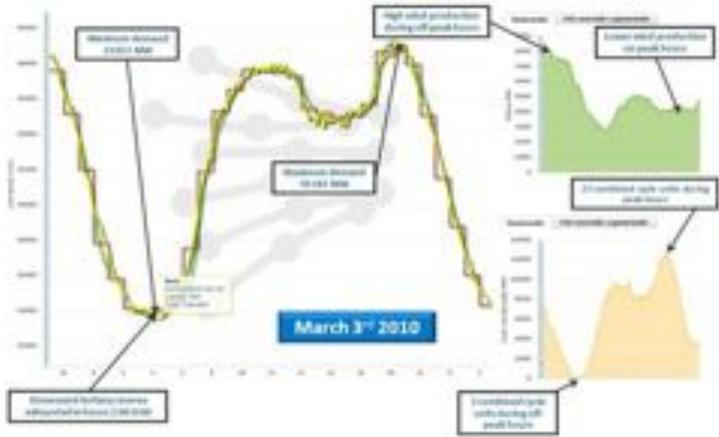
- Generation management
- Smart Grid
- RE Forecast Tools
- Flexibility
- Power System Studies
- Industry Response
- Network Developments
- Monitoring & Controllability

11

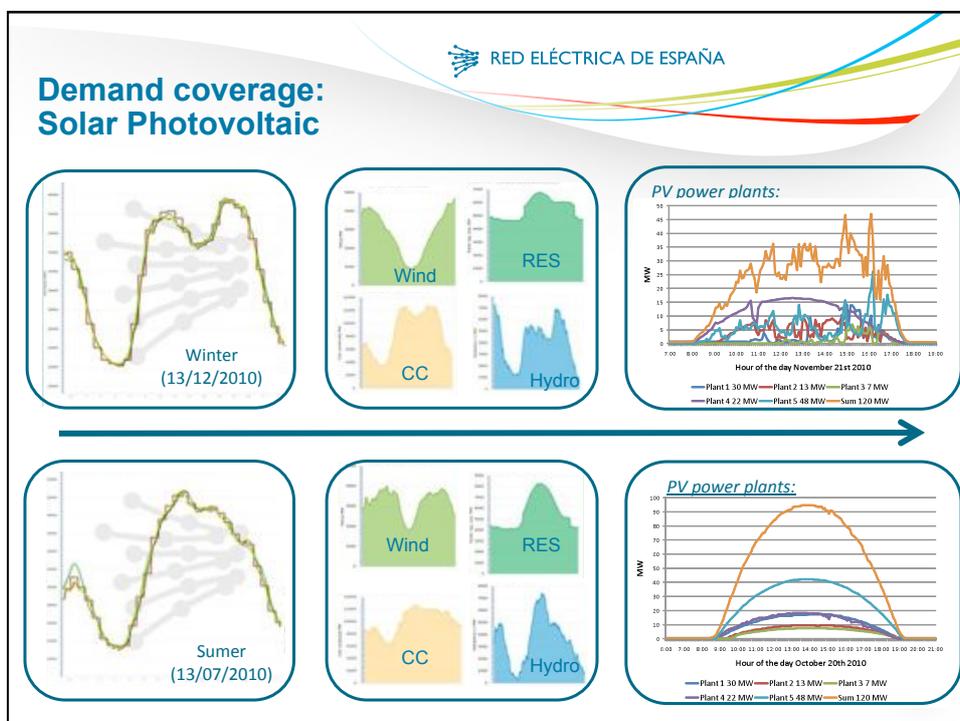
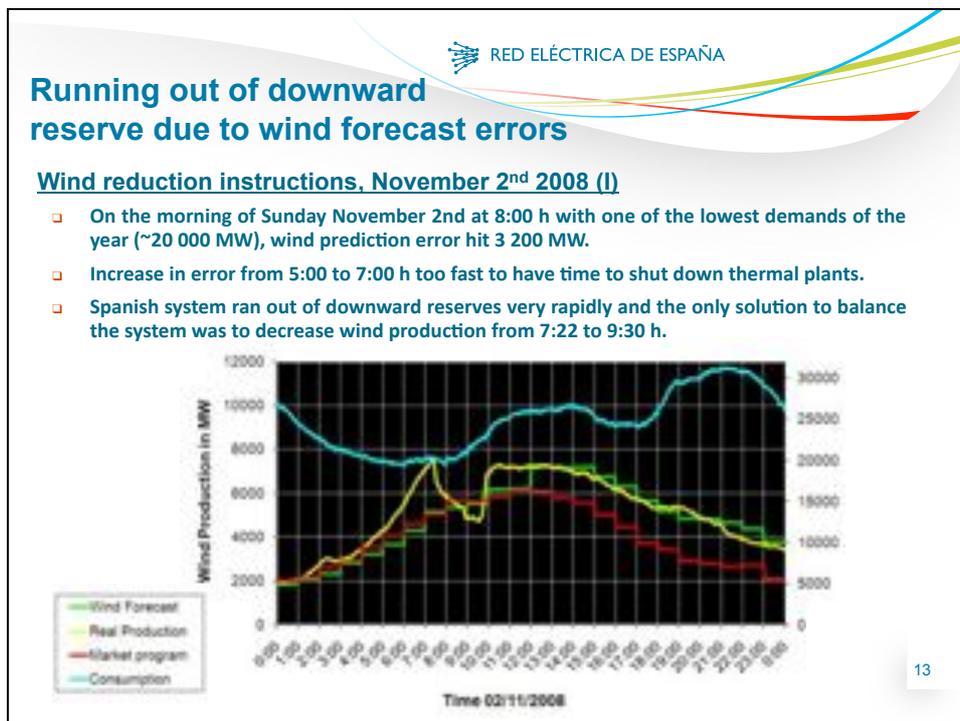
RED ELÉCTRICA DE ESPAÑA

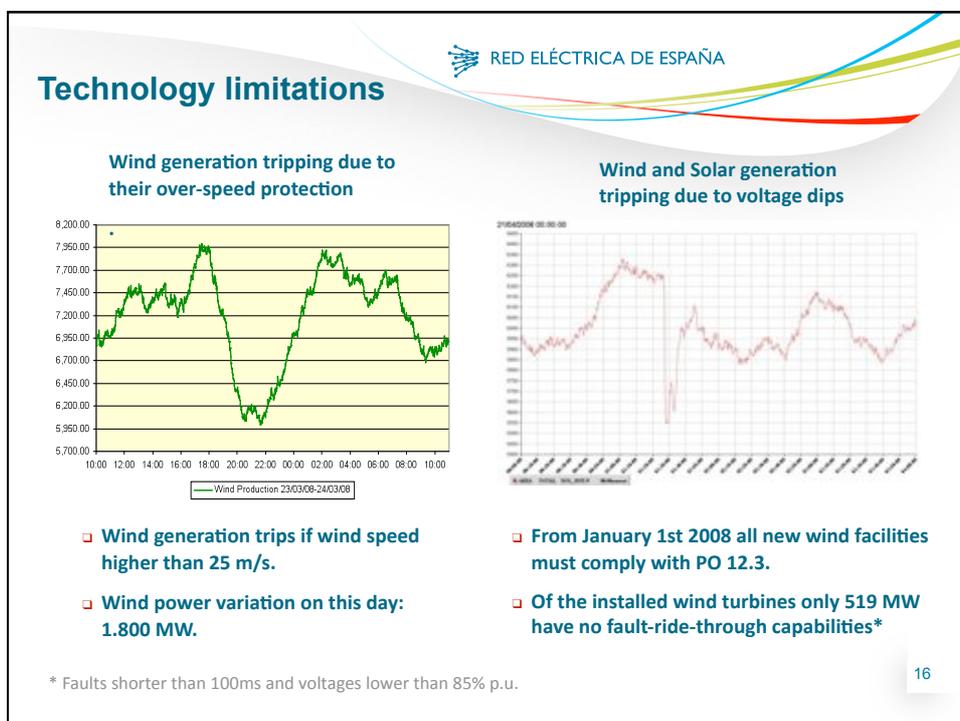
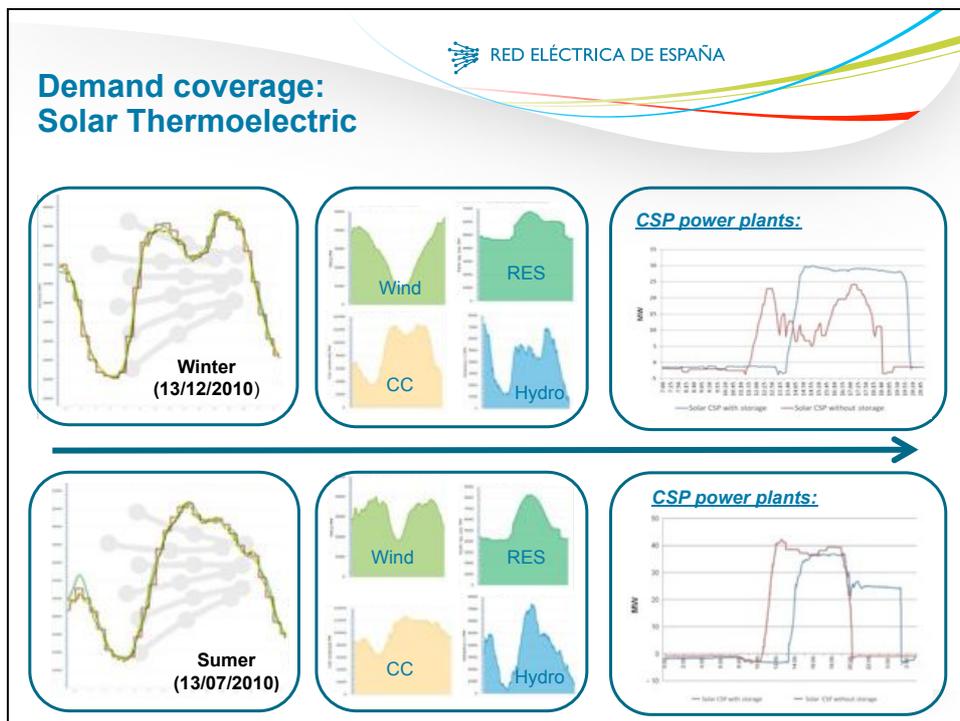
Demand coverage: Wind Generation

□ Balance feasibility during off-peak hours



12





RED ELÉCTRICA DE ESPAÑA

Generation tripping due to voltage dips

SOLAR THERMOELECTRIC

SOLAR THERMOELECTRIC

↓

Synchronous generator
Similar to conventional generators, but smaller

↓

Good performance facing disturbances

SOLAR PV

SOLAR PLANTS AGGREGATION

↓

Solar plant aggregation
P > 2 MW

- ❑ The facilities that get access after July 1st 2011 must comply with PO 12.3.
- ❑ The facilities that get access before July 1st 2011 will have until October 1st to comply with PO 12.3.

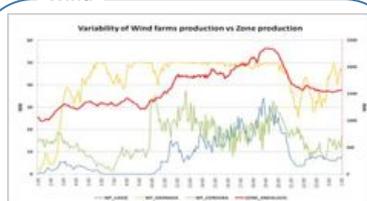
17

RED ELÉCTRICA DE ESPAÑA

Distributed generation: Influence of geographical spread

Wind

Variability of Wind farms production vs Zone production

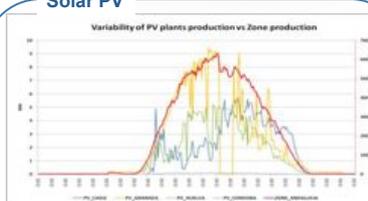


Variability of Spain's Zones Production vs Total Spain production (related with medium production)



Solar PV

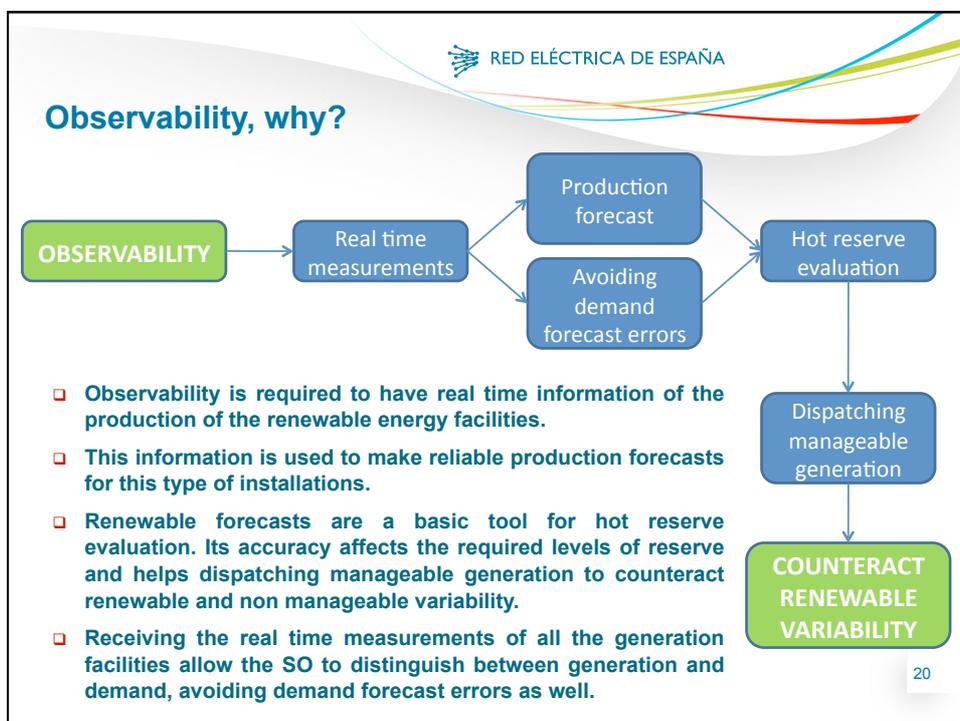
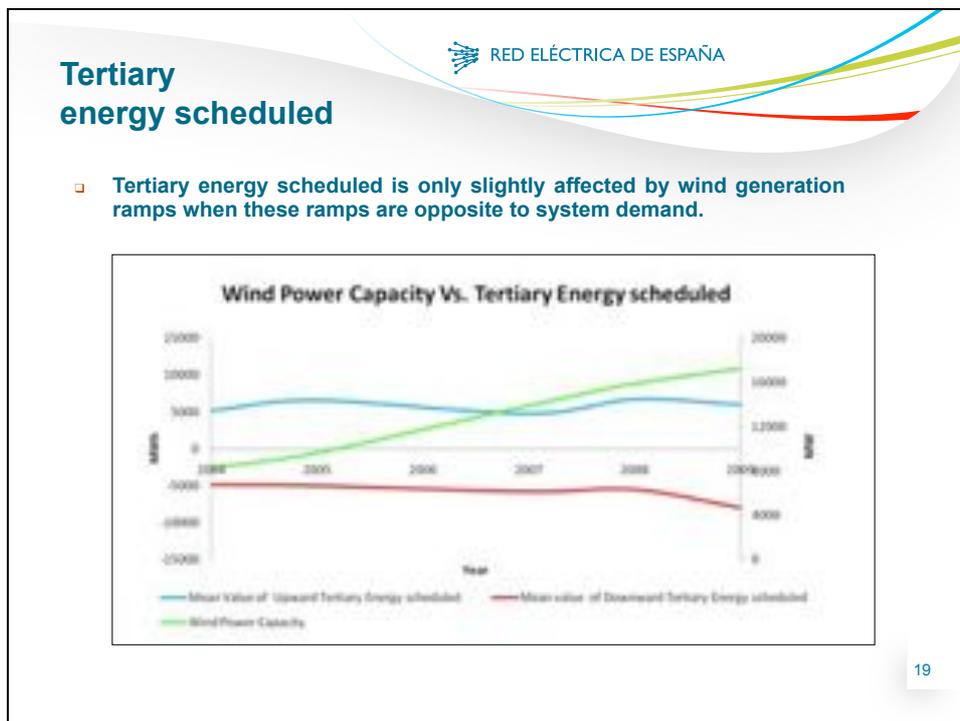
Variability of PV plants production vs Zone production

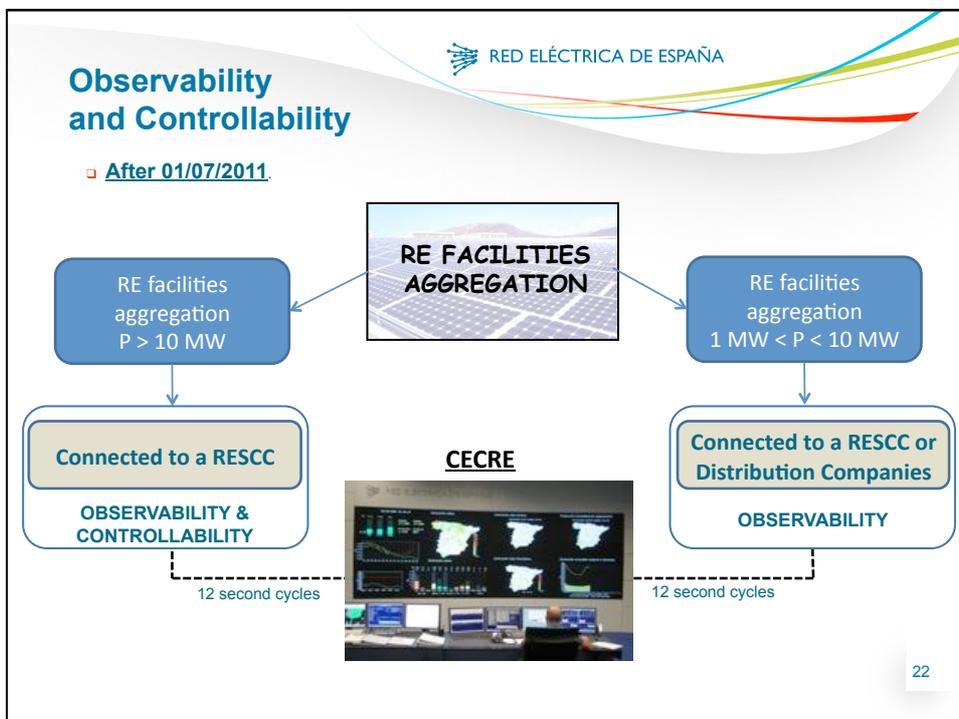
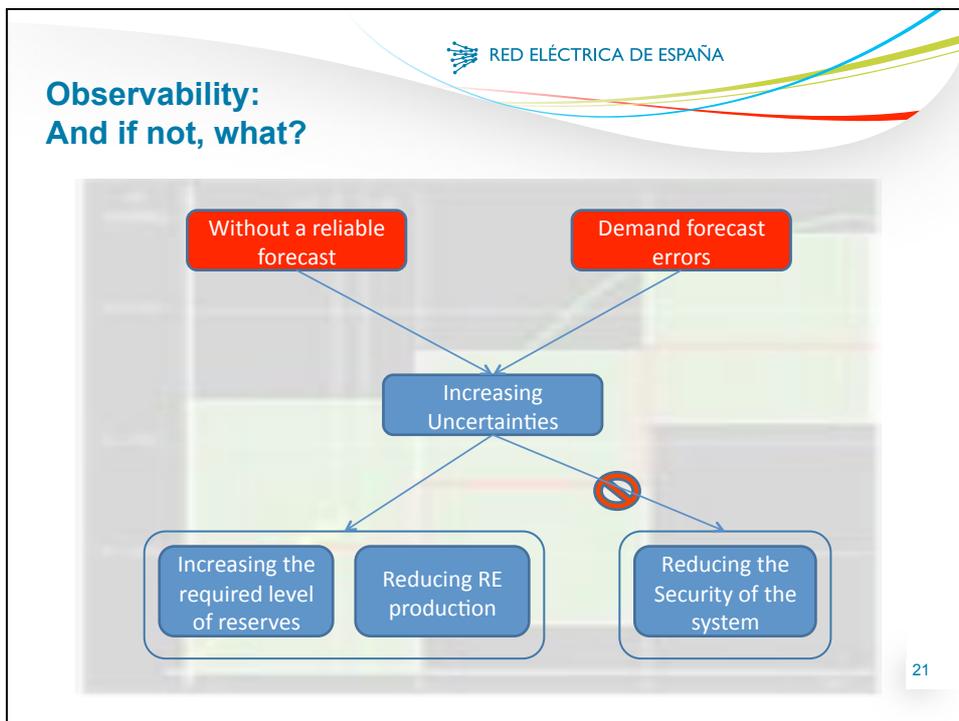


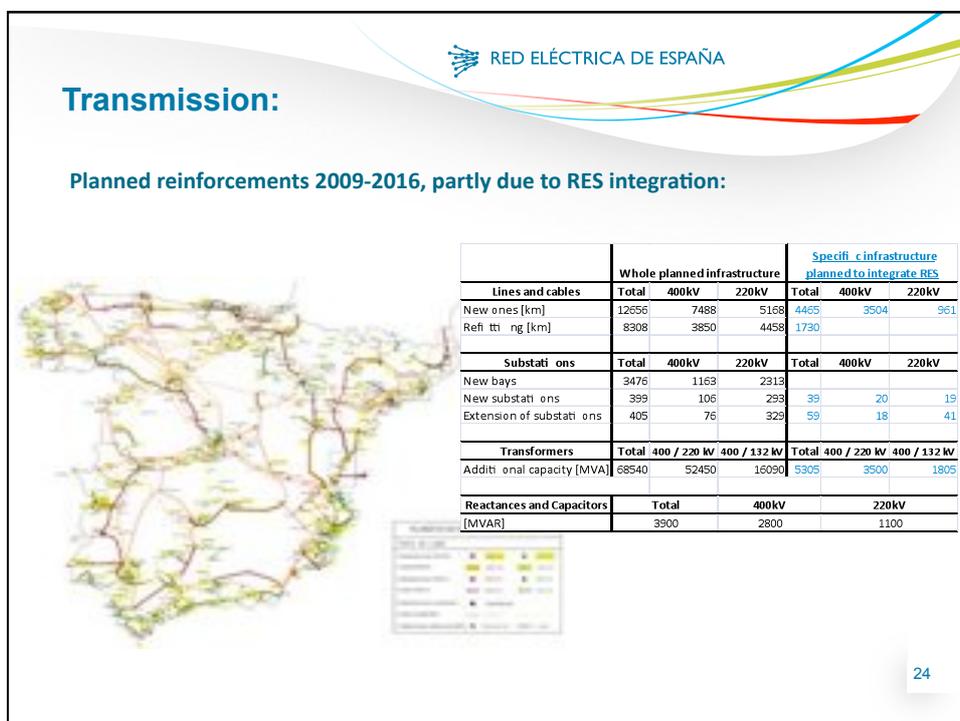
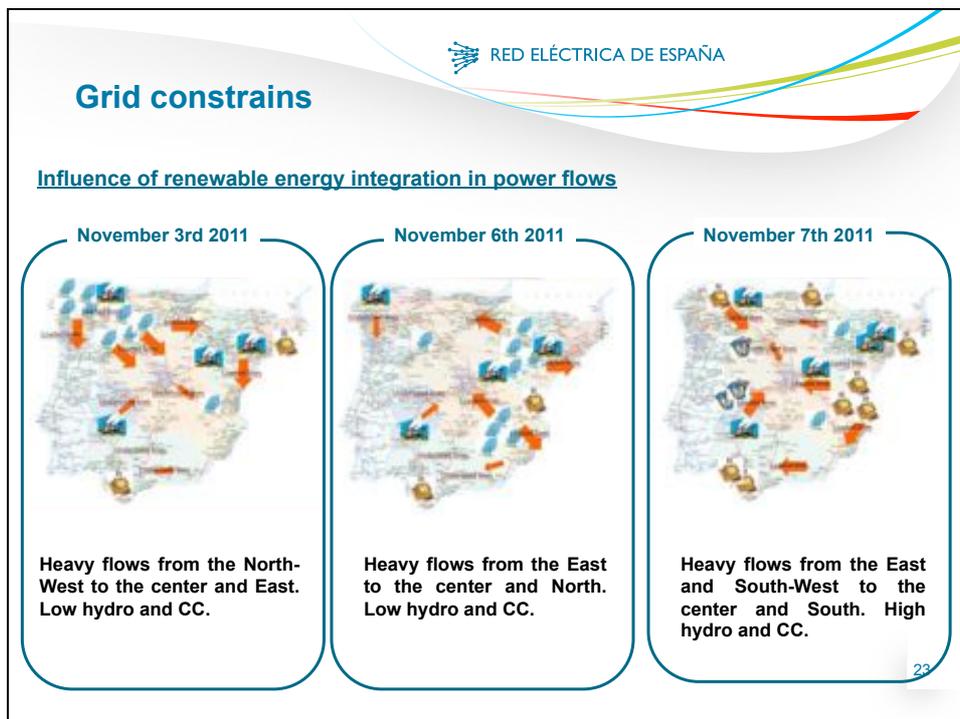
Variability of Spain's Zones Production vs Total Spain production (related with medium production)



18







 RED ELÉCTRICA DE ESPAÑA

Thanks for your attention!



25