

Power grid development – Policy and challenges

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Conférence du Bureau de coordination des énergies renouvelables : « Développement des réseaux, solutions intelligentes et stockage de l'énergie : Comment réussir l'intégration des énergies renouvelables – 22 May 2012

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An ambitious roadmap for RES development

 The 3x20 objectives have been declined in the national renewable energy action plan :

Wind onshore	19 GW
Wind offshore	6 GW
Solar PV	5,4 GW
Biomass (including biogas)	2,3 GW
Hydroelectricity	+ 3 TWh per year and 3 GW of peak capacity in 2020

 At the end of 2011, the capacity connected to the grid was :

- 6,8 GW for wind (Growth rate is about 1000 MW per year since 2005) ;
- 2,8 GW for PV.

The mutualisation scheme of connection costs for RES generators as an important regulatory tool promoting grid integration

 The **shallow costs** principle as a general basis :

- the connecting infrastructure up to the existing grid is totally paid by generators as well as any new infrastructure ;
- The infrastructure reinforcement for upper voltage level is mutualised by network tariffs ;
- Those costs are paid by the first generator connected to the grid.

 This shallow costs principle has been improved for RES generators in order to :

- **Ensure a grid development consistent with generation objectives** declined at regional level ;
- **Create connection capacity dedicated to RES** for 10 years : priority is given to RES for the connection capacity identified in the scheme ;
- **Avoid free-rider effects** : The cost mutualisation allows to take into account that each grid development can benefit several producers and to avoid that the first producer connected to the grid pays for the whole connecting infrastructure.

 A regulation has just been published last month and will be implemented in the coming years (décret n°2012-533 of 20 April 2012)

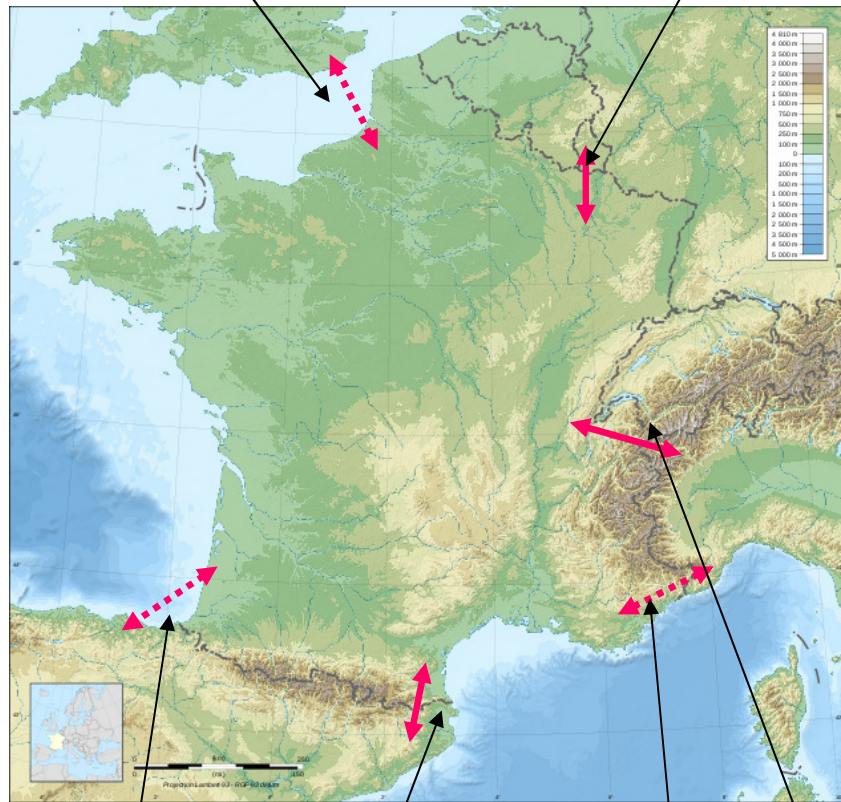
Focus on the development of cross-border capacity

IFA 2 :

- 1000 MW
- Submarine cable HVDC (direct current)
- Studies in progress

Moulaine-Belval :

- Overhead line 225 kV HVAC
- 9 km
- 17 M€



France Espagne 2 :

- Submarine HVDC
- Studies in progress

France-Espagne 1 :

- 2x1000 MW
- Underground cable 320 kV HVDC
- 70 km
- 700 M€

Nice-Vintimille :

- Underground HVDC
- Studies in progress

Savoie-Piémont :

- 1000 MW
- Underground cable 320 kV HVDC
- 100 km
- 500 M€

- Important projects are implemented to increase the capacity of cross-border flows ;
- Investment capacity of RTE for the development of interconnectors and reinforcements of the main grid has increased by 80% between 2010 and 2011 (460 M€ in 2011) and will increase by almost 20% by 2012 ;
- 1,2 bn€ expected for RES integration by 2020 only for transmission grid ;
- RTE strongly involved in cooperation tools such as Coreso for the improvement of security of supply ;
- The implementation of market coupling between France and Germany has improved the use of cross-border infrastructure.

The smart grids technologies as a key element for RES integration

-  The implementation of smart meters is a stepping stone toward a better knowledge of power flows and load control :
 - The implementation of smart meters has been decided after a successful wide-scale experiment ;
 - An ambitious project : 35 millions meters and 4,3 bn€ investments by 2020 ;
 - On-going and future smart grid demonstration projects consistent with the anticipated AMI infrastructure.

-  A 1,49 bn€ support scheme is dedicated for RES and decarbonised energy demonstration projects including smart grids (« Investissements d'avenir » program)
 - With leverage effect on industry, expected total investments of about 3 bn€.
 - 12 calls for interest in 2011 including energy storage, hydrogen and fuel cells, positive energy buildings, CCS, geothermal energy, solar and wind power...
 - Regarding smart grids technologies :
 - 9 smart grids projects have been selected after 2 calls for interest ;
 - On-going selection of projects submitted to a 3rd call in 2011 ;
 - 2012 call has been opened in March and will be open until December 2012.

Key questions addressed by demonstration projects in defining the new paradigms for the Power system



How to ensure security of supply?

- Increase short term time-accuracy of production from intermittent RES ;
- Capacity market for demand response and energy storage ;
- Mid and long-term adequacy forecast ;



How to manage intermittency with high penetration of intermittent RES?

- Markets' reactivity to intraday trading and balancing schemes ;
- Automated distribution networks ;
- Management of peak load through demand side management ;
- Transition to virtual power plants and ancillary services at local level;
- Energy storage (electricity and within processes) ;
- Active charge management of electric vehicles ;



How to ensure social acceptability of infrastructure development and modernisation?

- Anticipate procedures to improve local acceptability (NIMBY, BANANA) ;
- Find acceptable levels of impacts on tariffs.