



1 Including salt as an energy storage, CSP plants get broad more full load hours as photovoltaics

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»SuperGrid« THE FUTURE POWER HIGHWAY

Advanced System Technology

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Challenge

With more than 80 GW wind power capacity and nearly 30 GWp installed PV capacity, Europe is the world leader developing renewable energies. The associated power generation is highly volatile which is also facing the conventional 380 KV power transmission system. As a technology extension, the development of a pan-European „overlay-power-grid“ based on high-voltage direct current transmission (HVDC) may distribute renewable energy over large distances more efficient and balancing power fluctuation. Such a grid structure is also the source of the more visionary ideas, such as the „DESERTEC concept“ which could supply North Africa and Europe with renewable energy from big concentrated solar power plants (CSP).

Fraunhofer Future Project SuperGrid

HVDC is particularly suited for a long distance transport of large amounts of renewable energy. A single HVDC connection can transfer up to 5000 MW - the output of three up to five nuclear power plants. Until now, only a few HVDC systems exist, which are usually implemented as point-to-point connection. In the Fraunhofer Future Project „SuperGrid“, scientists from the Fraunhofer AST researching on the management and the grid protection of meshed HVDC systems. Thereby, different power plant technologies, such as solar power (CSP), should be considered, which are also the strategic focus within the DESERTEC concept for a long-term power supply based on renewable energies.

Technical implementation

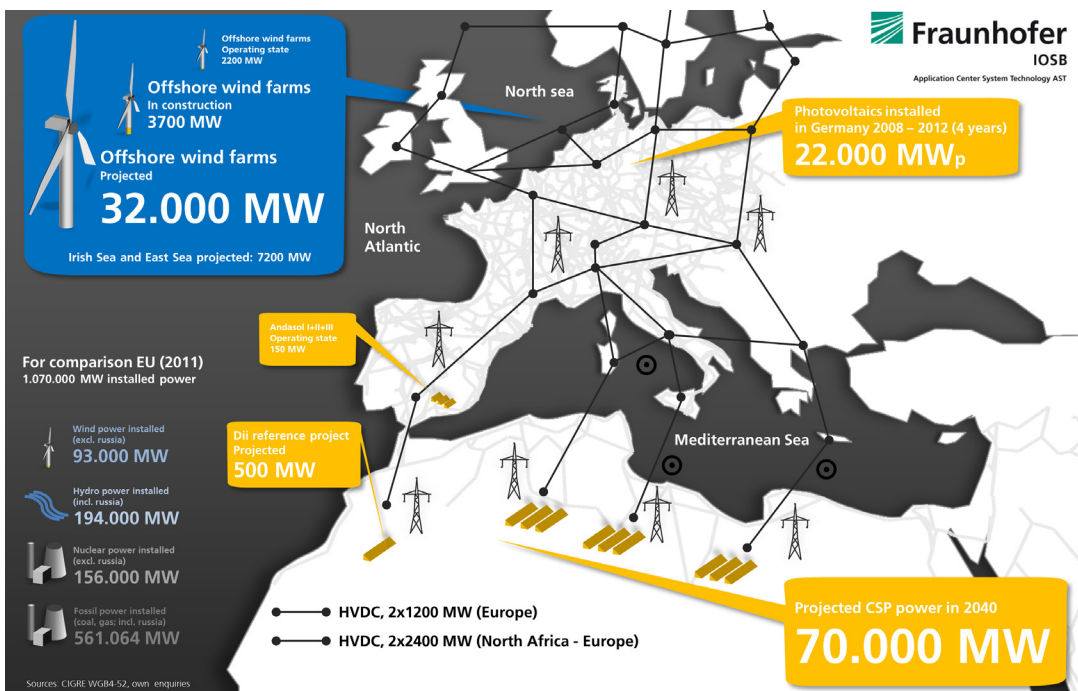
- Analysis of the European and North African transmission grid (ENTSO-E)
- Research of the development potential based on meshed HVDC
- Research of possible strategies for management, grid protection and power system stability
- Prototype implementation of power grid protection and grid management
- Design of simulation models of the transmission grids MENA and ENTSO-E
- Analysis of interactions between HVAC and HVDC systems
- Power grid management and grid protection of meshed HVDC systems
- Prototype software moduls for future commercial use

Project management

- Fraunhofer Institute for Solar Energy Systems ISE

Project partners

- Advanced System Technology AST
- Fraunhofer Institute for Integrated Systems and Device Technology IISB
- Fraunhofer Institute for Mechanics of Materials IWM



2 North Africa has a huge potential for concentrated solar power (CSP)

Source: Guilherme Jófili, CC BY 2.0

3 European HVAC integration