

TRANS-CSP Team

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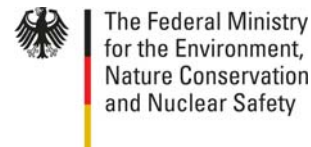
The full study report can be downloaded at:
<http://www.dlr.de/tt/trans-csp>

Trans-Mediterranean Interconnection for Concentrating Solar Power

by

German Aerospace Center (DLR)
Institute of Technical Thermodynamics
Section Systems Analysis and Technology
Assessment
Study commissioned by

Federal Ministry for the Environment, Nature
Conservation and Nuclear Safety, Germany



Results of the TRANS-CSP Study

The TRANS-CSP study focuses on the interconnection of the electricity grid of Europe, the Middle East and North Africa (EUMENA) with the purpose of supplying about 15 % of the European electricity demand by solar energy imports from the South by the year 2050. The conventional electricity grid is not capable of transferring large amounts of electricity over long distances. Therefore, a combination of the conventional alternate current (AC) grid with High Voltage Direct Current (HVDC) transmission technologies will be used in such a Trans-European electricity scheme. Figure 1 shows three examples of interconnections that could be realised without causing major environmental impacts.

There are several good reasons for such a transmission scheme:

- the huge solar energy potential of MENA can easily produce 700 TWh/y in 2050 for export, reducing significantly the European CO₂-emissions,
- concentrating solar power plants in MENA provide around the clock firm capacity for base load, intermediate load and peak load and can complement the European renewable energy mix to provide secured power supply,
- a well balanced mix of national and imported renewable energy will reduce the dependency on energy imports in Europe and provide a basis for economic development in MENA,
- transmission losses of roughly 15 % (e.g. from Southern Algeria to Central Europe) are overcompensated by 300 % annual solar irradiance in MENA,
- electricity from solar thermal power plants will become the least cost option for electricity in MENA, a well balanced mix of renewables is the only guarantor for stable electricity prices,
- import solar electricity can be used in Europe for firm power capacity and to generate hydrogen as fuel for the transport sector.

The TRANS-CSP study provides a first information base for the political framework that is required for the initiation and realisation of such a scheme. It quantifies the available solar energy resources and the expected cost of import solar electricity, a scenario of integration into the European power sector until 2050, and shows the environmental and socio-economic impacts of such a large scale infrastructure.

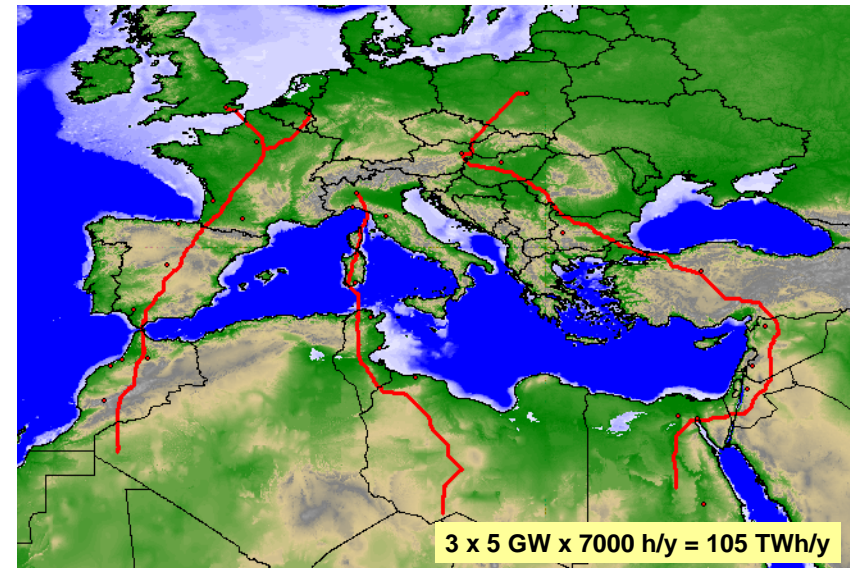


Figure 1: Three exemplary HVDC interconnection lines for the export of solar electricity from concentrating solar power plants from North Africa to Europe

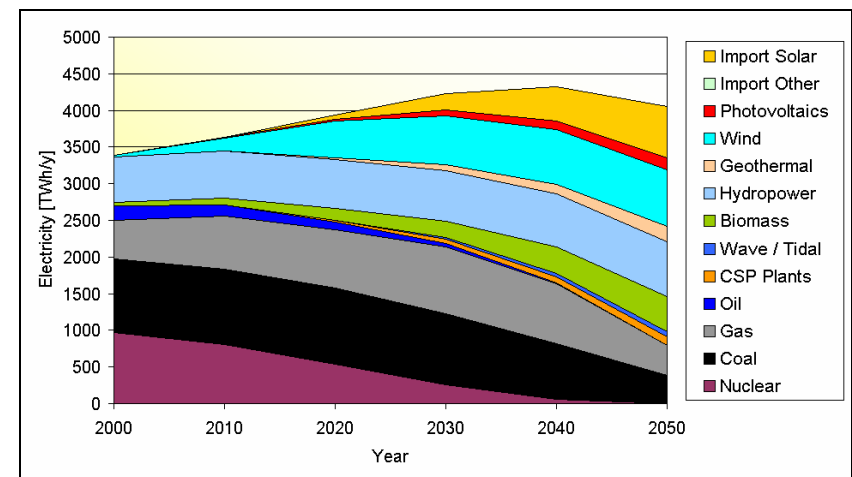


Figure 2: Electricity supply scenario for EU 30 including solar electricity imports from Northern Africa.