

The DESERTEC concept in brief

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Concentrating solar power (CSP)—which is quite different from the better-known photovoltaics—is the simple but effective technique of concentrating sunlight with mirrors to create heat and then using the heat to raise steam to drive turbines and generators, just like a conventional power station.



Power tower



Parabolic trough



Dish/engine



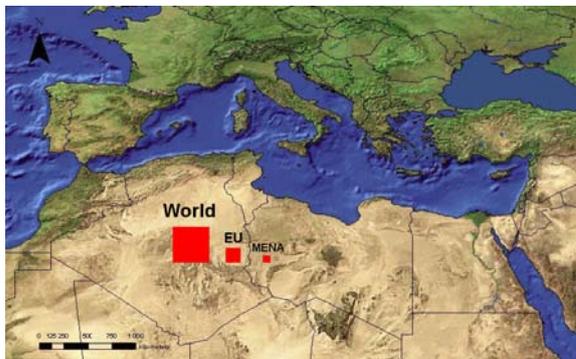
Fresnel mirror system

CSP is a practical technology with **huge** potential to supply Europe, the Middle East and North Africa (EUMENA) with plentiful, inexhaustible and secure supplies of clean electricity at competitive prices and on relatively short timescales:

- Every year, **each square kilometre of desert receives solar energy equivalent to 1.5 million barrels of oil**. Multiplying by the area of deserts worldwide, this is several hundred times the entire annual energy consumption of the world.
- Using CSP, **less than 1% of the world's deserts could generate as much electricity as the world is now using** (see map overleaf).
- **It is feasible and economic to transmit solar electricity to the whole of EUMENA via a low-loss HVDC supergrid**. There are several other good reasons to build such a grid. But the UK may start to benefit quite soon from solar power from North Africa via existing transmission lines. The grid may be upgraded as quantities of electricity increase.
- The **DESERTEC Industrial Initiative (DII)** is a consortium of blue-chip companies that now plan to build solar plants and wind farms in desert regions, and HVDC transmission lines throughout EUMENA.
- The 'TRANS-CSP' report from the German Aerospace Centre calculates that **CSP is likely to become one of the cheapest sources of electricity in Europe, including the cost of transmission**.
- The TRANS-CSP report provides detailed projections showing how **CSP, with other technologies, can enable Europe to meet all its needs for electricity, make deep cuts in CO₂ emissions, and phase out nuclear power at the same time**.
- CSP plants are quick to build. **With the right political impetus, capacity may be ramped up quickly**.

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- Solar heat may be stored in melted salts so that **electricity generation may continue at night or on cloudy days**. With heat storage and with gas or biofuels as backup sources of heat, **CSP plants can provide base load, intermediate load and peaking power**.
- CSP plants have been operating successfully in California since the mid-1980s and new ones are now being planned and built around the world. **CSP plants are already feeding electricity into the European transmission grid**.
- CSP may be used to generate **hydrogen**, with many applications in a future ‘hydrogen economy’.
- There are reasons to have confidence in the **security of energy supplies** (see www.trec-uk.org.uk/csp/security.htm).
- Plentiful and inexpensive supplies of clean electricity from CSP would open up **many interesting possibilities for reducing CO₂ emissions from transport and buildings**: electrification of rail transport, plug-in hybrid electric vehicles (PHEVs) partly powered by green electricity, space heating using ground-source heat pumps powered by green electricity, and so on.
- Apart from its enormous potential to supply EUMENA with clean energy, CSP promises **other major benefits**, especially in countries of the sun belt:
 - Waste heat from the generation of solar electricity may be used for the **desalination of sea water**. This can have a major impact in alleviating shortages of water, a problem that is likely to become increasingly severe with rising global temperatures.
 - The shaded areas under solar mirrors are **protected against the harshness of direct tropical sunlight**. They have many potential uses including **horticulture** using desalinated sea water. Thus **land that would otherwise be unproductive can be brought into use**.
 - CSP can become a large new industry, providing **jobs and earnings throughout EUMENA**.
 - **Global security**:
 - By alleviating shortages of **energy**, **water**, **food** and **usable land**, CSP can reduce the risk of conflict over those resources.
 - A win-win solar collaboration amongst countries of EUMENA can help to improve relations amongst different groups of people.
- **CSP, with HVDC transmission, can have a major impact in decarbonising the world’s economy**. 90% of the world’s population lives within 2700 km of a desert and may be supplied with solar electricity from there. The USA and the populated parts of Canada may be supplied from the sunny south west of the USA, all of India may be supplied from the Thar desert and all of China may be supplied from the sunny north and west of China.
- These ‘**DESERTEC**’ ideas have been developed by the Trans-Mediterranean Renewable Energy Cooperation (TREC), now the **DESERTEC Foundation**, and in the ‘**MED-CSP**’, ‘**TRANS-CSP**’ and ‘**AQUA-CSP**’ reports from the German Aerospace Centre.
- Further information, with links to those sources and others, may be found at www.desertec.org and www.trec-uk.org.uk.



In the map, the larger red square on the left shows an area of desert—less than 1% of the area of the world’s deserts—that, if covered with concentrating solar power plants, would produce as much electricity as the world now uses. The smaller squares shows corresponding areas for the European Union and for the Middle East with North Africa.

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