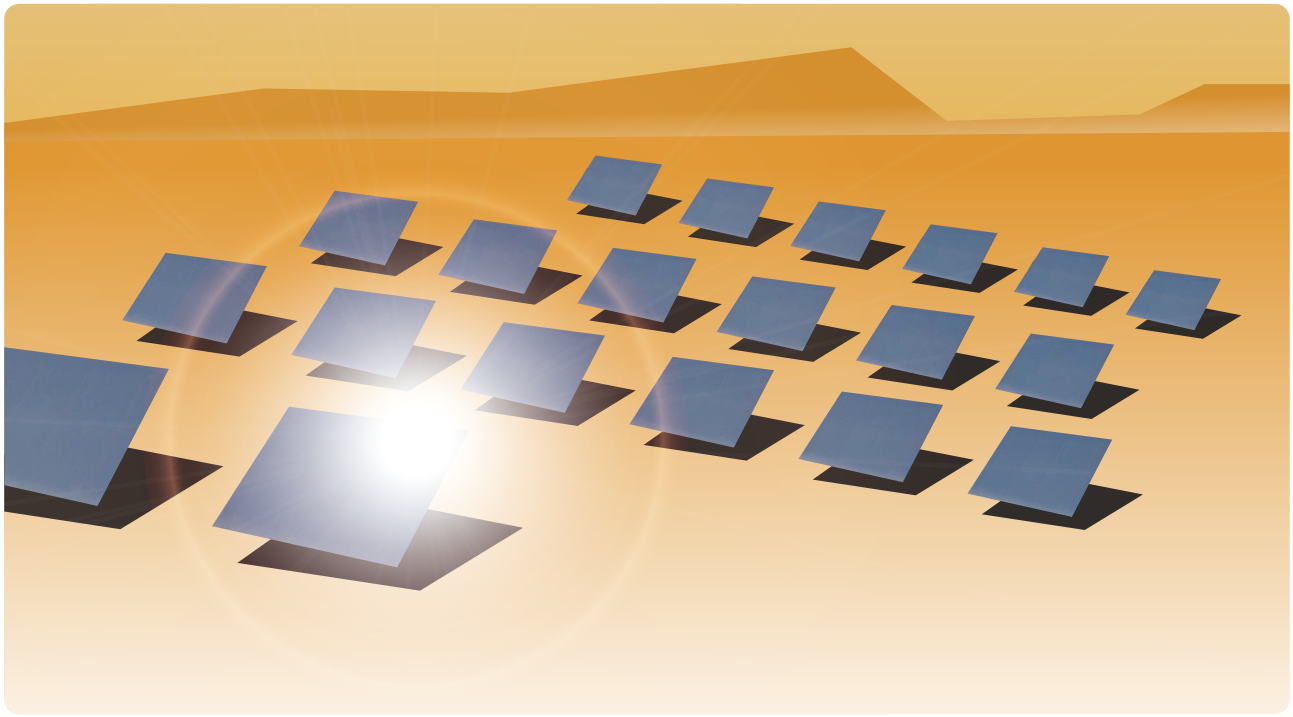
Solar power from Sahara for fossil-free Europe

Solar electricity from the Sahara could supply Europe with 15 per cent of its electricity by 2050, at a price tag of 400 billion euros.



Solar power from the North African desert could help Europe to phase out fossil fuel and nuclear power at a lower cost than anything else, and also help North Africa and the Middle East to earn export income without oil, as well as obtaining a large contribution to their own electricity production and a large supply of freshwater from desalinated seawater.

That is the grand vision behind Desertec. a visionary project, backed by ABB, Siemens, and the Club of Rome. ABB´s interest is understandable, as the cost for the high-voltage direct current cables – of which ABB is the world's leading producer – to Europe is estimated at €50 billion. Other companies behind the Desertec Industrial Initiative are Siemens and the German energy giants Eon and RWE, Deutsche Bank and the insurer's insurance company Munich Re and other companies.

There is as yet no firm financial commitment to anything, and the scale and timescale of the project has been questioned for very different reasons.

It should not be dismissed too easily, though. Concentrating thermal solar power (CSP) is a simpler and possibly cheaper technology than its more well-known cousin solar cells.

CSP uses mirrors or lenses to concentrate solar rays, which heat a liquid to high pressure vapour. The vapor drives a turbine and generator, just as in a coal or nuclear power plant, except that the liquid is oil instead of water.

CSP works. It has been tried on a fairly large scale (some 300 megawatts) for more than 20 years in the Californian desert and later also in Spain.

Whereas solar cells or photovoltaics are now much bigger (several thousand megawatts are installed each year) than CSP, some people believe CSP can reach "grid parity" faster i.e. become competitive with other power sources. IIASA[1] has recently presented a favourable review, in which it claims that with supportive policy CSP could reach parity by 2020, and without policy by

1 www.iiasa.ac.at/Admin/PUB/policy-briefs/pb07.html

2035. The US Department of Energy[2] has targeted 2020 for CSP grid parity in baseload and in the intermediate power market by 2015, which is also its target for photovoltaics grid parity.

One advantage of CSP – compared to photovoltaics – is that the heat can be stored, so some power can be produced at night. A drawback is that water is the best coolant, though air-cooling with little water use is an option. And if seawater is used, reasonably near the sea, "a 250 MW collector field may be used to operate a 200 MW turbine and 100,000 m^3 of drinking water may be produced a day" according to the Desertec website FAQ[3].

Area is not a problem. According to a study by the German Aerospace Center DLR, Europe could get 17 per cent of its electricity from 2,500 square kilometres of solar plants out of a total area of 12 million square kilometres in the Middle East and North African nations, much of which is desert.

Costs appear surmountable, though the DLR figures – making the case for Desertec – are open to criticism in some respects.

Wind power, photovoltaics, biomass, energy efficiency, smart grids and possibly wave power may develop faster than CSP and thus erode the economic rationale of the project. It is at least not sure that the cost of photovoltaics will fall slowly from 2020 to 2050 or that all progress on biomass electricity will cease by 2020, or that wind power in Europe will grow to less than 700 TWh by 2030, and then grow very little or that wind power will have a capacity factor of only 20 per cent. But that is what the DLR figures presume.

Social Democratic German MP and long-term solar champion, Hermann Scheer, has criticized Desertec for relying too much on unknown figures, but also for being too long term.

"It is hardly possible to calculate the total cost of this project. There are just too many unknowns," he told der Spiegel[4]. He has also claimed that "businesses are trying to delay the required changes in energy production for another 30 or 40 years," and finally that "Desertec can really only be implemented by a handful of large companies, and it could also allow them to determine the price of electricity."

This may potentially be a problem, and it is much less of a problem with photovoltaics and wind power where there is more of an in-built competition between manufacturers and where the manufacturer and power producers are usually separate companies.

For the foreseeable future, however, it does not look likely that wind power and photovoltaic developers are being deterred by the prospect of big CSP.

Unlike RWE and Eon, the third German big power company Vattenfall wants no part of Desertec, both for pragmatic reasons and because its outgoing CEO (and Eurelectric CEO) Lars Josefsson is wary of both "European dependence" and danger of terrorist attacks.

That is indeed taking a long-term look, given Europe's present oil dependence and more near-term dangers from terrorist attacks on existing nuclear power stations.

But with all the confusing arguments for and against Desertec, it should be kept in mind that it does enjoy support not only from what the average NGOs perceive as the bad guys (RWE and Eon), and neutrals (such as ABB) but also from a fair number of clearly good guys such as Munich Re and former MEP Anders Wijkman, now vice president of the Club of Rome, as well as the former UNEP head, Klaus Töpfer. Greenpeace[5] has also issued a very positive report on CSP.

The grand scale of Desertec, for better or worse, has a strong political appeal. In the confirmation hearings of the incoming European Commission in the European Parliament last January, the Energy Commissioner Oettinger called Desertec a "a great opportunity" for Africa and the EU, and it fits well with EU, especially French, ambitions to forge a strong and constructive alliance around the Mediterranean.

Nuclear power and oil have proven divisive in relations between the north and south Mediterranean. Solar power could be a uniting factor, creating some peaceful prosperity in all directions, maybe not exactly to the tune of 400 billion euro, but then on the other hand maybe a lot faster than 2050.

2 www1.eere.energy.gov/solar/csp_program.html

3 www.desertec.org/en/concept/faq/

4 www.spiegel.de/international/germany/0,1518,664842,00.html

5 www.greenpeace.org/international/press/releases/concentrating-solar-power-250509

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