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Power from the desert: what progress have Desertec and the Mediterranean Solar Plan made?

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Power from the desert: what progress have Desertec and the Mediterranean Solar Plan made?

Bonn, 9 July 2012. This week marks the anniversary of two initiatives that could be highly significant for future energy supplies to Europe and in the Middle East and North Africa (MENA): the establishment on 13 July 2008 of the Union for the Mediterranean (UfM), with its Mediterranean Solar Plan (MSP), and the presentation in 2009 of the Desertec-Industrial-Initiative (Dii). Since 2010 they have been joined by the Transgreen initiative, now known as Medgrid, for the analysis of the technical, economic and institutional feasibility of a power grid between Europe and North Africa.

While the establishment of the private-sector Desertec-Industrial-Initiative in particular has attracted considerable media interest, we do not hear much about the power-from-the-desert initiatives these days owing to the current financial crisis and the Arab Spring. Four years after the proclamation of the Mediterranean Solar Plan and three years after the launch of the Dii, it is time to take stock again (see the first review in *The Current Column* of 2 August 2010).

The story so far: the German Aerospace Center (DLR) drew up three studies on the potential of power from the desert, which formed the basis for the development of the Desertec concept by the DESERTEC Foundation, or its precursor, the TREC network. The target set in the DLR studies was to meet 17 percent of European electricity demand with desert power by 2050.

In the recently published Dii report *Desert Power 2050* the aim now is for Europe to obtain as much as 20 percent of its power from the desert. While in 2006 the DLR was still working on the basis that an annual 707 terawatt hours (TWh) of desert power would be exported to Europe by 2050, the Dii is now expecting the net export volume to exceed 1,000 TWh. How much electricity will be able to remain in the producing countries of the MENA region at those export volumes remains unclear, although their demand in 2050 is calculated at 3,000 TWh. The generation potential of 10,000 TWh of solar and wind power at no more than € 50/MWh to which the Dii refers appears to be an unrealistic objective, seen from today's perspective at least.

Are the energy projects making progress?

According to the latest information, the Desertec-Industrial-Initiative is currently preparing reference projects totalling 2.5 gigawatts (GW) in Morocco, Algeria and Tunisia. In practical terms, the plans are farthest advanced in Morocco. In May 2011 the Dii and the Moroccan Agency for Solar Energy (MASEN) signed a declaration of intent concerning a 500 megawatt (MW) reference project. Contrary to popular opinion, however, the Dii will neither be investing in nor operating the power stations.

Relatively well advanced are MASEN's plans for a 160 MW power station based on concentrated solar power (CSP) near Ouarzazate in Morocco. Of the funding, 75 percent will take the form of loans from the World Bank, the African and European Development Banks, the KfW, etc. Such projects can still be financed only through development cooperation; private investors continue to be afraid of the risk.

Which technology – at what price?

The steep decline in photovoltaic (PV) prices since the beginning of last year has already led to Dii's business model being questioned, since photovoltaic power generation has become far cheaper than CSP. While power generation costs at PV arrays are steadily falling (currently € 0.08 to 0.10/kWh at free-standing PV arrays in North Africa), there is no scope for cost reductions in the case of CSP (currently € 0.18 to 0.23/kWh in North Africa). Although 2 GW of CSP power generation has been installed worldwide, current expansion is not sufficient to realise economies of scale. Even if all the potential for cost reductions was tapped, CSP would continue to be, at € 0.15 to 0.16/kWh, more expensive than photovoltaics.

However, concentrated solar power has two advantages of relevance to the implementation of the power-from-the-desert concept: it can provide baseload power, and combining it with a salt storage unit enables power to be generated after sunset. With the steam turbine working at a higher capacity, power generation costs are reduced. The drawback in the case of PV is that a

battery must be used to store the electricity. This raises power generation costs. The power-from-the-desert business model will not fail because of falling PV prices, but the Dii and the other initiatives would do well to rely on CSP, PV and wind energy. In *Desert Power 2050* the Industrial Initiative puts the cost advantage of power from the desert at an average of 20 percent over European alternatives. From 2050 desert power is expected to save Europe € 33 billion a year, or € 30 per megawatt hour.

Cooperation between the initiatives is growing

While it initially looked as if separate and competing projects were seeking to develop renewable energy capacities and a power grid between Europe and North Africa, this year has seen the advent of cooperation agreements between the UfM Secretariat and the Medgrid and Dii consortia. In 2011 Dii and Medgrid had already agreed to cooperate more closely on the development and transmission of renewable energy sources from the desert.

What form this cooperation will take in practice remains to be seen. That cooperation between the initiatives is urgently needed is evident from the following example: in 2011 the UfM issued four invitations to tender for the establishment of an *MSP Master Plan* covering the legal and administrative foundations, the financing and promotional measures and the transmission and storage of desert power. As the Dii team was working on the same issues, cooperation between the UfM Secretariat and the Dii was well overdue.

Before power from the desert can actually begin to flow, a number of obstacles will need to be overcome. The projects must also benefit the countries in which the power stations are located, primarily in the use of the power generated, but also along the value chains of the power stations themselves. For that, however, the MENA countries will have to create political and legal conditions that attract rather than deter investors, as some do today. One requirement for this will be the reduction of the high fossil fuel subsidies. Nor is it possible at present to tell whether there is any clear prospect of long-term democratic development in the Arab countries; this is also true of Tunisia, Egypt and Libya. After all, a private investor is interested not only in the economy but also in whether local partners can give any guarantee that contractual conditions will be observed over the relatively long duration of such projects.

In addition, concentrated solar power in particular must become cheaper through economies of scale, because it has technical advantages over photovoltaics. Moreover, high-voltage direct-current grids will have to be constructed between Europe and the MENA region, since the existing two lines between Spain and Morocco, with their total capacity of 1,400 MW, will be inadequate after the increase in power station capacities. Only with new high-voltage transmission lines will there be a Mediterranean power link from which all concerned can benefit.

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