

Moving the Desertec Concept Towards Sustainability

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The main goal of the Desertec project is to connect Europe with the Middle East and North Africa (MENA) through an integrated electricity grid. In its financial volume, geographical extent and potential impact, Desertec is unprecedented in history. The project raises both, great expectations and fears. While the European countries hope to cover soon a significant proportion of their energy demand through renewable energy sources, partly generated in the MENA, some of the countries here are keen to benefit in terms of investment, technology transfer and energy supply for their own region, disregarding concerns of a new form of energy colonialism.

In principle, Desertec has the potential to supply Europe with renewable and low-carbon energy sources and at the same time to contribute to sustainable development (SD) in the MENA region. In fact, it is a unique opportunity to overcome environmental, economic and social challenges driven by population growth and increasing energy demand in a holistic approach that combines several security dimensions within a framework of North-South cooperation. However, as PricewaterhouseCoopers recently noted (PWC 2010), it is still unclear as to whether the concept can actually deliver sustainable development and especially whether the local population of the MENA region will see its benefits.

Framework for sustainability standards

One possible way to successfully implement the Desertec concept in a sustainable way is to develop and establish sustainability standards with Principles, Criteria and Indicators (PC&I) frameworks which then could be certified by an independent institution or authority. PC&I frameworks are defined as a thematic and hierarchic list of principles and criteria with corresponding, measurable indicators. This universal and versatile tool is used in many different applications (such as eco-certification and policy-evaluation) and at both the regional and national level (Van Cauwenbergh et al. 2007). Frameworks in that context can help to structure knowledge regarding a specific matter by transforming data into information. Since it is unlikely to find one common framework for different sectors and issues, it is necessary to develop specific frameworks for certain purposes (Lyytimäki and Rosenström 2008). A hierarchical framework is useful to break down the final goal (“sustainability vision”) into parameters that can be successively assessed and managed (Lammerts van Bueren and Blom 1996). Furthermore, a hierarchical framework can help to group sets of information which can be used for the evaluation of SD (Kondyli, in press).

Van Cauwenbergh et al. (2007) define *principles* as the first hierarchical level and as general conditions for achieving the final goal of sustainability. Sustainability itself is conceived as the classical three-pillar model, which represents an environmental, economic and social dimension. Furthermore, they pointed out that principles should be formulated as general concepts to be achieved. The second hierarchical level consists of *criteria*, which are more specific and concrete than principles. Criteria “[...] essentially indicate how the sustainability principles can be achieved” (Haywood and de Wet 2009). As they are related to a state of the system, one can link them easier to the third hierarchical level, which is formed by *indicators*. Indicators “[...] function by simplifying complex phenomena and information into quantifiable measures that can be readily communicated” (Khalifa and Connelly 2009). Also, they are used to determine compliance with a certain criterion and should show a representative picture of all sustainability aspects of a system (Van Cauwenbergh et al. 2007). As descriptive tools, indicators can also measure changes of criteria over a certain time period (Worrall et al. 2009) and thereby expose developments towards or away from sustainability (Huge et al. 2009). Indicators have been tested in many different

fields and became a key element of the sustainable development debate (Gasparatos et al. 2008). However, the development of suitable indicators is difficult as a balance between complexity and usability needs to be found. Few, aggregated indicators may be easy to use (e.g. for decision makers) but can be insufficient and inaccurate for the evaluation of complex issues (Worral et al. 2009). The fourth and lowest hierarchical level, as defined by Van Cauwenbergh et al. (2007), consists of *reference values* which describe a desired level of sustainability for each indicator. Reference values can be subdivided into absolute reference values that can be threshold values (expressing maximum or minimum levels of acceptable values) or target values (identifying desirable states), and relative reference values that can be used to compare values between different sectors, regional averages or different points in time.

Sustainability standards and frameworks have been used in different sectors and for different issues, such as, in the forestry sector, the biofuel sector, the mining sector and in the context of the Clean Development Mechanism (CDM). The CDM has the dual aim of achieving SD in developing countries and to find the most cost-effective way of reducing greenhouse gas emissions in developed countries (Olsen and Fenhann 2008). To fulfill this goal, a wide range of options is conceivable, which also includes renewable energy projects. In that sense, problems that occurred during the implementation of the CDM could help to identify possible challenges for the Desertec concept. So far, the contribution of CDM to local SD in developing countries has been highly limited as it hardly accomplished any technology transfer, induced only low capital investment and promoted almost no additional employment (Nussbaumer 2009; Sutter and Parreno 2007; Olsen 2007). Reasons for this failure are, among others, the difficulty of defining SD (Boyd et al. 2009), finding meaningful criteria for SD and translating them into measurable indicators, especially at the local level (Huge et al. 2009). Also, the assessment of the contribution made to SD is left to the Designated National Authority (DNA) of the host country (Nussbaumer 2009). This could lead to a “race to the bottom” (Sutter 2003) as a host country may aim for minimum SD requirements to attract foreign investments. Further, the experience with the CDM showed that a) it is difficult to translate the broad concept of sustainability into useful and specific criteria and indicators, especially at the local level; b) stakeholder involvement is important during the process of developing PC&I and their implementation and c) it is problematic to leave the full evaluation of the SD goals to the host country. These findings need to be taken into account when developing a PC&I framework for the Desertec concept:

Possible sustainability criteria for the Desertec concept

A first step towards a sustainability framework for the Desertec concept has been taken in a study, which was done in cooperation with the research group Climate Change and Security (CLISEC) at Hamburg University, Germany (Klawitter 2010). The study is based on literature research and semi-structured interviews with experts from different fields such as the renewable energy industry, science and research as well as from the policy sector and non-governmental organizations (NGOs). The study identifies both benefits and risks associated with the implementation of the Desertec concept and presents first ideas for sustainability criteria. According to the study the benefits for the target countries can be summarized by the following list:

- creation of jobs that are necessary to build components for power plants and to operate power plants;
- know-how, technology and investment that is transferred (from Europe) or acquired to build and operate power plants;
- build-up of production capacities and necessary infrastructure;
- supply of renewable electricity to the (urban and rural) population of the target countries;
- enhancement of the electricity grid in the MENA region;

- desalination of water, based on renewable energy sources; and
- overall economic growth in the target countries.

Risks could arise if the Desertec concept is implemented without paying attention to (a) the water usage of CSP (Concentrated Solar Power) plants, (b) the allocation of electricity between the electricity producing and receiving country, and (c) if participation or access rights are neglected.

As energy and resource supply are also security issues, a negligence of the aforementioned points could, in the worst case, affect human and international security on various geographical scales. On the local scale, the water needed for the cooling of the CSP plants could aggravate the already critical water situation in some parts of the MENA region. This in turn could contribute to existing localized conflicts over water and land use (see Schilling et al. 2010). The distribution of water could also become an issue of international security as Link et al. (2010) show for the riparian states of the Nile River. Desertec could even play a role in interregional conflict if several North African countries perceive the project as a vehicle of energy exploitation by European industrialized countries. Vice versa, the energy producing countries could use Desertec to threaten the energy supply of the receiving countries in Europe. Similar geopolitical levers have for instance been applied by Russia, which stopped its gas supply to Europe in 2009 (Deutsche Welle 2009). On the other hand, by reasonably integrating the desalinization option the issues of water security and energy security could be mutually beneficial. Furthermore, the mutual dependence between industrialized and developing countries could serve as a driver for building a cross-Mediterranean security partnership between Europe and Africa (Brauch 2010), which has been described as one of the arguments for the Desertec concept.

Taking these and other concerns into account, the sustainability criteria as well as specific indicators and reference values should address the following points:

- water usage of a CSP plant;
- material flow needed to build a power plant;
- a limit of electricity that is transferred to Europe;
- technology transfer, investment and employment aspects;
- social, ecologic and economic criteria;
- participation, educational, ownership and justice aspects;
- local suitable criteria, which can be gradually adjusted according to the local progress;
- security issues, conflict resolution, communication and regional governance.

Approaches for developing sustainability criteria include the orientation to human, process and participation rights of local population; the development of criteria modules; the development of process or procedural criteria and the creation of a process/space for communication such as stakeholder dialogues.

In summary, sustainability criteria for the Desertec concept have to fulfill two central goals. First, the criteria need to ensure that generated benefits actually reach the local population within the target countries. Second, implemented sustainability means to prevent risks of social inequality before they unfold. This concerns an adequate distribution of generated energy between production and target country as well as a sound examination of the water usage for CSP plants and the consideration of land use rights. While sustainability criteria from other purposes such as the evaluation of industrial processes (see Labuschagne et al. 2005) or the CDM (see Sutter 2003; Brent et al. 2005; Olsen and Fenhann 2008; Alexeew et al. 2010), could serve as a starting point for the Desertec concept. However, the existing catalogues for sustainability criteria are

unsatisfactory for the Desertec concept because they do not address its specific “needs”. Sustainability criteria should rather take into account the environmental, economic and social dimensions of sustainability. Stakeholders from both southern and northern parts of the cooperation should agree on a common sustainability vision which first defines benefits and deliverables. In order to achieve these, the stakeholders should then negotiate region and country specific sustainability criteria. This approach would promote a participatory process and hence increase the chances for implementation.

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