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Concentrating Solar Power's potential for Europe

A recent study has highlighted the potential of one form of solar power, Concentrating Solar Power (CSP), to make a significant contribution to meeting future electricity demands from renewable sources in Europe.

The EU is committed to reducing greenhouse gas (GHG) emissions by 20% by 2020, and by 80-95% by 2050, compared with 1990 levels. In addition, the share of renewable energy in the energy mix should reach 20% by 2020. The electricity sector is required to achieve zero GHG emissions by 2050.

This study examined the role that CSP could play in helping the EU meet its GHG reduction targets and increase the share of renewable energy in the European electricity grid by 2050. CSP is a reliable, renewable technology, which captures the sun's energy to produce electricity. Using curved mirrors or lenses, sunlight arriving at the Earth's surface is concentrated to 25-3000 times the intensity of natural sunlight. There are different configurations of CSP, but typically the captured energy heats water, which drives a steam-turbine generator to produce electricity.

Importantly, the technology allows heat to be stored and then released to produce electricity at times when the sun is not shining. This overcomes the intermittent nature of electricity generation common to many renewable technologies, such as wind power.

Southern Mediterranean countries and countries in the Middle East and North Africa (the MENA region) with high levels of sunshine have tremendous potential to produce clean energy from the sun. Being close to Europe, the MENA region is well placed to export electricity to the European grid and to benefit locally from renewable supplies of energy, the development of skills and the creation of jobs. However, the degree to which CSP is developed in southern Europe and the MENA region will be influenced by a number of factors. These include:

1) **Costs**. The costs of CSP generation need to be reduced to allow the technology to compete with fossil fuels and other renewables technologies. Current costs of electricity from CSP plants are 2-3 times higher than the cost of electricity from fossil-fuelled sources without carbon capture and storage. It is anticipated that CSP could be cost-competitive with fossil-fuelled power between 2020 and 2030. Although CSP plants worldwide produced 1.3 GW (gigawatts) of power in 2011, and worldwide plants with a capacity of 2.3 GW are under construction, incentives and subsidies are essential to enable further research and development, construction of more demonstration plants and continued commercialisation of the technology.
2) **Location.** Physical constraints, such as high water demand, will need to be overcome, particularly as plants are typically located in dry regions. Alternative dry cooling systems[1] should be further developed. In addition, issues around land ownership, planning permissions and the availability of skilled labour could slow development in some areas.
3) **Grid infrastructure.** New grid connections between Europe and the MENA region will need to be built and transmission and distribution systems in Europe upgraded, to enable incorporation of a larger share of renewable energy sources.
4) **Security of energy supply**. CSP located in southern Europe would increase Europe's energy security by cutting reliance on imported fossil fuels. However, there could be risks associated with importing electricity from the MENA region if energy supplies are disrupted for any reason.

1. Current CSP technologies rely on water cooling towers. Dry cooling systems refers to technologies that use alternatives to water, such as air cooling. See for example the FP7 funded MACCSOL project: http://www.drycooledcsp.eu/lack-of-water.aspx.

Source: European Academies Science Advisory Council (EASAC) (2011) *Concentrating solar power: its potential contribution to a sustainable energy future*. Halle: European Academies Science Advisory Council. Available to download from: www.easac.eu/home/reports-and-statements/detail-view/article//concentratin.html

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