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Build a Supergrid

With so much renewable energy available at falling prices, we come to the next great challenge: the need to expand the grid to accommodate the new sources of power.

Supergrid Europe/Middle East

The vision of a renewable energy supergrid has emerged most clearly in Europe, which has enormous solar potential in Spain, North Africa and the Middle East; enormous wind potential in Egypt, Morocco and offshore from Ireland to the Baltic Sea; enormous geothermal potential in Spain, Italy, Germany and Turkey; and enormous hydro potential in Norway that can also be used for storage.

Two versions of the supergrid have emerged, both using high-voltage DC (HVDC) lines, which lose three times less energy over long distances than AC, cost less and can transmit power both ways.² Superconducting cables that can conduct large quantities of electricity with virtually no line losses may be practical for local distribution.

The Trans-Mediterranean Renewable Energy Cooperation (TREC) has proposed a land-based network, to bring North Africa's solar potential to

If the political framework is put into place now, we have the technical abilities to build such a super grid within twenty years. This would not cause any noteworthy economic problems, we just need to commit to this big long-term strategy.

- Gregor Czisch, University of Kassel, Germany¹

Europe, while the Irish wind company Airtricity and the Swiss engineering giant ABB have proposed an undersea network, bringing the enormous offshore wind energy to land.

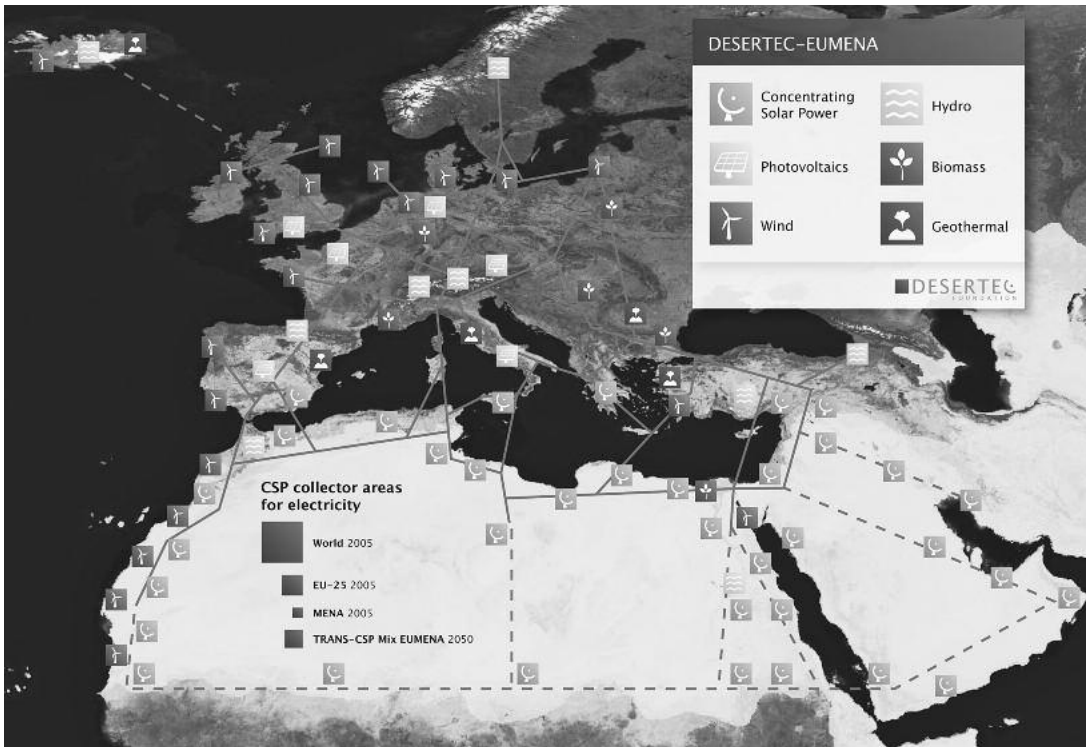
The two proposals have been merged by Gregor Czisch, an energy systems modeling expert at the University of Kassel, Germany. Including the cost of new power lines, he estimates that the project would cost about \$80 billion and deliver energy to Europeans for 7.3 cents/kWh, meeting the energy needs of 1.1 billion people in 50 countries with 100% renewable electricity.³ It would eliminate Europe's annual 1.25 Gt of CO₂ emissions from electricity generation and enable all electric transport to be CO₂ free.

The merit of this is that when you combine sun, wind, hydro and geothermal in a large, interconnected grid, the problems of baseload power and power storage can be handled by the variety of sources available. The challenges are mostly political, needing support from the 27-member European Union and the North African nations and overcome the power of the coal and gas lobbies, but the process is already underway.

Supergrid North America

In North America, solar thermal, wind and geothermal could each provide 100% of North America's power needs, so linking the renewable resource areas by coastal and overland HVDC power lines makes sense. The Western Renewable Energy Zones project, led by the Western Governors' Association, is mapping renewable energy zones in the US and Canada, to facilitate grid planning and permitting. The regulatory and jurisdictional

- Airtricity Supergrid: tinyurl.com/5t7be8
- Global Energy Network Institute: geni.org
- HVDC Cables: abb.com/hvdc
- Supergrid for Renewables: transnational-renewables.org
- Trans-Mediterranean Renewable Energy Cooperation: desertec.org
- TREC-UK: trec-uk.org.uk



difficulties that have troubled previous attempts to build a new grid might be lessened by the scale of the vision, which provides a reliable source of renewable power that will never run out. A single publicly owned grid, financed by a small wires charge on every utility bill, would make the most sense, similar to the publicly owned national highway system. The cost in the US has been estimated at \$400 billion over ten years.⁴

Supergrid Germany

On a smaller scale, scientists at the University of Kassel have demonstrated that Germany could provide 100% of its energy from renewables by linking 10,000 localized biogas, wind, solar and hydropower plants. When combined, these smaller decentralized grids could meet the needs of the nation-wide fluctuating grid, using biogas and geothermal energy to provide baseload power.⁵

A possible sustainable supergrid for Europe, the Middle East and North Africa.

Actions

- Build a clear picture of a unified, national supergrid, and analyze its advantages, costs and obstacles.
- Build political support for a single, publicly owned supergrid with smart grid capacities into it, enabling energy efficiency functions to operate.

The implications of this big-picture thinking are enormous. In every region of the world, climate activists, renewable energy companies, utilities and political leaders need to work together to realize the vision.