

Study on future European grid in 2030 and 2050 commissioned by Greenpeace

Brussels, Belgium, January 18, 2011: Commissioned by Greenpeace International, energynautics has prepared a study on the future European electricity grid in 2030 and 2050 to assess the infrastructure required to support up to 100% penetration of renewable energies as predicted by the latest Energy [R]evolution scenario. The study discusses the role of demand-side management, storage, and optimization of renewables production in smoothly integrating renewable energies as well as maintaining a secure supply of electricity.

This study follows the 2009 analysis performed by energynautics and Greenpeace International titled 'Renewables 24/7 Infrastructure to Save the Climate' which looked at the feasibility of integration over 90% share of renewable energies in the European power system for 2050, based on Greenpeace's Energy [R]evolution scenario. This study investigates in more detail the strategic options for reaching this outcome in 2050 and how to optimize the use of all the installed renewable energy sources. The revised Energy [R]evolution for 2010 now forecasts 97% renewable energy sources for the European grid in 2050. This new study was commissioned to investigate various operating scenarios in the year 2030 and 2050 and to develop a methodology for optimizing the use of installed renewable energy sources in our simulations.

With large quantities of renewable energy sources in excess of 60% of total installed capacity, it was found that strong reinforcements will be required in the current European grid for supply to meet demand, even under standard operating conditions. Particularly important are reinforcements to transfer large quantities of mainly solar energy from southern countries such as Spain, Portugal, and Italy to the load centers in Central Europe. Equally important is the realization of the North Sea offshore grid and its connections to the load centers in mainland Europe.

Another important finding is that the most effective method to optimize the use of installed renewables is to introduce a European-wide renewable energy prioritization in the generation dispatch process. Using this method the use of renewables can be improved from 88% to 96%. Demand-side management and the inclusion of storage devices in the electricity grid aids in the smooth integration of renewable energies. This becomes more evident as the percentage of renewables become closer to 100% in the energy mix, and especially when transmission capacity is constrained. On the other hand if coal and nuclear power plants remain in operation with a similar output pattern as that of today, rather than being phased out as assumed in the Energy [R]evolution scenario, it will displace electricity production from renewable energies.

In assessing the grid far into the future up to 2050, finding the optimal grid structure becomes more complicated, as it is a combination of grid upgrades, generation capacity expansion, available energy imports from outside of Europe, optimization of renewable energy sources, and better management of demand. It is imperative that further studies develop more tools to better integrate economic variables such as generation costs to achieve an economically optimal grid.

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