

The great Energy transformation

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The worlds present primary energy consumption is today equivalent to the one of an engine with a power of 15 TWatt. Over 80% of this energy is of fossil origin. The future predictions indicate that consumption will increase, leading to as much as of the order of 30-35 TWatt by 2050. Although it may become harder to extract Oil as easily as in the past, other forms of accumulated fossils first of all Coal are extremely abundant on the planet, of the order of about 5000 Gton to maybe 20000 Gton. Fossils offer therefore the possibility to continue by themselves to run the industrial progress with a cheap and abundant energy for many centuries to come at several times the present consumption.

The realization of the risks related to Climate Change has generated in the EU the political determination to aim for a reduction of at least half the present emissions from fossils, again by 2050, namely to 6 TWatt, leading to a need for 24-29 TWatt of carbon free supplies, and maybe, if at all possible, of much more.

Which are the options for such a major transformation?

In order to produce 12 TWatt (1/2 of the carbon free energy) with ordinary nuclear energy, we would need to build about 5000 nuclear reactors each of 3 $GW_{thermal}$ (1 $GW_{electric}$) slightly less than one new 1 GWatt reactor every two days. A serious evaluation of the costs and critical issues related to the problems of proliferation and the security of long-term waste disposal should be carried out when facing these numbers in a long-time perspective. If we want to produce the remaining 12 TWatt with the traditional renewables we are confronted with similarly unrealistic numbers.

The image is clear: the energy needs of our planet by 2050 are much too large to be achieved by a mix of the presently indicated sources.

There is, however, an option which can, at least technically, provide the required world-wide energetic deficit of 10 to 20 TWatt. The global 15 TWatt of todays primary energy corresponds to only about 0.1 percent of the solar energy of all sunny, desertic areas in the world, namely about 200 x 200 km^2 ! This option deserves to be properly understood and supported by the political and financial stakeholders: in particular Concentrating Solar Power Plants (CSP) have the true potential to harness a major fraction of energy with an appropriate energy storage by the targeted date of 2050.

This is not science fiction, but a concrete, revolutionary solution which deserves to be thoroughly explored and quickly developed for the benefit of Mankind.