Solar Power Implications of our Climate Crisis

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The European Photovoltaic Industry Association just published a new study together with Greenpeace called Solar Generation 6. They commissioned updated modelling into how much solar power the world could reasonably see in the world by 2030: „The model shows that with a Paradigm Shift scenario towards solar power, where real technical and commercial capacity is backed-up by strong political will, photovoltaics could provide: 688 GW by 2020 and 1,845 GW by 2030“ [1]. By 2050 the model assumes that the electricity demand would top 4,5 TW (39,360 TWh/a). This demand is based on the Greenpeace/EREC *Energy [R]evolution* report of 2007 [2] and takes into account extensive energy efficiency measures. Those measures should ensure that the consumption of electricity is significantly lower in 2030 than today. In 2050 the demand should reach 3,6 TW (31,795 TWh/a); of these, 0.77 TW (6,747 TWh/a) could be provided by PV following the socalled Paradigm Shift Szenario, the study concludes.

This view is by far too optimistic what the demand side is concerned and therefore also much too conservative in terms of the requirements for solar electricity to contribute to any improvement of the worlds climate conditions.

In the talk a szenario describing the further development of the world's power demand will be discussed in detail taken from a 1998-paper by Hoffert et al. [3] summarizing modelling 1992-data of the IPCC based on data until 1990 [4]. In this paper the *Energy Implications of Future Atmospheric Stabilization of CO_2 Content* (so the title) are calculated. Comparing the data of the last 20 years used in this paper with the actual data it is obvious that the demand side is estimated overly optimistic. Further this paper provides estimates of the total amount of power needed world-wide in 2050 to be produced CO_2-free in order to keep the worlds CO_2-level within certain limits.

According to these data the world power demand in 2050 will be at least 30 TW (the 2008 level having been estimated to about 15 TW [5]). All these will have to be produced CO_2-free in order to keep the atmospheric CO_2-concentration at around todays level [6] of 390 ppm. If only all the power we use today will until 2050 be produced CO_2-free the atmospheric CO_2 level will at least double. To reach far above 750 ppm, a level which in all mankinds history has never exceeded 300 ppm.

It will be shown that this huge amount of power needed from CO_2–free sources can be provided only by direct use of solar and partly by wind energy.

Technically there would not really be a problem to achieve this. Land area is easily available, the technologies are developed and proven. However, a steady annual growth of production and installation of more than 20 % will be needed and kept going for the next decades which currently can be achieved only by political measures such as the socalled feed-in tariffs. As soon as possible

low-cost modules need to become available based on abundant materials made available processed without too high energy input.

Our estimates concerning crystalsol's CZTS solar modules shows that today's module costs of around 3 US-$ (Fig. 1) can be reduced again by up to a factor of ten.

However, in order to really have an impact on our climate problem much larger amounts are needed in 2050 than those taken into consideration in the above mentioaned EPIA/Greenpeace study. The aim then can't be to contribute to electricity production which decreases due to energy saving. The aim has to be to replace fossil fuels in a scale more than 20 times larger than the numbers given above. This will probably Since in addition to poviding just the needed amount of power also the energy lost for storing chemical produced by electricity and their conversion into required power need to be taken into account.

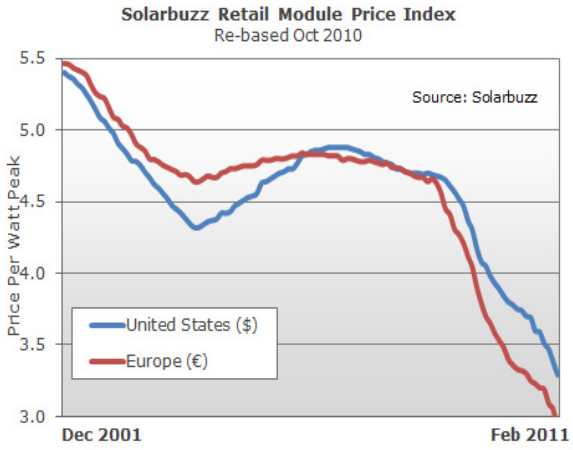

Fig. 1 PV module price development [7]

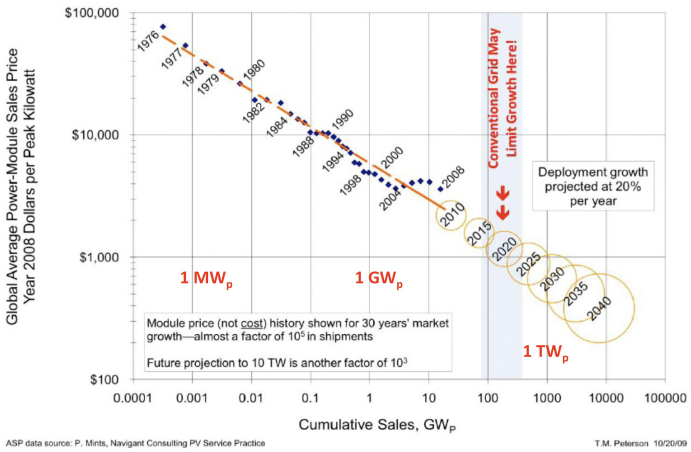

Fig. 2: PV learning curve extrapolated to 2040 [8]

If an annual growth of 20 to 30 %/a for PV continues the next 40 years it can grow from 2 GW_e in 2007 to 10 - 30 TW in 2050 !

References

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