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PV as a major contributor to the 100% renewably powered world

Only a few years ago it was difficult to explain a world, powered 100% by renewables only – not only electricity but all secondary energy needs, including transportation, heating, and cooling as well as industry needs. The major reason for this was that the production cost for electricity from wind and solar was – although characterized as most elegant - much too high and electricity storage not seen as an option at all. Only with large centralized solar concentrating systems together with hydrogen production (hydrogen economy) or a world-wide distribution system (using high voltage DC current grids) a renewably powered world was seen potentially possible in the very long run. With the rapidly declining cost per produced kWh from PV and wind, together with the push from the automotive sector for Li-ion batteries which also results in a quick reduction of electricity storage cost, there is now – including IoT (Internet of Things) - a new horizon open how to serve man-kinds energy needs rather quickly with renewables only. After analyzing today's energy needs and how they are served with primary (fossil, nuclear and renewables with ~150 PWh, P=10~15) and secondary energy (electricity, fuel, (process)-heat with ~90 PWh), the future demand for secondary energy is analyzed. Today's energy inequity will be changed to a situation where each person on the globe will have a similar energy usage per year, comparable to the living standard today in the industrialized world. An increase in energy efficiency by a factor of 3 will be explained. The global population for the future world is estimated to be ~10 billion according to UN statistics. With this, the future secondary energy offering has to be ~150 PWh per year. The portfolio of renewable energy technologies is discussed and their respective share analysed. PV is seen as one of the prominent technologies in the future, especially when comparing their production cost – more precise: Levelized Cost of Energy - compared with clean fossil and new nuclear power plants, even when including the necessary electricity storage cost. The crucial role for new materials and processes for future solar cells and modules together with the parallel development of storage devices and fuel cells is emphasized. The transition towards 100% renewable energy makes most sense economically, socially and from an energy security point of view. This and the timely coincidence of several break-through technologies will trigger the transformation towards a 100% renewably powered world quicker as many expect also on a global level.

Biography

Winfried Hoffmann studied solid state physics, diploma in superconductivity and finished with a PhD-thesis in biophysics (laser flash photolysis). He started his industrial career in 1979 at NUKEM/RWE in the area of CdS/Cu₂S – Thin-Film solar cells and modules, amorphous Silicon as well as Dye Solar Cells. In the mid-1980s and 90s, a pilot production for MIS-inversion layer c-Si solar cells and large area modules was put in operation. From 1994 he served as Managing Director to "Angewandte Solarenergie - ASE GmbH" (JV DASA and RWE). In the same year the acquisition of 100 % shares of Mobil Solar as a subsidiary company was done with special focus on their developed ribbon EFG technology. In the late 90s the company was renamed RWE Solar and was one of the worldwide 5 biggest production companies. The first inline PE-CVD machines for SiN were developed and built in these years. In 2007 he joined Applied Materials to become Chief Technology Officer and Vice President of the Solar Business Group and member of the Management Board of the German-based Applied Materials GmbH. For many years he was a member in the supervisory board of listed companies (SMA Solar Technology AG and SolarFabrik AG) and was also active in numerous Research Institutes (FhG-ISE, ISFH, Helmholtz Center Berlin, ZSW, and DLR). He served many years in solar associations in order to convince politicians to support the PV market development (German BSW Solar and European EPIA, now SolarPower Europe). Since 2011 he gives lectures about Renewable Energy at the universities Konstanz and Freiburg. In 2012 he received the John Bonda prize from EPIA and the prestigious "European Becquerel Prize for Outstanding Merits in Photovoltaics" from the European Commission. The World Renewable Energy Network (WREN) awarded him as "Solar Pioneer" in 2014.

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