Conclusions

In this book the authors have looked at PV from a variety of viewpoints. It can be seen that the overriding vision is for PV to become a major global supplier of electricity in the twenty-first century at affordable cost cheaper than fossil fuels within the context of potentially catastrophic climate change, which was largely triggered by the industrial revolution and the use of fossil fuels, emphasizing the ease of use and installation and its almost pollution-free generation.

Examples in the book look at both macro megawatt power stations and micro stand-alone generation systems, and an historical overview is given. One of the remarkable achievements in the development of PV has been the considerable improvement in efficiency accompanied by greatly reduced costs. In 1977 the cost of one Watt of electricity produced by PV was US$76.67 which has fallen to US$0.36 per Watt today. While in 1960 the efficiency of a crystalline silicon cell was 6 % and today is more than 25 %.

Because one of the major applications for PV panels is on roofs and facades, PV should also be considered as a building material in itself; architects and the building industry are urged to integrate PV into their designs rather than making PV a haphazard add-on.

As an example of the use of PV globally in 2014 crystalline silicon cells continue to have a larger market share compared to that of thin films: 43.1 GW of crystalline silicon cells while thin films were 4.4 GW. In the same year Germany, China, Japan, North America, and Italy continue to dominate the field in PV installation. In terms of efficiency under normal operating lab scale test conditions, most types of cell have exceeded 21 %, while amorphous silicon has reached over 13 %.

The history of PV is considered as well as looking at one exemplar of a long-term stand-alone solar house. On the other hand power plant layout is discussed taking into consideration load requirement and management of load shifting, load adoption, and appropriate market design.

New concepts in cell efficiency and production from hybrid photovoltaic-thermal cells (PV/T) and bifocal cells are described and it is envisaged they will produce up to five times the voltage of normal cells and hence more energy.

A. Sayigh (ed.), *Photovoltaics for Sustainable Electricity and Buildings*,
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A full analysis is given of solar radiation applications for PV use as well as concise notes for teaching the mathematical concepts associated with PV theory and practice.

The future of PV continues to be one of intense research and development where thin films will overtake crystalline silicon in cost and efficiency. It is foreseen that the role of PV in the generation of electricity will overtake other forms of renewable energy and that 50 % of all new buildings will incorporate PV in their design while the debate over the use of nuclear fuel continues despite doubts as to its long-term economic and environmental viability.

Index

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