

Off-grid PV electricity supply is by no means restricted to the rural areas of developing countries. Mountain lodges, remotely situated farms, holiday houses and so on represent a considerable market for PV energy supply also in industrialised countries. Such installations may be connected to the central grid as well. In these cases photovoltaics serves as a back-up electricity supply in case of line failure or unreliable electricity supply from the utility side.

2.3.1 In Summary

Photovoltaics is an excellently suitable solution for low power electricity supply in rural and remote areas in developing countries. Photovoltaics have a similar but smaller market in industrialised countries as well. In total, one-third of today's world population could benefit from off-grid PV installations. System electronics and storage batteries have to be further developed in order to address the market in an optimal way. Financial engineering, social integration of the new technology, training and the installation of an appropriate trade and industrial infrastructure are the most important prerequisites for a successful worldwide implementation of off-grid PV electricity supplies.

2.4 POWER SUPPLY FOR INDUSTRIAL SYSTEMS AND PRODUCTS – THE PROFESSIONAL LOW POWER DIMENSION

This segment of PV application comprises the electricity supply of consumer products, professional industrial systems and remote low power systems. In this area, photovoltaics substitutes or complements the traditional power supply via batteries or small fossil fuel motor generator sets. The average power demand, especially in the area of consumer products and professional systems, lies generally in the power range of several milliwatts to 100 W. On the other hand, a mass market of billions of units may be envisaged gaining market volumes in the 10-GW range in several decades [8]. The drivers of these markets are strong technological innovations in the field of telecommunication, dispersed electronic intelligence and remote sensors/actuators and so on (Figures 2.12. and 2.13).

Such equipments need small amounts of electric energy for operation and standby. Even if the electric grid is ready-to-hand, wireless and maintenance-free systems are generally preferred by the users. Maintenance-free here means that costly primary batteries with limited energy content can be avoided. In many cases photovoltaics may enter this field of energy supply (1) if the devices are at least temporarily under illumination and (2) if suitable storage devices are applicable. Thus the availability of small and efficient storages (rechargeable batteries, capacitors) is a prerequisite for a widespread application of PV cells in this area.

In this market segment there is a wide range of specific requirements for PV cells. Communication equipment like mobile phones being characterised by low surface area and relatively high energy demand call for high efficiency (e.g. 20%) solar cells; wrist watches on the other hand can be powered by PV cells having only some percentage of efficiency. PV car roofs need aesthetically optimised precision products, while powering a last mile repeater for telecommunication links may be done with small standard PV