PV systems can be designed and built in the stand-alone mode, in which photovoltaics is the only source of electricity, or as hybrids, in which photovoltaics is combined with other sources of electricity, such as wind generators, small hydropower stations or combustion generators. PV hybrids are normally built to take advantage of other locally available renewable energy resources while at the same time improving the economics of the application. Photovoltaics can be installed in the so-called "disperse" mode, in which each individual application carries a full PV system as its source of electricity (just as it used to be in the very early stages of the electrification process in the late 1800s). Larger PV systems can be built to feed isolated electric minigrids, as is done today with diesel gen-sets in many parts of the world. Since PV panels produce relatively low-voltage direct-current electricity, a minigrid system requires additional components, such as DC/AC inverters and step-up transformers, to yield the right characteristics of the electricity on the user's side of the grid. Hybrid systems are also more complex to integrate, since different types of electricity can be produced by the different generating units that are included in the system. Figure 23.2 shows a number of possible configurations of PV systems, for most of which practical examples can be shown.

Solar home systems (SHS) are perhaps the most popular of all the PV applications. An estimated 500 000 to 1 000 000 such systems have been installed in rural communities around the world [12]. Systems for basic lighting generally include one small, 10 to 40 W PV module and a small battery, enough for one to four points of light (normally compact fluorescent lamps). Larger, 50 to 100 W PV panels and batteries of around 100 Ah open the possibility of feeding other electric appliances, such as transistor radios, tape recorders and small TV sets. Even larger PV systems can support complete sets of domestic electric appliances, just as in any urban house, but the price of such systems is at present prohibitively expensive for a poor family. The smallest SHS are direct substitutes for dry cells and other ancient means of lighting a house, and a form of using electrochemical batteries without the need of sending them elsewhere for recharging.

Quality and efficacy of communal services can substantially be increased when relatively small amounts of electricity are available on site. This can be done by photovoltaics. Schools can be supplied with modern audiovisual means, educational television, and even the Internet, as shown by the project *aldea solar* in Honduras, supported by UNESCO, the Honduras Ministry of Education and the Council for Science and technology (COHCYT) of Honduras. In Mexico, over 13 000 PV powered telephones now link tens of thousands of people in remote communities with the rest of the world, through terrestrial PV powered transmitting stations and satellite links [13]. In Cuba, the Ministry of Health has implemented a system of rural clinics powered by photovoltaics, which has been operational for a number of years [14]. PV powered technologies to disinfect water have already been tested and field-demonstrated in countries of Africa and Latin America in a recent project financed by the European Commission [15]. A large number of PV water-pumping projects have been implemented around the world, and many examples of other PV powered communal services and applications can also be found (see for instance: [16–20]).

A large number of possibilities to apply photovoltaics for productive activities in rural areas of the developing countries can also be envisioned. Small irrigation, cattle watering, grain grinding, small handicrafts shops and other similar activities that require