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Helios Prototype in flight over lakebed during second battery-powered flight

Figure 17.33 Helios, an unmanned prototype aircraft for flights at 30 km of altitude

the PV generator and the battery, without need for any conversion or transformation of the supplied PV energy.

Unfortunately experience has shown that in stand-alone PV systems, the battery appears to be the "weakest point" of the system, since its lifetime expectancy is usually an order of magnitude lower than that of all the other PV system components, and thus 30% of the lifetime costs of solar off-grid systems or even more may be attributed to the storage. Although a variety of storage technologies are under development, the lead-acid battery still is, and will be for some years to come, the working horse for electricity supplies in remote areas.

Typically, the storage battery of a stand-alone PV system is dimensioned to ensure, if the solar irradiation is insufficient, that the envisaged loads can be powered for at least 3 to 4 days. The result of such typical dimensioning is that the daily depth of discharge of a PV battery is in the range of about 25 to 30% of its rated (10 h) capacity. Furthermore, the dimensioning of the PV generator may usually be assumed to cover the entire energy