and to check the general state of the battery. The set points of the charge controllers or the battery management should be checked. For a 48 V battery system with single cells, 30 to 60 min for the maintenance are necessary.

Figure 18.31 gives an example of the cost share of the battery in a PV battery system. The system is designed to supply power with 100% reliability at a location in Mexico. The left-side graphs show a system that was designed to minimise the initial investment costs under the given boundary conditions. The right-side graphs show the results of a minimisation of the lifetime costs. The calculation includes the initial investment costs, maintenance, repair and replacement of the components, capital costs and other operating costs. It can be seen from the graphs that the lifetime costs are 288% or 248% of the costs for the initial investment. Sizing of the system with respect to lifetime costs resulted, in this example, in an overall cost reduction of 14%. It is interesting to see that this was achieved by approximately 20% higher investments in the PV generator. This allows on one hand a reduction of battery size by approximately 25% and on the other hand the larger PV generator allows a more frequent complete charging of the battery and therefore a lifetime extension. This altogether resulted in a cost reduction for the battery of more than 40% and – as mentioned above – for the overall system of 14%.

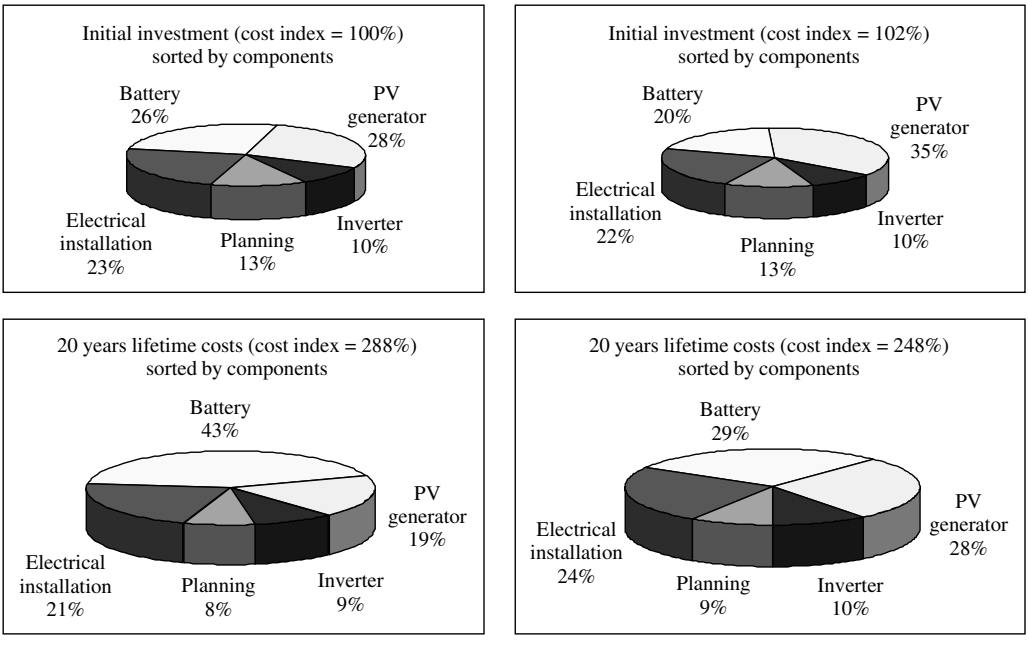

Figure 18.31 Comparison of costs for a PV battery system derived under different assumptions. Left-side graphs show the costs for the system optimised by initial investment costs, right-side graphs show the costs for a system optimised by lifetime costs. The overall costs for the initial investments (upper graphs) and the overall lifetime costs (lower graphs) calculated according to the annuity method are normalised to the initial investment costs for the system optimised by initial investment (cost index = 100%). Location, Mexico; annual power consumption, 1500 kWh; effective interest rate, 6%; lifetime of components: PVgenerator 20 years, electronic components 15 years, battery according to sizing and operating conditions, calculations and optimisation done with the simulation tool TALCO[42]