17.2.1.1 Consumer applications

Power systems for appliances and small devices in which the energy supply and demand occur simultaneously do not need an energy storage unit. Pocket Calculators, fans and electric letter balances are examples of such applications [2–4]. As one example of an appliance in the small power range, Figure 17.3 shows an electric balance.

When an electric display is used, these devices are normally powered by dry-cell batteries. As energy demand and photovoltaic energy supply are very well correlated in this application – reading the LCD-display is not possible without light – the system may be designed without any energy storage. Besides environmental aspects, one fact is often neglected – the cost per kWh supplied with dry cells is extremely high – for example, a 1000 mAh dry cell with nominal voltage of 1.5 V contains 1.5 Wh. Its cost of about 1 euro per unit means that the kilowatt hour stored in this way costs about 700 euro/kWh. Not relying on a storage battery means that the system reliability is higher, negative environmental effects are reduced and the comfort in using these systems is increased.

Another example is the fountains that can be found in many public parks, squares, cemeteries and zoos. Usually, the water is recirculated rather than being constantly replenished with fresh water. In general, just a few standard solar modules are sufficient to operate the circulation pump. As circulation during the night or overcast periods is not

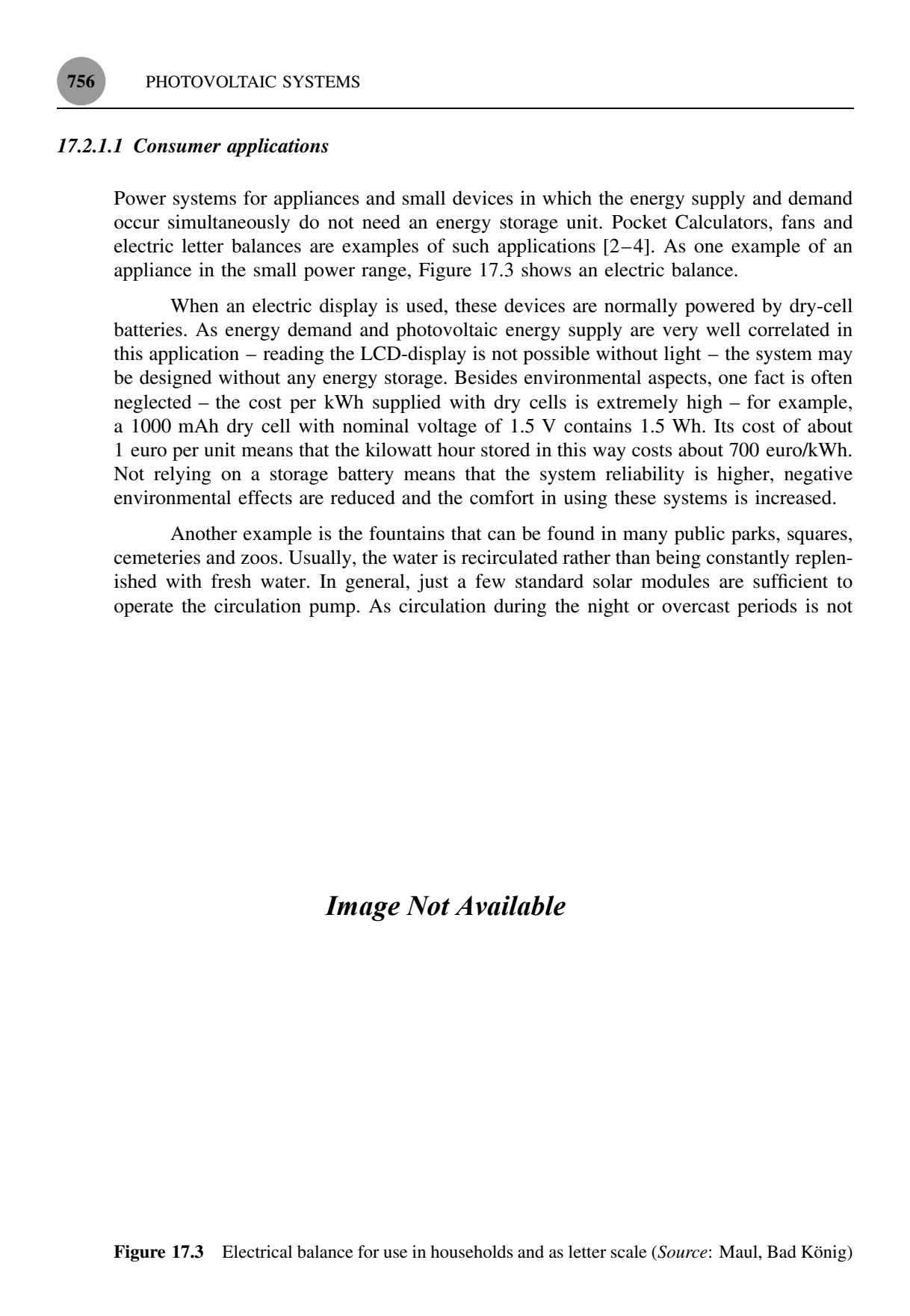

Figure 17.3 Electrical balance for use in households and as letter scale (*Source*: Maul, Bad König)