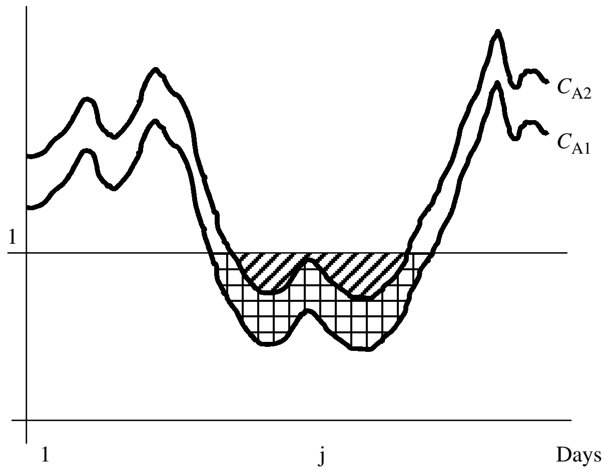

Figure 20.22 Time variation of the generated daily energy, relative to load, for two PV generators for which $C_{A1} < C_{A2}$. The shadowed areas represent the corresponding energy deficits to be covered by the storage device

In essence, any PV- sizing method involves four different steps:

- obtaining solar radiation site information,
- preparation of global horizontal daily irradiation sequences,
- transposition from horizontal to inclined radiation values,
- simulation of PVsystem behaviour, in order to quantify *LLP* corresponding to pairs of C_A and C_S values.

The first three steps have already been discussed in previous sections of this chapter. We will now deal with the last step, with the following assumptions: first, the daily energy consumption is constant all through the year; second, all the daily consumption occurs at night (i.e. after the energy generation time ends); and, third, the components of the PV system are ideal and can be linearly modelled. This is adequate for analysing the "pure" sizing problem, that is, the relation between C_A, C_S and *LLP*. Non-linearities and non-ideal effects (for example, battery efficiency) are better taken into account by the use of proper correction factors when translating C_A and C_S values into nominal PV array power and battery capacity. It is interesting to note that short-term (hourly) variations of demanded energy have no effect on *LLP* [64, 69], provided that $C_S > 2$, which is usually the case. The above- described assumption leads to particularly simple calculations. The state of charge, *SOC*, of the accumulator at sunset of day j is given by

$$SOC_j = \min\left\{SOC_{j-1} + \frac{C_A \cdot G_{dj}}{C_S \cdot \overline{G_d}} - \frac{1}{C_S}; 1\right\} \tag{20.81}$$

where G_{dj} is the total irradiation for day j, and

$$LLP = \frac{\sum_{1}^{N} E_{\text{LACK}}j}{N \cdot L} \tag{20.82}$$