As far as can be seen today, such reduction goals may – in a socially acceptable way – only be realised if renewable energy technologies are applied worldwide on a really large scale. For electricity production, this means above all the use of photovoltaics and to a lesser (but important) extent wind energy, biomass conversion and solar thermal power plants. Thus, the principal ecological dimension of photovoltaics is extremely high. The question arises of course whether we can activate this potential in due time. With respect to this, at least two sub-problems have to be addressed: (1) how fast can the industry produce the required large-area PV energy conversion systems and (2) is it possible to establish a strong long-lasting market-driving mechanism that conforms with today's ideas of a competitive market.

During the last few years, annual market growth rates and thus the increase in industrial PV production have been in the order of 15 to 30% (Figure 2.2). The main drivers behind this impressive growth are several governments and consumers who see an urgent need for a transformation of today's energy systems towards sustainability [5–7]. Financial-support mechanisms have been developed that include clear components of competition inside well-defined areas of energy supply technologies. The financial support is justified by the high potential of PV electricity and its ecologically benign character. On the other hand, such schemes have to be limited in time, which is especially important if the promoted markets evolve exponentially. Thus, the question arises whether grid-coupled PV electricity will become cost-effective within reasonable time frames. Figure 2.5 shows a cost projection of base-load, peak-load and photovoltaic electricity.

The assessment is based on an extrapolation of the prize experience curve given in Figure 2.3, a PV-market growth rate of 20%/annum and an increase of conventional electricity costs by 2% per year. Under these assumptions, a break even between peak load and

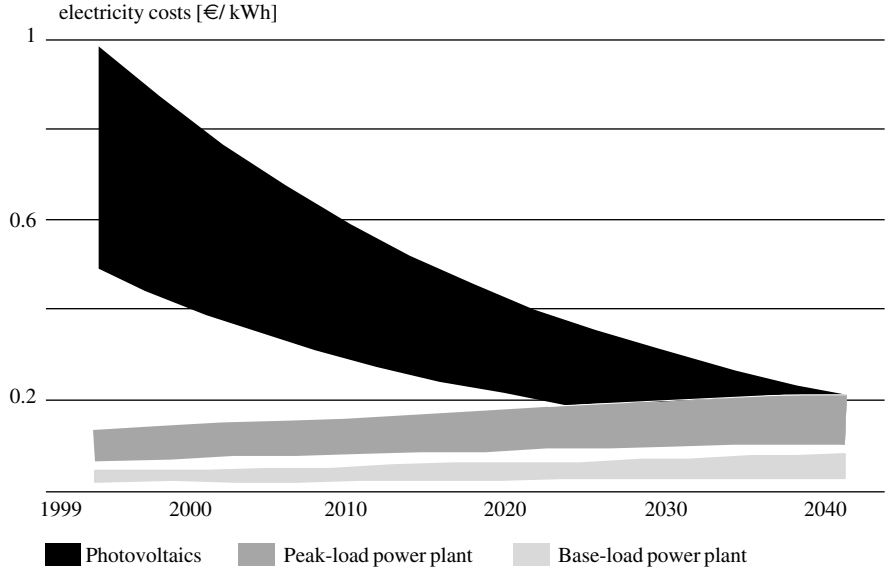

Figure 2.5 Cost projections for photovoltaic electricity. The upper boundary of photovoltaic costs reflects the meteorological situation of Germany, the lower boundary that of Southern Europe [8]