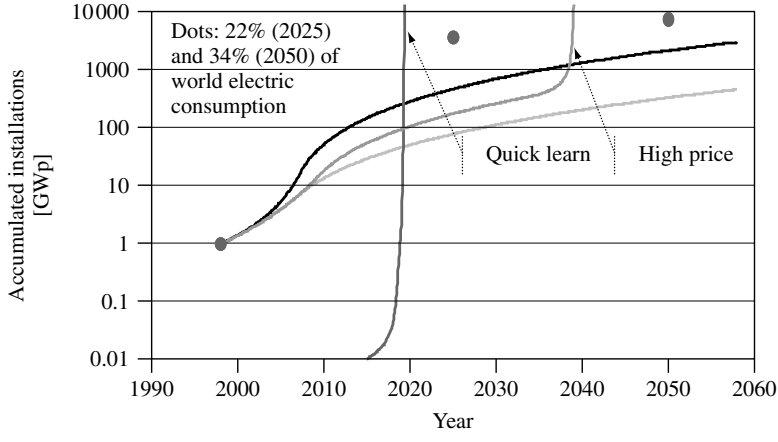


**Figure 1.7** Long-term forecast of cumulative installed peak PV power. The dashed area represents the expected cumulative installed capacity for a range of assumptions associated with the demand elasticity. PV prices (not shown) will not be competitive in the period shown unless the conventional electricity doubles in price (in constant dollars). However, photovoltaics will be competitive if some innovation develops and is commercialized with a "quick learn" experience factor like that of the microelectronic memories (0.32). Dots represent the level of electricity penetration to reach environmental goals (see text)

the goal for 2050 is to produce the 34% of the total world electricity production; by no means a niche market to be produced by a cottage industry!

It is observed that with the present low experience factor, the environmental goals are not achieved. Nevertheless, this forecast predicts that the PV industry will be very large by the middle of the century.

The curve labeled high price refers to the case where conventional electricity prices are doubled. In this case, photovoltaics will reach price competitiveness with the existing electricity before the middle of the century (the almost-vertical line means photovoltaics is cheaper than conventional electricity but realistic growth will occur more slowly). Perhaps a hidden but practical conclusion of this analysis is that support to the PV industry will result in an additional element of security in the supply of electricity. Energy security is of increasing interest for the public officials as well as for citizens.

The preceding cases correspond to the situation governed by a constant experience factor. No technological breakthrough is considered. What would be the situation if a breakthrough were produced? A breakthrough technology would be characterized by a higher experience factor and should be able to reduce costs by experience faster than present PV technology. The curve labeled quick learning in Figure 1.7 shows the case of a technology with the experience factor of the microelectronic memories. Note that in very few years (after real commercialization starts) it would be able to reach competition with conventional electricity.

However, note that this success is based on reaching a certain cumulative market (in this exercise 10 000 MW) despite the higher price of this technology at its early stage as compared to the competing PV technology. This is a commonly occurring situation and