



Figure 1.4 Public funding for R&D (triangles) compared to module (diamonds) and system (squares) sales. (This curve is drawn from the data of Eckhart *et al.* in Chapter 24, “Financing PV Growth”, in this book)

been stronger. This should be taken into account while making decisions about energy policy and public or private financing.

The critical question then is: Should the support be focused in R&D, or is PV technology already mature enough (as many claim) to focus on the cost reduction via the economy of scale permitted by the larger volume of production required by a subsidized market? This point will be discussed later in this chapter.

5. *Photovoltaics is polluting just like all high-technology or high-energy industries only with different toxic emissions:*

One of the most valuable characteristics of photovoltaics is its well-deserved image as an environmentally clean and “green” technology. This healthy image obviously results from the cleaner operation of a PV electricity generator compared to a fossil-fuel fired generator, but this must also extend to the manufacturing process itself as well as the recycling of discarded modules. Manufacturing of PV modules on a large scale requires the handling of large quantities of hazardous or potentially hazardous materials (e.g. heavy metals, reactive chemical solutions, toxic gases). Let it be stated at the beginning that the present Si-based PV technology which dominates the market has few environmental concerns and is considered totally safe to the public.

The PV industry is very aware of the value of its clean “green” image and has worked hard over the years to establish and maintain high standards of environmental responsibility [6, 7]. Conferences on PV Safety and Environmental Issues have been held since the late 1980s and their proceedings have been published [8, 9]; the PV Environmental Health Safety Assistance Center at Brookhaven National Laboratory in New York, USA provides worldwide leadership in risk analysis and safety recommendations for the PV industry [10].

Safe handling procedures for some of the materials and processes were already well established from the integrated circuit or glass coating industries. But in the case of unique materials and processes, safety procedures had to be developed by the PV industry. This is especially true of the thin-film technologies [11]. The PV industry recognized early that being proactive and designing safety into the process, from the