

issued by the International Electrochemical Commission (IEC) Technical Committee 82, and little attention is being given to the soft and organizational aspects of the problem dealt with in other works [25, 26].

## 23.3.4 Nontechnical Issues

### 23.3.4.1 *Initial cost*

It is common knowledge that for a commercial operation to be sustainable in the modern economy, a flow of goods has to be properly matched by a counter flow of money. Sunrays striking on the roofs of houses are free, but equipments to turn solar energy into electricity, and to transform this electricity into needed services, are not. PV manufacturing companies invest in factories and raw materials, pay wages to their workers and taxes to their governments and are obliged to deliver revenues to their shareholders. All expenses plus profits essentially set the base price of their products. In a second step, PV components from different companies are transported to specific points for systems integration. In turn, packaged systems are fed into the distribution channels for retailing and final installation where the end user wants them.

By the time a PV system is installed on the user's premises, its base price has increased a number of times. So, people need money to get their systems installed. Considering the low capacity of the peasants in rural areas to pay for goods, a set of important questions emerge when one considers photovoltaics as the solution to the rural electrification problem. Are people willing to pay for the system? How much can they afford to pay? What mechanisms can be instrumented to make systems more affordable? If people cannot pay, should they remain in darkness or should somebody come to their rescue? What roles can governments and development agencies play? And even when people can pay, should they bear the full system cost, even at this early stage of technology introduction when many companies are still building their infrastructure and learning how to manufacture, integrate and market the systems, so that their transactions costs are a lot higher than they should be? These are not trivial questions considering that, for the miracle of full-scale rural electrification to happen, around 300 000 million US\$ must, in principle, flow from the poorest regions of the world to the modern sector of society so that PV systems can flow in the opposite direction.

### 23.3.4.2 *Breaking the initial cost barrier*

Consequently, since solar energy, the fuel used by PV systems is free and systems are, at least theoretically, low maintenance and long lasting, system cost is commonly seen as the main stumbling block for the introduction of photovoltaics. A number of schemes have been tried over the past decade in search of an effective way to remove this barrier. Most of them can be grouped into three categories: the *social route*, in which poverty alleviation programs and other socially driven mechanisms are used by governments and bilateral aid organizations to make funds available for the purchase of PV systems in favor of the least privileged people; the *fiscal route*, in which taxes, import duties and other fiscal levies are removed to lower the local price of the PV system, thus making it somewhat more affordable for the final user, while at the same time facilitating the