24.5 FINANCING PV IN RURAL AREAS OF DEVELOPING COUNTRIES

Financing programs for PV in the rural areas of developing countries is the focus of the World Bank, the IFC, aid agencies from the OECD nations, charitable foundations, and a number of special-purpose funds such as the Solar Development Group and the proposed SolarBank Fund.

24.5.1 Rural Applications

There are four principal applications for photovoltaics in the rural areas of developing countries (see Reference [13]):

Solar home systems (SHS): This basic battery-based electrical system with a solar PV charger includes a PV module – typically 20 Wp in Kenya, 35 Wp in southern India, and 50 Wp in Indonesia and the Philippines – plus a battery, charge controller and wiring, receptacles, outlets, and switches for lighting and communications. Financing can be justified on a cost basis, the monthly payments for the SHS are less than a family's existing costs for kerosene, candles, and dry cell batteries (see Reference [14]), but the stronger basis for lending is the upliftment of family lifestyle and income that generally accompanies rural electrification. A 35-W solar home system costs US $300 to $750, depending on the manufacture, import duties and taxes (if applicable), the quality of components, and installation. Financing is just beginning to be made available through banks, nonbanking finance companies, microcredit lenders, cooperatives, and other sources. Typical financing for an SHS in a developing country is a 1- to 3-year loan at 18 to 36% interest, or a fee-for-service payment that approximates a lease.

Water pumping for irrigation: The financing of a PV-powered water pump for irrigation can be justified on the basis of the economic impact on the farm, typically the addition of a third crop to what was a two-crop farm, or higher yield per acre as a result of irrigation. A 900-W PV pumping system can cost $5000 to $8000, a cost that can be recovered in as little as one year in some extraordinary cases, and can be the least-cost option on a life cycle–basis for many remote farms, especially when compared to the costs of diesel power. PV-powered water pumping is heavily subsidized in most cases today, ranging from 100% grants from European donor agencies to a 50% subsidy from the government of India.

Microenterprise ("Productive Uses"): There are many applications for photovoltaics in small businesses. Financing can be established through microcredit models of group lending, and justified on the basis of the expected cash flows of the microenterprise businesses. PV systems can extend the operating hours with lighting, improve working conditions with lighting and fans, power mechanization and product preservation (drying and refrigeration), and enable communications. PV systems for the microenterprise range in cost from $300 for a minimal PV lighting system to $10 000 or more for a system that is capable of running a significant level of factory motors or refrigeration (see Reference [15]).

Institutional uses: Photovoltaics is being applied for lighting, communications, water supply and refrigeration in schools, health/medical clinics, and community services. A 1000-W PV system for a school or clinic can cost $10 000 or more, fully installed.