

Foundation (NSF) held in Cherry Hill, New Jersey in October 1973 (see Reference [28]). The program was the responsibility of the National Science Foundation, and then was transferred to the Energy Research and Development Agency (ERDA), which became part of the US Department of Energy (DOE) in 1977.

The first US program was the Low Cost Silicon Solar Array Project, later renamed the Flat-Plate Solar Array Project. The Jet Propulsion Laboratory was assigned management responsibility based on their long experience with space PV power systems. The newly created Solar Energy Research Institute (SERI) was charged in 1978 with the responsibility for thin-film materials and the Sandia National Labs for the concentrator PV programs. The DOE PV Program features significant cost sharing by its industry partners.

SERI became the National Renewable Energy Laboratory (NREL) in 1990, which has championed such programs as the amorphous silicon partnerships, the Photovoltaic Manufacturing Technology (PVMaT), the Thin-film Partnership, the building-integrated (PV-BONUS) program, the Utility Photovoltaic Group (UPVG), and the Million Solar Roofs (MSR) Program. The National Center for Photovoltaics (NCPV) was established to integrate the programs at NREL and Sandia.

US program funding is shown in Figure 24.4, which indicates the rapid buildup of the program in the 1970s, followed by a sharp reduction in the 1980s, and subsequent increase in the 1990s. As reported by DOE, the government's investment in photovoltaics since 1974 is estimated to be \$1.7 billion.

### 24.9.2 PV Programs in Japan

From 1974 to 1983, the Japanese R&D program focused on low-cost solar cell production including mass production of raw silicon (Si) material, poly-Si, ribbon crystal, and amorphous silicon (a-Si).

During the second decade of the program from 1984 to 1993, in addition to material R&D efforts, mass production technologies and solar photovoltaic system technology were pursued, together with cell technology such as a-Si-based stacked solar cell and flexible substrate solar cells.

The New Sunshine Project has been in existence since 1993 in which a variety of new programs have been organized on the promotion and cost reductions of PV systems. Examples include field demonstration and testing of PV systems on public facilities and a subsidy program for private houses. The budget for the R&D portion of the Japanese PV Program is shown in Figure 24.4. It should be pointed out that the R&D portion represents only a small portion of the total Japanese PV effort. In FY 2000, the total effort, including subsidies, was approximately six times the R&D portion of the budget.

### 24.9.3 PV Programs in Europe

The UNESCO conference "The Sun and the Service of Mankind" held in Paris in 1973 was the starting point for the development of renewable energy in Europe (see Reference [29]). The first European Commission technology program for renewable energy was established by the Council of Ministers in 1975. The European Commission's PV program focused