24.8.2 Direct Subsidies ("Buy-downs")

Governments have used different measures to place a value on the public benefits of photovoltaics. Subsidies are tending to be about 30 to 50% of the cost of the PV system. The following is a summary of subsidies that are in use today:

Japan: The program was launched in 1996 with direct subsidies to the amount of 50% of the cost for residential rooftop, grid-connected PV systems. The subsidy is paid to the installation company, not the end user, to foster maximum impact on creating a competitive installation industry and minimum distortion of buyer behavior. The subsidy has since been reduced to 33% in 1999, 25% in 2000, 15% in 2001, and less than 10% in 2002. The Japanese PV market has boomed, reaching over 90 MW or 35% of the world PV market in the year 2000, and there are projections that over 30 000 systems – as much as 130 MW – may be installed in the year 2001 (see Reference [25]).

India: The Ministry of Nonconventional Energy Sources (MNES) has a program in which 10-W to 20-W PV lanterns and 900-W PV water pumps are eligible for a 50% subsidy. The subsidies are distributed through state-level nodal agencies that pass the funds down through the bureaucracy. Thus, it is a matter of working a government "system" to receive the funds. Subsidies are paid only if there is budget available. The net effect has been to create a small market that is "capped" by the availability of subsidy funds. The subsidy program, with its minimum technical specifications, has spawned a subculture PV industry that makes inferior grade equipment just for what is called *the subsidy market*. The Indian subsidy program not only illustrates the power of a subsidy program to create a market but also how to cap it and create distortions (see Reference [26]).

California: The State of California enacted a $3.00/W "buy-down" for PV systems, initially until the year 2002. The subsidy was subsequently increased to $4.50/watt and extended for ten years to 2012, but there were still no financing programs. The program had little effect on the market at first; according to the California Energy Commission, only about 235 residential PV systems were installed in the years 1998 to 2000. A power shortage and sharp increase in electric tariffs in the years 2000 to 2001 created a crisis atmosphere, greater public interest in energy and environmental solutions, and, subsequently, renewed demand for PV systems and other power equipment.

Other countries: Many other countries are adopting PV subsidies. Argentina embarked on a concession approach that included embedded subsidies, but the program has not been fully implemented. Mexico adopted a set of programs that added up to a 90% subsidy for rural photovoltaics. Brazil's PRODEEM program provided massive subsidies, but ended up with a high percentage of nonworking systems. South Africa is considering subsidies as high as 80 to 100% of the cost of a basic 50-W solar home system, in conjunction with the national concession program for nongrid electrification. Morocco's PV program is delayed, awaiting the resolution of the subsidy amount and distribution method, reportedly about 50% of the system cost.

While PV subsidy programs are being implemented around the world, there is a growing body of evidence and opinion that subsidies ultimately do more harm than good for market development. The common argument in favor of subsidies is that they have an immediate impact on demand – which is the mutual goal of the elected officials who enact