RECOMMENDATION

Consumer incentives for active solar systems should be put in place only when standards have been developed and warranties can be offered.

A second criticism of PUSH and PASEM is that most of the installations have been large. This, of course, arises from the nature of the facilities under federal jurisdiction. It does not seem prudent, however, to expect the solar industry to begin its development with only large, complex commercial systems, as their failure to operate as designed may well be expected given the present stage of development of the industry. Those involved in industrial development should not find this hard to comprehend, but the public perception of such difficulties may work against the introduction of domestic solar systems. A demonstration program featuring domestic solar space heating systems thus should be an essential part of any solar strategy. The National Research Council has such a program already in which a variety of space heating systems are being tested, but the results of testing deserve to be better publicized than in the past. Additional demonstrations should be undertaken by the Federal Government as solar systems evolve and the results of these tests need to be widely publicized. The 1980 National Energy Program announced such a demonstration for solar domestic hot water heating with 1,000 units to be installed in homes across Canada. Of course, some thought will have to be given to the timing of such programs to ensure that both trained individuals and equipment are available when required.

RECOMMENDATION

The Committee welcomes the recent announcement of a large-scale demonstration program for solar domestic hot water heating systems and recommends a similar program for active solar space heating systems. This program should incorporate a range of storage systems including zeolite and sodium sulphide.

Experience gained in the solar water heating demonstration program will obviously be useful in implementing this recommendation.

3. SOLAR-THERMAL POWER SYSTEMS

Solar-thermal power systems first convert solar energy into heat and subsequently change the thermal energy into mechanical energy by means of a turbine. The output from the turbine then generates electricity.

Two technologies currently exist for collecting, concentrating and converting solar energy. They are known as the central receiver system and the distributed collector system. The central receiver system consists of a large field of sun-tracking mirrors (heliostats) which intercept and redirect incoming solar radiation to a single large receiver mounted on top of a tower. This configuration is sometimes referred to as a "power tower". The redirected radiation heats a circulating working fluid in the receiver. A number of working fluids are being examined including high-pressure water, superheated steam, oils, molten salts and liquid metals. The choice of working fluid depends in part on the system's operating temperature. The United States, for example, intends to develop receivers which will operate at about 925°C (1,700°F) by the early 1980s and at 1,100°C (2,000°F) by 1985.

The distributed collector system does not focus the sunlight on a central receiver but instead converts the sunlight to heat at the individual collector module. Each collector module consists of a cylindrical mirror surface which redirects the solar radiation onto the receiver/absorber unit at the focus of the mirror. In this design, the working fluid circulates through the collector where it is first heated, then pumped through a pipe network to a boiler or heat exchanger. From this point on, the central receiver and the distributed collector systems are identical (Figure 6-31).

As in conventional power generation technologies, cooling towers or condensers are used to remove and reject waste heat. A thermal storage unit also forms part of the system to make use of sunlight which is in excess of immediate needs. Various storage media including rocks, oil and salts are being considered. No research and development is being done on solar-thermal power systems in Canada.

CONCLUSION

The Committee believes that Canada should not pursue an RD&D program in solar-thermal power systems since they offer less promise than other solar technologies in this country for both the short and long term.

4. PHOTOVOLTAICS

A solar, or photovoltaic, cell produces electricity directly when exposed to the sun's rays. It has no moving parts, consumes no fuel, produces no pollution during operation and can be made out of one of the most abundant elements on Earth — silicon.

The technology for manufacturing solar cells is already well developed. It was established in the early 1960s in the U.S. space program for satellites requiring a source of electrical power which could operate reliably for long periods of time. Nevertheless, while the space