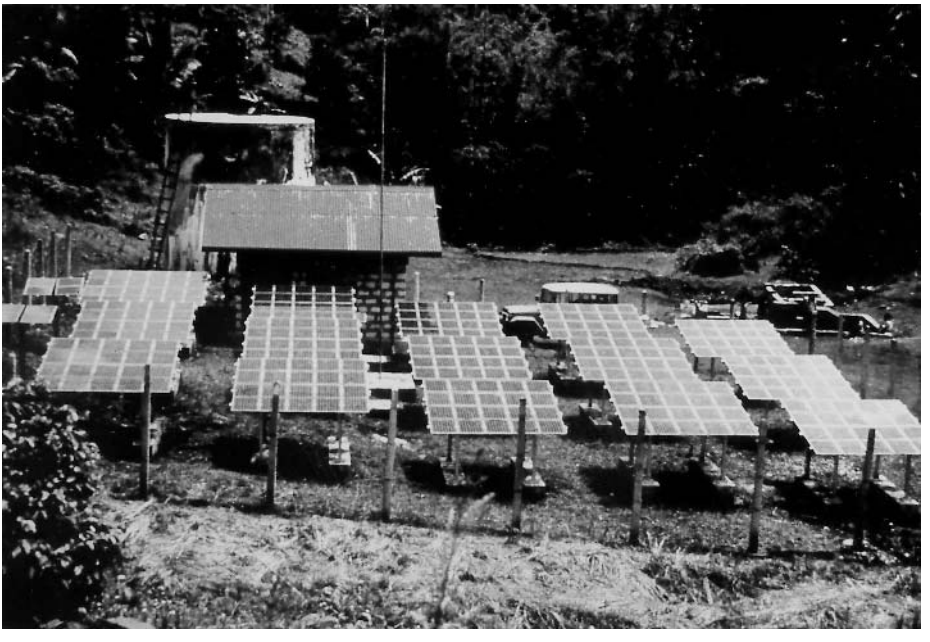

Figure 17.16 Photovoltaically powered system to provide drinking water for 4000 people (*Source*: TÜV Rheinland, Cologne)

that the people involved in the whole process must be taken seriously in their ideas about the design, advantages and disadvantages of the PV system. The behaviour of the users influences the system's performance tremendously, because they may purchase components, may install and/or change the system, determine the use of energy, may take over maintenance jobs and even repair the PV system. From this it becomes evident that the functioning of PV Systems can be optimised when the interaction between the new technology and their users can be improved. From this assumption, at Fraunhofer ISE the user-centred approach on rural electrification, called "socio-technical system approach", was developed.

The socio-technical system approach originates from work and organisational psychology and was applied first to labour organisations in Europe. When new technologies were introduced, it was found that not only the technology had to be designed according to the needs of the organisation but also the social organisation needed restructuring to increase the productivity. The approach is based on the open system theory in which the introduction of technology consists not only of hardware and software but also of orgware [19], the human part of the socio-technical system.

"Applied on stand-alone electricity systems" means that a properly reflected energy concept in the planning phase is the basis for the system design. But it is not only the quantity of components and their power consumption that finally determine the energy consumption in the PV system. The users have a decisive influence on the energy consumed, on the energy management carried out to optimise the energy available from the PV generator and to undertake the first level of maintenance (cleaning the PV module,