

and avoid a decreasing output. However, thin-film amorphous silicon reacts differently. The higher temperature does not influence the efficiency as much as crystalline silicon.³

3. Although the lifetime of modules is proven to be over 20 years, it is better to know how to remove a single module in the middle without removing the whole system. Electrical connections should also be “plug and play”.⁴ Easy electrical connections are needed for fast installation and for easy replacement of modules. Depending on the local safety regulations, precautionary measures should be taken, for example, using lifelines or moveable safety ladders.
4. The surface of the modules should be clean. Tilted modules will be cleaned by rain in most regions. Modules mounted at low angles can be treated with PV-Guard, a treatment that makes the surface smooth and makes cleaning with rain easier. In dry areas, cleaning should be part of the regular maintenance schedule.
5. Protect wiring against the weather. Rain is not the main problem, though all connections must be waterproof. Long-term influence from water should be avoided. Protection against sun and UV light is needed to ensure that the lifespan of the wiring is not reduced. Depending on the area, wiring may also need to be protected from small gnawing animals.

22.4.3 Step-by-step Design

A PV system consists of a number of modules with solar cells, an inverter, batteries or, in most cases, a connection to the grid. A single house with a small installation can be connected through the existing electricity meter. The electricity that is produced will be used primarily in the house. Any surplus will be fed into the grid and the meter will spin backwards. However, not every utility company will allow this and in some cases a second meter is installed. This often happens with larger systems (more than 2 or 3 kWp). Larger systems or combined systems that are maintained by the utilities are connected directly to the grid.

22.4.3.1 Solar design

To design with photovoltaics the first set of questions are, “Why do I want to integrate PV into the building?” and “Is it for general energy supply, to make the building more independent, or to make a statement about the building’s inhabitants?”

Large systems will be used for general energy supply. This means large surfaces that can be treated in an architectural way. Different types of modules, shapes, colors or textures can be used to design the look of the building.

The main issues for a more independent building are the efficiency of the system and the generated yearly output. The size of the PV system will depend on this and the designer has to allow for a certain number of modules. The designer will probably design

³ See Chapter 12.

⁴ “Plug and play” refers to very simple wiring and components that fit together like a computer and can easily be replaced.