



*Retrofit standard system, 0.9kWp, UK*



*Custom-design, integrated glazed roof system, 30kWp, Switzerland*

## Main components

Our grid-connected solar electricity systems consist of the following main components:

- Solar modules – fitted with quick connectors
- Mounting structure – to suit building location and degree of integration
- Module cabling: interconnects, string cables, DC box
- Inverter - to match array characteristics
- DC electrical hardware: main indoor cables, possibly a DC disconnect switch
- AC electrical hardware: connection between mains and inverter, protection devices, kWh meter, etc.
- Monitoring, display, data logging devices may also be included

# Naps-Fit, Family of Mounting Methods for Solar Electric Systems

Since the early 1990s, Naps has designed and supplied complete building-mounted photovoltaic systems for grid connection. During that time, we have designed and developed a variety of mounting systems for attaching the photovoltaic modules to buildings, ranging from retrofit systems, designed with low added cost and rapid installation in mind, to fully-integrated systems, customised for individual building projects.

Building-integrated means replacing some of the building roof, wall or other area with solar modules, and often these are of special construction. It is most commonly used when solar electricity is included in a new building, since the cost of some conventional building materials is avoided.

Mounting standard modules on an existing building, without replacing any of the building skin is known as retrofit solar electricity. It is often the lowest cost method.

Most commonly solar modules are mounted on a roof (sloped or flat - it does not matter), on a wall (often referred to as a building façade), or over windows to reduce sun glare as well as producing electricity. Another option is as part of a glazed roof or atrium where special semi-transparent modules produce electricity and also reduce solar gain.

Naps grid-connected systems are already feeding electricity into the grid systems of several European countries, including Germany, Finland, Sweden, Denmark, France, Switzerland, Greece and United Kingdom.

## Standard mounting methods and systems

Naps standard mounting methods for buildings use standard photovoltaic modules and so are readily available in any quantity or system size. Naps standard grid-connected systems are complete packages which include the photovoltaic modules, suitable mounting structures and fixings, inverters and all the main electrical installation components, such as dc connection boxes, array cables, etc. In some countries, we also supply additional components to conform with local requirements, e.g. a DC isolator and AC locking isolator for UK systems.



### **Naps Solar Roof systems (NSR)**

Naps Solar Roof (NSR) systems are complete, standard systems where the size of the solar array (set of modules), the mounting method, the electrical connections, the inverter type, etc is pre-designed. They are fast and easy-to-install for most types of house roof and installation time is less than one day. Installing does not require drilling through roof tiles. These systems are designed for retrofit to an existing roof. However, please note that although these packages are as standardised as possible, the roof type has to be known in order to specify the roof attachments correctly. NSR systems are available in a variety of sizes: from 0.75 to 5 kWp. Larger systems can be built up from two or more of these individual systems.



### **Naps Solar Flat Roof systems (NSFR)**

On large flat roofs, standard support structures (G series) can often be used. These are the same structures used to mount solar arrays on the ground in off-grid systems. It is normally required to strengthen the roof to take the extra weight and to prevent lifting due to wind loads. Attention needs to be paid to spacing the lines of modules sufficiently to avoid shadows.



### **Naps standard Solar Wall systems (NSW-H)**

For fitting standard modules over an existing wall, Naps has designed the Hook-On system. The modules are mounted 'sideways' (i.e. landscape orientation). Each module is pre-fitted with a pair of Hooks, and the Hooks have slots that will fit over bolts. Aluminium U-channels are attached to the wall of the building. These have holes drilled to accept bolts which the Hooks fit over. There is an anti-theft option which means a special tool is needed to remove modules.

## Special mounting methods and systems

The mounting methods and systems described here are always custom-designed for a particular application and may need some non-standard components (e.g. modules with special frames). They are not normally offered for very small projects. As for standard systems, we supply complete packages which include the photovoltaic modules, suitable mounting structures and fixings, inverters and all the main electrical installation components, such as dc connection boxes, array cables, etc, and other components that may be required in certain countries, e.g. in UK, DC isolators and AC locking isolators.

### Naps Solar Glazing systems (NSG)

GG type large glass-glass laminates are custom-designed for special glazed roofs, facades and atria. The photovoltaic cells are often spaced more widely than normal to provide increased light transmission. Options include an insulating air gap and/or laminated back glass. The module design is tested to the IEC61215 standard, but individual module designs do not have their own certificate as there are no standard sizes. The mounting profiles are normally sourced from standard building component suppliers.



### Naps Integrated Solar Roof systems (NSR-I)

The Solrif system provides full integration of modules into roofs, especially new roofs. Special frames on the modules lock together to give a weatherproof construction. The modules overlap like tiles, and there are special end profiles for sealing. The roof needs to be prepared with special battens for fixing the modules.



### Naps special Solar Wall systems (NSW-D)

Naps Drop-In system allows modules to be mounted 'upright' (i.e. portrait orientation) over a wall. It uses modules with special slim (10mm) frames. The modules 'drop in' to horizontal H-profiles, and can be quite easily removed for service. The H-profiles are mounted on vertical supports of wood or aluminium). Edge trims are supplied for a neat finish. The underlying wooden or aluminium supports for the Drop-In Profiles may be supplied if needed.



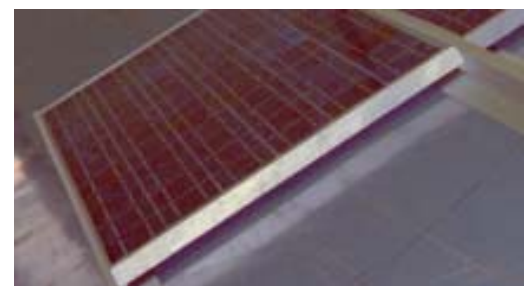
### Naps Solar Sunshade systems (NSS)

For mounting standard modules over windows to provide shading as well as solar electricity, various customised modifications to our roof and wall mounting systems are possible.



### Naps Step Profile systems

Naps Step Profile is a versatile Slide-In profile, easily fixed using bolts to underlying supports of wood or aluminium. Mounted horizontally, it can be used for standard framed modules in such areas as sloping skylights. Mounted vertically, with suitable wooden or aluminium supports beneath, it provides a low cost method of mounting a small single row of modules on a roof. The underlying supports may be supplied if needed.





## About our photovoltaic systems

Naps grid-connected solar electric systems are designed to give well-matched photovoltaic array and inverter combinations, plus a suitable mounting method.

Selection of the most suitable mounting method depends on the exact location of the array (roof, wall, sunshade, glazed area, etc) and selection of the most suitable module type largely depends on the space available.

Our 'packaged' grid-connected systems, such as the NSR range of solar roof systems for domestic houses, are standardised systems in which the array and a single inverter are well-matched in characteristics. They are modular in that larger systems can be built up by using two or more standard systems (not necessarily of the same type).

Systems for larger buildings are in general designed on a custom basis, although it is also possible to use standardised 'building blocks' if these will fit into the available space. In a custom-designed larger system, the array is normally designed to give the best possible coverage of the available area, and then it is split into electrical subsections to match a suitable inverter type. In doing this, attention is paid to the likely patterns of shadows that will be encountered (which can determine the optimum way that the modules are wired together). Configuring a larger system into separate electrical blocks, each with its own inverter, increases the system reliability and also reduces the losses in total output due to shadowing.

Naps experts are at your disposal for advising on the most appropriate standardised or customised system. Our complete specification will include all mounting hardware and needed electrical hardware, along with any data logging or display equipment.

**NAPS**  **Power of Light**