megasol

25 years innovation in power

Leading Architecture
Integrated Photovoltaics

BIPV

▼ Office building in Lucerne

▲ Residential neighbourhood in Zurich Altstetten | Solar balustrades with custom-made glass-glass modules

Overview
Building-integrated photovoltaics

Facade integration

▲ Apartment building in Zurich | Solar facade with carbon-like appearance

▲ Valley station Klein Matterhorn | 2'923 m.a.s.l. | Swiss Solar Prize 2018 Image: Solarbau Lowel GmbH

Roof integration

▲ Residential building in Pfäffikon ZH | LEVEL integrated system

▲ Apartment building in Lucerne | LEVEL integrated system

Open structures

▲ Schindler Group global headquarters | NICER solar carport

▲ Eugster Haustechnik | Arbon | Swiss Solar Prize 2017

▲ Apartment building in Ostermundigen | 560 m² FAST solar façade

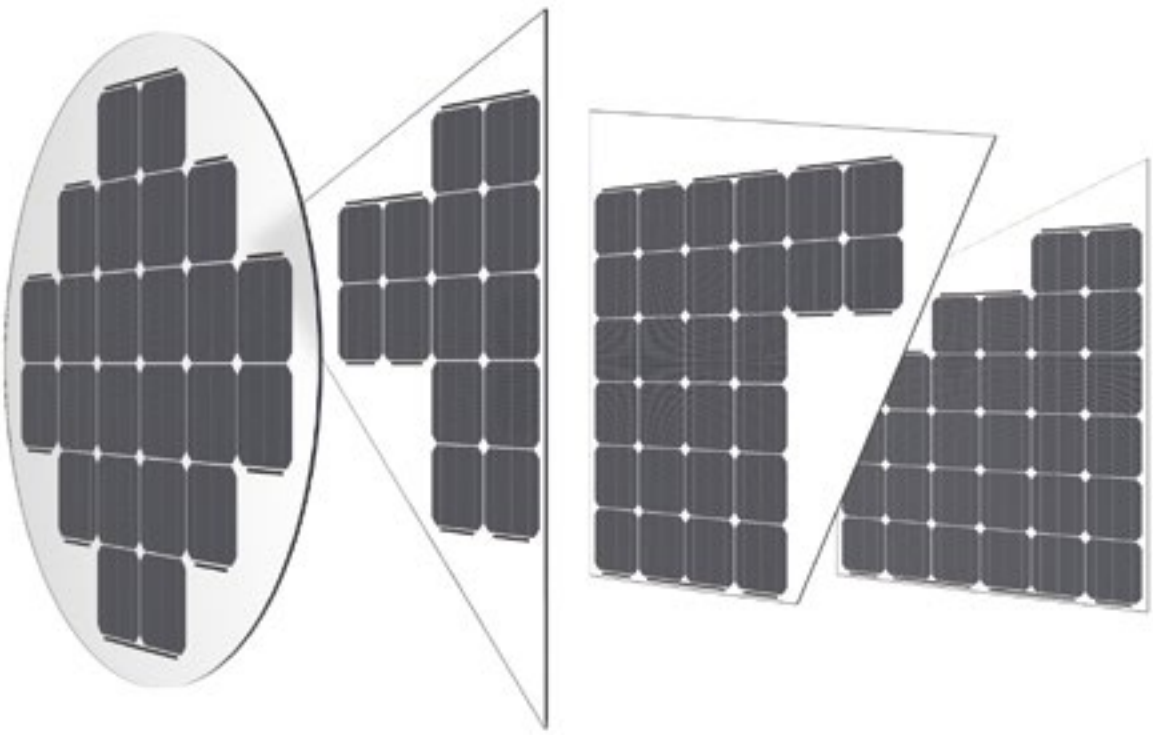
Completed metamorphosis

Solar modules are concluding their development towards a freely designable building material. The design of this building material starts with the vision of the overall project. Three steps lead from the central idea to the solar module.

1

The grid defines the shape, size and power of the solar modules

Rectangles, triangles, polygons, circles, curves, cut-outs: the free choice of the solar modules' geometries is the starting point for the design. The measurements range from 200 x 300 mm to 2400 x 4150 mm. Glass thicknesses of 2 - 12 mm per pane can be processed. Cost advantages are achieved by using the standard size of 1669 x 999 x 8 mm. The degree of hardening (TVG, ESG) can be chosen freely.



Special shapes

2 The appearance determines the surface of the solar modules

The full spectrum of the material «glass» is available for the design. Structures and finishes of surfaces are possible, along with the targeted use of reflections. Solar glass is the basis of most integrated solar modules, due to its subtle structuring and highest efficiency. This structuring ensures a high light absorption and minimal glare.

A Smooth glass

B Satinised glass

C Light, barely noticeable structure

D Structured, crystal-like surface

E Deep-structured, rough surface

F Deep-structured, slightly corrugated

G Deep-structured, strongly corrugated

3 The character results from the colours and their intensity

Colour: The colour of the solar modules is open. It is possible to design with light pastel tones, as well as with rich earthy tones. Three sources can be used for the choice of colour:

> SOLARCOLOR colour chart (time and cost-efficient)
> NCS colour chart (wide colour spectrum)
> Individual colour development (completely open)

High colour intensities (opacity) make the cell structure disappear, keeping the solar secret of the building envelope. Light intensities, on the other hand, allow a technoid impression and performance up to 95% of a conventional solar module (up to 185 Wp/m²).

Black: The classical pinstriped look allows accents with the help of technology. This design option is the most efficient both in terms of performance and costs. By concealing the busbars (cell contacts), discretion can be increased, so that the technology is only visible at second glance. This design option is known by the name of «Full Black»

SOLARCOLOR «Spring»

SOLARCOLOR «Summer»

SOLARCOLOR «Autumn»

SOLARCOLOR «Winter»

Full Black

▲ Coop Letzipark Zurich | Solar facade with individually coloured modules

▲ SBB Cargo service facility in Muttenz | NICER roof and facade with translucent glass-glass modules | Swiss Solar Prize 2017

From costs to yields

Solar integrations are profitable investments. The reasons for this are, firstly, that the additional investments compared to conventional building envelopes represent a fraction of the total project costs. Secondly, solar building envelopes generate yields and amortise within a few years. In the period after that, they generate earnings and become profitable power plants. Two examples.

Workshop with 10 employees

Location: Lausanne

Orientation: west

System: NICER roof-integrated system

Module type: glass-film, with frame

Colour: deep black

Surface: 300 m²

Power: 52.8 kWp

Annual yield: 51'000 kWh

Gross investment incl. VAT: CHF 108'000

Substitution conventional roof: CHF 23'000

Net investment: CHF 85'000

One-off grant[1]: CHF 19'552

Return[2]: 6.2%

Break even: 15 years

Profit over lifespan: CHF 111'000

Office building with 20 employees

Location: Zurich

Orientation: east

System: FAST facade system

Module type: glass-glass, frameless

Colour: slate grey

Surface: 500 m²

Power: 75.0 kWp

Annual yield: 40'000 kWh

Gross investment incl. VAT: CHF 371'000

Substitution glass facade: CHF 297'000

Net investment: CHF 74'000

One-off grant[1]: CHF 27'100

Return[2]: 11.5%

Break even: 8 years

Profit over lifespan: CHF 231'000

[1] One-off grant

The one-off grant is a subsidy model for solar systems by the Swiss federal government. It covers around a third of the investment. Additional contributions from the buildings programme for energy-efficient renovation are not yet included.

[2] Rate of return

Yields and returns are project-specific and depend on factors such as irradiance values, project design and development of electricity prices. They take into account inflation, capital costs, discounting, tax benefits and reinvestments. Customized profitability studies can be provided upon request.

Glass-glass solar modules

There is a distinction between two solar module types: glass-film and glass-glass modules. In the glass-glass type, two panes are combined into one solar module. They become laminated safety glass and therefore have unique properties.

Areas of application

The use ranges from facades and railings to roof-integrated and rooftop applications.

Properties

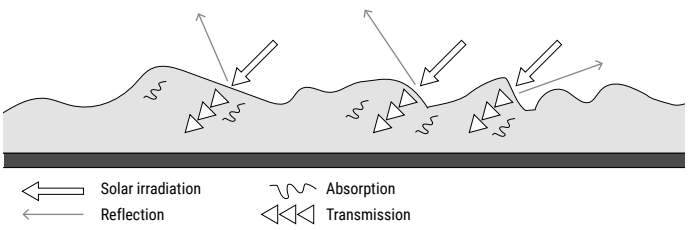
Front and back glass in combination with durable encapsulation material protect the components from vapour penetration. In the «neutral zone» between the panes, the cells remain stress-free (no compression or bending) which reduces the occurrence of so-called micro cracks. This results in a potential lifespan of over 50 years. Free design scope, high durability and stability characterise this solar building material. All glass-glass modules can be designed freely. Glass-glass modules are manufactured in Deitingen SO, Switzerland.

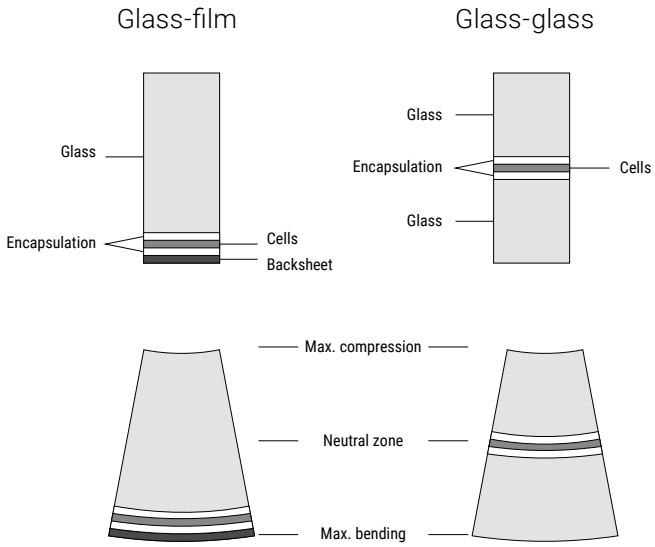
Type of installation

Glass-glass solar modules can be installed both with or without frames. The mounting systems FAST, LEVEL and NICER are especially suitable for the integration of glass-glass solar modules.

Non-glare solar glass

Particularly anti-glare surface structures are used.





Technical specifications

Cell types: Poly / Mono PERC / Heterojunction / Bifacial
Cell sizes: 156.75 x 156.75 mm / 158.75 x 158.75 mm (full-square)
Typical power (Full Black)*: 195 Wp / m²
Typical power (colour)*: 150 - 185 Wp / m²
Encapsulation material: EVA or PVB
Glass thickness per pane: 2 - 12 mm
Hail resistance: Hail protection class 4 or 5
Fire protection: Top and back layer are made of heat-resistant glass. The component is considered to be non-combustible material as defined by the Cantonal Fire Insurances.

* The square-metre performance of the module depends on the specific format.

▲ Mountain station Klein Matterhorn | Europe's highest PV installation at 3'821 m.a.s.l. Image: EW Zermatt AG

▲ Football stadium LIPO Park Schaffhausen | 1.4 MWp | 8'707 m² NICER solar modules (roof and facade)

Swiss Solar Prize 2017 | Norman Foster Solar Award Diploma 2017 | European Solar Prize 2017

Image: Solar Agentur Schweiz

FAST facade system

Curtain facade structure for solar modules

Areas of application

FAST is suitable for all areas where curtain wall systems are used. This includes single-family houses, apartment buildings, high-rises, etc.

How it works

The solar modules with backrails are placed into the horizontal profiles and folded up like a tilting window. They are fixed by a slide safety catch. Later dismantling is possible without restrictions.

Flexibility

Glass-glass modules used on the facade are usually custom made. Their shape, colour, size and surface can be individually designed. Price advantages can be achieved when using the standard measurements.

Compatibility

The FAST facade system is compatible with vertical structures in all standard materials (wood, aluminium, steel).

System interface

The adhesion of the backrails on the rear side of the module takes place in-house.

Type of installation

The mounting is concealed by means of backrails on the rear side.

Installation time

10 m² / man-hour (experienced installation personnel)

Components

> Glass-glass solar modules with SSG adhered backrails and mechanical support
> Horizontal rail, slide safety catch
> Vertical structure as well as consoles/spacer screws are often provided on site. If required, they are part of the package.

Technical specifications

Solar module type: glass-glass (colours, shapes, thicknesses, surfaces can be freely defined)
Vertical adjustment: +/- 3 mm, on the front also possible after mounting
Typical span width of the horizontal profile: 800 mm
Fire protection: structure consists of aluminium. The component is considered to be non-combustible material as defined by the Cantonal Fire Insurances.
Vertical support: mechanical (lower edge of solar module)

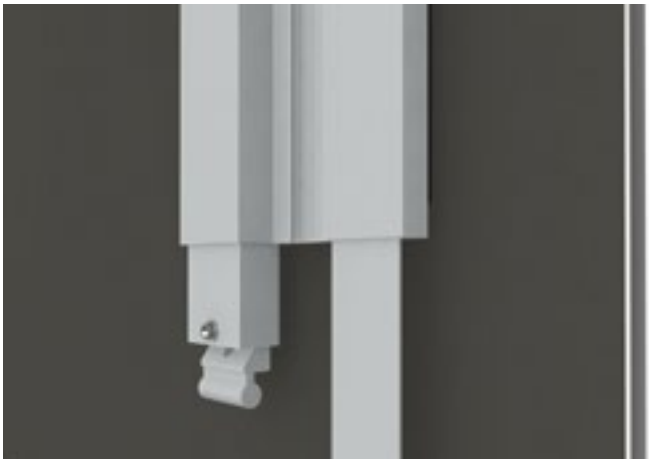
Video and technical documentation:
megasol.ch/en/fast

1 Apply transverse profiles to the vertical structure of the building.

2 Place module, inclination is possible for cabling.

3 Secure module temporarily and adjust, +/- 3mm also possible after mounting.

4 Secure module and place next module.



Option: Concealed mounting

Option: Lateral adjusting screws for concealed mounting

LEVEL roof-integrated system

Overlapping solar roof coverage

Areas of application

LEVEL is used for pitched roofs, challenging roof geometries, individual roof integrations, as well as facades.

How it works

The holding hooks are screwed onto the roof battens. The sealing rails are fitted onto them. The solar modules are laid in. Later dismantling is possible without restrictions.

Flexibility

Half and quarter modules with identical appearance are among the standard components of the system. The basic palette contains three colour versions. More complex design requirements (colour, surface) can be realised with individually designed solar modules.

Compatibility

The LEVEL roof-integrated system can easily be combined with all standard roof coverings such as roof tiles, shingles or aluminium composite panels. A skylight (Wenger Fenster) specially developed for the LEVEL roof-integrated system enables seamless integration. LEVEL can be equipped with an integrated snow guard.

Type of installation

The system is laid overlapping, using the conventional or English method (horizontal offset).

Installation time

10 m² / man-hour (experienced installation personnel)

Components

> LEVEL solar modules
> Holding hooks
> Sealing rails
> *Snow guard (optional)*
> *Wenger skylight (optional)*
> *Anchoring devices for personal protection (optional)*

Sub-roof requirements

> Roof pitch above 25°: sub-roof for normal demands
> 14° - 25°: sub-roof for increased demands
> 6° - 13°: sub-roof for extraordinary demands
> 3° - 5°: sub-roof with flat roof quality

Technical specifications

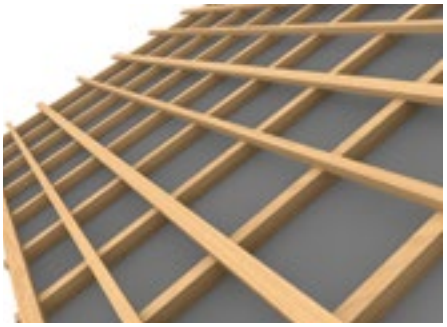
Solar module type: frameless glass-glass modules

Modular dimensions: 1016 x 1700 mm

Fire protection: Top and back layer are made of heat-resistant glass. The component is considered to be non-combustible material as defined by the Cantonal Fire Insurances.

Rear ventilation: by means of wooden slats

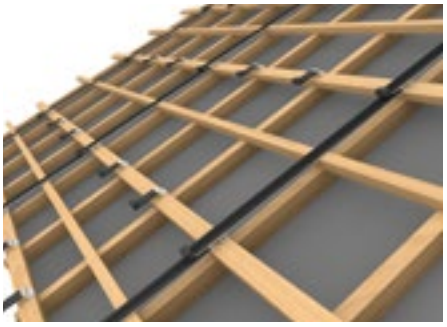
Video and technical documentation:
megasol.ch/en/level



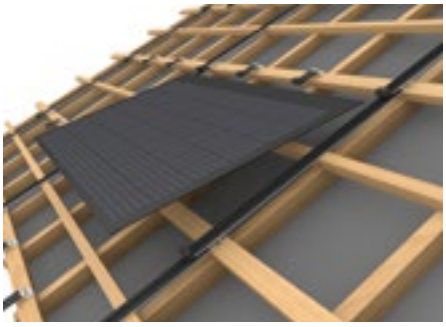
1 Roof battens 80 x 40 and 50 x 50 are fitted alternately in the grid.

2 The rail hooks are mounted directly on the roof battens.

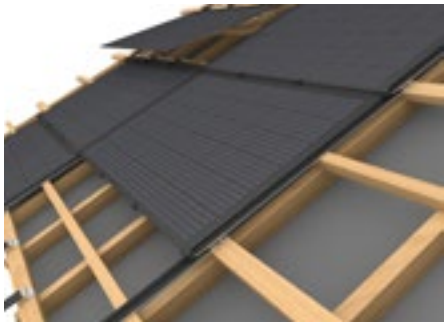
3 The support rails can be pushed easily into the rail hooks.



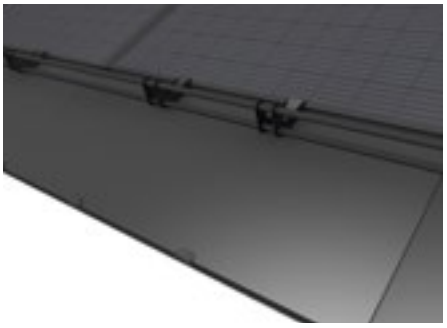
4 Central hooks provide additional stability.



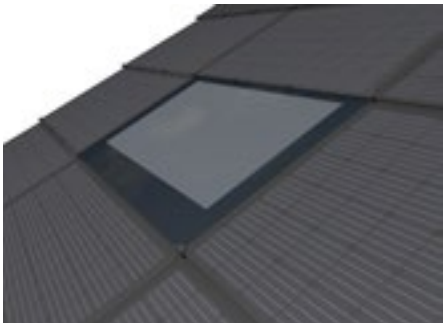
5 The solar modules can be pushed up from below and laid in.



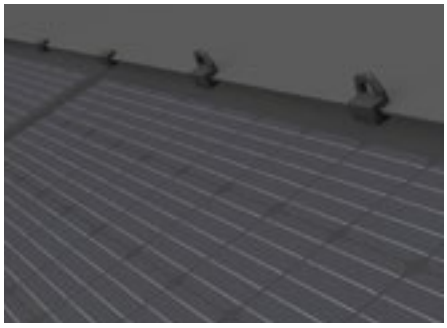
6 The solar tile system allows individual layouts.



Option: Snow guard

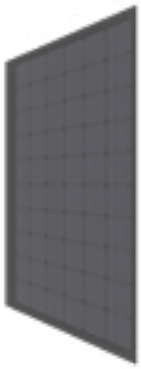


Option: Skylight



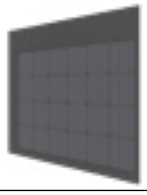
Option: Anchoring devices for personal protection

Basic modules



6x10 cells

4x10 cells



6x4 cells

4x4 cells

Colour variations

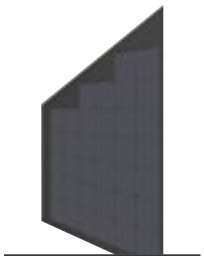
Black

Full Black

Terracotta

Special solar modules

Category 1
Complexity: low
Adapted module length



Category 2
Complexity: medium
One side slanted, or adapted module height

Category 3
Complexity: high
Various modifications, two sides slanted, cut-outs, round shapes, holes

Category 4
Electrically passive
Complexity: high

NICER roof-integrated system

Flush-mounted solar roof coverage

Areas of application

Typical areas of use for NICER are pitched roofs, roofings of any kind, wood and steel constructions. The most frequently used roof-integrated system in Switzerland is especially suitable for flat inclinations up to 3°.

How it works

Vertical supports are applied to the roofing battens. The modules are placed into the vertical supports and closed similarly to a car boot door. The modules are fixed with a snap lock. Later dismantling is possible without restrictions.

Flexibility

NICER solar modules are available as black, white and translucent versions. Half and quarter modules with a comparable appearance are among the standard components of the system. Translucent NICER systems are particularly suitable for carports, hangars, stadium roofs or pergolas and provide targeted shading and sun protection with simultaneous use of residual light.

Compatibility

A skylight (Wenger Fenster) specially developed for the NICER roof-integrated system enables seamless integration. NICER can be equipped with an integrated snow guard.

Video and technical documentation:
megasol.ch/en/nicer

Type of installation

NICER modules are installed flush-mounted and floating (horizontally and vertically).

Installation time

20 m² / man-hour (experienced installation personnel)

Components

> NICER solar modules
> Vertical rail
> Roof ridge profile
> Covering panel and ventilation grid
> *Snow guard (optional)*
> *Wenger skylight (optional)*

Sub-roof requirements

Canopy, carport, open warehouse, etc.
(buildings that do not have to be completely water-proof in practice)
> No sub-roof necessary

Residential buildings, office buildings, closed halls, etc.
> Roof pitch above 13°: sub-roof for normal demands
> 7° - 13°: sub-roof for increased demands
> 3° - 6°: sub-roof for extraordinary demands
> 0° - 3°: sub-roof with flat roof quality

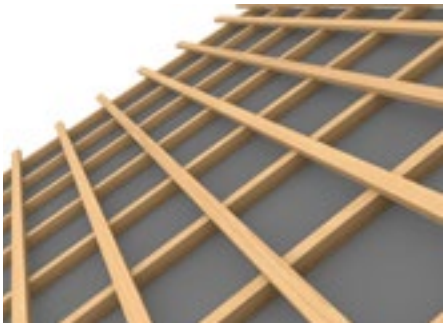
Rail extensions and special modules can affect impermeability and must be verified individually.

Technical specifications

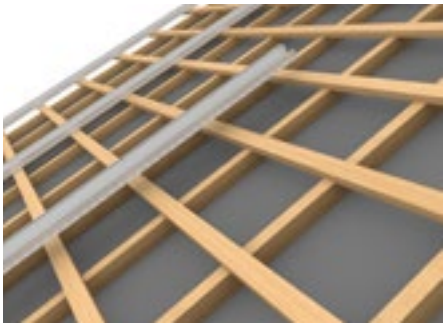
Solar module type: glass-film or glass-glass modules with frame

Modular dimensions: 1016 x 1653 mm

Fire protection: Top layer is made of heat-resistant glass. The component is considered to be non-combustible material as defined by the Cantonal Fire Insurances.



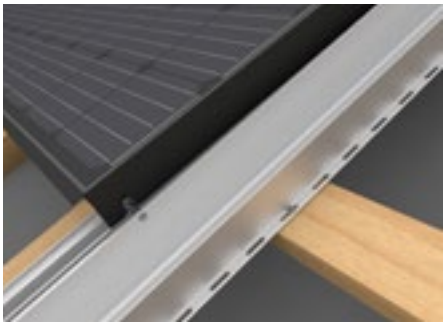
1 A steel or wood construction serves as the basis.



2 The NICER rails are laid out and screwed onto the roof battens.

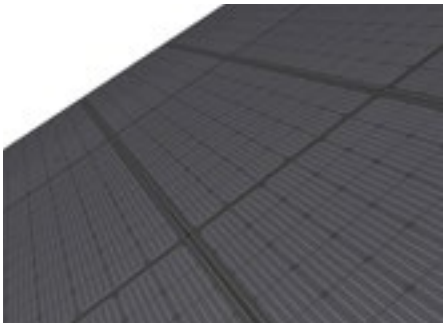
3 The roof ridge profiles are then installed.

4 The individual solar modules can simply be clicked in...

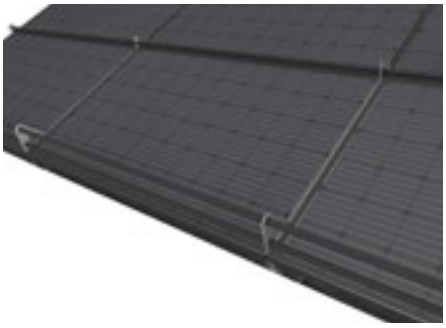


5 ... and fastened.

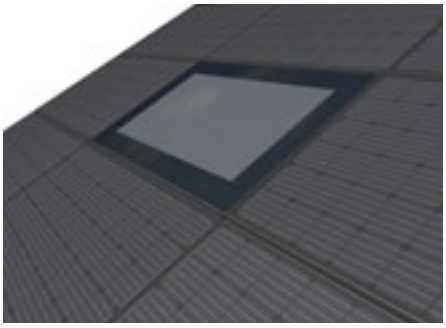
6 Install the covering plate and ventilation grid.



7 Completely installed, NICER is a water-proof roof covering.

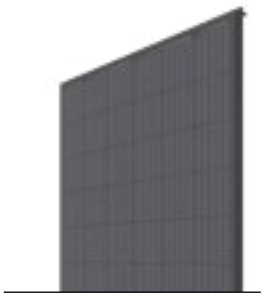


Option: Snow guard

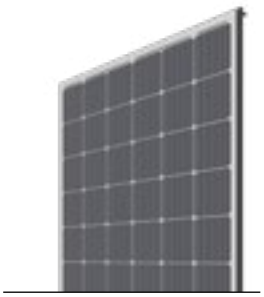


Option: Skylight

Colour variations



Black



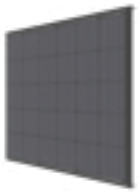
White

Translucent

Basic modules

6x10 cells

3x10 cells



6x5 cells

3x5 cells

Solar tile

Solar roof coverage for tiled roofs

Areas of application

Solar tiles are ideally suited for small and medium-sized systems – both for new buildings and roof renovations. Typical areas of application are challenging roofscapes and locations with special requirements for historical site protection.

How it works

Modules and tiles are laid out on a conventional roof battens and fit seamlessly into each other. The absence of sheet metal flashing saves installation and material costs.

Flexibility

This solar roofing system meets particularly high aesthetic requirements and is modularly expandable. Thanks to its horizontal and vertical flexibility, the system is also suitable for roof surfaces with obstacles such as chimneys, skylights or dormers.

Compatibility

Solar tiles are available in the colour variations *Full Black* and *Terracotta*. They are compatible with the following roof tiles:

> Flat sliding tile FS 03 (Gasser Ceramic)
> Hollow sliding tile MS 95 (Gasser Ceramic)
> CANTUS tile (Creaton)
> TERRA OPTIMA tile (Creaton)

Type of installation

Solar tiles are installed like normal roof tiles. One solar tile replaces four roof tiles.

Installation time

The installation time corresponds to that of classic roof tiles.

Components

> Solar tile (10 cells)
> Alu clip for 24 mm / 30 mm battens
> End rail for FS 03 / MS 95 tiles

Sub-roof requirements

> Roof pitch above 20°: sub-roof for normal demands
> 18° - 19°: for increased demands
> 15° - 17°: for extraordinary demands
> 10° - 14°: for extraordinary demands with additional measures
> 3° - 10°: with flat roof quality

Technical specifications

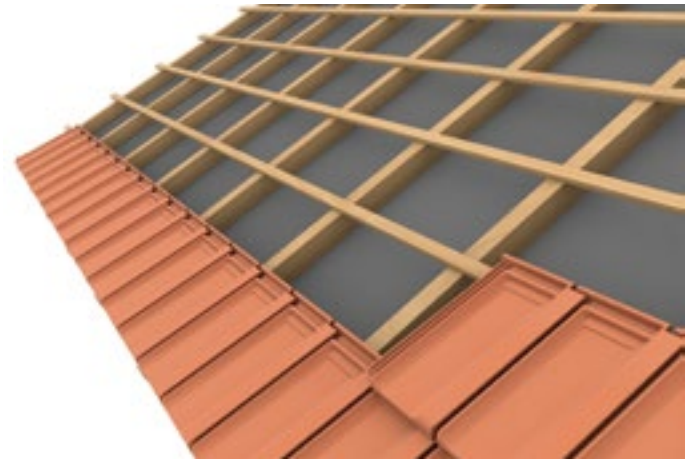
Solar module type: glass-glass modules with frame

Modular dimensions: 890(-900) x 350(-380) mm

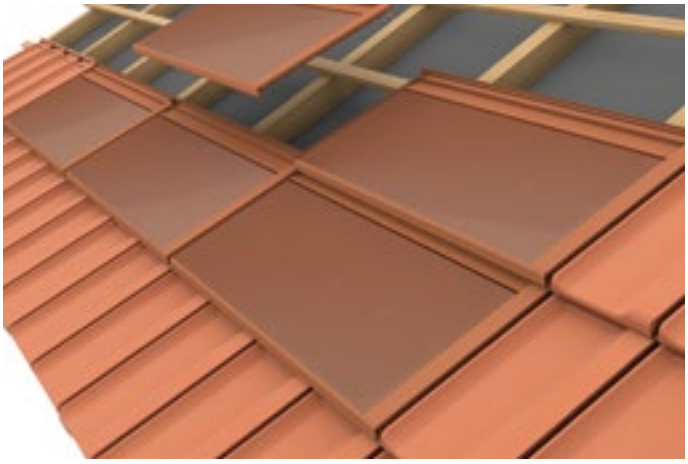
Fire protection: Top and back layer are made of heat-resistant glass. The component is considered to be non-combustible material as defined by the Cantonal Fire Insurances.

Rear ventilation: by means of wooden slats

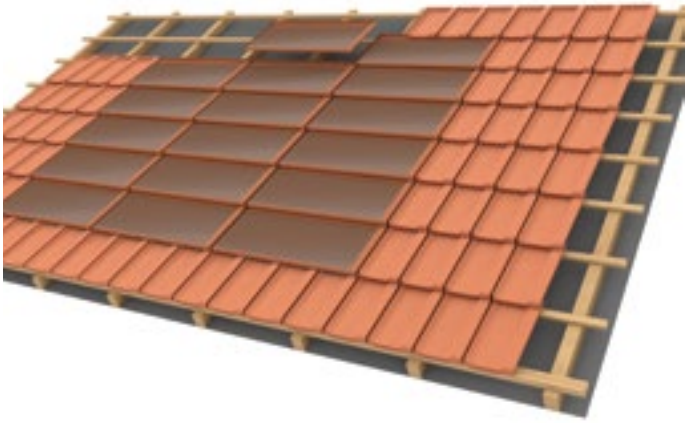
Technical documentation:
megasol.ch/en/solar-tile



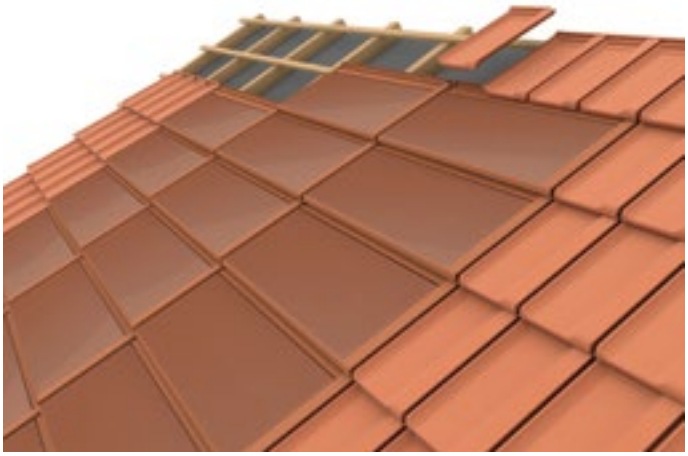
1 Lay out the first roof tiles on a conventional roof batten.



2 Place one solar tile instead of four roof tiles.



3 Secure the module and place the next module.



4 Place the roof tiles over the solar tiles.

Colour variations

Full Black

Terracotta

▲ Schlössli Wohlen | Cultural monument | LEVEL roof-integrated system with customized modules

Expert consultation

Solar projects involve specific topics that required specific attention. A road map from the vision to implementation can contain the following milestones:

1

Gaining a shared understanding

The focus is on the vision and the planned appearance of the overall project. The first technical approaches are outlined. Preferences regarding interfaces and consultation services are discussed.

2

In-depth introduction

The doors of Megasol are open for partners. A production tour in Deitingen shows how the company works and where the integrated solar modules come from.

3

Rough concept

Guiding ideas flow into a rough concept and are formalized as system principles. It is possible to make substantiated statements about investment and profitability. The first samples follow.

4

Detailed concept

The design and the systems are worked out in detail and specified. Developments and formalities are carried out. Further samples follow and are approved.

5

Implementation

The solar modules are manufactured according to the agreed plans and designs. Support is ensured during the building phase and operation.

Support services

Consultation:
> Detailed design options
> Grid layout
> Connection details / interfaces
> String / inverter dimensioning
> Specifications

Formalities:
> EIV, ESTI, EEA

Development:
> Colour development
> Samples / mock-ups
> Product development (special solar modules / substructure)

▲ Residential tower Wattbuck in Effretikon | Complete renovation of the building skin

Image: Aragorn Frey, arento ag

Values as a solid foundation

Responsible actions form the cornerstone of the company. The aim is to create opportunities for others and therefore give back some of the success.

Society

Social commitment

Megasol is committed to ecological and social sustainability projects in economically disadvantaged regions – for example Solafrica's *Solar Learning* initiative and the Women's Solar Project Nicaragua. The commitment includes material supplies for specific projects or financial support, which benefit local vocational training and build up competent young talent in the solar sector.

Manufacturing and research site

Forward-looking and regular investments in the production site in Deitingen as well as close cooperations with universities and technology partners set the relevant signals and help to strengthen Switzerland as a centre of research and industry.

Corporate culture

The corporate culture is based on a high degree of trust in the employees. Room for creativity and self-responsibility are the sources of its innovative strength and the continual development of the company. In China, the remuneration exceeds the local standard in terms of benefit-oriented promotion. All employees are provided with further training and language courses. The implementation of Swiss safety and health standards at both sites is a question of entrepreneurial conscience.

Environment

Material and manufacturing

From the sourcing of raw materials to the completed solar module, manufacturing exclusively uses renewable energies. In Deitingen SO, the electricity necessary for the production is produced on site by means of a solar plant. The applied high-performance solar cells consist of high-purity silicon – free of cadmium, rare earths and heavy metals.

Recycling

The involvement with the Swiss foundation SENS and the European PV Cycle enables the reuse of almost 100% of the used material.

Electromobility

An own fleet of electric vehicles and free solar charging stations at the Deitingen production site reinforces the investment in future-orientated environmental technologies.

Quality

Awards

Megasol is an award-winning company. Many Swiss and European solar prizes testify to the trust that is placed in Megasol.

Certifications

The manufacturing processes are TÜV-tested and run in accordance with EN/IEC and ANSI/UL standards.

Traceability

Based on the individual serial number, all materials used for each solar module can be traced back to the raw material batch without any gaps.

Testing steps

Each individual solar module undergoes a multitude of test steps. These include electroluminescence tests, flash tests and visual controls. The company has its own test centre. Tests such as Damp Heat, Shockfreeze, UV Lifetime, Dynamic Load and Thermocycle ensure the durability of the solar modules.

Politics

Involvement

Despite enormous potential, photovoltaics require strong voices in politics. Through memberships in industry associations and interest groups, Megasol is involved in sustainable progress. The focus in everyday life is on concrete steps: appearances at conferences, provision of comprehensive information material for voting and guided tours for schools and political parties – also for those who are traditionally critical of environmental issues.

▲ Single family house in Oberwil-Lieli | FAST facade modules on stone wall | LEVEL roof-integrated system | Swiss Solar Prize 2018

▲ Weather radar station Owarna | Pointe de la Plaine Morte VS | 2'922 m.a.s.l.

Vision and vigour

Founder

Markus Gisler founded Megasol in 1993 in his youth. He directs the company as CEO and president of the administrative board. His vision led to the organic and continual development of Megasol Energy Ltd. The vision remains the driving force in everyday company life.

Markus Gisler, Founder and CEO

Vision

Solar modules by Megasol are intended as design material from which structures and pictures can be created. The integration of solar technology not only into buildings, but also into the living environment and consciousness of people, is the maxim.

Locations

The company consistently focuses on two locations. Development, administration and production are anchored in Deitingen SO, Switzerland. With a strong focus on customer proximity, individual design requirements can be met. 70 employees work in Deitingen. 120 employees work at the site in Ningbo, China, which specializes in large series and standard solutions.

Partnerships

The company has a wide network of architects, planning offices, investors, installers and operators. The company also fosters close partnerships with universities and both national and international research institutes.

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▼ Cleantech Businesspark in Deitingen