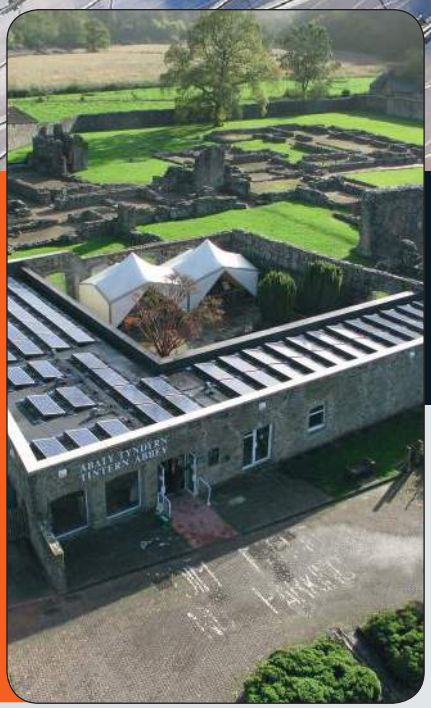
BAUDER



PHOTOVOLTAICS

- BAUDERSOLAR FLAT ROOF SYSTEM
- BIOSOLAR GREEN ROOF PV SYSTEM

OUR COMPANY

Who We Are

Bauder is one of Europe's leading manufacturers of flat roof waterproofing membranes and insulation products that has been owner-operated for over 150 years across 13 countries. We have an enviable reputation and track record for delivering the highest quality materials and service through supplying and project managing the installation of premier flat roof systems.

Our comprehensive portfolio of flat roof waterproofing systems, green roofs and photovoltaic energy delivers an extensive range of solutions to meet individual project needs without compromise.

"Manufacturing the highest quality roofing materials is one thing, but here at Bauder it is our total commitment and passion to work closely together with our clients to successfully deliver every product to the highest possible standard, that sets us above the rest."

Andrew Mackenzie
Managing Director
Bauder Ltd

What We Do

Bauder is fully committed to providing a complete service with an unrivalled level of support on all roofing projects, whether it's for a new build project or the refurbishment of an existing building.

Technical Expertise

Our large team of regionally based technical managers and site technicians will be on hand throughout the process, from specification design through to inspection of the installation and project completion to ensure a defect free finish.

Our technical department is the envy of the industry, providing a comprehensive and superior service with bespoke specifications individual to each project. Our support services ensure that products and materials all arrive on site when required providing an efficiency that all our clients demand.

Assured Quality

To ensure a consistent and proficient service, Bauder approved contractors are the only people fully trained and certified to install our products. We only approve contracting companies that possess the technical expertise and the organisational capacity to maintain an efficient and well-run site.

We have always operated a policy where we train and approve the individual installer and not just the company they work for. By taking installers with proven experience and demonstrating the techniques particular to our system, we can ensure the quality of workmanship that meets our clients' expectations.

Every operative receives an identity badge providing proof of competence, which is available for inspection at all times.

Guaranteed Satisfaction

Bauder is noted throughout the industry for the range of guarantees we offer that can cover design, products and installation. We unreservedly issue our guarantees on all projects because we monitor quality every step of the way from manufacture to finished installation.

PHOTOVOLTAIC SYSTEMS








Committed to utilising the very latest manufacturing technology, Bauder invests in a programme of continuous research and development to ensure every product and installation is ahead of industry standards, and that the needs of the environment are always kept in focus.

PHOTOVOLTAIC SYSTEMS

The Bauder photovoltaic solutions are specifically designed to deliver the most efficient energy generation solution on flat and green roofs whilst also ensuring the waterproofing system beneath remains completely intact and without compromise, which can occur when mechanically fixing or ballasting onto waterproofing membranes.

The entire installation process of both of our photovoltaic systems is quick and simple. Only our approved contractors, engineers and installers are fully trained and certified to install our unified rooftop solutions.

Through our systems we guarantee the entire Bauder specified roof package rather than a separate element, giving single source point of contact and responsibility to reduce risk.

Key Features

- Risk-free installation due to penetration-free fixing methods to the flat roof and tool free installation of modules is quick and simple.
- Range of PV modules available to suit client needs and budget.
- Lightweight systems.
- Single source for complete design and supply of waterproofing and PV array with clear accountability.

We have two systems within our photovoltaic portfolio:

BauderSOLAR for Flat Roofs

The BauderSOLAR flat roof PV solution is suitable for new build and retrofit projects and features a mounting system that is secured to the roof using membrane-to-membrane welding techniques on our bituminous or single ply waterproofing.

The modules are positioned at a 12° angle to maximise the roof space for energy generation. The system is lightweight at 9-12.5Kg/m^2 depending on the modules selected.

Bauder BioSOLAR for Green Roofs

Bauder BioSOLAR is a unified solution for mounting solar PV arrays on a green roof where the substrate and vegetation provide the ballast to secure the array.

The layering of systems and the height at which the panels are positioned allow for vegetation to establish across the entire roof area enabling it to achieve an enhanced BREEAM rating compared to systems that adjoin each other. The system is suitable for both new build construction and retrofit projects.

The modules are raised above the substrate and angled at 15° to optimise the capacity for solar energy production and green roof area so that both can easily occupy the same space and work in synergy. In alternative systems the technologies compete against each other for room, dividing the roof area between them.

TECHNICAL CREDENTIALS

PV Partner – Assuring Quality

We provide the ultimate solution for our clients through our partnership with Aleo Solar as we trust their uncompromising quality standards to ensure that every module produced delivers the same quality output and high efficiency. Alternatively, we can also work with a client's chosen supplier to deliver the precise energy solution desired. Either way, our ethos is to work so that every photovoltaic installation is as good as the next one.

It is all too common that performance and quality can vary dramatically between/amongst manufacturers, even if the same cells are used and the modules appear to be similar; and so it becomes increasingly apparent that the superiority and reliability of the manufacturer is far more important than selecting modules by output statements alone.

The BauderSOLAR solutions utilise high efficiency Aleo Solar modules with panel options ranging from 255W to 300W to suit client needs and budget, alternatively a range of modules can be supplied to meet the project's individual needs.

APPROVED PRODUCT

MCS

SOLAR TRADE ASSOCIATION

PV CYCLE

Maximising the Roof Area

Our photovoltaic solutions are designed to be installed to allow for the maximum number of modules to be installed on the roof area for both east-west or north-south orientations. This gives prime energy generation from the roof compared to standard 30° fixed tilt solutions.

Regulations, Guidelines and Standards

Our products are built in accordance with applicable standards and technical regulations and therefore correspond to all relevant technical standards. This applies to both material selection and structural design.

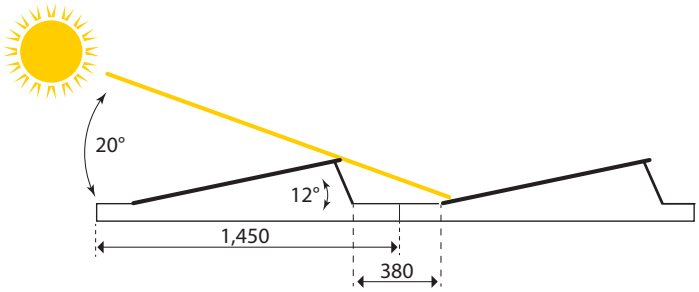
BSEN 62446 Grid Connected Photovoltaics
BSEN 61853-1 Defining Solar Photovoltaic Power
BSEN 1991-1-4 Wind Actions on Structures

The aluminium alloy framed modules are certified through VDE (IEC 61215 Ed. 2, IEC 61730-1 Ed.1 and IEC 61730-2 Ed. 1)

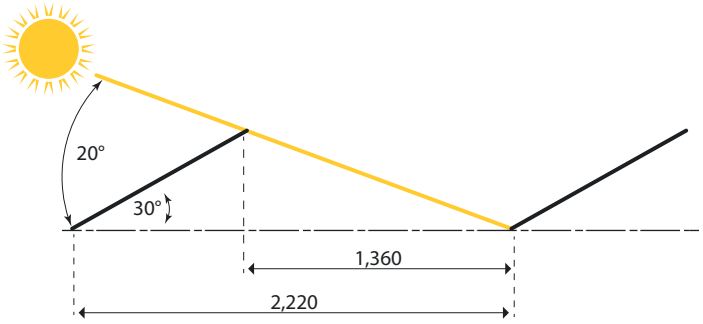
Array Designs

Bauder PV array proposals are designed to meet MCS requirements and IET codes of practice.

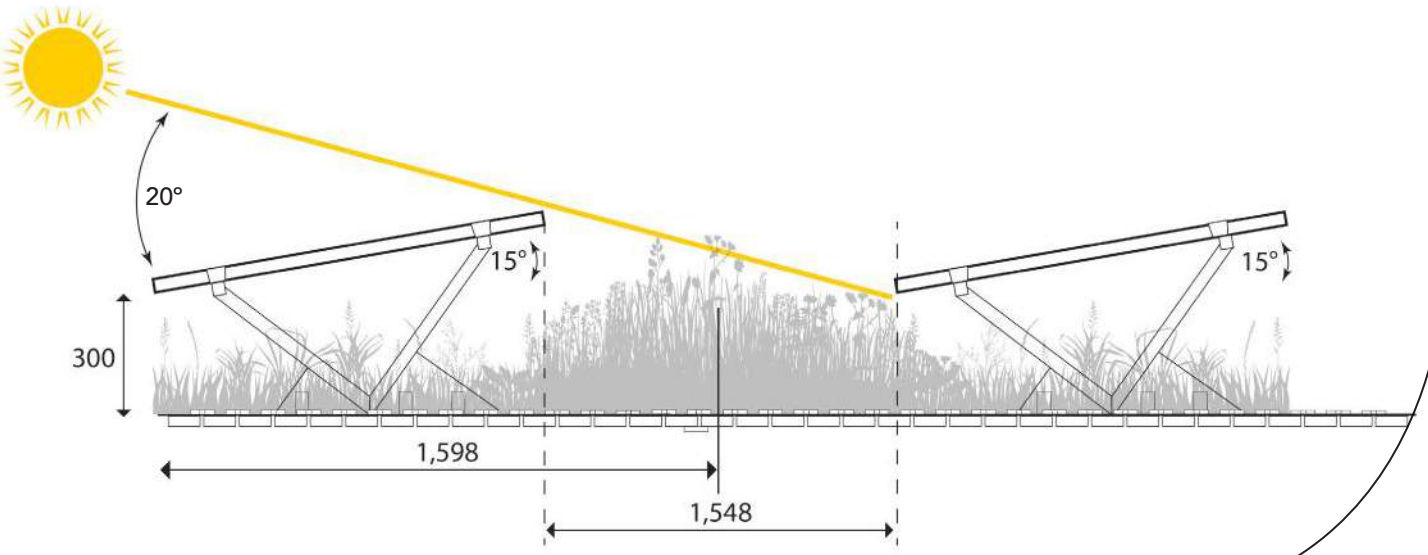
BauderSOLAR panels installed at 12 degrees on a flat roof



Typical panels installed at 30 degrees



Bauder BioSOLAR panels installed at 15 degrees



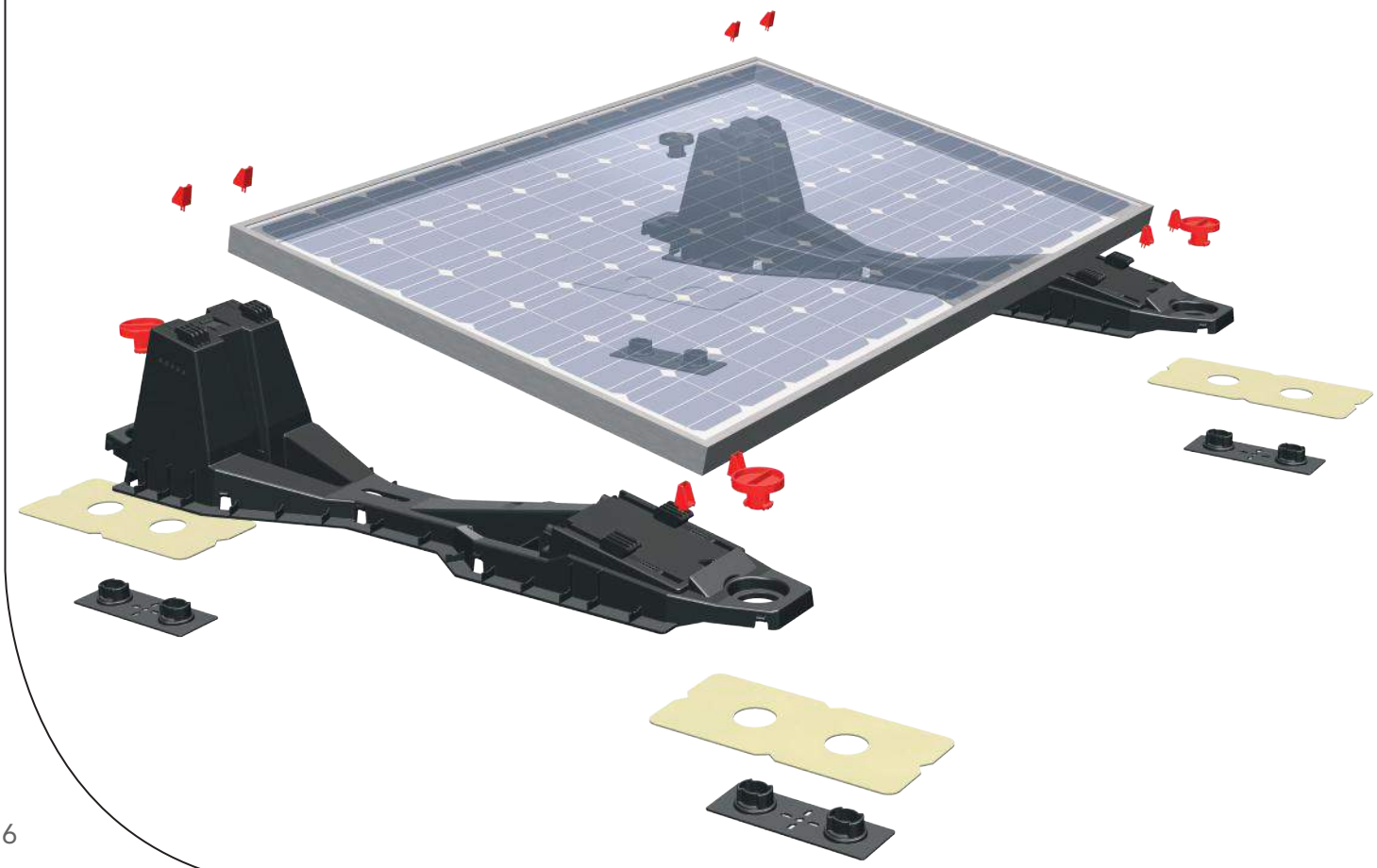
BAUDERSOLAR
Photovoltaic Energy for Flat Roofs

The BauderSOLAR flat roof PV mounting solution is an aerodynamically optimised system for framed modules suitable for both new build and retrofit projects. The mounting units are secured to the roof using membrane-to-membrane welding techniques on our bituminous or single ply waterproofing systems. This installation method means that the roof is not compromised by penetrations for fixings nor is it ballasted, which would add additional weight loading to the roof.

Our combined solar array and waterproofing offer provides a single-source solution with clear accountability to reduce risk and bring peace of mind through all aspects of the flat roof.

Key Features

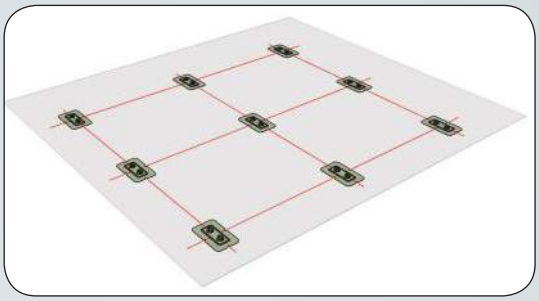
- Risk-free installation due to penetration-free fixing methods to the flat roof waterproofing.
- Lightweight system 9-12.5Kg/m², depending on the module selected.
- High output to roof space ratio.
- Aerodynamic to reduce the impact of wind uplift.
- Low profile with modules set at 12° which can overcome some planning challenges.
- Single source for complete design of waterproofing and PV array with clear accountability.



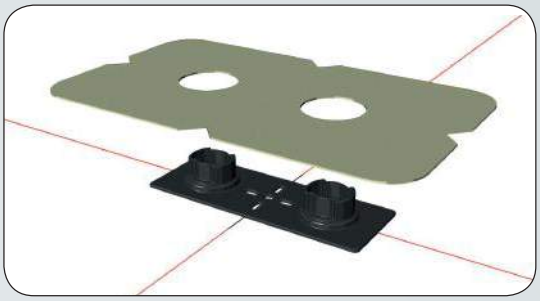
SECURE INSTALLATION

The distinctive element of our lightweight PV energy system is the pre-fabricated Bauder membrane sleeves which slip over the mounting plates and are welded into position, anchoring the plates to the surface of the Bauder waterproofing system. Once this is completed, the rest of the PV installation is simply locked into place without any requirement for tools or sharp fixings.

The attachment of the mounting components is very stable so that even in extreme weather the entire array is secure on the roof. Any minor movement of the panels, which is generally created by wind uplift, is easily tolerated and does not affect the fixings, or waterproofing system.



1. Positioning the Baseplates
The baseplates are plotted and measured out to ensure correct positioning according to the array design.



2. Attaching to Roof Surface
The waterproofing membrane sleeves are placed over each of the baseplates and welded into position.

The large attachment footprint is very stable and the entire array is secure on the roof even in extreme weather.

3. Installing the Substructures
The substructures are positioned over the mounting plates and locked into place.

The distance between the module rows is always 1450 mm due to the fixed length of the substructures.

4. Placement of the PV Modules
The PV modules are placed on to the substructure mounting system and secured using a tool free fixing method.

BAUDER BioSOLAR
Integrated Photovoltaic Green Roof

Bauder BioSOLAR is an integrated mounting solution for photovoltaic renewable energy with a green roof where the substrate and vegetation provide the ballasted installation mechanism, which removes the need for penetrating the waterproofing to secure the mounting units to the roof.

A key element of the BioSOLAR system is that the front edge of the PV panel is set at around 300 mm above the level of the substrate, that allows growing room for the extensive vegetation without blocking light to the polycrystalline solar cells which would otherwise reduce the output and efficiency of the panels. This height setting also enables light and moisture to reach beneath the panel to support the plants below.

Key Features

- Maximises solar output and allows entire roof to qualify as biodiverse green roof.
- No roof penetrations as the green roof substrate acts as ballast, ensuring that the waterproofing guarantee remains uncompromised.
- Quick and simple installation process.
- Cost competitive compared with a mechanically fixed alternative.
- Raised modules allow light and moisture under the panels so reduces the unproductive area.
- System can be retrofitted on many roofs without structural modification to the building.
- Single point responsibility for the waterproofing, green roof and PV installation.
- Increased module space between substrate and panels reduce risk of panel damage during green roof maintenance.

Improved Solar Panel Efficiency

The combined green roof with PV delivers advantages to the building as the cooling effect of the vegetation and water held within the green roof system preserves the ambient temperature around the photovoltaic array. Studies in Germany have shown that PVs work more efficiently with an ambient temperature of around 24°C and when an array is combined with a green roof, the panels can be expected to achieve around a 6% higher output.

Varied Habitats for Flora and Fauna

The mixture of sunny, shaded and sheltered areas together with a variable depth of FLL compliant extensive substrate gives a matrix of different habitats which allow a broader range of plant species to thrive, and small invertebrates to seek refuge from strong wind and rain. The broad mix of flowering vegetation provides a rich foraging environment for bees and insects.

SECURE INSTALLATION

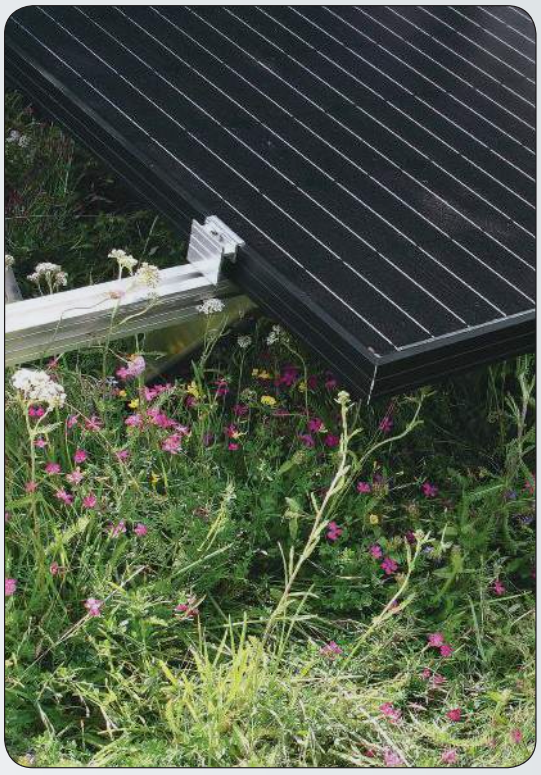
The mounting board for the PV green roof is a bespoke moulded landscaping component manufactured from HDPE with a deep recessed profile that provides water storage and multi-directional drainage whilst also providing a repository for the green roof substrate. A support profile is formed in the centre of the board to which the mounting arms are attached.

The boards are positioned on the top of separation and protection layers which prevent mechanical damage to the waterproofing, just as they would be specified on a conventional green roof.

1. **Positioning the Mounting Boards**
   The mounting boards are positioned according to the array design with any areas between boards or around the perimeter are finished using Bauder DSE 40 drainage board.

2. **Attaching the Railing System**
   The aluminium arms and carrier rails are fixed into position

3. **Installing the Substrate and Vegetation**
   The substrate is poured into the mounting board and vegetation is introduced according to the specified desired finish.



4. **Placement of the PV Modules**
   The PV panels are secured to the carrier rails with clamps.

OUR SERVICE

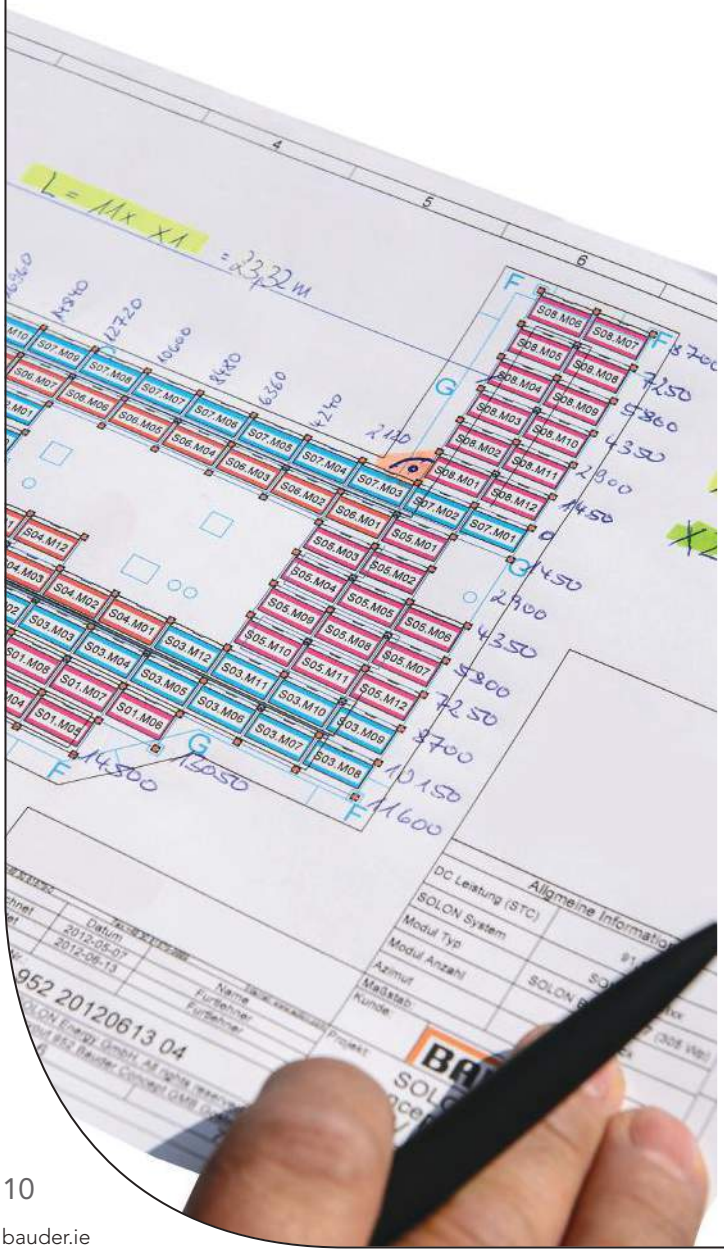
Your project is important to us and our service is dedicated to providing a photovoltaic solution that fully understands all the individual issues of the project and answers the waterproofing needs of the building, as well as any green roof requirements.

New Build Construction

Your roof design and PV array can be complex, especially if it has countless elements of equipment sited on the roof; we work with you to ensure all the roof detailing is robust and accurate. Our technical managers meet you and from your plans they will produce, alongside our technical department, a specification package and technical layout for the waterproofing, PV units and system engineering ready for the tendering process.

Retrofit Roof Projects

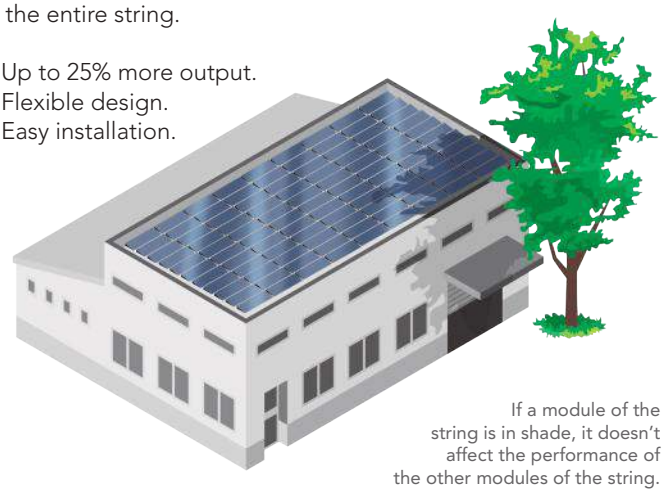
We will survey and fully inspect your current roof and with the aid of your structural engineer's report and we will propose the right option to suit the building and required energy outputs.



System Optimisation

The power optimiser replaces the traditional junction box and is responsible for determining the individual MPP of each module. This ensures that shading, for whatever reason does not impact on the entire string.

- Up to 25% more output.
- Flexible design.
- Easy installation.



If a module of the string is in shade, it doesn't affect the performance of the other modules of the string.

Remote Monitoring

Web based, module level monitoring increases the reliability by ensuring that problems can be identified and dealt with extremely quickly, providing the most productive performance on a permanent basis.

- Cost effective maintenance.
- Automatic alerts.
- Easy access to real time data.

Optimized by solaredge

We strive to specify the best quality, innovative inverters, such as Solar Edge, that have a range of benefits to both the end user and installer. The Solar Edge inverters allow the system to be monitored and managed as easily as possible.

SIX STEPS

1: Brief and Consultation
You give us your remit either at your office or on site. We will discuss the roofing project, your budget and how the programme of works can be formulated to maximise your benefits from the use of PV.

2: Design and Specification Service
You will receive the detailed specification package for your project, which answers your brief and includes a technical layout of the PV units and system engineering.

3: Grid Connections and Funding Options
Our in depth understanding of energy efficiency funding can help you find the financial package that best suits your circumstances. We can help size the array for optimum return on investment based on electricity consumption data supplied, and assist with necessary paperwork to register the solar installation with the national electricity network.

4: Contractor Selection
Your Bauder technical manager will assist in the selection of appropriate contractors from a national network of MCS accredited contractors who are approved in the installation of Bauder's various roof and PV systems. Once the contractor has been appointed, a pre-contract meeting will make sure the project delivery is well coordinated. The works are closely monitored by Bauder site technicians with regular inspections to ensure quality and waterproof integrity of the final scheme.

5. Sign Off and Guarantee
A full final inspection is undertaken by the Bauder PV team on completion of the works with the energy performance of the array assessed. Comprehensive guarantees for the roof and PV system are provided.

6. Monitoring and Maintenance
Proactive monitoring systems enable us to ensure the maximum possible energy generation and financial return over the system's lifespan, and to identify faults or maintenance requirements remotely. After the project has been successfully completed Bauder can continue to support you with aftercare advice and post occupancy evaluation.

INSTALLATIONS GUARANTEED

Installations
You can be assured that your photovoltaic installation will be of the highest quality as we only allow fully trained and certified Bauder approved contractors to install our rooftop solutions.

Approved Contractors
Our national network of approved contractors are given all the training, support and expert advice they need in order to deliver a high quality roof installation that we are proud to put our name to.

We look to build strong working relationships with all of our approved contractors, as we recognise just how essential the quality and experience of the installing operative is to ensuring a successful project.

Bauder Site Technicians
Once your roofing works commence, our experienced team of site technicians will monitor and inspect the workmanship at key stages to ensure that the standards required to meet our guarantee are fulfilled, as well as providing you with easy to understand reports on how the works are progressing.

Our national team is the largest of all the manufacturer-suppliers, ensuring all our sites receive the attention they deserve.

Guarantees
A full final inspection is undertaken by the Bauder PV team on completion of the works with the energy performance of the array assessed. Comprehensive guarantees for the roof and PV system are provided.

Your completed roof package will be backed up by what we can confidently claim to be the most comprehensive guarantee range in today's roofing industry, giving you total reassurance with regards to the future performance of your building's roof and the PV installation.

Unlike others in the market, Bauder offers a full range of guarantees that can cover product, design and workmanship. Our guarantee provides you with complete satisfaction and will be bespoke to your project and its requirements.

We issue our guarantees unreservedly as part of our service because we monitor quality every step of the way from manufacture to installation.

Guarantee Options

- Products supplied by Bauder (exclusions exist).
- Workmanship and installation of Bauder products by our Approved Contractors.
- Design, advice, formula and specification where Bauder products are concerned.
- Financial loss from building damage due to faulty manufacture or installation of Bauder products.
- Consequential damage through Bauder waterproofing system failure due to faulty manufacture or installation of Bauder products.

CASE STUDIES

BAUDER BUILDING BOARD

Project	Hethel Engineering Centre
Location	Norwich
Investor	Norfolk County Council
PV Roof Area	500m²
PV & Electrical Installer	Voland Asphalte

Hethel Engineering Centre

Hethel Engineering Centre (HEC) supports high performance engineering companies located throughout Norfolk. The original building at the centre had been operating at maximum capacity and they urgently required a new facility to satisfy increasing levels of demand. The client wanted the new building to meet an extremely high level of sustainability using key renewable technologies, such as photovoltaics (PV), to minimise its environmental impact.

The installed PV array maximised the assigned roof area with 160 modules inclined for optimal energy performance, enabling HEC to generate at least 44.23 Megawatt Hours of solar power each year.

The PV system was fitted without any penetration of the waterproofing or roof deck, ensuring the integrity of the roof was completely upheld. The work was completed on time and to budget, providing the client with an innovative roof that boasts extraordinary environmental credentials.

APPLIED PRODUCTS

- 160 PV modules were installed with an expected energy generation of 44.23 MWh and a kWp of 47.20.
- Each module weighs just 23.8Kg and is 1,973(h) x 993(w) x 5.3(d) mm.

BAUDER BUILDING BOARD

Project	Tintern Abbey Gift Shop
Location	Tintern, Wales
Investor	Cadw (Welsh Historic Monuments)
PV Roof Area	630m²
PV & Electrical Installer	J Randall Roofing

Tintern Abbey Gift Shop

Situated in Tintern, the Cistercian abbey is one of the most historic ruins in Wales. In 2013 work started to replace the gift shop roof, which had exceeded its serviceable life.

The brief was to not only repair the roof, but to bring the abbey to the forefront of roofing technology with the installation of a state-of-the-art PV system. Given these requirements, BauderSOLAR's innovative PV solution with power optimiser was a natural choice. This unique system allows for web-based monitoring of the modules, identifying irregularities and increasing output by up to 25%.

Roof areas totalling 630m² were fitted with 57 PV Modules, enabling the abbey to generate at least 14.05 Megawatt Hours of solar power each year. Tintern Abbey has been recognised by many award-giving bodies for its sustainability, including the NFRC.

APPLIED PRODUCTS

- BauderSOLAR is an innovative renewable energy source that is secured to the roof without any penetration of the waterproofing or roof deck.
- 57 PV modules were installed with an expected energy generation of 14.05 MWh

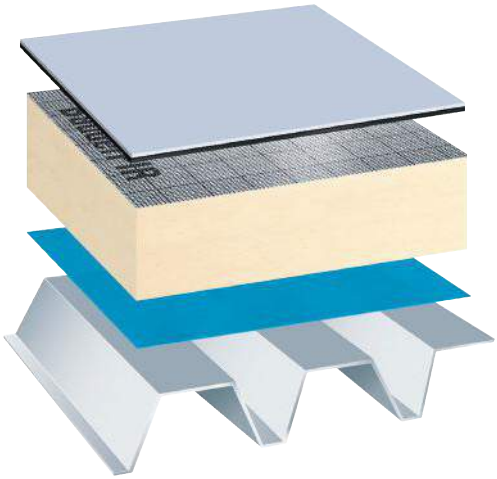
WATERPROOFING OPTIONS

The Bauder portfolio of waterproofing systems ensures we impartially match the right solution for every project whether new build or refurbishment. These are our further options for roof covering systems to accompany a PV solution:

Single Ply Systems

Our single ply roofing systems are ideal for lightweight, fast track and cost effective construction projects. The systems provide solutions that are durable, resistant to the natural elements and are able to support extensive green roofs.

- Projects: New build or refurbishment.
- Construction: Warm, cold and inverted roofs.
- PV System: Green roofs and BauderSOLAR flat roof.
- Certification: BBA, FM Approval.
- Guarantees: Full range to accompany the PV system.



Bitumen Membrane Systems

Our long-established and fully integrated roof systems incorporate SBS modified elastomeric bitumen membranes and highly efficient PIR insulation to give a robust waterproofing solution with long-term durability and life-expectancy. These systems are ideal for all types of green roof scenarios and solar PV.

- Projects: New build or refurbishment.
- Construction: Warm, cold and inverted roofs.
- Upgrades: Green roofs and BauderSOLAR flat roof or BioSOLAR photovoltaics.
- Certification: BBA.
- Guarantees: Full range to accompany PV system installed.

Hot Melt Structural Waterproofing

The Bauder Hot Melt Structural Waterproofing System can be installed on decks with zero degree falls.

- Projects: New build.
- Construction: Cold and inverted roofs.
- Upgrades: Green Roofs and BioSOLAR photovoltaics.
- Guarantees: Full range to accompany BioSOLAR PV system.

ONLINE TECHNICAL RESOURCES

At Bauder, our service is free to you and covers all elements for a successful project delivery from initial concept or site survey, through to specification package with bespoke drawings and calculations, on site monitoring and final sign-off and handover.

We appreciate that there are times when you need resources to get your project started and the Bauder online technical centre will support you. By registering on our site you will get free and unlimited access to everything from specifications, CAD drawings and BBA certificates to DoPs, datasheets and design guides.

www.bauder.co.uk/technical-centre

BAUDER

UNITED KINGDOM
Bauder Limited
70 Landseer Road, Ipswich, Suffolk IP3 0DH, England
T: +44 (0)1473 257671 **E:** info@bauder.co.uk
bauder.co.uk

IRELAND
Bauder Limited
O'Duffy Centre, Carrickmacross, Co. Monaghan, Ireland
T: +353 (0)42 9692 333 **E:** info@bauder.ie
bauder.ie