



Case Study Weser-Stadion Bremen

The new Bremen Weser-Stadion: A Home Match for the Future

The Real Football Feeling. It took almost three years to reconstruct the Bremen Weser-Stadion into a pure football arena. Fans are now getting an absolutely first-hand football experience. The whole spectator area including the curved fan stands has been moved close to the pitch, allowing for an even better view of play. However, in the new Bremen Weser-Stadion, the winner is not only football, but also the environment. Following the slogan “A Home Match for the Future”, a novel energy concept was realised.



The core of this energy concept is a state-of-the-art building-integrated 1.2 MWp PV system contributing to the shape and design of the building structure. PV modules have been integrated into both the new circumferential facade and the stadium roof which is slightly sloped outwards. The building shell is made of glass-bonded flat PV modules. Along the outer ring of the completely refurbished stadium roof the world's first power-generating, multi-purpose waterproofing membrane EVALON® Solar, made by

alwitra GmbH, Trier, Germany, was installed as a PV system. The inner roof ring consists of semi-transparent PV modules.

Consortium PV Roof Weser-Stadion

For carrying out the roofing works on the Weser-Stadion, which took nearly three years, the roofing companies W+M Flachdachbau GmbH in Bremen, Schneider-Dach-Fassaden-Abdichtungen GmbH in Papenburg and Schneider Dach Fassade Abdichtungen



▲ The new Bremen Weser-Stadion - a state-of-the-art football arena providing a total PV capacity of 1.2 MW

Reconstruction of the Bremen Weser-Stadion within two halves and an extra time

GmbH in Westerstede partnered in the “Consortium PV Roof Weser-Stadion”. With a view to coordinating and executing all electrotechnical works, the Consortium also contracted an electrical installation company.

Alternating between playing and building the project, which was divided into several construction phases, began in 2008 with the dismantling and subsequent rebuilding of the northern and southern stands (1st construction phase). Naturally,



▲ 3th construction phase: Rebuilding the western curved stand



▲ 1st construction phase

construction work could only be carried out between matches. In a second construction phase, the power-generating waterproofing membranes were installed on the new roof of the western curved stand (2010), and the third and last construction phase saw the installation of EVALON® Solar waterproofing membranes on the roof of the eastern curved stand (2011).



▲ 4th construction phase: Construction works at the eastern curved stand completed

Where passion meets power:
The new Bremen Weser-Stadion with EVALON® Solar.



The new roof of the Bremen Weser-Stadion with EVALON® Solar.

Completely new roofs

As a first step, on all new-built roof areas an even and load-distributing substrate had to be achieved for the further roof build-up. To this end, steel workers installed plain sheet metal on the trapezoidal sheet profiles and fixed them with screws through the corrugation ridges. Subsequently, roofers applied 30 mm thick refurbishment insulation boards. These highly compressed, extremely hard and thin roof insulation boards consisting of incombustible mineral wool, on



▲ Dismantling the old roof build-up



▲ Installing plain sheet metal for an even roof area

the one hand, serve as an even substrate for the multi-purpose, mechanically fastened EVALON® Solar roof waterproofing and, on the other hand, allows trunking, of the same height as the insulation, to be installed, so that the PV cables can run neatly under the waterproofing membrane. Of the total roof area of approx. 18,000 m², 10,470 m² were waterproofed with a total of 1,736 EVALON® Solar waterproofing membranes. The connecting cables were bundled up in cable conduits under the roof waterproofing. In accordance with the installation plan designed by the alwitra application engineers the cables were run to the mains inverters placed behind the facade.

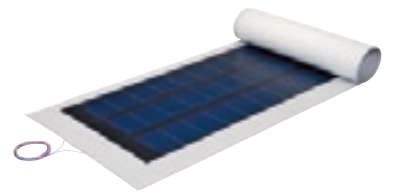


▲ Inverters

Flat roof and solar technology: If there's one thing we know, it's both.

Multi-purpose waterproofing membrane

A special advantage of the multi-purpose roof waterproofing is the convincing combination of the proven EVALON® waterproofing membranes and flexible PV modules. Like any standard waterproofing membrane, EVALON® Solar is installed on the roof directly from the roll. The flexible and light-weight UNI-Solar® PV modules are all-side weatherproof in a transparent polymer encapsulation and full-size laminated to the synthetic waterproofing membranes. The patented connection system allows for weatherproof installation of all connecting cables underneath the roof waterproofing. With an extremely light weight of only 4 or 4.3 kg/m², EVALON® Solar can also be applied on roof constructions with a low load bearing capacity. No need for expensive support frames or additional heavy-duty constructions like concrete bases or gravel-filled elements for bedding and securing the position of the membrane.



Rough going not only inside the Bremen Weser-Stadion



▲ Exposed location directly near the river Weser

The location of the stadium is another challenge, as the football arena with its 27 metre high roof lies in close vicinity to the river Weser. The area of Bremen is located near the coast and thus in wind zone 3, according to DIN 1055-4, position stability against wind uplift. This had to be considered while securing the EVALON® and EVALON® Solar membranes against wind uplift on the entire roof of the Bremen Weser-Stadion.

For wind load transmission into the supporting structure, plain sheet metal was installed on the trapezoidal sheet profiles. Furthermore, the plain metal sheets allow for mechanical fastening of

the roof waterproofing and the power-generating waterproofing membranes irrespective of the corrugation ridges. For mechanical fastening in the membrane seam area approved fasteners with stainless-steel screws and washers were applied. Fastener spacing on the individual roof areas was determined according to the results of a wind load survey. The resulting data provided the basis for the fastening plan. The individual calculation for wind uplift security and the fastening plan were also designed by the alwitra Technical Department. The membranes were connected by hot-air welding in the seam area.

Conclusion:

Visitors of the Bremen Weser-Stadion will now experience sports and energy at first hand: The state-of-the-art photovoltaic installation integrated into the stadium generates more than one million kilowatt-hours of electricity per year which equals the power consumption of more than 300 households. Thus, the Bremen Weser-Stadion has not only the largest building-integrated photovoltaic installation in Germany, but, as the first big sports facility, also sets a course for new construction and energy ideas.

A Home Match for the Future: A win-win situation for both football and the environment.

About 10,470 m² of the stadium roof area of approximately 18,000 m² are covered with the world's first power-generating waterproofing membrane EVALON® Solar. This amounts to a total power yield of around 511 kWp, i. e. 156 kWp from the curved stands each, 103 kWp from the southern stand and 96 kWp from the northern stand. Together with the other PV systems installed at the stadium, the total installation area amounts to almost the size of two football pitches annually generating up to 1.2 MW of electric power. Resulting in an annual reduction of CO₂ emissions of 450 tons. As for planning and funding, the Bremen Weser-Stadion GmbH and the SV Werder Bremen are supported by the utility companies EWE AG and swb AG. Professional design of the building-integrated photovoltaic system was carried out by Decker & Mack GmbH Solar Engineering, Hanover.



alwitra in brief

alwitra Flachdach-Systeme in Trier, Germany, is a supplier of complete flat roof systems operating globally for more than four decades. In addition, alwitra ranks among the leading experts for designing and implementing state-of-the-art photovoltaic systems on flat and low slope roofs. The comprehensive product range includes waterproofing membranes EVALON® and EVALASTIC®, the world's first power-generating waterproofing membrane EVALON® Solar, as well as aluminium profile for roof edge trimming and integrated details like rainwater outlets, vents and rooflights. Furthermore, alwitra is a member of numerous national and international associations.

Project data

Roof-integrated PV system with a total capacity of 511 kWp

Roof of the eastern curved stand:	156 kWp	Construction time:	2008 - 2011
Roof of the western curved stand:	156 kWp	Roof area m²: approx.	18,000
Roof of the southern stand:	103 kWp	Solar area m²: approx.	10,470
Roof of the northern stand:	96 kWp	Number of EVALON® Solar waterproofing membranes:	1,736

Construction site sign

Principal:	Bremer Weser-Stadion GmbH, Bremen
Investor:	EWE AG, Oldenburg
Partner:	swb AG Bremen
Overall planning:	ProCon Ingenieurges. für wirtschaftl. Bauen mbH
PV planning:	Decker & Mack GmbH Solar Engineering, Hanover
Installers:	Consortium PV Roof Weser-Stadion: W+M Flachdachbau GmbH, Bremen Schneider Dach Fassade Abdichtungen GmbH, Papenburg Schneider Dach Fassade Abdichtungen GmbH, Westerstede
Electrical contractor:	Elektro-Strohschein GmbH, Bremen
Material:	EVALON® Solar, EVALON® V
Manufacturer:	alwitra GmbH & Co., Trier

