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10/2009

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Company profiles

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4/2009

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“Fuel stations” for everyone



The character of solar carports is changing as feed-in tariffs continue to fall: the once simple PV area with elementary rain protection has evolved into an integral concept, placing architecture and a new quality of mobility on two or four wheels in the foreground.

Sunside carports use a wooden construction and transparent modules for a light atmosphere and a good carbon balance.

Photo: Holzbau Gröber GmbH

The basis for PV profitability calculations is not only changing for systems mounted on house roofs. “In the past, a solar carport practically financed itself, but that has become much more difficult under the current framework conditions,” says Hans Fuchs, Project Consultant for German mounting system manufacturer Schletter GmbH. We are heading for a paradigm shift: today, solar carports are increasingly elements of a broader mobility concept. One example for such concepts is that of an integrated “solar fuel station”. At the same time, the aspects design and corporate identity are gaining in importance.

“It all began with the car park at juwi AG in 2008,” as Fuchs recalls, “and the sales figures have been increasing ever since. We have built carports with outputs from 2 kW to 6 MW.” The biggest installation of its kind stands in Piadena in Italy. The spectrum of customers ranges from private home-owners, via supermarkets to municipal authorities planning park-and-ride facilities or large-scale parking for event venues. A further major segment is that of companies connected in one way or another with environmental engineering, who choose to cover their staff car parks. Particular attention is paid to the practical benefits, for example the protection against intensive sunshine, snow, rain or hail. In this connection, Fuchs mentions an important target group: “For the automobile industry and car dealers, the hail protection function can lead to a significant reduction in insurance premiums.” Schletter has already built carports for the distribution centres of various car manufacturers.

A modular system has been developed for both single- and double-row parking arrangements. This system serves as the basis for standardised mono- and duo-carports for private home-owners and small businesses. Contrary to larger projects, carports with one or two parking spaces generally require no specific building permission. A single-vehicle carport is often fitted with nine standard solar modules (165 x 99 cm), which is sufficient for an output of 2 to 2.5 kW. For larger carports, it is usual to calculate approximately 2 kW per parking space. To ensure maximum, unrestricted “drive-in” accessibility, the aluminium supports are designed in the form of a “Roman IV” (single row) or “W” (two vehicle rows). Double-row parking spaces in north-south alignment are erected with roof areas inclined in the east and west directions. The exact dimensions vary according to customer wishes and the installed modules.

“We build with roof inclinations between 5 and 20°, though the range 10 to 15° is most favourable,” says Schletter technician Stefan Reitz. For double-row parking with a plane roof area, a lower inclination of around 10° is recommended, so that the ridge of the roof does not become too high. The structural stability must be assessed individually for each carport, taking into account the regulations applicable for the specific location. The most important point is the foundation, which may be produced using either cast-in-situ concrete or so-called “micropiles”. In the latter case, profiled hollow bars are drilled into the ground and pressure-grouted at a pre-defined pres-

sure, whereby the grouting is forced into the cavities in the soil. Reitz: "That leaves a concrete structure which is anchored in the ground like the roots of a tree." Depending on the condition of the soil, the piles are driven to a depth between 2 and 6 metres, with two piles serving as the anchors for each prefabricated concrete element. Especially for existing car parks, micropile foundations can be realised quickly, with a minimum of excavation. The larger the parking area, the more economical the use of the drilling rig.

Carports from Cologne-based Energiebau Solarstromsysteme GmbH require no excavations whatsoever: they are mounted on massive concrete blocks which provide for the necessary stability by way of their weight alone. "In all normal situations, up to wind and snow load zone 2, that is no problem," says Stefan Gerding, who is responsible for electromobility projects at Energiebau. The chosen approach speeds up erection enormously – and likewise later relocation. Commercial users retain flexibility for site expansion, and private families can simply dismantle the portable system and take it with them should they ever move home. Where a carport is accessible to the public, the regulations stipulate collision protection with a height of at least 50 cm for the supporting structure. This function is provided by the concrete blocks. For single-row standard carports, Energiebau also uses prefabricated concrete elements at the space ends. "Drive-through" carports are available to cater for double-row parking and can

be supplied in the variants "Heavy Duty" with a clearance of at least 4 metres and "Butterfly" with an east-west roof.

Pillar-free for maximum convenience

To achieve maximum parking convenience for drivers, the solar system house mp-tec GmbH & Co. KG has eliminated all lateral support members. The "solar-carport comfort" is restricted by steel pillars only at the back of the parking spaces. Arau Technik GmbH (Arausol) is another supplier of single- and double-row carports in this cantilever design. Siso GmbH, on the other hand, bases all its carports on a proprietary mounting principle, wherein a special screw cuts its own thread into a continuous mounting channel. As this principle functions at any point of the metal channel, the carport frame can be tailored precisely to the local circumstances. As one of only few manufacturers, SolarWorld AG offers its single-vehicle SunCarport in a version with inclination to the side. This permits an optimum solar yield for parking spaces in east-west orientation. "Our design department plans larger carport installations as individual projects," says SolarWorld PR Manager Anne Schneider. Such projects have been realised above all in the USA. Single and double carports, on the other hand, are supplied as so-called "Sunkits", with modules and inverter as a complete package.



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The Self Energy system developed by Giulio Barbieri combines a charging station with mini-carport.

Photo: Giulio Barbieri

Sustainability with wood

For the roof material, most manufacturers use trapezoidal sheet metal which is subsequently screwed to the rafters or profile beams from below. The concept chosen by Holzbau Gröber GmbH is based on the installation of transparent modules. To this end, the company cooperates with module manufacturer Fath Solar GmbH and makes use of the latter's in-roof system. "When the sunlight shimmers through, it produces the same light-and-shade effects as if you were standing under a tree," says Christoph Gutmann, Sales Manager at Holzbau Gröber. Holzbau Gröber generally builds its "sunsides" carports from glued laminated timber. Alongside its appearance, wood possesses one unrivalled advantage. Gutmann: "The carbon balance is significantly better than that of steel or aluminium." Regenerative energy and sustainable construction thus go inseparably hand in hand. It must be said, however, that the company also presented a cantilever design with round steel pylons for the first time at Intersolar 2012. In double-row parking situations, this variant best guarantees unrestricted door opening for the vehicle passengers.

Module and in-roof system manufacturer Galaxy Energy GmbH also attaches particular importance to aesthetics. The company's product range includes "Edition" modules with black, blue or transparent rear foils. They are intended especially for future integration into own carport constructions with square steel tubing and in-roof solar system, where they serve to add an individual design touch. Freiburg-based ClickCon GmbH & Co. KG uses glass-glass modules matched to its new PowerPort. Cooperation partner SI Module GmbH supplies the panels with so-called bifacial solar cells. "Cells which are active on both sides achieve 10 to 20 % higher yields by utilising the light reflected from underlying surfaces," says ClickCon Managing Director Alexander Koller. "The composite safety glass of the modules is only 2 x 2 mm thick. A module thus weighs only 23 kg and is much lighter than previous glass-glass mod-

ules." With the type Enduro, the junction boxes are integrated into the frame. The new modules are installed as an insert-and-click in-roof system. Aluminium sheets take care of rain drainage. According to Koller, the aluminium underframe is also used for cable routing. In the future, ClickCon plans to offer the PowerPort also as a complete set with integrated charging facility.

"Fuel up" with electricity

All the manufacturers supplying solar carports emphasise the option of realising an autonomous source of mobility drive energy. Only a few, however, offer own products to actually utilise the available solar energy. "There is a lot of interest in charging systems, but little actual demand, simply because there are still too few electric vehicles on the road," says Christoph Gutmann from Holzbau Gröber. Consequently, many carport builders fall back on the charging infrastructure of proven manufacturers. One of the foremost companies in this field is Mennekes Elektrotechnik GmbH & Co. KG, which developed the standardised – and in the meantime widely used – Type 2 charging connector with seven contact pins. The "Mennekes connector" is also suitable for fast charging with three-phase power. The charger product range covers the full spectrum from simple home chargers for the garage, to charging columns and full charging infrastructures for public parking facilities. All 13 charging station types possess two charging points with Type 2 connectors.

Small complete systems which place the e-mobility charging function in the foreground have been developed by Giulio Barbieri S.p.A. from Italy: the Self Energy system combines a charging station with a 5-metre-wide mini-carport. The standard version is fitted with only six PV modules, but the roof area can be completed with additional modules or plain glass panels. The electronic components – batteries, charge regulator, inverter and operating panels – are accommodated in three boxes directly beneath the 20° inclined roof. The roof front and side panels can be decorated individually, for example with advertising to promote the use of electric vehicles.

With three additional wind turbine kits with an output capacity of 500 W each, the Self Energy system can be expanded into the wind and solar charging station Eco-Synergy. The electrical output then increases from 1440 W to almost 3 kW. "Our Self Energy and Eco-Synergy vehicle charging stations need a connection to the main supply to be able to guarantee reliable charging power. Eco-Synergy in the version 'bike charging', on the other hand, can also be operated off-grid," explains Export and Sales Coordinator Simona Rizzardi. If requested by the customer, however, even the bike version can be connected to the public power grid (see info box). With the model Energy Parking, Giulio Barbieri also offers a modular system for larger carport installations – though here without modules and electronics as standard. There is even a special variant for angled parking spaces.

All systems comprise silver-anodised aluminium supports, with prefabricated concrete elements as foundation, making excavation work unnecessary.

Among the solar companies, SolarWorld AG is further developing its SunCarports to be able to present a complete system with charging facility. Energiebau Solarstromsysteme GmbH already offers wall-mounted and free-standing charging stations with fast-charge capabilities, but is still working on an intelligent load management system and the integration of electricity storage. Schletter established its P-Charge charger series in 2009. The current portfolio covers a wall box and diverse stand-alone columns with two or four charging points, together with corresponding identification and payment systems.

Since the feed-in tariffs have already dropped to well below the price for household electricity in many countries, it is more economical to use solar electricity directly for the charging of an electric vehicle, rather than feeding it into the grid and then using conventional electricity for charging. In the home sector, it is still relatively easy to give priority to charging with self-produced electricity, by integrating the inverter into the house system and positioning the meter accordingly. With larger solar carports and whole electric vehicle fleets, however, local load management becomes necessary. The Belectric Group has developed a concept specifically for this case. The intelligent charging boxes from subsidiary Belectric Drive GmbH use the maximum possible proportion of solar electricity for vehicle charging and minimise peak power consumption. The output capacities range from 3.7 to 22 kW. The most powerful version is claimed to deliver a charge sufficient for 110 km of

driving in just one hour. With the further developed "Online" variant, the user can be identified by way of his mobile phone, and billing is likewise effected via the phone provider. The Belectric concept is implemented with carports from cooperation partner Solperis GmbH. A double carport with an output capacity of 4.9 kW serves as the basic element of a modular system. An airy, cantilevered construction of round tubular steel supports the roof. "We have installed the first charging box carport system in Paris," says Solperis Managing Director Holger Langer. "The roof is formed with a flexible tarpaulin skin, the underside of which serves as advertising space."

Customising is in general an important topic in connection with carports, for example colour schemes or lighting transporting a corporate identity. Many suppliers draw their potential customers' attention to the possibilities to convey an ecological and progressive image. As a result, even rather extravagant designs are popular: the company Eight GmbH & Co. KG, with Managing Directors Thomas Prinzing and Christoph Rößner, has designed the solar charging station Point.One. The sweeping form with two roof sections in the style of wings lends the construction a futuristic appearance. After a number of trade fair presentations, for example in Hannover, and the presentation of a prototype in Stuttgart, the company is now working to transfer the drafts into reality. "The solar modules are to comprise exclusively cells which have been rejected in the course of normal production due to a performance deviation. We use a special laser-assisted process to recondition and repair those cells," says Rößner in explaining the challenge of matching the solar surface to the curved roof.

Christian Dany

From bikeports to bus stops: small, but complete!

If it works for a car, it must also be good enough for a bike: a canopy with integrated energy source and filling station! The Eco-Synergy wind and solar charging station from Italian manufacturer Giulio Barbieri S.p.A. can be supplied in a version with special charging columns for e-bikes and electric scooters (see main text). The concrete columns were developed specifically to provide protection against the weather, theft and vandalism. During charging, the batteries can be kept safe in a separate locker. Eco-Synergy generates the electricity with a combination of small wind turbines and solar roof modules with a joint total output of 3 kW. Lead gel batteries with an overall capacity of 13.9 kWh provide for fully autonomous off-grid operation. The same basic components, but without wind turbines, are used for the solar bus stop Green Up. The solar electricity permits the otherwise typi-

cal bench and glass shelter to be supplemented with a diversity of useful extras: cooling ventilation for the comfort of waiting passengers, illuminated advertising, security cameras, wi-fi access, charging points for smartphones and other mobile electronics devices, and above all charging stations for e-bikes.

Donauer Solartechnik Vertriebs GmbH has even set up a new business unit for e-mobility: in addition to pedelecs, the company also manufactures an autonomous energy supply station. Each station accommodates four electrically-assisted bicycles and comprises a trapezoidal sheet roof, two solar modules, inverter, charging timer and two 140 Ah batteries. The available variants provide for a mains power input and double carports for eight of the trendy bicycles. Donauer also takes "corporate branding" one step further: the e-bikes themselves can

be given an individual paint finish, with or without appropriate lettering. Donauer offers a choice of 126 different models, including mountain bikes and 20-inch models which can be transported free of charge on local trains. The "SunShed" from SolarWorld AG is less concerned with branding, and concentrates instead on protection from the elements. As a classic shelter construction with a covered area of 1.5 x 5 m, it can be erected either directly against a wall of the house or in an open space. In addition to bicycles, it provides protection for firewood or garden tools. The prefabricated kit comprising aluminium profiles and trapezoidal sheet roof is supplied with five 240 W modules and an inverter for connection to the mains supply.

www.giuliobarbieri.it
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