



INTEGRATED SOLAR ROOFING SOLUTIONS

## CASE STUDY

**CASE STUDY betic s.a. ingénieurs-conseil Dippach Luxembourg**

**A "green," simple, efficacious... and beautiful concept! Betic, a consulting engineering firm, is a fan of its integrated solar roof**



In 2009, betic decided to renovate an old, 720 m<sup>2</sup> farmhouse it had just acquired so that it would generate most of its energy by itself and come as close to neutral as possible in terms of CO<sub>2</sub> emissions. Its integrated half-roof in 100% MegaSlate® panels (distributed exclusively by Solarwood Folkendange SA in the BeNeLux) is part of the main technologies that help achieve this double objective. It has from the first year on covered half of the electricity needs of the thirty or so people who work in the building



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Folkendange, 10 February 2015 - Feeling cramped in its former premises in Garnich, in 2009 betic acquired a main building and a barn where the alterations were subject to the constraint of complying with the existing structure, from the shape to height via the volume, but also the cornice and the roof. This concern for continuity did not prevent the technical engineering firm from proceeding with due diligence, giving concrete shape to a concept that is as innovative as it is sustainable, thanks in particular to an integrated solar roof.



Gilles Christnach, its managing director, confirmed as such: ***"The modules of our roof is a perfect illustration of our determination to promote buildings that function simply and safely, because their technology leaves no room for poor handling. Many buildings are actually designed to be energy efficient, but ultimately consume more than a standard building because they entail excessive technology that can go wrong".***

### One roof, two uses

betic tries as often as possible not only to limit the technical installations, but to give priority to double use of one and the same construction element, as the civil engineer explains:

***"We are actually interested not only in the generation of renewable, highly efficient energy, but also in the way we can obtain it assigning more than a single function to an element insofar as possible. Here: a perfectly waterproof roof that generates energy".***

This integrated photovoltaic system was therefore indispensable in the eyes of the company, which was looking for the best products available and opted for the MegaSlate® panels by Swiss giant Meyer Burger SA in 2010, thereby saving on slates (which became redundant).

***"The modules create a waterproof roof while generating energy, thereby complying with the double use principle which we promote"***

Gilles Christnach, betic s.a.

### Did you really say "waterproof"?

betic then joined forces with Solarwood, the exclusive distributor of MegaSlate® products for the BeNeLux and the Great Region. No need to brandish the "made in Switzerland" label to reassure engineers that the panels are solid. Conversely, apprehension persisted due to the relative novelty of the product at the time: ***"we had few references to confirm the supplier's assurances concerning the waterproof nature of the product... I must confess that we were a little surprised that the panels are capable of preventing any water infiltration on their own. As extra precaution, we nonetheless added a standard protective sheet".***

For each Solarwood project, the company in charge of the installation moreover applies this type of draining membrane, which combines solar covering of the entire roof, and thus guarantees full protection against all infiltration of water, which flows entirely via the gutters of the assembling system.



***"Aesthetically,  
the panels distributed  
by Solarwood fit  
perfectly because they  
are custom-made,  
and respect the  
surrounding setting"***

Gilles Christnach, betic s.a.

## **Semi-roof with harmonious appearance**

The aesthetic qualities have also played in favour of MegaSlate®:

***"The former residential house and barn which constitute our building are part of the municipality's heritage. The appearance of their roofs is typical of a Luxembourg farm. We did not want to change that under any pretext! That is partly why we did not add windows on the street side, which would have distorted the appearance".***

The entire roof surface on the street side is consequently covered with black MegaSlate® panels, half of which standard, the other half custom-made, the latter without solar thermal collectors. The roof panels on the back, equipped with windows, are in slates.

***"These choices were due to a budget constraint. Perhaps one day we will cover the rear again with modules with built-in windows. I am all for it! In any event, there is no visual difference between our slates and our photovoltaic panels, nor between our active photovoltaic panels and those which are blind. The important thing for us was that the entire roof be covered down to the edges, and that there was no part covered with tiles".***

## **Easy design, rapid installation**

Solarwood has defined the number of panels and optimal active modules based on the plans of the framework provided by betic. Some more exchanges back and forth, and then in January 2011, Solarwood provided the latest 3D simulation. ***"That is where the installation of customised blind modules was planned, in accordance with the shadows; the small parts which were not covered because they were needed for the inlet and outlet of air; and the cornice strip,"*** Gilles Christnach continues. ***"Once our joiner put in place the lathwork, the counter lathwork and the details of the gutter on the basis of a very well designed explanatory manual, an electrical installer included in the Solarwood offer took charge of the assembling of the panels. Although the customised elements had to be re-measured on the site, the speed was impressive, as the panels are far larger than the slates".***



***"I think that photovoltaic technology will be the most interesting option in our region for generating the remaining energy in most buildings designed according to the "nearly zero energy" standard, which will be mandatory as of 2019"***

Gilles Christnach, betic s.a.

### **Onsite generation of the energy consumed and independence of the building**

The betic team finally entered in the renovated farmhouse in January 2013, as the works had to be stopped for several months because of administrative red tape.

***"No maintenance since, and our only concern is that the power of the solar thermal collectors will diminish slightly after 15 years. Whereas the electricity generation had been calculated by simulation at 16,191 kWh, it slightly exceeded our expectations: 17,625 kWh in 2013, and 18,945 kWh in 2014"***. A priori, the orientation of the façade,

east-west and not south-north, reduces generation by 12% to 18%: ***"In our case, 12%."***

***Whereas some people thought that we would not generate any electricity at all!"***

says Gilles Christnach peevishly. The owner was delighted to add that over a year, this

generation ***"covers half of our electricity needs. Bearing in mind that only half of our roof is covered with photovoltaic panels, this means that if the rear panels were also covered, we would be autonomous in electricity"***. The electricity generated is sold entirely

to the grid at a rate of €0.36 per kWh.

From the thermal point of view, betic consumed only 850 m3 gas. ***"As our production is taken up entirely by the electric power needs, the question of generating heat through the photovoltaic system does not arise. If it were sufficient to meet our heating needs also, we would have to store it and use it as and when wanted. This is still a challenge, although the results of the first tests are starting to come through"***, the expert concluded.

### **With the photovoltaic system, ready for "nearly zero energy", mandatory in 2019**

***"The reduction of subsidies has unfortunately caused a slowdown on the photovoltaic front. We must however not lose sight of the fact that each kWh saved compared with fossil energies reduces CO2 emissions in the environment, and it is high time that the latter ceased! In any event, these types of energy will disappear in a few decades. Luxembourgish regulations concerning energy classifications are even more stringent than those of Europe: as of 2019, new buildings, residential as well as commercial, will have to be 'nearly zero energy'. Although no deadline is yet set, some are already preparing for the next step: positive energy buildings, i.e. which generate more energy than they consume. At betic, designing a sustainable building systematically entails 3 chronological steps. First, reduce needs to the maximum. Then, discuss the future use of the building. These two precedents are necessary in order to be able to determine the balance of energy that still has to be supplied to the building and how to generate it in the most efficient manner. I think that in a country like Luxembourg or its neighbours, for most of the buildings, photovoltaic technology will be the most interesting source to do so; for instance, to generate electricity that feeds a heat pump. An integrated solar roof enables the owner to generate power and can become cost-effective in 7 to 8 years... which is interesting! The photovoltaic surface must of course be sufficient: in the case of a functional building, a roof capable of covering the needs of 3 floors will not suffice for 6 floors... So it is up to us to be creative!"***

Gilles Christnach, betic

## About betic – consulting engineers



betic S.A. ([www.betic.lu](http://www.betic.lu), visit on [www.youtube.com/watch?v=bWATwPJVHtU](https://www.youtube.com/watch?v=bWATwPJVHtU)) is a consultancy engineering firm situated in Dippach (Grand Duchy of Luxembourg) founded in 2000 by Gilles Christnach (Civil Mechanical Engineer, certified passive house designer) and David Determe (Electromechanical Engineer), its current managers. Composed of 33 employees, betic S.A. specialises in the provision of all services for studies, consultancy, assistance and coordination for technical and industrial projects. The company has earned extensive certification, including CEPH, which confers on engineers the status of Certified European Passive House Designer. Various projects carried out by betic SA have led to environmental certification (DGNB, MINERGIE P-ECO, VALIDEO) for the buildings concerned.



## About Solarwood S.A. Integrated solar roofing solutions

Solarwood Folkendange S.A. ([www.solarwood.lu](http://www.solarwood.lu)) was founded in 2004 by Michel Unsen and Myriam Bellion. The company now concentrates on the sale and distribution of high quality integrated and customised solar roofing solutions without frames, in replacement of traditional roofs, for new and renovated buildings. Its flagship product is the MegaSlate® (maximum aesthetics and high performance guaranteed) from Meyer Burger S.A., European leader in integrated roofing modules. Solarwood Folkendange S.A. is the exclusive distributor of the entire MegaSlate® (photovoltaic, thermal and roof windows) line for the BeNeLux and the Great Region.

Contact: Will Kreutz Solarwood Folkendange S.A. Head of Marketing and Communication  
+352 691 293 333 [will.kreutz@solarwood.lu](mailto:will.kreutz@solarwood.lu)

### Solarwood Folkendange S.A.

#### Head Office

Maison 1  
L-9368 Folkendange  
Grand Duché de Luxembourg

#### Contact

T +352 24 55 99 11  
F +352 24 55 99 12  
M [contact@solarwood.lu](mailto:contact@solarwood.lu)

#### Company ID

Aut. No 104572  
RC B103125  
TVA 2004 2218 554  
ID LU 20314951

#### Bank

IBAN LU04 1111 2446 6935 0000  
BIC CCPLULL  
[www.solarwood.lu](http://www.solarwood.lu)