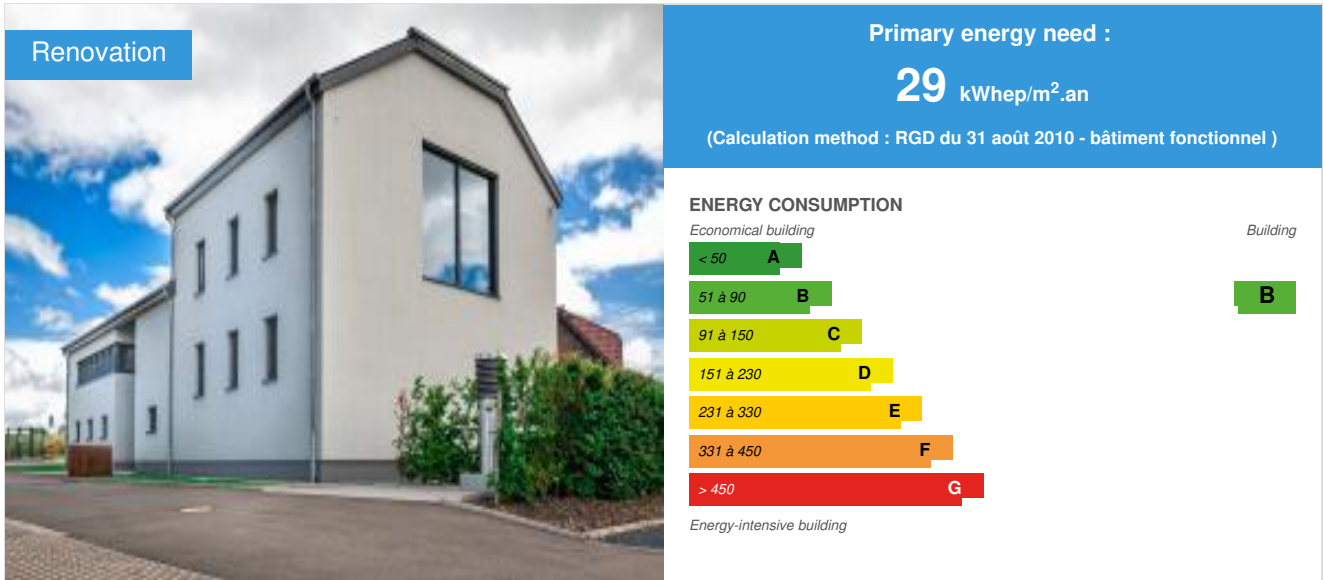


## New headquarters of Betic S.A.

by Betic Ingénieurs-Conseils, part of Sweco / 2015-06-24 15:16:11 / Luxembourg / 11962 / FR



**Building Type** : Office building < 28m  
**Construction Year** : 2010  
**Delivery year** : 2011  
**Address 1 - street** : 2, route de Luxembourg 4972 DIPPACH, Luxembourg  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 650 m<sup>2</sup> Autre type de surface nette  
**Construction/refurbishment cost** : 2 000 000 €  
**Number of Work station** : 49 Work station  
**Cost/m<sup>2</sup>** : 3076.92 €/m<sup>2</sup>

Proposed by :



### General information

**Betic** is, first and foremost, **a team which shares a set of common values**. It employs 35 people, including young talents who bring their own innovative ideas, alongside several more seasoned workers whose experience provides valuable expertise.

Since it was created in the year 2000, the team has been based around a **central nucleus**: **Gilles Christnach and David Determe**, the two managing directors of the consultancy. This team work is based on close cooperation between our three teams of engineers and the team of designers. **The designers have worked in 3D** for more than 10 years and are now getting use to **BIM**. They draw up the plans and technical details using the dimensions provided by our engineers. In the spirit of continuous improvement, all of the members of the team regularly receive training and exchange knowledge in sharing meetings organised internally.

Betic and its employees **have a number of technical and environmental certifications**: the design of energy-positive buildings and some hydrogen storage research studies are testament to its ambition. Curiosity and daring also characterise the "Betic philosophy". This mindset and dynamism has seen us **gain the trust of numerous clients** and, therefore, to contribute to the design and follow-up of projects which range from one-family houses to a 600-apartment complex, from an individual office to a 50,000-m<sup>2</sup> building.

## See more details about this project

<http://www.betic.lu/>

## Data reliability

Assessor

## Stakeholders

### Stakeholders

Function : Contractor

betic s.a. - Ingénieurs-Conseils

David Determe

[http://www.betic.lu](http://www.betic.lu/)

Function : Designer

SCAHT Architecture

Pascal Hubin

<http://www.scaht.eu/>

Function : Thermal consultancy agency

BETIC Ingénieurs Conseils

David Determe

[http://www.betic.lu](http://www.betic.lu/)

## Contracting method

Separate batches

## Owner approach of sustainability

This major renovation of an old farmhouse was, in more than one way, an ambitious project. To start with, the client is the operator, i.e. Betic, an engineering consultancy, known and recognised for its innovative and unusual technical and energy-efficient designs. In creating a project for its own requirements, the company has to look at itself and to project forwards into the future which is very fast-moving in the engineering sector. By way of example, at the time of acquisition we have fewer than 20 employees whereas today we have nearly double that amount. There was a need, therefore, to create a building which was over-sized for the identified requirements and suitable for the current requirements. Before beginning the renovation, a budget was drawn up in keeping with the means for self-financing. This was a crucial phase for accurately budgeting the cost of the works, to avoid having to make choices which have a negative impact on quality during the project. The budget was exceeded by 2.3%; the goal was achieved. Our energy goal was to design a healthy and low-tech building, or rather with invisible technology, that is comfortable, useable and accepted by its users. It has been a major advantage to have complete freedom in terms of planning, appearance and the budget. Each choice has been taken by those affected and the results have a direct impact on them, which is a benefit for the project. The result is a project which the whole team has bought in to. One surprise is the impact that a building can have on productivity and on the profile of a consultancy such as ours.

## Architectural description

Site: The site covers three distinct zones registered under the urban development plan (PAG): a green zone (barn and outbuildings), a residential zone (main building) and a visible zone subject to a construction ban (cowshed) under which the existing building outline must be maintained and preserved. Thanks to its central position in the town, alongside the roundabout and approach roads, the location lends itself to a commercial or professional role with its gable end overlooking the road. It is a crossroads, accessed via the N13 Route des 3 Cantons and exiting onto the N5, Route de Luxembourg. This site and building was of particular interest to the consultancy. Its proximity, the ability to create open spaces connected with the immediate requirements and its potential for future growth and the number of possible car parking places are also advantages. These zones have now been reclassified into a low-density residential zone, a change which has not affected the current building which still complies with the applicable regulations. Structure: The structure has an unusual position on the site, its morphology typical of its role (e.g. the main building, cowshed). During the works, the foundations of the cowshed walls were found to have been damaged, virtually rotten, as a result of its former usage, which meant that this masonry had to be demolished and reconstructed in order to ensure that the building was completely stable. The northern gable end, facing the Route de Luxembourg, has been kept as it is in order to preserve the original building outline. A large window brightens up the southern gable end, facing the Route des 3 Cantons, like a shop window. The original entrance to the cowshed became the main entrance to the building, replaced with a large lobby that stretches the full height of the building, shedding plenty of light onto each of the different floors. The existing floor levels have been preserved. A two-level stairwell built between the cowshed and farmhouse connects the two spaces. An area for possible expansion of the work space has been created on a mezzanine. Particular attention has been paid to the internal layout, allowing for flows of visitors and employees to be managed in the ideal way and for working areas to be defined according to the different working groups. A communal area called the "meeting, conversation, canteen and relaxation area" has been put in on the first floor. Solar panels have been incorporated into the west-facing side of the roof. Skylights on the east-facing side of the roof (the same applies to the main building), out of view, provide natural ventilation for the open-plan loft spaces. Light, energy and

technology: Good technology, good insulation. The building has a high thermal inertia due to its favourable position in terms of the amount of sunlight. To the east, the shell of the former cowshed has new windows on both floors and on the first floor to the west, whereas the old farmhouse building has a window spanning both floors on the gable end. The existing picture windows have been retained to provide the correct lighting levels. The work spaces enjoy a significant amount of natural lighting. Particular care and attention has been paid to the protection from the sun for the low-energy building in order to prevent over-heating from sunlight. CMV in the offices is boosted by an additional supply from ground-coupled heat exchangers. Architecture: Clean and understated layouts, pleasing to the eye, providing large open spaces, which are user-friendly, suited to their purpose. Sensible use has been made of technical areas, the archives and the print room. A dynamic appearance has been created in the false ceilings of the roof of the cowshed by laying diagonal wood panelling and by incorporating lights which brighten up the space. Surroundings: Removal of the concrete slab of the former barn to create car parking on a porous green surface. Creation of an exit onto the Route des 3 Cantons. A few green areas and a terrace have been created for the building's occupants. The car park has been laid out in a way that allows for an occasional events space to be created. Materials: Respect for the existing materials. The external walls are rendered, the roofs are covered with natural slates and the window external woodwork and window sills are made from lacquered aluminium. The floor coverings are largely a neutral, lasting concrete grey colour. The connections between the different floor levels feature wood and metal, giving a warm and lightweight appearance. Adaptation: A double-door entrance was created in order to limit energy losses. Pascal Hubin, Scaht Architecture & Développement.

## If you had to do it again?

If we were to do this again, personally, I would treat this project in the same way as a research project as we design them for our clients. By this, I mean devoting a team and freeing up sufficient time in the managers' schedules.

A construction project carried out for our own purposes requires a significant involvement; I had underestimated this task.

The project didn't suffer but, as time cannot be compressed, other work had to fall by the wayside.

If we were to do this again, from a project viewpoint: incorporate the acoustic requirements from the design stage.

If we were to do this again, from an energy-efficiency and technology point of view: we would duplicate the same design.

## Building users opinion

All of the thermal comfort and visual parameters have largely been fulfilled. A few days of mild discomfort caused by the lack of air conditioning would not justify its installation.

The real drawback is the acoustic comfort which is far from satisfactory and which will be improved. If this requirement had been part of the original design, the overall quality of the project would have been higher.

## Energy

### Energy consumption

Primary energy need : 29,00 kWh<sub>ep</sub>/m<sup>2</sup>.an

Primary energy need for standard building : 53,00 kWh<sub>ep</sub>/m<sup>2</sup>.an

Calculation method : RGD du 31 août 2010 - bâtiment fonctionnel

Final Energy : 64,90 kWh<sub>ef</sub>/m<sup>2</sup>.an

Breakdown for energy consumption :

Heating: 46%

Toilets: 4%

Ventilation/cooling: 20%

Lighting: 30%

More information :

The actual energy usage was 12% less than the estimates for the first year; 18% in the second year and 13% in the third year (expansion of the teams).

Initial consumption : 201,70 kWh<sub>ep</sub>/m<sup>2</sup>.an

### Envelope performance

Envelope U-Value : 1,46 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

The insulation for the façade was applied externally by applying 20 to 24-cm-thick insulation (as the existing walls were uneven).

A 30-cm-thick thermal insulation was placed on the roof and a sheet of wood, typically used for passive houses to prevent the risk of overheating, was added.

The ground slabs have been insulated with polyurethane that is between 10 and 15 cm thick. The underside of the staircases which provide access to an underground half-level was insulated during the structural works.

The triple glazing provides the thermal and acoustic comfort required for the business and the low-energy nature of the property.

Building Compactness Coefficient : 0,50

Indicator : EN 13829 - q<sub>50</sub> » (en m<sup>3</sup>/h.m<sup>3</sup>)

Air Tightness Value : 1,61

### Real final energy consumption

Real final energy consumption/m<sup>2</sup> : 57,00 kWh<sub>ef</sub>/m<sup>2</sup>.an

Real final energy consumption/functional unit : 1,16 kWh<sub>ef</sub>/m<sup>2</sup>.an

## Renewables & systems

### Systems

#### Heating system :

- Condensing gas boiler
- Low temperature floor heating
- VAV System
- Canadian well

#### Hot water system :

- Individual electric boiler

#### Cooling system :

- Canadian well

#### Ventilation system :

- Natural ventilation
- Nocturnal ventilation
- Nocturnal Over ventilation
- Free-cooling
- Double flow heat exchanger

#### Renewable systems :

- Solar photovoltaic

Renewable energy production : 34,00 %

#### Other information on HVAC :

<https://vimeo.com/50295377>

<https://vimeo.com/50295377>

#### Solutions enhancing nature free gains :

<https://vimeo.com/50295377>

## Environment

### GHG emissions

GHG in use : 30,40 KgCO<sub>2</sub>/m<sup>2</sup>/an

#### Methodology used :

EPC-F (functional buildings) regulatory calculation

Building lifetime : 100,00 an(s)

### Water management

Consumption from water network : 130,00 m<sup>3</sup>

Consumption of harvested rainwater : 90,00 m<sup>3</sup>

Water Self Sufficiency Index : 0.41

Water Consumption/m<sup>2</sup> : 0.2

Water Consumption/Work station : 2.65

We have recorded the use of mains water and rainwater over 3 years. This means that the results are based on actual measurements and not a theoretical calculation.

### Comfort

**Health & comfort :** Each employee is less than 3 m from a window which can be opened, so they have the freedom to regulate their surroundings. The lights adjust to the indoor sunlight and employees benefit from a supplementary dimmable personal lamp.

#### Calculated indoor CO<sub>2</sub> concentration :

Non simulé

#### Measured indoor CO<sub>2</sub> concentration :

Entre 600 et 800

**Calculated thermal comfort :** Le confort thermique d'hiver est sans reproche, le chauffage sol étant particulièrement bien accepté par les collaborateurs. Durant la période estivale, le puits canadien permet un certain rafraîchissement.

**Measured thermal comfort :** 20 à 22°C durant les périodes de chauffage. 28,5°C pour les bureaux sous les combles, durant les périodes de canicule.

**Acoustic comfort :** The roof is covered with sound-absorbing panels which provide an acceptable level of acoustic comfort and a much-appreciated architectural appearance. The meeting rooms have received special acoustic treatment (double glazing and removable panels) following on-site measurements taken by an approved sound engineer. The other surfaces of the offices need to be fitted with sound-absorbing surfaces, which should be done during 2016.

## Products

### Product

Solarwood integrated solar roofing solutions – MegaSlate

Solarwood Folkendange S.A.

Will Kreuz

<http://www.solarwood.lu>

**Product category :**

MegaSlate solar panels are fully watertight and generate enough solar power to meet 1/3rd of our requirements.

The modules form a watertight roof covering generating power, which aligns perfectly with the dual-usage principle promoted by Betic.



## Costs

### Construction and exploitation costs

**Global cost :** 2 000 000,00 €

**Renewable energy systems cost :** 150 000,00 €

**Global cost/Work station :** 40816,33

## Urban environment

The site covers three distinct zones registered under the urban development plan (PAG): a green zone (barn and outbuildings), a residential zone (main building) and a visible zone subject to a construction ban (cowshed) under which the existing building outline must be maintained and preserved. As a result of its central position in the town, alongside the roundabout and approach roads, the location lends itself to a commercial or professional role with its gable end overlooking the road. The major routes to Luxembourg City and Belgium are nearby (in particular the E411 between Namur and Luxembourg City). This location and this building are fully aligned with Betic's objectives for its new offices: the ability to create open spaces, the potential for future extensions and for available car parking, etc. These zones have now been reclassified into a low-density residential zone, a change which has not affected the current building which still complies with the applicable regulations.

## Land plot area

**Land plot area :** 2 000,00 m<sup>2</sup>

## Built-up area

**Built-up area :** 15,00 %

## Green space

**Green space :** 500,00

## Parking spaces

Betic's office has a private car park right next to the building.

## Building Environmental Quality

- Building flexibility
- indoor air quality and health
- works (including waste management)
- acoustics
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- integration in the land
- mobility

## Contest

### Reasons for participating in the competition(s)

In 2010, Betic s.a., an engineering consultancy firm specializing in building technology, decided to renovate an old farmhouse in Dippach to use for its new offices. Having worked there for 3 years, its team of 35 employees can confirm that this energy-saving renovation has been a real success. With energy efficiency in its blood, it was natural for Betic to enter the competition organized by Construction 21 and Neobuild.

The main challenge was to preserve the traditional look of this Luxembourgish farmhouse, part of the area's heritage. The Dippach municipal authority was very positive about the concept and approved the renovation plans. The immediate task was to eliminate energy losses, in particular by using high-performance insulation for the front walls and roof and with an LED lighting system. An extra challenge was the commitment to meet what few energy needs remained by producing energy in situ as far as possible. This target was achieved with innovative technical installations such as an earth-to-air heat exchanger and an expanse of solar panels to ensure that the team is as comfortable as possible. This comfort is fully accentuated by the office space which is a total fit with Betic: open and congenial.

### Building candidate in the category



Energies renouvelables



Rénovation énergétique

