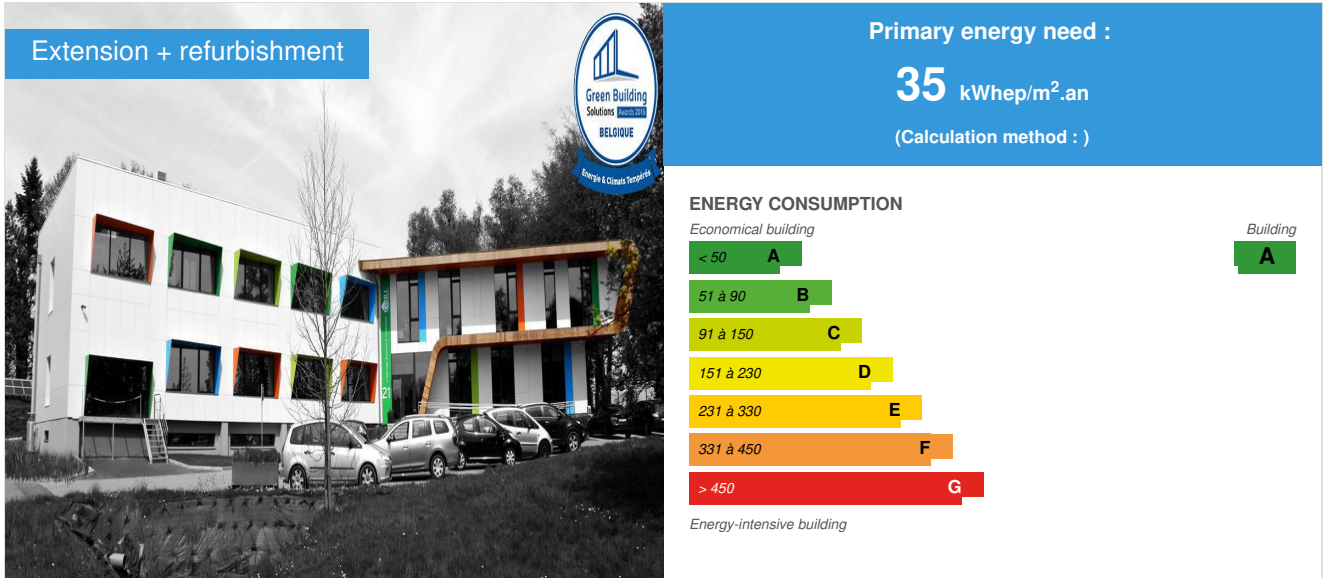


## CoRI - Paint it Green

by André LECOMTE / 2016-05-25 10:47:47 / Belgique / 18372 / FR



### General information

#### Building users opinion

CoRI: "In general, workers are very happy with the comfort of their offices and other work spaces The lighting is good and does not tire the end of the day Soundproofing is generally good.. whether in an office or between offices. regarding the quality of indoor air, we selected paintings without much of VOC emissions. There was never any comment on that. the thermal comfort will be tested next winter since the last settings were selected after severe cold and for the moment we can not say that we suffer from heat waves. to see the use ... "

#### If you had to do it again?

CoRI: "As regards us, we really have no negative point if we would change it again on the type of materials in relation to their implementation but especially compared to companies that have been selected for this project. It is true that the implementation of the siding on existing building was tedious. this could have been avoided if the company had had a better experience on the implementation of the selected panels .... It seems that risk can never be avoided because they are the architects who select the materials and then these are the companies that implement them and they sometimes commit without really knowing the risks / challenges related to particular materials ... .. Finally even if it is true that the beginning was a bit difficult to find a temperature equilibrium in the different spaces (rooms, corridors and laboratories), ultimately it is a matter of adaptation, we must change the way General to address this type of system. Once accepted this finding, we went on a completely different setting .... In the end it works. "

## See more details about this project

<http://www.construction21.org/belgique/articles/be/laur-eacute-at-energie-amp-climats-temp-eacute-r-eacute-s-gbcsawards-2016-cori-paint-it-green-belgique.html>

## Data reliability

Assessor

## Stakeholders

### Stakeholders

**Function :** Contractor

CoRI

Carine Lefèvre, Directrice, lefevre.c@cori-coatings.be

<http://www.cori-coatings.be>

**Function :** Designer

helium3

André Lecomte, gérant, alecomte@helium3.be

<http://www.helium3.be>

Architecture and responsible mission PEB

**Function :** Other consultancy agency

Arcadis

Marie Descamps, m.descamps@arcadisblegium.be

<http://www.arcadis.com>

dynamic simulation, artificial and natural lighting studies, stability study, study special techniques

**Function :** Company

Synergie Bois

Didier Vonneche, gérant, info@synergiebois.be

<http://www.synergiebois.be>

Carcass work, wood frame, frame, insulation, facades, air tightness

**Function :** Company

Apruzzese

info@apruzzese.com

<http://www.apruzzese.com>

interior finishes

**Function :** Company

Collignon Eng.

Jérémy Balon, jbalon@collignon.eiffage.be

<http://www.collignon.net>

HVAC

**Function :** Company

Lamelec

Didier Lamaire, didier@lamelec.be

electricity

**Function :** Certification company

MATRIciel

Thomas Leclercq

Function : Others

Pierre Beguin

safety health coordinator

## Contracting method

Separate batches

## Owner approach of sustainability

CoRI: "The first goal was the lack square Indeed, the number of employees rose sharply from 2010 to 2014 and the building became too small The second objective concerned the modernization of our image through our corporate identity and more widely.. our communication. with a dilapidated building, we had trouble convincing potential customers that we are a modern research center, dynamics and advanced technology. as part of this building, from the beginning we wanted to integrate reflection of the environment. in fact, this line is one of our three privileged areas and it was essential for us that the building reflects our commitment to society in terms of environment. it was our first experience in this type of investment and this is why the helium3 office was selected because it was able to integrate this dimension in the project. "

## Architectural description

Our will, realizing this project was to design a building in the image of its occupant, the company CoRI (Coating Research Institute). To do this, we have introduced two concepts to carry the project. 1 / The color chart CoRI is an active research center in the field of paints. When thinking "paints" is believed "colors" or rather "range of colors." The concept of the color chart we therefore appeared as an image to the strong symbolic and identity pronounced character to the building, two qualities in our redevelopment optical readability CoRI its site. The graphic image of the facades wants an interpretation of the activity in the presence in the building. The extension takes the form of an elegant wooden cladding façade ribbon around which the composition is drawn. It is characterized by alternating large windows and Rockpanel tone white, all punctuated by signs with the colors of the company. The tape is fastened to the existing building, defines the outline of the new volume, and gives the building a new entrance at the junction between the old and the new. The existing building is insulated and encased with Rockpanel white. The colored buttons here are made by large sunshades to control solar gain. 2 / high-tech opposition / sustainable Durability, functionality and performance are three criteria that focuses its activity in the CoRI. In this idea, the objective was to create a building designed in an intelligent and thoughtful way, combining two aspects that our priori opposed to: high-tech and durable. In the collective mind, a "sustainable" building is perceived as a building constructed from natural materials with traditional techniques or forgotten (timber frame, coated lime or clay, ...). Conversely, when talking about a high-tech building, we imagine rather large windows, clean lines and advanced technology, or even a "smart" building. Through this project, we want to change prejudices and design a building both environmentally friendly and at the forefront of today's technologies. To achieve this, the principle is to put technology at the service of ecology. Thus, when designing the project, several thrust studies identified the optimal solutions: Dynamic Simulation, PEB study of natural and artificial lighting study, study of solar masks, blower-door, analysis of the life cycle, etc. . Moreover, during the life of the building users and visitors can be informed and aware of sustainable development: teaching screen that provides real-time information (consumption, temperature, ...), visible natural materials, dry basin green roof, etc.

## Energy

### Energy consumption

Primary energy need : 35,00 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 163,00 kWh/m<sup>2</sup>.an

Calculation method :

CEEB : 0.0001

Final Energy : 62,00 kWh/m<sup>2</sup>.an

Breakdown for energy consumption :

- Heating: 52 319 MJ / year according PEB - Cooling: 0 MJ / year (dynamic simulation: no need for cooling) - Ventilation: 7.006 MJ / year according PEB - ECS: neglected - Lighting: 23 666 MJ / year (according PEB) - Electricity another: 110 278 kWh / year (estimated from average consumption before work) - photovoltaic production: 43,000 kWh / year

More information :

Actual consumption is not yet known because the building is in operation for less than a year. In addition, adjustments of technical facilities are adjusted throughout the first year of the building and therefore it is not very representative of the actual consumption.

Initial consumption : 467,00 kWh/m<sup>2</sup>.an

### Envelope performance

Envelope U-Value : 0,40 W.m<sup>-2</sup>.K<sup>-1</sup>

More information :

Extention (UBAT = 0.29 W / m<sup>2</sup> K): - Facades: Timber frame with insulation blown in cellulose (22 cm) and wood fiber (5 cm) - Ground Floor: floor slab insulated with sprayed PUR (12 cm ) and slab finishing polished concrete - roof terrace: gîtage wood insulated with rock wool (16 cm) - warm roof - main roofing: gîtage wood insulated with blown cellulose (average 34 cm) - compact roof - Windows: double glazing (Ug = 1.0 W / m<sup>2</sup> K) and aluminum chassis (Uw = 1.13 W / m<sup>2</sup> K) Existing (UBAT = 0.5 W / m<sup>2</sup> K): - fronts: isolated from the outside with PIR ( 10 cm) - Wall against vv: isolated from the outside with the projected PUR (10 cm) -

buried walls: not isolated - ground floor: isolated at the bottom with the projected PUR (10 cm) - basement floor: slab on non-isolated floor - flat roof: insulated exterior with rock wool (16 cm) - Windows: aluminum frame and double glazing not replaced existing ( $U_g = 1.1 \text{ W / m}^2 \text{ K}$ )

Building Compactness Coefficient : 0,43

Indicator : EN 13829 - q50 » (en m<sup>3</sup>/h.m<sup>3</sup>)

Air Tightness Value : 2,31

Users' control system opinion : CoRI: "It is very comfortable not having to think about turning on and off lights in different local Regarding the setting of the temperature and air exchange, people who are in charge of the system. are very friendly. "

## Renewables & systems

### Systems

Heating system :

- Heat pump
- Low temperature floor heating

Hot water system :

- Individual electric boiler

Cooling system :

- Others
- Floor cooling

Ventilation system :

- Free-cooling
- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic
- Heat pump

Renewable energy production : 48,00 %

Other information on HVAC :

Space heating is provided by an aérothermal heat pump (COP 3.32). This feeds a heated floor in the extension and a forced air heating in the existing building. Also in the "Products" tab. The heat pump is reversible, this system can also cool the building if needed. However, the dynamics simulation showed that the active cooling was not necessary, so this is only a security. The extension and the existing building are ventilated via a double-flow mechanical ventilation system with heat recovery (78% yield). The ventilation unit is equipped with a bypass to avoid overheating in summer. The building can be cooled naturally by opening windows on opposite facades. A small electric heater allows for hot water in the shower and kitchen sink but drinks in hot water the building is minimal.

The 196 photovoltaic modules placed in the garden at the rear of the building achieve an output of 50.7 kWp for an estimated annual production of almost 43,000 kWh. The electricity produced will be completely self-consumed. Indeed, many measuring devices present in laboratories operate continuously and require huge electric power. The return on investment time is estimated at 6 years.

### Smart Building

BMS :

All building technology are managed by the GTC. Some information is transmitted in real time on the teaching screen placed in the building lobby. Thus, occupants and visitors can follow live the evolution of conso

Smartgrid :

With equipment installed in the building, and primarily the GTC, the building is ready for connection to a Smart Grid. Alas, these are not yet available in this region.

Users' opinion on the Smart Building functions : CoRI:"It is very comfortable not having to think about turning on and off lights in different local Regarding the setting of the temperature and air exchange, people who are in charge of the system. are very friendly. "

## Environment

### Urban environment

The building is located on the CSE website (Scientific and Technical Centre for Construction). The choice of location of the extension is due to an energy reflection (North-South direction) but also a desire to provide better visibility to the building (to avoid confusion with the CSTC). The site already had a correct biological quality by the presence of a meadow behind the building and a wooded area on the back edge of the field. Interventions on biodiversity are: placement of two hives in the garden, various plantations around the building, extensive green roof, dry dock, new permeable parking. The majority of the site is verdurisée. DSUB = 0.0007 (destruction coefficient of useful areas for biodiversity) NSUB = 0.1 (coefficient of useful new areas for biodiversity) CBS = 0.85 (biotope surface coefficient)

Land plot area : 10 854,00 m<sup>2</sup>

Built-up area : 6,00 %

Green space : 8 400,00

## Products

### Product

Rockpanel Colours

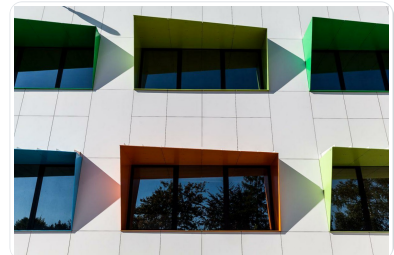
Rockwool

Thierry De Hemptinne - 0473/30.09.33

<http://www.fr.rockpanel.be/produits/rockpanel+colours>

Product category : Second œuvre / Menuiseries extérieures

Rockpanel panels are prefabricated compressed mineral wool and amalgamated with thermosetting binders. The outer surface is coated with four layers of polymer emulsion paint in aqueous phase, available in a rich palette of colors. Rockpanel suitable as facade cladding, finishing panels and roof details and perimeter trim (soffits, exterior ceilings, etc.).



Rockpanel were used to achieve the cladding of the existing building and extension, but also to make the sunscreens that provide the colored buttons on the existing building. In addition to their environmental benefits (BRE label A + / A), Rockpanel allowed to reproduce on the facade identity colors of society, through collaboration with Akzo Nobel has provided adequate paint.

Cellulose i3

Isoproc

info@isoproc.be

<https://www.isoproc.be/fr/solutions/producten/i3-cellulose/22>

Product category : Second œuvre / Cloisons, isolation

Cellulose is made from waste paper newspapers. The i3 cellulose is produced in Belgium on a highly efficient production line. Its lambda value of 0.038 W / mK allows it to compete with insulation of mineral origin.

The cellulose was blown into the timber frame facades (22 cm) and the main roof (34 cm in average).



Wood fiber insulation Steico Flex

Steico

contact@steico.com

<http://www.steico.com/fr/produits/isolants-en-bois/steicoflex/apercu/>

Product category : Second œuvre / Cloisons, isolation

flexible and compressible insulation panels wood wool. lambda value of 0.038 W / mK.

This natural insulation material is very suitable to be placed between the rafters of the technique against bulkhead. In it also pass various techniques of small diameter such as water supplies or electric pipes. This technique against bulkhead also allows not to break the air seal during placement of wall mounts.



Heat treated wood siding DC-Wall

Decolvenaere

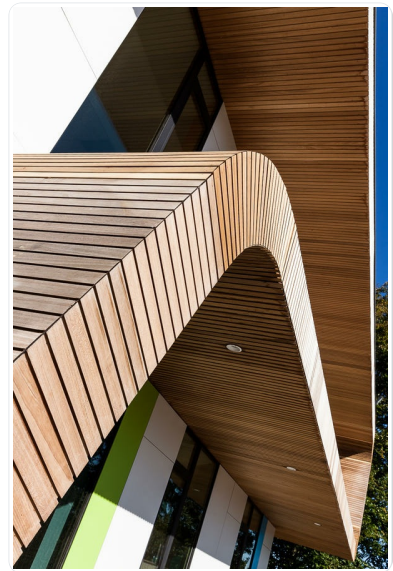
info@decolvenaere.be

<http://www.decolvenaere.be/fr>

Product category : Second œuvre / Menuiseries extérieures

This ayous cladding ensures outstanding stability on both the rigorous care of during sawing. Softwood ayous is subjected to heat treatment with steam, under conditions of high temperature and high pressure that alter the long term. In a climate like ours, subject to intense fluctuations in temperature and humidity, wood so changed remarkably resists better to the formation of cracks and is ideal for the application of coatings. The four kilns at the port of Ghent has a capacity of 1000 m<sup>3</sup>. The company is certified FSC since 2008.

This cladding ayous heat treated and FSC label was chosen because it presents an interesting aesthetic, without knots, and requires no chemical post-treatment using heat treatment carried out at the manufacturer. The profile used is a "perforated false" giving the impression that the slats used are very thin. The angles tabs cutouts give a very neat finish to the wooden strip.



reversible heat pump AWR-HT

Climaveneta

+33 1 (0) 1 30 95 19 19

<http://fr.climaveneta.com/Web/>

**Product category :** Génie climatique, électricité / Chauffage, eau chaude

reversible heat pump with high efficiency air source for outdoor installation, high temperature water. The entire range reached a much higher level of efficiency to the levels provided by the class A energy savings (heating).

Pump aerothermal heat of a heating power of 71 kilowatts is placed on the roof of the existing building. In the extension, the heat pump supplies the heating circuit with the ground. In the existing building, it feeds two batteries preheat ventilation air. Because the heat pump is reversible, it can also be used to cool the building in summer. However, this function should not be used or bit by the building design.



Photovoltaic solar panels Professional 60 poly

Solar Fabrik

ab@solar-fabrik.de

<http://s626627551.online.de/>

**Product category :**

rated power: 260 W Number of cells: 60

The 196 photovoltaic modules placed in the garden at the rear of the building achieve an output of 50.7 kWp for an estimated annual production of almost 43,000 kWh. The electricity produced will be completely self-consumed. Indeed, many measuring devices present in laboratories operate continuously and require huge electric power. The return on investment time is estimated at 6 years.



Luminaire LED ArimoS

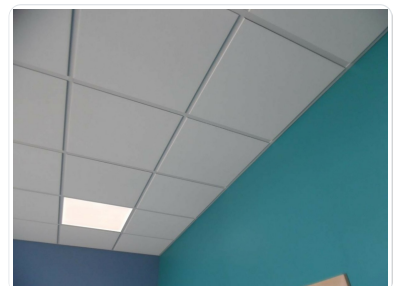
Trilux

Philippe Lefebvre - philippe.lefebvre@trilux.com

<https://www.trilux.com/bf/>

**Product category :** Génie climatique, électricité / Eclairage

LED luminaire with microprismatic cover CPD. A built-in exposed grid ceiling 60x60 cm module. Applications: offices, corridors, lobbies, meeting rooms, retail areas, waiting rooms, ... System LED luminaire luminous flux 4000 lm, connected load 40 W, luminous efficiency of 100 lm luminaire / W. Color neutral white light color temperature of 4000 K, color rendering index Ra > 80. Parameters of the rated lamp life: L80 rated life: 50000 hours.



Besides the aesthetic integration in false ceilings in mineral slabs, the choice of high performance luminaires allows to significantly reduce electricity consumption for lighting. They also limit the internal loads and therefore summer overheating. These devices were used to equip every office in the extension but also a part of the laboratory to replace outdated fixtures.

Synco building automation

Siemens

<http://www.siemens.com/synco>

<http://www.siemens.com/synco>

#### Product category :

The Synco 700 is a communicative and flexible pre-programmed controller. The Communication on KNX allows Synco controllers exchange a lot of information together: temperature, time programs, energy demands, defects etc. This also allows up all the information on a supervisory or directly on the web.

Centralized technical management (CTM) allows to retrieve data from different meters in the building. These fall in energy consumption (lighting, heating, ventilation and hot water are measured separately) but also other consumption (rainwater, mains water) and energy production (via photovoltaic). These data are then communicated to the shapes and the building users and visitors via the screen placed in the building lobby. The GTC also allows users to easily set up the technical facilities. They can for instance change the desired temperature in each room.



charging point for electric car

Keba

<http://www.keba.com/en/emobility/emobility>

<http://www.keba.com/en/emobility/emobility>

#### Product category :

charging point for electric cars.

This terminal, located on the front of a parking space, allows users or visitors of the building that have an electric car recharging during their presence in the building.



## Costs

### Construction and exploitation costs

Renewable energy systems cost : 80 000,00 €

Cost of studies : 250 000 €

Total cost of the building : 1 800 000 €

Subsidies : 141 700 €

## Health and comfort

### Water management

Consumption from water network : 42,00 m<sup>3</sup>

Consumption of harvested rainwater : 400,00 m<sup>3</sup>

Water Self Sufficiency Index : 0.9

Water Consumption/m<sup>2</sup> : 0.03

Water Consumption/Work station : 1.4

All of the water falling on the building roof is directed to a tank of a volume of 20 m<sup>3</sup> which allows to collect 450 m<sup>3</sup> over the year. Rainwater is used to supply the toilets and External casseroles (for roadsides). So we limit the use of drinking water in the kitchen sink, the shower, the sanitary sinks and sinks in a few laboratories. The rainwater tank is sized for 30 days of autonomy for the toilet, so it should cover 100% of this consumption. When the tank overflows, the water is routed to a dry area. This is a depression in the ground for the collection, retention and infiltration of rainwater. This is converted into green space and thus integrated into the landscape. It prevents any discharge of rainwater into the public sewer. In addition, its location at the entrance of the site, it allows visitors and tenant awareness to the problem of rainwater.

### Indoor Air quality

Particular attention was paid to the finishing materials to limit releases of pollutants in indoor air. Paints, flooring (linoleum, tiles) and false ceilings (slabs) were chosen with an A + label emissions into indoor air. The building is equipped with a double mechanical ventilation flow with a filtration of the incoming air, which allows to obtain a good quality of indoor air. In addition, in the meeting rooms, CO<sub>2</sub> probes to adapt the ventilation rate with the measured pollution.

### Comfort

**Health & comfort :** Daylight: The offices and laboratories are highly glazed, ensuring a significant amount of natural light and also views to the outside. To the south facades, fixed solar protections help to limit solar gain in summer to prevent overheating while retaining the natural light. To validate the dimensions and location of windows, the light of day factor was calculated using the Design Builder software for each room of the building. Artificial light: In each office, a brightness sensor coupled with presence detection allows a fully automated lighting management and a consistent level of brightness in the room. Power and location of lighting were chosen following a simulation carried out using the Dialux software. In offices, illuminance of 500 lux on the working plane, the index of uniformity U<sub>0</sub> is greater than 0.6 and the glare UGR index is below 19. Fight against overheating: A simulation dynamic performed using the design Builder

software was used to validate the building design, including the size of the solar fixed protection in the South, so as to prevent overheating without having to set up an active cooling system. If sunscreens and natural ventilation are insufficient, the reversible heat pump helps cool the building. Winter Comfort: The high wall insulation ensures high wall temperature, which contributes to comfort (resulting temperature dryer). The underfloor heating also brings great comfort to occupants.

**Acoustic comfort :** The composition of the partitions between offices ensures good sound insulation ( $R_w = 52$  dB): Metal Stud structure 10 cm thick filled with rock wool + 2 drywall on each side. Inside the premises, false ceilings in mineral slabs guarantee good acoustic comfort by reducing reverberation. Movable partitions that allow divide the large meeting room into three smaller rooms were chosen with high sound insulation ( $R_w = 51$  dB). The realization of a floating screed on wood gîtage the floor also provides good sound insulation for airborne and impact sound between the floor and the ground floor.

## Carbon

### GHG emissions

**GHG in use :** 18,00 KgCO<sub>2</sub>/m<sup>2</sup>/an

**Methodology used :**

All building consumptions are electric (heating, hot water, lighting, ventilation, ...). The final energy consumption is 62 kWh / m<sup>2</sup>an and we consider 0.29 kg of CO<sub>2</sub> per kWh of electricity.

**Building lifetime :** 50,00 an(s)

### Life Cycle Analysis

The analysis of the life cycle was conducted for two building walls: the facade of the existing building and the roof of the new building. The study compared the solution to two other alternatives that had the same level of isolati

**Eco-design material :** The supporting structure of the outer walls, the floor of the floor and roof of the extension is made of wood frame with insulation blown in cellulose. Additional insulation of wood fiber is applied inside the facades. For the existing building as for the extension, the compressed Rockpanel rockwool panels are used as facade cladding. These panels are certified BRE A + / A.

## Contest

### Building candidate in the category



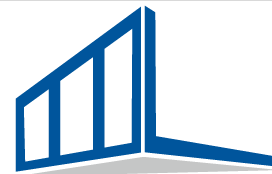
Energie & Climats Tempérés



Bas Carbone



Bâtiment Intelligent



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Coup de Coeur des Internautes



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