

INSPIRATION

Cité du Centenaire: energy retrofit and neighborhood urban renewal



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The energy renovation of 48 apartments in a social housing estate in Montignies-sur-Sambre (Belgium) forms part of the global neighborhood rehabilitation project of "La cité du Centenaire" which is located in the city of Charleroi on the easterly peripheral. This housing estate was designed by the architect Victor Bourgeois in 1957 and was based on the model of a garden city, but over the last decades it had become impoverished and the natural landscape blighted. The area in its original state was comprised of 7 identical buildings each having 4 stories and containing 12 apartments; totaling 84 residential units. There were also two parking structures with 15 garages each.

The objective of the intervention was to improve the comfort and safety of occupants by **increasing the living space** of the dwellings to meet current standards, improving the **energy performance** of the buildings, and to replace the existing technical installations. Another objective was the redevelopment of the surrounding green area, creating a **pleasant and generous living environment** for the neighborhood. The project was therefore not limited to a simple renovation of housing but to a global overhaul and a complete requalification of the neighborhoods. Social inclusion also played an important role in the project as the inhabitants of the neighborhoods were also invited to take part. Tenants were able to express their opinions regarding the creation of community spaces, students from the main school of the district collaborated in the artistic composition of one of the renovated facades, working together with the artist Leopoldine Roux, in order to give homage to Victor Bourgeois, the original architect of the estate.

Summary of the main interventions:

- The demolition of the 30 garages and one 12 unit residential block
- Energy retrofitting of the remaining 6 buildings, or 72 units
- The construction of a new building with 12 apartments on the part of the land freed up after demolition of the garages
- Develop the natural aspects of the surrounding green area.

Location

Rue Trieu Kaisin , 6061 Montignies-sur-Sambre, Belgium

The Cité du Centenaire is located in the heart of an urban area, easily accessible by public transport (bus and metro lines), and close to public facilities (nurseries, schools, hospitals, etc.) as well as shops and services. In order to reduce the environmental impact from cars, bicycle parking has been installed and pedestrian paths connect the site to the various existing pedestrian networks.

Project team

Architectural design, project management and special techniques: STARTECH MANAGEMENT GROUP <http://www.startech-group.eu>

Contact person: Nathalie Abrassart - info@startech-group.eu

Contractor and others:

La Sambrienne <http://www.lasambrienne.be>

R. De Cock <http://www.entreprises-decock.com>

STABILI.D <http://www.stabilid.be> Stability studies. Contact info: Denis schumer, info@stabilid.be

Time schedule

Renovation: 2016 - 2017

Building use and area

Land plot area: 3040 m²

Built-up area (BUA): 58%

Green area: 760 m²

Renovation costs

Construction/refurbishment cost: 2,997,329 €

Number of dwellings: 48

Cost/dwelling: 62,444 €/dwelling

Cost/m²: 876 € m²

Energy consumption

Initial consumption: 208.00 kWh/m².year

Primary energy need: 50.00 kWh/m².year

Primary energy need for standard building: 170.00 kWh/m².year

Calculation method: RT 2012

Final energy: 42 kWh/m².year

Breakdown for energy consumption: Heating 36%, Domestic Hot Water (DHW) 46% and others 18%

Envelope performance

Previous envelope retrofit

In 1978, the architectural aspect of the buildings was denatured, firstly by the installation on the façade of a 4 cm thick mineral wool insulation and cladding in asbestos-cement white panels which aged very poorly. Wood frames replaced the old white painted frames without respecting the original divisions. The initial architectural value was lost as a result of these different interventions. The thermal bridges of the reinforced concrete balconies and lintels were never solved when the façade insulation became insufficient to meet current standards (1978). After removing the cladding, it was no longer possible to restore the original appearance of these buildings.

Actual envelope retrofit

The envelope intervention was done by the insulation of the underground floor covering (thickness 12 cm Polyurethane rigid foam or PUR). Façade insulation using 24 cm graphite polystyrene coated with plaster or 30 cm mineral wool covered by a cladding in compressed mineral wool. Roof insulation was done by using 2 alternating layers of Polyurethane rigid foam (PUR) with a 14 cm thickness. Replacement of exterior joinery with passive window frames equipped with triple glazing. Replacement of the cupola at the top of the common staircase by an outlet of chimneys with improved thermal insulation. Replacement of the access door (staircase to the cellar) with a reinforced thermal insulated door.

U value	1959	1978	2017
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W/m2.°K	Original building	Façade intervention	After energy retrofit
Roof	2.20	2.20	0.07
Windows	6	3.1	0.84
Exterior walls	2.08	0.83	0.12
Floor on terrain	1.56	1.56	0.08

Airtight strips were placed at the various unions between the basement-covering floor and the walls over the entire outer perimeter before tiling, top floor walls / ceilings and joints frame / wall.

Global building results:

	U value	Building Compactness Coefficient	Airtightness value n50 (vol/h)
Building	0.18 W/m2.°K	2.15	1.4

The architects have achieved insulation levels which are comparable to those that can be encountered in a passive building. To accomplish all the criteria of passive certification in order to reach the airtightness value of 0.6 vol/h. was difficult and was not possible within the framework of the project renovation.

Energy systems

The overall aim of the project has been to make the heating needs as homogeneous as possible in order to standardize the energy bill (itself a factor of equity between the inhabitants of the city) and at the same time increase the winter and summer comfort.

Heating system: Central heating based on a low temperature condensing gas boiler (63.2 kW) that heats each dwelling with water radiators. The heating loop is insulated with 5 cm of mineral wool.

Domestic Hot Water: Central heating based on a low temperature gas boiler. The DHW loop is insulated with 5 cm of mineral wool.

Cooling system: Not considered for the global building

Ventilation system: A double flow heat exchanger ensures comfort of residents.

Health and comfort

The comfort of the inhabitants has been enhanced by increasing the living area of the dwellings. The surface area of the existing balconies has been extended. There is more space in the living room and kitchen as the dividing partition was demolished and now constitutes a single larger open living space. Moreover, new balconies on an independent structure as well as storage spaces

have also been added. The materials are chosen without organic volatile compounds (VOCs) so as not to affect the health of the workers and the inhabitants. The dimensioning of the windows in the living room has been optimized to take full advantage of natural lighting.

Environment

From an environmental point of view, the project has employed good waste management practice regarding the treatment of construction waste. The building demolition/dismantling before transformation (buildings n ° 125 and 127) was carried out by a resource efficiency company.

20 tons of construction demolition waste (CDW):

- one ton has been reused (the boiler and the radiators of all apartments)
- 17 tons were fully recycled (wood, metals)
- only 2 tonnes were considered as waste and treated in an approved sorting center.

Some original elements of the building were conserved: the floor coverings of the common entrance halls and landings and the flights of stairs in polished granite concrete which have been restored. The height of the handrails was too low and were therefore exchanged, for a continuous stainless steel handrail. The completely renovated façades have additional structures which support the new balconies. They constitute complementary volumes that mark the verticality and give more relief to the surface and, therefore, break the monotony of the façade. The appearance of the common entrances has also been improved and identified by a new salient volume. The use of materials from a balanced chromatic choice give a new identity and a strong image to the buildings - redefining a new place in modern times.

Awards and recognition

Green Solutions Awards 2017

Additional information

<https://www.startech-group.eu/portfolio-item/rehabilitation-de-la-cite-du-centenaire/>

<http://www.hainauthorizons.be/cite-centenaire/>

<http://www.maisonpassive.be/IMG/pdf/-36.pdf>

Article by Mrs Pascale Triffoy - *Chargée de mission, Hainaut Développement*