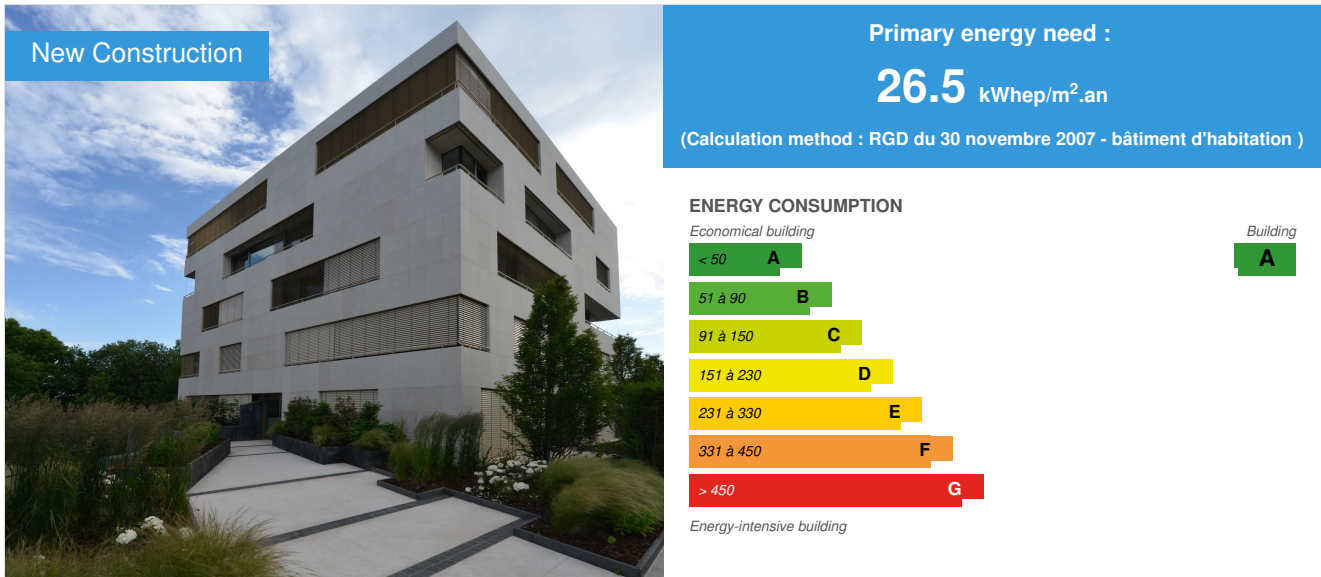


## Avenir Residences

by Saël Gramdi / 2019-06-18 17:16:13 / Luxembourg / 8733 / FR



**Building Type** : Collective housing < 50m  
**Construction Year** : 2015  
**Delivery year** : 2017  
**Address 1 - street** : 70-72, Rue de l'avenir L-1147 LUXEMBOURG, Luxembourg  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 1 140 m<sup>2</sup> Autre type de surface nette  
**Construction/refurbishment cost** : 4 435 900 €  
**Number of Dwelling** : 32 Dwelling  
**Cost/m2** : 3891.14 €/m<sup>2</sup>

Proposed by :



### General information

The project consists of 2 passive buildings of 4 levels connected in the basement by 2 levels of cellars and parking, for a total of 32 apartments.

The project owner, who kept all the buildings in his portfolio, was not going to be profitable in the short term during the planning phase. Convinced of the rise of renewable energies very early on, studies to combine a set of innovative sustainable techniques for the time by combining them to create an energy mix thanks to the following technical installations:

- Geothermal baskets to heat and cool the building using reversible heat pumps;
- Biofluids' ERS system for the production of domestic hot water by recovering calories from grey water;
- Hybrid solar panels for the simultaneous production of heat and electric ity; Canadian air and hydraulic wells to preheat the air entering buildings;
- Rainwater collection tanks of 20m<sup>3</sup> per building to supply toilets and outdoor watering.

## Data reliability

Assessor

## Photo credit

Leif Chiotis

## Stakeholders

### Contractor

Name : Weidert Estate

Contact : Jo Weydert

### Construction Manager

Name : Atelier d'Architecture Danièle Weidert

Contact : atelier@weidert.lu

<https://aadw.business.site/>

### Stakeholders

Function : Other consultancy agency

Bureau d'études Boydens Luxembourg

luxembourg@boydens.lu

<http://www.boydens.be/fr/home-2.html>

### Contracting method

Other methods

### Owner approach of sustainability

In addition to innovative technical installations, an important sustainable approach has been taken in the choice of materials, such as wood for joinery and natural stone for facades.

### Architectural description

The PAP of rue de l'Avenir had planned the implementation of five 17X17m squares, on 5 levels. In order to preserve the minimalist aspect of this urban planning, the architectural idea taken consists in respecting and taking advantage of this monolithic cubic form, without however giving up the possible projections and balconies to which the old PAG gave right. The main materials are stone on the outside and inside to ensure visual continuity at the thresholds of large windows and sliding doors. The light-coloured stone on the inside increases the brightness thanks to its reflective effect and visually enlarges small spaces. All kitchens and closets have been designed and built to measure, integrating all technical equipment and inspection hatches. To complete the idea of an intimate loggia, the sun blinds are relocated in the alignment of the exterior façade.

### If you had to do it again?

Absolutely

### Building users opinion

Satisfied with the location, less than 1.5 km from the centre, the exceptional view of the accommodation overlooking the valley and the canopy of the Bambesch forest, the tranquility of the district. Proximity to public transport, schools. The brightness of the apartments, the quality of the finishes and the feeling of comfort.

## Energy

### Energy consumption

Primary energy need : 26,50 kWh/m<sup>2</sup>.an

Primary energy need for standard building : 45,00 kWh/m<sup>2</sup>.an

Calculation method : RGD du 30 novembre 2007 - bâtiment d'habitation

Final Energy : 7,00 kWh/m<sup>2</sup>.an

## Envelope performance

### More information :

Facade U=0.112 W/(m<sup>2</sup>.K); Walls to unheated rooms U=0.248 W/(m<sup>2</sup>.K);

Roof U=0.075 W/(m<sup>2</sup>.K);

Flat roof U=0.121 W/(m<sup>2</sup>.K);

Slab to unheated rooms U=0.160 W/(m<sup>2</sup>.K); Slab against ground U=0.216 W/(m<sup>2</sup>.K);

Walls against ground U=0.320W/(m<sup>2</sup>.K).

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,59

Users' control system opinion :

**The installations have been designed to be simple to use and intuitive without going to the extremes that lead users to be confused by a multitude of unnecessary features.**

## Renewables & systems

### Systems

#### Heating system :

- Geothermal heat pump
- Low temperature floor heating
- Radiant ceiling
- Solar thermal
- Canadian well

#### Hot water system :

- Heat pump
- Solar Thermal

#### Cooling system :

- Reversible heat pump
- Geothermal heat pump
- Radiant ceiling

#### Ventilation system :

- Double flow heat exchanger
- Canadian well

#### Renewable systems :

- Solar photovoltaic
- Solar Thermal
- Heat Pump on geothermal probes
- Energy recovery from waste
- Heat pump

## Environment

### Life Cycle Analysis

#### Eco-design material :

**The contracting authority's approach has been to opt for as many natural materials as possible, in which no chemical components are used, as far as possible from the available materials.**

### Water management

Consumption of grey water : 4 400,00 m<sup>3</sup>

Consumption of harvested rainwater : 614,00 m<sup>3</sup>

## Indoor Air quality

With buildings on the outskirts of the city, the Rollingergrund valley separates the buildings from the Bamesch forest, which is one of the greenlungs on the outskirts of the city, allowing large windows to be opened during the summer months and natural air to be drawn in. In addition to the comfort of the air quality of the high-efficiency mechanical ventilation units, whose filters are maintained and replaced by the contracting authority, in accordance with the maintenance intervals prescribed by the builder.

## Comfort

### Health & comfort :

For the comfort of the occupants, active floors and slabs have been favoured, allowing the inertia of the structure to contribute to comfort, the installation of efficient VMCs and the exceptional location of the buildings, air quality contributes to the comfort and health of the occupants. The large openings in the facades are equipped with motorized blackout slat blinds, improving comfort by reducing solar gains in summer and overheating of the homes and, in winter, optimizing the gains and allowing the benefits of natural light to be enjoyed.

## Products

### Product

ERS technology

Biofluide environnement

a.delatourdupin@biofluides.com

<http://www.biofluides.com/10-technologie-ers>

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

For the concept, it is essential at the outset to design waste water disposal systems by separating faecal and grey water. Only grey water will be recovered and the energy contained in the water will be recovered. The installation consists of a recovery tank that is pre-dimensioned by wastewater flow calculations.

This wastewater recovered in the retention tank, equipped with an exchanger coupled to a heat pump, regenerates hot water that will be stored in the tanks of

storage. Once the energy contained in the wastewater has been harnessed, the water will be discharged to the public drainage system. This reuse of the energy contained in wastewater contributes to the concept of saving and circular energy.



The project owner was open to all solutions that went in a sustainable way and in a combination of energy mix. Having no reference to Luxembourg and after discovering the product at the Interclima show in 2013, we went to visit facilities with the project owner who immediately found an interest in these facilities and made it the first project of 4 units of 16 apartments in Luxembourg.

DualSun Spring

DualSun

contact@dualsun.com

<https://dualsun.com/fr/produit/panneaux/>

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

DualSun technology allows dual energy production in the form of both electricity and heat, via a single solar panel, without increasing in size compared to a standard photovoltaic panel. This is a major technological innovation that makes it possible to meet all the energy needs of buildings while minimizing the amount of roof space occupied by the solar system.

The Spring hybrid solar panel has a polypropylene water heat exchanger on its rear side, the design of which is protected by 3 families of international patents.

In operation, a standard photovoltaic panel produces 80% heat and only 20% electricity.

This heat, in addition to being lost, is detrimental to the performance of the panel, which drops as it warms up.



Thanks to its innovative heat exchanger, Spring is constantly cooled, which allows it to produce more electricity than a standard photovoltaic panel. As the water circulates in the exchanger, it will recover the heat emitted by the photovoltaic cells and heat up. It can reach a temperature of up to 70°C.

The water thus heated can then be used to meet the building's various heating needs.

The new generation Spring panels allow you to produce your domestic hot water and make a swimming pool autonomous in terms of energy, for example, or also heat a building with a combined system.

As with greywater energy recovery, by 2013, this product was a precursor and had huge benefits for residential buildings with reduced areas available for photovoltaics and solar DHW production. The combination of the two technologies has made it possible to combine the efficiency of photovoltaic electricity production with the needs of solar DHW production.

Bachner probes

Bachner

Josef.Maderthaner@bachner-brunnenbau.at

<http://www.bachner-brunnenbau.at/index.php/de/erdwaerme>

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

The ground is a natural heat accumulator, which draws its energy from solar radiation and climate. Helical probes use this heat to heat buildings. The ground probe consists of spiral PE Pipelife pipes of OD 25size, which are filled with a mixture of water and antifreeze (brine). The heat generated by the ground is elevated to the upper level by means of a heat pump, thus allowing the operation of a low temperature heating system (underfloor heating, for example).

The use of geothermal energy is a sustainable and environmentally friendly heating alternative, as the soil regenerates every year in summer.

Compared to surface collectors, the ground probe requires little space and can therefore be adapted to small spaces. Unlike deep drilling, the helical probe is installed in a 3 to 10m shallow borehole and does not require permits or complex procedures, especially in areas where drilling is restricted.

These probes are compact and do not require drilling that can be closely spaced to install a sufficient number to meet the needs of the buildings. They can not only produce heating via the heat pump, but also produce passive cooling in geocooling.

As geothermal drilling permits are subject to restrictions, it was impossible to have a conventional drilling permit for wells from 80to 120m deep. The use of baskets was too complex to implement given the available surface area, so it was only possible to drill below the surface that the building would cover.

Hence the use of helical probes similar to the geothermal pile principle, limiting drilling operations with conventional pile drilling equipment.

This has made it possible to create a drilling field without having to handle cubic metres of soil and compensate for soil stability by installing the probes, as with geothermal baskets.



## Costs

## Urban environment

The location of the buildings is in a new district. Thirty years ago, the land was still an agricultural field that, as urban development progresses, has led to development with a view to creating a new district. Less than 400m away are two high schools and 200m away is a crèche, which allows residents to send their children to school with a focus on soft mobility. The passage of a bus line in the street and a stop in front of the buildings to reach the city centre within 10 minutes. The recent construction of the tram line links the European institutions and financial centres district. Neighbourhood playgrounds are nearby, as well as urban garden areas that can be made available through rental by the municipal administration of the city of Luxembourg. Finally, a self-pedestrian circuit runs along the back of the building and connects the nearby forest to less than 15 minutes' walk.

## Parking spaces

Each building has 20 underground parking spaces, all of which have the facilities allowing, if necessary, to install slow or fast charging stations according to the occupants' choices, for hybrid or electric vehicles.

## Building Environmental Quality

### Building Environmental Quality

- waste management (related to activity)
- water management
- energy efficiency
- renewable energies
- mobility

### Building candidate in the category



Energie & Climats Tempérés



Bas Carbone

