

## Châtelet 3 - Actis (France)

**50% energy saving for heating**

**Total living expenses lower than before renovation**

### Project data

Location, address:	2,4,6 rue Riollot - GRENOBLE
Region:	RHÔNE-ALPES
Surroundings:	Urban location
Climate:	Continental and cold
Heating degree days:	2830
Year of construction:	1966
Year of renovation:	2002
Typology:	Apartment building
No of dwellings:	120 – 3 buildings
Total floor area:	6 178 m <sup>2</sup>
Owner:	ACTIS (social housing association)
Renovation design team:	Cabinet Jauré - Archimedes
Realization team:	Tomai (mançonnery) , Energos (façade), Ratto-Pérenon (heating – internal), Bertolino (heating network), TTE (electricity)
Costs of energy saving measures:	2 000 000 € (excl VAT)
Renovation financed by:	The owner – tenants - subsidies

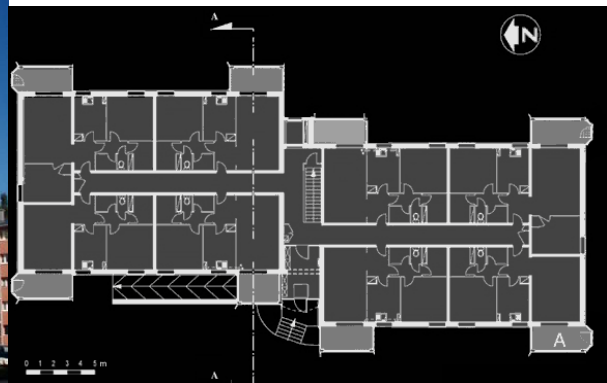


Figure 1: Building n°6 (40 flats) after renovation

### Renovation concept

#### Key renovation features

- Insulation of facades, floors, roofs
- double envelope "parieto dynamic" insulation
- Heat recovery ventilation
- Individual heating regulation per building
- Addition to the building of east and west facing glazed sunspaces (7m<sup>2</sup> of floor space to each flat)

### State-of-the-art

#### Before renovation

##### Constructions [U-values: $W/m^2K$ ]

- Poorly insulated roof [1.07]
- Insulated ground floor [0.66]
- Non-insulated cavity wall [1.69]
- North oriented gable [0.51]
- Timber window frames double glazed [3.15]
- Timber entrance door [2.20]

##### Installations

- Communal heating for the three buildings connected to urban network

#### After renovation

##### Constructions [U-values: $W/m^2K$ ]

- Insulation of roof (200mm layer of mineral fibre insulation) [0.55]
- Insulation of ground floor: no change [0.66]
- Insulation of cavity wall (100mm insulation, clad with thin rendering) [0.34]
- North oriented gable [0.23]
- Timber window double glazed: no change [3.15]
- Timber entrance door: no change [2.20]
- Glazed sunspace (aluminium framed single window) [1.69]

##### Installations

- Building Energy Management system per building



### Energy saving and monitoring

Heating energy consumption before renovation:  
 $KWh/m^2$ : 191

Heating energy consumption after renovation:  
 $KWh/m^2$ : 92,5

Percentage saving: 52%  
Including the comfort improvement

Figure 2: Before renovation

### Additional information

Owned by the local housing association ACTIS (previously named Opale), each block is 5 storeys plus basement, built in 1966 in an urban housing area near the centre of Grenoble. This project demonstrates the potential for an energy efficient renovation project to improve a run down estate of flats, with physical and social problems. Hazardous materials have been removed, extra living space created and the appearance of the unappealing building has been transformed. Also using an innovative double envelope system, ventilation has been improved, without the requirement for ductwork, or decanting of tenants during the works.

### Lessons learned and conclusions

- This renovation aimed at a successful energy consumption reduction rate
- Tenant appreciate extra living space brought by greenhouse (7m<sup>2</sup>) even if it is unheated
- Modifying the aesthetic of the buildings brings more satisfaction for inhabitants
- Dynamic façade coupled with heat recovery venting allows controlling fresh air losses and it works as well as a natural cooling system in summer because the night coldness is stored into the mass of the fabric.
- Consumption controls are attested by the heating bill from the facility "Compagnie de Chauffage".

### References

<http://www.learn.londonmet.ac.uk/packages/cdres/intro/fr/intro.html>

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