

## Venissieux (France)

**54 % energy saved on DHW + space heating**  
**Solar thermal system for DHW**  
**Façade-integrated PV**

### Project data

Location, address:	Vénissieux, plateau des Minguette, quartier "La Darnaise"
Region:	Rhône-Alpes, Rhône.
Surroundings:	South suburb of Lyon
Climate:	Continental
Heating degree days:	2362
Year of construction and renovation:	Construction: Early 70's Renovation 2005/2006
Typology:	11 High-rise multi-family buildings
No of dwellings:	727 flats
Total floor area:	36 696 m <sup>2</sup>
Owner:	OPAC Grand Lyon (social housing company)
Architect and Builder:	B.PARIS/BERIM/THERMIBEL/RBS
Costs of energy saving measures:	Solar thermal : 874 320 € PV : 580 534 € Total: 1 554 854 €
Renovation financed by:	Conseil Régional 24% ADEME 36% State 40%

### Objectives and Results

The refurbishment project was undertaken to strengthen the attractiveness of towers while keeping competitive levels of rents and services. For that purpose, the objectives pursued through the entire program of rehabilitation are mainly:

- The reduction of service (maintenance) and operation (water&energy consumptions) costs,
- The requalification of the image of towers (to avoid high vacancy rate),
- The modernization of the technical equipments.



### Renovation concept

#### Key renovation features

- Extra insulation
- Low energy windows
- Solar heating for domestic hot water
- PV-systems for continuous electricity use
- Optimised lighting systems

### State-of-the-art

Before renovation	After renovation
<b>Constructions [U-values: W/m<sup>2</sup>K]</b> -Single aluminum frame glazed windows -Wall partially insulated (internal insulation) -Loggias Old mechanical ventilation system	<b>Constructions [U-values: W/m<sup>2</sup>K]</b> - Double glazed windows [2.6] -10 cm thick external wall insulation [0.31] - All loggias are closed with aluminium sliding windows [2.7] - Flat roof insulation [0.25] Replacement of the complete mechanical ventilation system including air extractor
<b>Installations</b>	<b>Installations</b>
	- 732 m <sup>2</sup> of solar thermal collectors connected to the urban network as back up system (38% solar fraction) - 75 m <sup>2</sup> of photovoltaic panels per tower (totalling 92 kWc) grid connected. - installation of water-saving devices on faucet and showers - installation of double flow flushes

### Energy saving and monitoring

<i>Energy consumption before renovation:</i>	
Heating (kWh/m <sup>2</sup> ):	162
DHW (kWh/m <sup>2</sup> ):	30.5
<i>Energy consumption after renovation:</i>	
Heating (kWh/m <sup>2</sup> ):	105
DHW (kWh/m <sup>2</sup> ):	19
Percentage saving <sup>1</sup> :	54%



### Additional information

- The feed-in tariff for the produced PV electricity allows to get back 8560 € a year that represents about 20 % of the electricity invoice for the common spaces
- Additional actions on the reduction of electricity demand have been undertaken (tariff adaptation, modernization of electricity consuming equipments such as elevators or lighting)

### Lessons learned and conclusions

To minimize inconvenience with tenants and optimize costs, works were realized by kind of activity and not by building:

- 1) replacement of external windows
- 2) insulation of facades, renovation of the mechanical ventilation system and the closure of loggias,
- 3) entrance halls

Solar installations (both thermal and PV) were treated in parallel with the other works.

### References

<http://www.opac-grandlyon.com/PDF/DP/Dossier%20de%20presse%20de%20la%20DARNAISE.pdf>