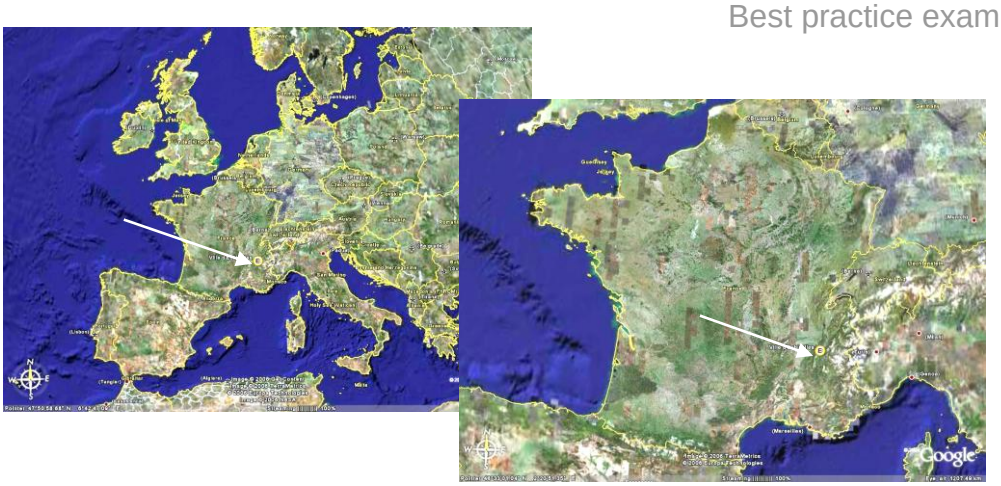

Echirolles (France)

39 % energy heating saved - 5% energy electricity saved
Improving environmental efficiency of urban energy supply systems

Project data

Location, address:	Echirolles, quartier du Surieux
Region:	Grenoble surrounding, Rhône-Alpes, Isère.
Surroundings:	South suburb of Grenoble, steep mountains around, Drac rivers running trough.
Climate:	Mountain
Heating degree days:	2290
Year of construction and renovation:	1970 / 1999
Typology:	High Raise Apartment Buildings.
No of dwellings:	505 flats
Total floor area:	36 696 m^2
Owner:	OPAC 38 (Social Housing company)
Architect and Builder:	DUO Architects
Costs of energy saving measures:	The cost of the entire programme is 1.83 million € of which 1.07 million € for the solar facilities only.
Renovation financed by:	"Solar" subsidies cover 50% of the corresponding investment (i.e. 533,570 €) distributed as follows: - European Union: 259,000 € (Thermie programme) - Rhône-Alpes Region: 244 000 € - Isère Department: 30 490 € The rest is covered by Palulos financing and own funds.

Objectives and Results

The OPAC 38 manages public housing, including more than 20,000 public housing units. Its main mission is to control the "rent + utilities" binary. To achieve this goal, the OPAC 38, is looking for new financing to cover further rehabilitation operations for buildings included in the heritage improvement plan.
Operations for energy management and the use of renewable energies are examples of such actions and are part of the OPAC's core energy policies.
The use of renewable energies was also intended to improve public awareness in controlling energy use.

Renovation concept

Key renovation features

- Insulation of blind walls
- High efficiency insulation glazing and frames
- Solar collectors for DHW
- PV panels for DC fans
- High efficiency lighting
- Heat consumption meters

State-of-the-art

Before renovation

Constructions [U-values: W/m²K]

- Non insulated blind walls *[1.5]*
- Simple glazing windows *[5.1]*
- Wood window frame

Installations

After renovation

Constructions [U-values: W/m²K]

- Complete replacement of insulation and Joinery. Blind walls insulation; 8cm Styrofoam *[0.6]*
- Double glazing windows *[2.3]*
- PVC window frame

Installations

- Energy-saving compact fluorescent light bulbs
- 705 m² solar thermal collectors, (450 MWh, 25% of the whole dwelling consumption.)
- 95 m² of photovoltaic panels (totalling 10 kWc coupled to the network). Electricity used for common light and DC fans.

Energy saving and monitoring

Energy consumption before renovation:	
Heating (kWh/m²):	154
DHW (kWh/m²):	52
Electricity (common space) (kWh/m²):	13.4
Energy consumption after renovation:	
Heating (kWh/m²):	115
DHW (kWh/m²):	33.8
Electricity (kWh/m²):	11.9
Percentage saving[1]:	36%

96€ /flat /year saved

Additional information

- The four solar water heating units were connected to three substations in the urban heating network which provide extra energy and maintain the solar equipment. A three-year GSR contract was established to check whether the recorded performance complies with the forecasts calculated during the initial study. From 1999 to 2000, the solar fraction of hot water provided by the solar water heaters reached 44%. The results are 35% higher than the guaranteed objectives. Globally, the solar facility reduces polluting emissions by about 130 T of CO2/year, 470 kg of SO2/year and 300 kg of NOx/year.
- To provide enough space and take advantage of the best orientation (45° due south), a second roof level was added to the top of the three buildings on which the solar collectors are placed. This extra level protects the technical equipment on the lower level from bad weather. The multicrystalline photovoltaic panels occupy the upper part of a blind gable on a building oriented due south. They are also used as building material since they replace the weather-board and help provide thermal insulation for the building.

Lessons learned and conclusions

The principal lesson learned for OPAC38 relates to the DHW distribution pipes. The existing DHW distribution pipes were working well. Therefore the solar panels were simply added without having a look at the pipes prior to installation. One year after the work ended, fur was discovered in some of the pipes. It would have been easier and cheaper to solve this problem during the work than afterwards. This experience has learned OPAC38 that in the future the pipes are examined and probably have a cleaning treatment prior to installation.

References

http://www.europeangreencities.com/demoprojects/france_grenoble/france_grenoble.asp