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Best Practices Guide- Successful Energy Efficiency Technologies integration in SME Hotels

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**BEST PRACTICES GUIDE:
SUCCESSFUL ENERGY EFFICIENCY
TECHNOLOGIES INTEGRATION IN
SME HOTELS**



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BEST PRACTICES GUIDE: SUCCESSFUL ENERGY EFFICIENCY TECHNOLOGIES INTEGRATION IN SME HOTELS



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Best practices guide: successful Energy Efficiency Technologies integration in SME hotels

Foreword

This report provides examples of best practices in the hotel sector regarding the integration of energy efficiency (EE) solutions. It has been produced within the framework of the Hotel Energy Solution (HES) project. Eighteen examples of small-to-medium size hotels which have implemented an energy conservation program are documented.

For each hotel, we have attempted to collect information regarding the motivation for implementing an energy efficiency project (as reported by the hotelier) along with the historical background.¹ Also, we have included both the difficulties encountered by the hoteliers and the key factors that helped in the process.

As for the energy efficiency solutions in place, they are presented in the following order:

- **Evaluation:** in existing buildings, assessing the current energy situation is an essential first step in deciding which actions should be taken. Therefore, we describe the actions taken by the hoteliers to assess the energy situation of their hotel as - “make a first assessment”.
- **Organisational and behavioural solutions:** for an energy policy to be successful, it is essential to involve the staff and guests to bring about long-lasting behavioural changes; for this reason, we describe the hotelier’s actions – “as far as the information was available”.
- **Technical solutions:** for the technical solutions, a distinction is made between the solutions taken to reduce the space heating and cooling needs of the hotel (described under “protect the building from the cold and hot weather”) and the solutions taken to improve the energy efficiency of the equipment (heating, hot water, lighting, electricity, etc). Renewable energy solutions are also described, even though this is not the main subject of this best practice guide².

Finally, some indication is given on the costs and benefits resulting from the energy solutions in place (as reported by the hoteliers).

It is important to stress that the information provided in the datasheets was mainly collected through phone interviews with the hoteliers: the level of details may vary from case to case depending on the information provided.

¹ It was interesting to note that in many cases, the energy conservation approach was motivated by environmental concerns and by the wish to reduce the hotel’s energy costs. Most of the time, the energy conservation approach was only part of a more global environmental policy of the hotel: hoteliers generally reported other environmental actions, such as the reduction of water use and the reduction of waste.

² Another guide is planned to address best practices in SME hotels in terms of renewable energy integration.
Successful EET Integration in SME Hotels

Notes:

- For this current report, we have targeted small-to-medium size, which have implemented a **“package” of energy efficiency solutions** (in other words, hotels that had implemented only one solution, such as changing light bulbs, have been discarded from the report; large structures have also been discarded, except one: Almaverde Village and Spa). This made identifying successful cases a challenge – very few hotels documented in the literature meet these two criteria. Therefore, extensive research needed to be done, and for this reason the most exemplary hotels were found in France. This explains why 11 of the 18 case studies presented are in France.
- **Existing hotels** were preferred over new constructions because the main challenge which the HES project aims to tackle is encouraging existing hotels to implement actions to reduce their energy consumption. For this reason only three case studies are new establishments (Le Coq-Gadby, Almaverde Village and Spa, Chateau Montagne).

Note that annual energy consumption and energy consumption per guest night sold are influenced by a number of factors, including weather conditions and occupancy. The energy consumption data indicated for each hotel should only be used as a guide.

List of successful cases

18 successful case studies are detailed:

1. « La Pérouse » hotel, Nantes (France)
2. « Les Orangeries », Lussac-Les-Chateaux (France)
3. « L'Orri de Planès », Planès (France)
4. « Les Tourelles », Le Crotoy-France (France)
5. « Nou4 » hotel, Laguiole (France)
6. « Hotel Jolie » hotel, Riccione (Italy)
7. « Le Coq-Gadby Spa Hotel », Rennes (France)
8. « Dunstanburgh Castle Hotel », Embleton (England)
9. « Twice Brewed Inn », Hexham (England)
10. « La Ferme de Bassilour », Bidart (France)
11. « Almaverde Village and Spa » (Portugal)
12. « Old Chapel Forge », Chichester (England)
13. « Le Morgane » hotel, Chamonix (France)
14. « Les Aiglons » hotel, Chamonix (France)
15. « Auberge Les Liards », Egliseneuve des Liards (France)
16. « Ecolodge des Chartrons », Bordeaux (France)
17. « Chateau Montagne », Troyan (Bulgaria)
18. « Cristallina Eco-Hotel », Coglio (Switzerland)

Beta version of the best practice guide on successful cases of EE solutions integration



Energy Efficiency Case Study

« La Pérouse » hotel Nantes (France)

General information on the hotel —

Hotel name & type:

- Hotel name: La Pérouse
- Type of hotel: City hotel
- Type of business: Private
- Services offered: B&B, air conditioning
- Category: 3 star hotel
- Staff number: 15

Building characteristics:

- Year of construction: 1993
- Climatic zone: Tempered, oceanic climate
- Size of the building: 1280 m²
- Number of guest rooms: 46

Environmental aspects:

- Environmental labels: Green key, EU Eco-label (since November 2007)
 - Annual electricity consumption per m²:
 - 210 kWh/ m²/year with a 75% occupancy rate
 - Electricity consumption per guest night sold:
 - 14 to 16 kWh/guest night sold



The hotelier's approach —

“The economy serves the people”

When the current hotel manager took over the hotel, he wanted his business to take into account the well-being of its customers and employees, as well as the environmental aspects of its activity. Therefore he decided to follow a “global performance” approach, which means: researching economic performance and taking social and environmental issues into account.

In addition, the hotel manager was concerned about climate change and wanted to do something to lower the environmental impact of his new business. To lower this impact, he followed an incremental approach. After implementing a “towel agreement policy”, he decided to learn more and did a one-year internship to study the feasibility of obtaining the Green Key label and the EU Eco-label for his hotel. The implementation of these two labels brought great improvements.

At the same time, a consulting firm offered to evaluate the CO2 emissions and the annual cost of each hotel activity. "This helped obtain a good overview of the impact and cost of each activity in order to help prioritize future projects".

"Putting sustainable development at the heart of the hotel's strategy"

Another big change arose when the hotel manager was contacted by the French channel called "Natural Step", an N.G.O. and an advisor to the Scandic hotel chain, well known for its environmental pro-activeness. Working with "Natural Step" helped put sustainable development at the heart of the hotel's strategy. "Now, for each decision, we consider sustainable development as a criterion".

"You can improve the global performance of your hotel while maintaining expenses at the same level"

"Decrease the environmental impact of the hotel, improve the quality of service given to the guests and maintain (or achieve) good economic performance" are realistic objectives a hotel can set for itself. To make improvements, it is important to take the time to analyse each hotel activity globally.

Usually, some investment needs to be made to improve global performance. Still, it is possible to keep global expenses of the hotel at the same level because some of the investment will lead to economical savings. "The important thing is to have a global view of the business".

The first step consists of starting with measures that are economically neutral.

For more information: www.perousevip.com



Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: energy sub-metering systems, with bi-monthly reading, were installed to assure accountability of energy in the main office, the guest rooms and the technical office. The indicators used for energy monitoring are:

- kWh/ m²/year
- kWh/guest room occupied;
- kWh/night sold.

Carbon assessment: a carbon assessment was made in 2007 to evaluate the carbon emission caused by the hotel's main related activities (including energy consuming activities such as space heating). The economic cost of all these activities was evaluated in the meantime, in order to identify projects.

Involve your staff

Staff information and involvement: The staff is informed on the environmental impact of the hotel through meetings to communicate the environmental indicators of the hotel; the staff also receives some practical advice on: recommended temperature levels (19°C in winter and 26° in summer); recommended load for washing machines, etc...

In addition, the staff is also encouraged to innovate and find solutions to consume less energy and reduce the hotel's environmental impact. If energy savings are achieved by the staff, the savings are redistributed to the staff as a bonus.

Involve your guests

Information to guests: guests are informed on good housekeeping practices, including recommended temperature levels (19°C in winter and 26° in summer). "It is also essential to communicate the non-visible efforts we make, such as purchasing electricity from renewable sources".

A TV in the entrance hall provides information on the hotel's environmental action plan.

Protect the building from the extreme temperature

Window insulation: double-glazing was installed during the building's construction in 1993.

(The walls are made of concrete covered by a 7 cm stone layer and have no insulation.)

Improve equipment efficiency

• Lighting & electricity

Efficient lighting: 80% of lights are low energy consumption lights.

Lighting control: a computer alarm indicates when lighting in the entrance hall can be switched off. The installation of time controls and occupancy sensors in other parts of the hotel (public bathrooms and internet office) is also under study.

Automatic control of electricity in guest rooms: an "economy box" has been installed to shut down the electricity when guests leave their rooms (except for the minibars).

Office equipment: the stand-by mode is used for computers.

Kitchen equipment: refrigerators and freezers are A+/A++ energy class.

• Space conditioning, ventilation and domestic hot water

Automatic control of heating/cooling: a control power circuit breaker which shuts down heating (or air conditioning) when the window is opened was installed during construction.

Ventilation control: a humidity control has been adjusted on the mechanically controlled ventilation extractor (in bathrooms); the 500 W



Environment

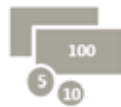
central motor was replaced by a dynamic 200-500 W motor.

Hot water saving: low-flow devices have been installed in bathrooms.

Hot water distribution: a hot water closed loop has been installed to have hot water available close to the taps and to return hot water back to the water heater; 5 pumps are working 11 hours a day (they are connected to a programmer).

The installation of a heat recovery system in the technical office and in the laundry for hot water production is also being considered.

Benefits for the hotel



Economic performance

Continuous improvement and global performance of the business

“Savings are re-invested in new environmental measures to ensure a continuous improvement”.



Meet today's guest expectations

Increasing environmental awareness

“Guests are becoming increasingly aware of environmental issues and they are getting more and more sensitive to the environmental policy of hotels”.

A lower environmental impact

The environmental action plan meant that CO₂ emissions were reduced from 46 TCO₂/year to approximately 30 TCO₂/year.

For information, here is the cost of some energy saving measures that have been implemented in the recent years:

	Cost (euros without tax)
Water saving devices	1,235
Hot water closed loop	12,171
Sub meters (water and energy)	1,040
Low energy consumption lights	487
Replacement of refrigerator and freezer	2,000
Fees for qualifying for Eco label	1,500
Fees for qualifying for Green Key	50
TOTAL	14,064

Integration of renewable energies

- Electricity

The hotel purchases renewable electricity from its supplier.

Market availability

Maturity of the solution: mature.

Type of service providers: environmental organisations working in the hotel industry sector and private consulting firms may be able to help you set up your information/training strategy (relevant only if the hotel is large enough).



Energy Efficiency Case Study

« Les Orangeries »

Lussac-Les-Châteaux (France)

General information on the hotel



©Hotel Les Orangeries, France

Hotel name & type:

- Hotel name: « Les Orangeries »
- Type of hotel: rural hotel
- Type of business: Private
- Services offered: restaurant, seminar facility, non-heated swimming-pool (35 m X 5 m)
- Category: 3 star hotel
- Staff number: about 15 employees

Building characteristics:

- Year of construction: old family home from the XVIIIth century (renovated in 1997-1999 before the hotel opened).
- Climatic zone: Tempered, oceanic climate
- Size of the building: 900 m²
- Number of guest rooms: 11 guest rooms and 4 apartments

Environmental aspects:

- Environmental label: EU Eco-label (since May 2006)
- Annual energy consumption per m²: not available.
- Energy consumption per night sold: not available.

The hotelier's approach

“We are engaged in a continuous improvement process”

Before opening the hotel in 1999, the owner of the hotel undertook some renovations following an environmental assessment with consideration focused on energy issues. She then decided to work towards implementation of the European Eco-label, which she obtained in 2006. “The EU Eco-label actually helped us make improvements”. But the adventure is still on-going: “Energy efficiency improvements in the building are taken step by step, following a logical assessment. It is a continuous process”.

Factors that helped in the process

The owner's husband is an architect and had previous knowledge of environmental standards for buildings.

In addition, the hotel owner was helped by three students in training for the implementation of the European Eco-label.

For more information: www.lesorangeries.fr

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the hotel monitors its monthly energy consumption every three months.

It also regularly monitors the energy consumption of the oil boiler and tries to correlate the energy consumption to hotel occupancy.

Involve your guests

Information to guests: a leaflet is available in each room to inform guests of the hotel's environmental policy. Guests are informed of good housekeeping practices when they arrive in the hotel (including correct use of the individual thermostatic control in the room and how to use the power circuit-breaker).



Involve your staff

Staff information: procedures have been written for each service to inform employees about good "actions" to adopt (such as shutters in winter after sunset, identifying which rooms are unoccupied and can have their temperature set to a lower level), etc.

Specific attention is also paid to activities in the kitchen because the employees are not familiar with the positive actions to adopt (like switching off equipment when not in use).

Staff training: some training seminars are regularly organized. They usually focus on issues relevant to the time period, and the season is also considered.

Protect the building from the extreme temperature

Window insulation: double-glazing was installed during the 1999 renovation.

Building insulation: the roof was insulated with natural hemp fibre during the 1999 renovation (using material which has the ability to absorb and release moisture without affecting heating performance).

More recently, the yard has been covered with insulated glazing (a nanogel glazing) in order to reduce heat exchanges with the exterior.

The interior walls have been coated with lime, which improves waterproofing and insulation of the walls while letting them breathe (thanks to the vapour permeability of the lime).

The thermal insulation of the new extension surpasses regulatory requirements.

Prevention of air infiltration at doors and windows: using weather-stripping.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: low energy consumption lights (compact fluorescent light bulbs) are used in public areas and in guest rooms. Some solar lights are also used outside.

Lighting control: occupancy sensors are used in areas of infrequent use (such as corridors and public toilets).

Automatic control of electricity in guest rooms: this device cuts off electricity when guests leave their rooms (it is connected to the room key).

- **Space conditioning, ventilation and domestic hot water**

Thermo-regulation: temperature in the whole building is set to 18°C in winter, but guests can also adjust the temperature in their room with individual thermostatic controls.

Hot water saving: installation of low-flow devices in bathrooms.

Hot water production: in the extension, a hot water circulation system has been installed, together with a hot water, wood burning accumulator.

Integration of renewable energies —

- **Electricity**

The hotel purchases renewable electricity from its supplier.

- **Space heating**

- The hotel is currently using an electric oil boiler and is experimenting with biofuel.
- The owner is planning to have a wood boiler installed in the future when the accommodation capacity is sufficient (a larger capacity is needed for the boiler to work at maximum efficiency).

Benefits for the hotel —



Economic performance

Energy savings

Energy savings achieved on space heating have been estimated at up to 30%.



Market visibility

Improved market visibility

According to the hotelier, the EU Eco-label gives the hotel a competitive advantage and greater visibility to clients.





Energy Efficiency Case Study

« L'Orri de Planès » Planès (France)

General information on the hotel



Hotel name & type:

- Hotel name: L'Orri de Planès
- Type of hotel: inn
- Type of business: private
- Services offered: half-board, swimming-pool
- Category: (no category classification)
- Staff number: 3 (the 2 owners + 1 person for cleaning)

Building characteristics:

- Year of construction: old stone and wood farmhouse that was fully renovated in 2004
- Climatic zone: located in a mountainous region (French Pyrenees) at an elevation of 1,550 meters above sea level
- Size of the building: between 350 and 400 m²
- Number of guest rooms: 10 guest rooms (can sleep up to 26 people)

Environmental aspects:

- Environmental label: Green key
- Annual energy consumption per m²:
 - Electricity: 20 kWh/ m²
 - Gas: 52 kWh/ m²
- Energy consumption per guest night sold:
 - Electricity: 2,5 kWh/guest night sold
 - Gas: 6,3 kWh/guest night sold

The hotelier's approach

“We wanted to create a business with a low impact on the environment”

When starting their business, the owners of the inn wanted to do something for the environment. They were convinced that they could run a profitable business, with a limited impact on the environment. Reducing the inn's energy consumption was part of their strategy.

As teachers, they also wanted their business to be a platform for promoting awareness of ecological issues facing our society. “Our inn is the result of this process.”

“The initial investment was important but we now have major energy savings and can invest more in the quality of our service”

Thanks to the investments made in energy efficiency, the running costs are considerably reduced. “This allows us to invest in a better service quality: we are the only inn in the area which provides customers with high quality, regional food, and our guests really appreciate it”.

The inn's owners collaborated with a bioclimatic architect to define the renovation strategy.

The owners decided to work with a bioclimatic architect to define the renovation strategy of the old farmhouse (choice of the insulating materials and the glazing, calculation of energy needs, choice of heating systems working on renewable energies, etc.).

The inn received some financial support that helped in the process:

The incorporation of solar energy in the inn was possible thanks to the financial support of La Nouvelle Economie Fraternelle (la NEF), a group of French investors with a special interest in rural projects and in the use of environmentally friendly technologies.

The project was also assigned grant money from both the ADEME (Agence de l'Environnement et de la Maitrise de l'Energie) and from local authorities (the Conseil Régional de Languedoc-Roussillon).



➤ For more information: www.orrideplanes.com

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the inn's owners check and report the consumption of gas and electricity every month, when the energy bills arrive at the inn. The owners also check the individual consumption of heat production equipment.

Involve your guests

Information to guests: a leaflet is provided in each guest room in order to inform guests on the inn's environmental policy and on good housekeeping practices (switching off lights, wearing a sweater in the house when it is cold, limiting the time spent in the shower).



©Hotel L'Orri de Planès, France

Involve your staff

Involve your staff: the person in charge of cleaning the inn is informed on good housekeeping practices, including switching off lights, closing windows when the heating is on, etc.

Rational heating policy: thermostat is controlled by the inn owner and is maintained at 19°C in winter.

Equipment maintenance: the owner regularly checks that heating equipment is working properly and if it isn't he can take corrective measures.

Protect the building from the extreme temperature

Improvement of the building's thermal insulation: thanks to the added thermal insulation, the thermal insulation of the roof, walls and floor offers twice the thermal resistance of insulation used in traditional construction in the region (the roof is insulated with 2 layers of extruded polystyrene foam – 8 cm each – the walls are insulated with 16 cm of high density glass wool and the floor is insulated with 12 cm of extruded polystyrene foam).

Window insulation: low emissive double-glazing was installed during the renovation of the building in order to improve thermal insulation.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: low energy consumption lights are used in the inn.

Other equipment: low consumption appliances are used whenever possible throughout the inn (computer screens, washing machine, etc.).

- **Ventilation and domestic hot water**

Regulation of ventilation: the inn is equipped with a mechanical ventilation system (simple flux) that the owner manually switches on and off as needed.

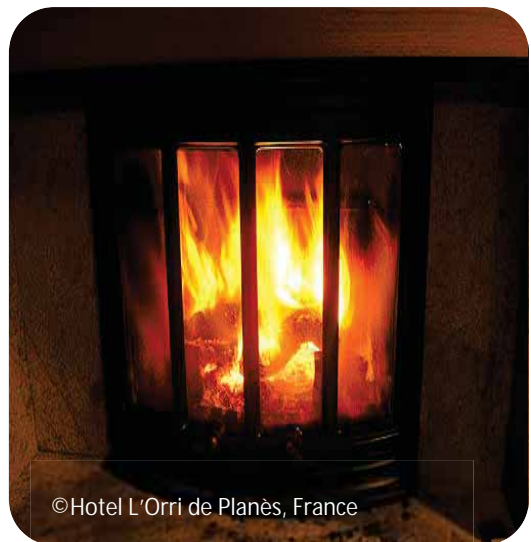
Hot water saving: low flow showerheads and faucets are used throughout the inn.

Integration of renewable energies —

- **Hot water and space heating**

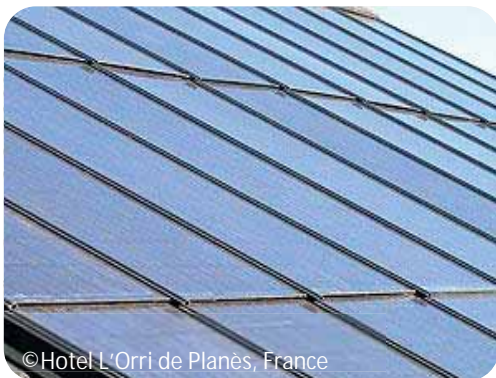
- **The solar installation** covers 2/3rd to 3/4th of the total water and space heating needs of the inn over the course of the year (the 42 m² solar panels integrated in the roof structure are used to heat two 1000 litre hot water tanks and the radiant flooring located on the ground and first floor). When there is not enough sun to cover the building's needs, the solar installation is backed up by two propane heaters (chosen because they are extremely efficient and produce relatively little air pollution).

- **High performance wood burning fireplace insert** helps cover additional heating needs.



- Electricity

The solar grid-connected PV system covers approximately half of the hotel's needs during the year (32 m² of solar panel are integrated in the roof structure, with a potential capacity of 3,600 watts at peak periods).



A small part of the electricity produced goes to charge a group of batteries. This backup system can cover the inn's basic electrical needs during a power outage for a minimum of 48 hours.



Benefits for the hotel



Economic performance

Energy savings

Energy savings achieved on space heating have been estimated at up to 30%.



Market visibility

Improved market visibility

According to the hotelier, the EU Eco-label gives the hotel a competitive advantage and greater visibility to clients.



Energy Efficiency Case Study

« Les Tourelles »

Le Crotoy-France (France)

General information on the hotel



© Hotel Les Tourelles, Crotoy-France

Hotel name & type:

- Hotel name: « Les Tourelles »
- Type of hotel: hotel-restaurant
- Type of business: private
- Services offered: full board, conference room (30 people), restaurant
- Category: 2 star hotel
- Staff number: 27

Building characteristics:

- Year of construction: Old country home (the hotel opened in 1994, after the building was refurbished)
- Climatic zone: Tempered, oceanic climate
- Size of the building: 1,664 m²
- Number of guest rooms: 33 double rooms + 1 single

Environmental aspects:

- Environmental label: EU Eco-label (since July, 2007)
- Annual energy consumption per m²: (electricity + oil + gas): 303 kWh/m²
- Energy consumption per night sold (electricity + oil + gas): 29 kWh/night sold.

The hotelier's approach

The Belgian group of investors wanted their hotel to be environmentally friendly.

As soon as they bought the hotel, the investors started on an environmental adventure. To them, it was a question of corporate social responsibility.

They saw the European Eco-label as a great opportunity to lower the environmental impact of their hotel and decided to work towards it. Although the implementation of the European Eco-label turned out to be a little demanding for this independent hotel of 27 employees, it proved to be very useful in structuring the management and gave a purpose to our business – as one of the shareholders commented.

Also, they decided to have a carbon assessment of the hotel's activities made. "It is quite interesting to see the hotel's activities within this perspective. It helps to get a precise view of the environmental impact of the hotel, and it is a great way to raise the awareness of guests and of the staff on the relation between our business and the environment"

The factors that helped in the process.

"The fact that the hotel is managed by a board of directors has provided some important support to our environmental adventure", comments one of the shareholders.

In addition, the ADEME paid half of the consultant fees (7,500 euros) to put towards subsidising the carbon assessment.

For more information: www.lestourelles.com/.

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the hotel reports its monthly consumption every 3 months.

Carbon assessment: a carbon assessment was made to evaluate the carbon emissions due to the main activities of the hotel (including energy consuming activities such as laundry and space heating). *The calculations were based on the method Bilan Carbone® method developed by ADEME (France).*

Involve your staff

Staff training: some technical seminars were organized and procedures were written for all the services to help the staff implement good "gestures". Also, a 3-day workshop was organized for the staff, with the help of a consulting firm, in view of the implementation of the EU Eco-label.

Regular servicing and maintenance of equipment: the staff is encouraged to carry out a regular servicing and maintenance of equipment.

Involve your guests

Information to guests: a leaflet can be found in each guest room to inform the guests on the the hotel's carbon footprint and its environmental policy. Guests are also informed on good housekeeping practices (such as switching off heating when opening windows, switching off lights when leaving the guestroom...).

Protect the building from the extreme temperature

Window insulation: double-glazing was installed during building renovation.

Building insulation: no major insulation work was done on the existing building, but the most recent extension of the hotel (6 bedrooms) has been insulated beyond regulatory requirements.

Improve equipment efficiency

- **Lighting**

Efficient lighting: low energy consumption lights are used in the hotel.

Lighting control: occupancy sensors are used in areas of infrequent use (such as corridors).

- **Space heating and domestic hot water**

Space heating: the boiler heating controls are checked regularly to ensure it is working at the most efficient level.

Hot water saving: low flow devices are used in the hotel.

Integration of renewable energies

- **Electricity**

The hotel purchases renewable energy source electricity from its supplier.

- **Hot water**

A solar system will be installed in the hotel's extension (6 bedrooms) to cover the energy needs for hot water

Benefits for the hotel



Economic performance

Continuous improvement and global performance of the business

- "We have definitely achieved notable energy savings".
- "The environmental action plan we have implemented also helped give purpose to our business and motivate our employees".



Energy Efficiency Case Study

« Nou4 » hotel Laguiole (France)

General information on the hotel



Hotel name & type:

- Hotel name: « Nou4 »
- Type of hotel: rural hotel
- Type of business: private
- Services offered: breakfast, restaurant, tearoom, gourmet shop
- Category: *not applicable*
- Staff number: 2 people (the hotel managers)

Building characteristics:

- Year of construction: 18th/19th century (renovated)
- Climatic zone: Mountainous zone (at an altitude of 1,000 meters)
- Size of building: 80 m² for each floor (guest rooms and common areas are on 2 floors)
- Number of guest rooms: 4 guest rooms

Environmental aspects:

- Environmental label: « La Clef Verte »
- Annual electricity consumption per m² (whole building):
 - 39.94 kWh/ m²/year
- Electricity consumption per night sold (whole building):
 - 22.87 kWh/night sold

The hotelier's approach

The hotelier received an education that raised his awareness of environmental issues, and when he rose to the position of running an hotel, he decided the hotel would be eco-friendly.

In order to minimize the hotel's impact on the environment, it was important to have low energy consumption and to use renewable energies. That is why the hotelier asked for a detailed evaluation of the energy needs of the building when he bought it in 2005.

The hotel opened in 2006, after the building was renovated.

For more information:

<http://nou.4.monsite.wanadoo.fr/>.

Description of energy conservation measures in place

Make a first assessment

Initial evaluation of the energy needs of the hotel: when the hotelier bought the building, he asked for a detailed evaluation of the energy needs of the hotel and studied the possibility of installing renewable energy systems.

Energy consumption monitoring: energy consumption is regularly monitored in order to assess energy savings and to identify abnormal changes in energy consumption.

Involve your guest

Information to guests: a leaflet is provided in the guest rooms and also in the tearoom to inform them about the hotel's environmental policy. Information is also provided on good housekeeping practices (such as keeping the windows closed when the heating system is on).

Involve your staff

No staff

Protect the building from the extreme temperature

Window insulation: energy saving double-glazing was installed during the renovation of the building in order to improve the thermal insulation of the windows.

Building insulation: the roof already had a good level of insulation when the hotelier bought the building. As for the exterior walls, they are made from stones which are 1 m thick. They provide a high level of insulation, which limits temperature extremes and variations throughout the year.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: most lights are low energy consumption lights.

Domestic appliances: most equipment is of energy class A (refrigerator, freezer, washing machine, dryer...).

- **Domestic hot water**

Hot water saving: low-flow devices have been installed in the hotel.

Integration of renewable energies —

- **Hot water and space heating**

A wood pellet boiler is used for space heating, and partially for hot water production. Solar panels are also used for hot water production.

- **Electricity**

100% of the electricity bought by the hotel is from renewable energy sources.

Benefits for the hotel —



Cost reduction

Energy savings

"Our energy consumption for space heating and hot water production is very reasonable for a hotel located in a mountainous region at an altitude of 1,000 mts!"



Market visibility

Improved market visibility

"Being green is important nowadays. Most of our guests come to our hotel because they know it is an eco-friendly hotel."



Environment

Personal satisfaction

"It is a great personal satisfaction to run a hotel that has a low environmental impact".



Energy Efficiency Case Study

« Hotel Jolie » Riccione (Italy)

General information on the hotel



© Hotel Jolie, Italy

Hotel name & type:

- Hotel name: Hotel Jolie
- Type of hotel: urban hotel
- Type of business: private
- Services offered: bed and breakfast, air-conditioning, service bar
- Category: 2 star hotel
- Staff number: 8 (including an intern)

Building characteristics:

- Year of construction: 1954
- Climatic zone: Oceanic climate
- Size of building: 725 m²
- Number of guest rooms: 24

Environmental aspects:

- Environmental label: EU Eco-label
- Annual energy consumption per m²:
 - Gas: 59.54 kWh/ m²
 - Electricity: 29.35 kWh/ m²
- Annual energy consumption per guest night sold:
 - Gas: 7.88 kWh/ guest night sold
 - Electricity: 3.88 kWh/ guest night sold

Note: the hotel is open only 4 months in a year. There is a great seasonal variability of energy consumption per guest night sold.

The hotelier's approach

"We are always thinking about better measures to adopt to help our environment. We do it because it is the right thing to do. In addition, it provides us with some financial savings. "

The hotel has been pursuing an environmental policy for years, and is part of the Italian Legambiente project, which aims at limiting the environmental impact of the tourism industry.

The hotel also received some help from the local Hotel Association, which is very sensitive to eco-tourism and helps the hoteliers achieve their purposes by providing information and training for hoteliers and workers on energy issues.

For more information: Details on the action plan of the hotel is available at www.hoteljolie.it.

Description of energy conservation measures in place

Make a first assessment

Energy monitoring: the hotel regularly monitors its consumption of electricity and gas. It fills in a datasheet once a year, on which the energy consumption is indicated for each trimester.

Involve your guests

Guest information: in every room, the guests can read a brochure that explains how the hotel operates the EU Eco-label and tells them what simple gestures they can adopt to reduce the hotel's impact on the environment.

Involve your staff

Staff training: staff is trained for good housekeeping practices. "We have a written form that we give to our workers, but the most important part is the oral training because the staff is more receptive to receiving instructions in this manner."

Kitchen: Refrigerators have been placed away from heat sources.

Protect the building from the extreme temperature

The building is old and was not properly insulated, but the hotel is closed in winter, thus limiting space heating needs.

In summer, the tall trees nearby shade the building.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: 66% of the light bulbs are low energy consumption bulbs.

- *Space conditioning, ventilation and domestic hot water*

Efficient boiler: an efficient gas boiler with low emissions has been installed.

Individual thermostatic controls in guest rooms: the guests can adjust the temperature in their room.

Hot water saving: low flow devices are used for showers and sinks.

Integration of renewable energies -

Since 2003, the hotel has been purchasing 100% renewable energy from its provider.

Benefits for the hotel



Cost reduction

Energy savings

The hotel has calculated its gas, electricity and water savings over **4 years**. They are indicated below:

- *Electricity savings: 4.614 euros*
- *Gas savings: 1.242 euros*
- *Water savings: 2.953 euros*



Environment

Satisfaction

"We are always thinking about better measures to adopt to protect the environment. We do it because it is the right thing to do."

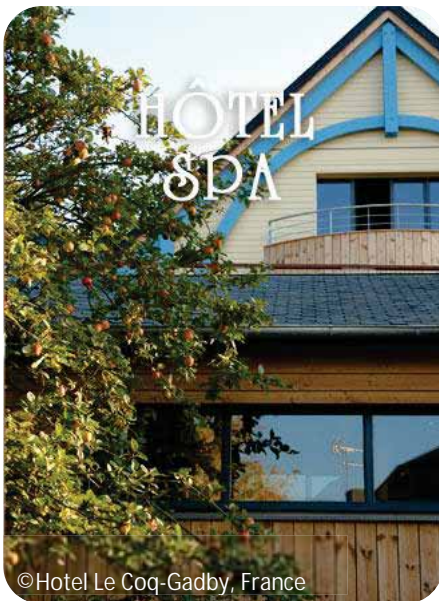


Energy Efficiency Case Study

« Le Coq-Gadby Spa Hotel »

Rennes (France)

General information on the hotel



©Hotel Le Coq-Gadby, France

Hotel name & type:

- Hotel name: Le Coq-Gadby Spa Hotel
- Type of hotel: urban resort, hotel spa
- Type of business: private
- Services offered: swimming-pool (10 m X 6 m, mainly heated by the solar system) and spa
- Category: 4 star
- Staff number: 37 persons for the whole property (11 buildings in total, including 2 hotels and a restaurant)

Building characteristics:

- Year of construction: the hotel spa was constructed in 2009 as an extension to the existing hotel. Some buildings on the property date from the 17th century.

- Climatic zone: tempered, oceanic climate
- Size of the building: the hotel spa is 1,000 m²; the whole property represents 3,000 m².
- Number of guest rooms: 14 suites (from 28 to 60 m²)

Environmental aspects:

- Environmental label: EU Eco-label (since March 2009)
- Monthly energy consumption per m²:
 - Gas: 3.71 kWh/ m²
 - Electricity: 13.12 kWh/ m²
- Energy consumption per night sold (on a monthly basis):
 - Gas: 7.55 kWh/ guest night sold
 - Electricity: 26.67 kWh/ guest night sold

The hotel spa has been open for only 6 months and there is no feedback as yet on annual energy consumption.

The hotelier's approach

The need for a new approach

In 2004, the hotelier decided to increase the hotel's accommodation capacity. However, because of the urban location of the hotel, there was concern about how to ensure the continued existence and service quality of the business. The hotelier had inherited a business that was 100 years old and she wanted to ensure the sustainability of the business for the future. Aware that the hotel industry was responsible for a great deal of pollution, she decided to build an

extension with low environmental impact: “a building that would generate little pollution during construction, use local materials for its construction and eco-manage its resources: energy and water”.

With the new building designed according to high environmental standards, the hotelier assessed the hotel as a whole (both the new and the ancient buildings) so as to qualify for the EU Eco-label. “We first thought we wouldn’t be able to qualify for the EU Eco-label, because of the poor thermal performance of the existing building. But we realized in the process that we could start with small improvements (such as changing the light bulbs) which already brought some significant energy savings choice of heating systems working on renewable energies, etc.).

“It gave sense to our business”

“The EU Eco-label was not an objective in itself, it was the beginning of a new way of thinking that gave sense to our business”. All procedures and ways of thinking were changed in the hotel. Indeed, the hotelier wanted to implement a global approach to ecology that would be reflected in all the services of the hotel. “The ecological approach makes sense only when implemented globally”. For each decision and action, the environmental impact is considered”.

Support received by the hotel

The hotel received some support from the French certifier for the EU-Eco-label (the AFNOR) throughout the project, which helped identify areas of improvement in the existing buildings.

Also, the hotel did a study of the thermal performance of the existing buildings and identify areas for improvement.

For more information: www.lecoq-gadby.com

Description of energy conservation measures in place

Make a first assessment

Assessment of the thermal performance of the existing buildings: the hotel made an assessment to study the thermal performance of the existing buildings and to identify areas for improvement.

Assessment of the qualification for the EU Eco-label: the hotel determined if it was able to qualify for the EU Eco-label and learnt a lot during this process: it helped them identify areas for improvement, particularly in the existing buildings.



Eu Ecolabel

Involve your guest

Guests information: guests are given a brochure upon arrival to introduce the hotel's environmental policy. When they leave, they are invited to fill in an evaluation questionnaire, where they can comment freely on the policy.

Involve your staff

Staff information: staff is informed on good housekeeping practices both orally and in written

form. Written procedures are provided to each service 'department' to remind them of good practices. In particular, room cleaning staff is informed of when windows should be opened, depending on the season and the room's solar exposure. Staff is also asked to switch off lights and all electrical equipment when the room is empty, etc.

Staff involvement: the environmental policy of the hotel is explained to the staff (during the annual employee meeting and through leaflets). They are reminded that their daily involvement is absolutely necessary for the environmental policy to be successful.

Although it took some time at the beginning for the staff to change its habits, everybody in the hotel now acknowledges that procedures have been simplified and that working conditions have improved (for example, through less exposure to hazardous chemicals, etc.).

Protect the building from the extreme temperature

Building insulation: the exterior walls of the new building have been insulated on the outside.

The insulation surpasses the insulation level specified by building regulations (it should comply with 2012 building regulations).

Window insulation: windows of the new building are double-glazed.

Bioclimatic architecture: particular attention was paid to the orientation of the new building, so that the building benefits from free solar heating in the winter and does not suffer from overheating in the summer.

Installation of sun protectors: exterior solar shading systems have been installed on the new building to protect it from the summer sun.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: low energy consumption light bulbs are used throughout the new building. In the existing buildings, an inventory of the 1,200 light bulbs has been done and most of them have been replaced by low energy consumption lights.

Lighting control: labels have been placed close to light switches to indicate to employees which lights should be switched on first. Also, occupancy sensors are used in areas of infrequent use (like corridors).

- **Space heating and ventilation**

Space heating (and hot water production): in the existing building, the old gas boiler was replaced by a high-energy efficiency condensing boiler. The boiler is also used for hot water production (with the solar system).

Ventilation control: a double-flux ventilation system was installed in the new building. In the summer the system is used to refresh the air, instead of using a traditional air-conditioning system.

Integration of renewable energies —

- **Hot water**

The swimming pool is mainly heated by a solar system (this system covers 60% of the pool's heating requirements). A heat pump covers the additional heating needs. A heat recovery system makes use of the heated air.



- Electricity

A solar PV system covers part of the hotel's electrical needs.

Benefits for the hotel



Global performance of the business

"A new and meaningful approach to the business"

"We have completely changed our habits and our way of thinking. This was a great opportunity to give a new sense to our business".

Increased comfort for guests and employees

"The new building provides great thermal comfort for guests and employees."

"Working conditions of the staff have improved."



Market visibility

Improved market visibility

"Our new guests come because they know it is an eco-friendly hotel". *« We have attracted new guests, in particular from Germany, thanks to our environmental policy »*



Energy Efficiency Case Study

« Dunstanburgh Castle Hotel »

Embleton (England)

General information on the hotel



Hotel name & type:

- Hotel name: Dunstanburgh Castle Hotel
- Type of hotel: rural hotel
- Type of business: private
- Services offered: restaurant, bar
- Category: 2 star
- Staff number: 25 persons

Building characteristics:

- Year of construction: 17th century
- Climatic zone: temperate (on the Northumberland coast)
- Size of the building: 2,500 m²
- Number of guest rooms: 18 guest rooms

Environmental aspects:

- Environmental label: Green Tourism Business Scheme (GTBS) gold
- Energy consumption per bed night sold: 34.18 kWh/bed night sold (electricity, oil, gas, wood)

The hotelier's approach

"I was an assessor for the BREEAM (*) method in the past and thus had previous experience in environmental consulting. When I took over the hotel ten years ago, I wanted to do something to lower the environmental impact of my hotel, because I care for the planet and for future generations".

For more information:

www.dunstanburghcastlehotel.co.uk/

(*) BREEAM (BRE's Environmental Assessment Method): method for assessing the environmental quality of buildings.

Description of energy conservation measures in place

Make a first assessment

Energy monitoring: the hotel monitors its consumption of electricity, oil, gas and wood every month.

Involve your staff

Staff information: the staff receives information on good housekeeping practices (such as switching off appliances when not in use: lights, TVs, etc.). Information is provided orally and also on a written leaflet.

Involve your guests

Information to guests: an information leaflet provided in each bedroom includes information on the hotel's towel policy (asking them to limit voluntarily daily towel changes) and explains the hotel's environmental policy.

In addition, guests are asked to contribute to efforts made by the hotel to reduce its energy consumption (e.g. to switch off lights and heating when leaving the room, etc.).

Customer feedback: customers are invited to fill in a satisfaction questionnaire and to provide feedback regarding the hotel's environmental policy. "Our customers have expressed satisfaction regarding our environmental policy."

Protect the building from the extreme temperature

Building insulation: loft insulation has been upgraded (with two layers of fibreglass) since the owners took over the hotel. It now exceeds the building regulations.

As for the exterior walls, they are made of stone and are half meter thick, and have not been insulated.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: low energy light bulbs are used extensively; moreover, the hotel is currently in the process of changing fluorescent lights to LED lights in public areas.

Lighting control: regarding external lighting: there is a timer for the lights to go on at pre-set times but there is also a light sensor which activates the lighting to go on sunset and go off at 23:00.

- **Space and domestic hot water heating**

Efficient heating equipment: the previous oil boiler has been replaced by an A rated condensing oil boiler.

Water heater insulation: the water heater is insulated to improve energy efficiency.

Integration of renewable energies —

- **Hot water and space heating**

The installation of a solar water heater is under study. "A solar water heater could replace the oil boiler in the future".

- **Electricity**

The hotel purchases renewable energy source electricity from its supplier with guaranteed zero carbon emissions

Benefits for the hotel —



Meet today's guest expectations

Increasing environmental awareness of guests

"Guests are becoming increasingly aware of environmental issues and they are getting more and more sensitive to the environmental policy of hotels".

Same level of comfort for the guests

"Energy efficiency measures do not compromise comfort at all".



Environment

Lower environmental impact

"I wanted to do something to lower the environmental impact of my hotel, because I care for the planet and for future generations."

« We have reduced CO2 and at the same time saved money, which is great. »

42.2 kWh/bed
night sold



34.18 kWh/ bed
night sold



Energy Efficiency Case Study

« Twice Brewed Inn » Hexham (England)

General information on the hotel



© Twice Brewed Inn Hotel, England

Hotel name & type:

- Hotel name: Twice Brewed Inn
- Type of hotel: inn
- Type of business: private
- Services offered: restaurant, bar
- Category: 3 Diamond Guest Accommodation
- Staff number: 30 people

Building characteristics:

- Year of construction: 1600 onwards
- Climatic zone: continental
- Size of the building: 450 m²
- Number of guest rooms: 14 guest rooms

Environmental aspects:

- Environmental label: Green Tourism Business Scheme (GTBS) silver award
- Annual energy consumption per m²:
 - Electricity + gas: £34
- Energy consumption per night sold:
- Electricity + gas: £3.83

The hotelier's approach

Since 2001, the owners of the inn and the hotel manager have implemented a wide range of measures to ensure that the environmental impact of their operation is minimised. Energy conservation measures are part of this policy.

For more information:

www.twicebrewedinn.co.uk

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the hotel owners monitor their consumption and read the results weekly.

Involve your staff

Staff information: the weekly readings of energy consumption are posted on the staff notice board in order to encourage saving energy.

Good housekeeping practices: refrigerators and freezers are kept well maintained in order to reduce energy consumption and thus running costs.

Involve your guests

Information to guests: the inn's environmental policy underlining the owners' commitments is on hand for guests to read. In addition, the staff answers all questions the guests may have on the energy measures in place.

Protect the building from the extreme temperature

Building insulation: the loft was insulated during the renovation carried out in 2007. The specified insulation exceeds the building regulations.

As for the exterior walls (half walls 0.61 m thick), they have not been insulated but “it is on the wish list”.

Window insulation: double-glazed windows were installed in 2004.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: low energy light bulbs are used.

Lighting control: occupancy sensors have been installed in the toilets.

Electrical equipment control: timers are used to switch off the wine cellar, the gas heating boiler, and the water heater. “If not needed during some periods there is little point in running them. For instance, we turn the water boiler off overnight and back on in time to have hot water for breakfast.”

- **Domestic hot water**

Hot water pipe insulation: the pipes and the hot water tank were insulated in 2004.

Integration of renewable energies

- **Electricity**

The owner is considering using electricity generated by wind power in the future

Benefits for the hotel



Cost reduction

Energy saving

“Energy conservation measures enable us to save money. If we take into account the increase in the cost of power, then it probably costs less to run the inn than when we first bought it.”



Market visibility

Improved image

“Energy conservation measures and efforts to lower the environmental impact also give a good corporate image in the market.”



Energy Efficiency Case Study

« La Ferme de Bassilour »

Bidart (France)

General information on the hotel —

Hotel name & type:

- Hotel name: La Ferme de Bassilour
- Type of hotel: boutique hotel
- Type of business: private
- Services offered: bed and breakfast
- Category: 3 star hotel
- Staff number: 5 persons for the whole property (“Ferme de Bassilour” hotel & the mansion)

Building characteristics:

- Year of construction: Old farmhouse from the XVIth century (renovated between 2000 and 2003)
- Climatic zone: Temperate, oceanic climate (located in a green park of 15 hectares)
- Size of the building: 800 m²
- Number of guest rooms: 8 guest rooms and 2 suites

Environmental aspects:

- Environmental label: EU Eco-label (since April, 2008)
- Annual electricity consumption per m²:
 - 88 kWh/ m²/year (7,71 €/ m²/year)
- Electricity consumption per guest night sold:
 - 44,95 kWh/night sold (4,90 €/night sold)

The hotelier’s approach —

The owner of the hotel was born in Sweden and received an education that raised her awareness of environmental issues. She arrived in Bassilour in 1989, and bought the farm in 2000 and then renovated the building which opened in 2003.

“People may believe that being environmentally friendly is costly and means less comfort. In reality, it is a good way to provide the guests with the comfort they expect nowadays while reducing operating costs. It is true that some initial investment is necessary, but this investment is worth it as operating costs are reduced for many years”.

The hotel received the EU Eco-label in 2008. The next step for the hotelier will be to obtain the EU Eco-label for the two other buildings that are on the property: the caretaker’s lodge and the mansion (for a total capacity of 48 guests).

For more information:

www.domainedebassilour.com

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: energy consumption is regularly monitored.

As the hotel manager says, “energy monitoring is a good way to detect problems and to identify anomalous changes in energy consumption”.

Involve your guests

Information to the guests: Information is provided to guests on good housekeeping practices they should follow in the hotel, and even in their own homes.

Involve your staff

Staff information: staff is encouraged to follow good housekeeping practices. An information sheet that explains the hotel's action plan and the reasons for being eco-friendly is available to both the staff and guests.

Protect the building from the extreme temperature

"The building – an old farm from the XVIth century – was constructed according to bioclimatic principles, such as using large stones and large openings on southern exposures. During the renovation, I wanted to keep the materials in place and follow a traditional approach".

Building insulation: the roof has been insulated with natural hemp fibre, which is an insulating material that has the ability to absorb and release moisture without affecting thermal performance. As for the exterior walls, they are made of heavy stones of 60 cm in diameter. They provide a good level of heat retention which limits temperature extremes and variations.

Building waterproofing: The interior and external walls have been coated with lime, which improves waterproofing of the walls and at the same time allows them to breathe (thanks to the permeability of the lime). Moisture collection is reduced and the thermal barrier of the wall is preserved.

Window insulation: triple glazing for windows and doors with wood joints.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: energy saving lighting is used throughout the hotel.

Automatic control of electricity in guest rooms: electricity is automatically turned off when guests leave their rooms (except for the minibar).

- **Space conditioning, ventilation and domestic hot water**

Regulation of space heating: thermostats are used to regulate space heating and provide a comfortable interior environment (one thermostat for 2 to 3 bedrooms).

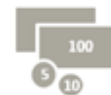
Hot water saving: low flow devices have been installed in the bathrooms.

Integration of renewable energies —

- Hot water and space heating

Geothermal heat pump: a ground source heat pump (with a horizontal system for heat collection) is used for hot water production and space heating. Circulating hot water carries the heat to rooms using a radiant under floor heating system.

Benefits for the hotel



Cost reduction

Energy saving

"Energy savings are important and we believe that thanks to these energy savings, the initial investment will be reimbursed in about 10 years".



Increase confort

Increased comfort for the employees

"Automatic control of electricity in guest rooms makes our life easier; we do not have to worry anymore about electrical appliances being left on."

"As heat is regulated directly by the thermostats, we do not have to be concerned about turning on the heating system either".

Increased comfort for the guests

"The geothermal heat pump and the under floor heating system is considered very comfortable by our guests."



Environnement

"Use of a renewable energy for heating means less pollution"



Energy Efficiency Case Study

« AlmaVerde Village and Spa »

Luz Lagos (Portugal)

General information on the hotel



Hotel name & type:

- Hotel name: AlmaVerde Village and Spa
- Type of hotel: spa and residential resort (residential and holiday destination)
- Type of business: large group (Elixir group)
- Services offered: villa and tourist apartment rental, spa and wellness centre, residential homes
- Category: 5 star
- Staff number: about 20 and rising to meet needs

Building characteristics:

- Year of construction: commenced 2000, continuing
- Climatic zone: Mediterranean, southern Portugal.
- Size of the building: varies – 1 bed apartments to 4 bed villas
- Number of guest rooms: numerous

Environmental aspects:

- Winners and finalists in 15th international awards for Energy Efficiency and Sustainable Architecture including the Royal Sustainability Award Tourism - Accommodation in 2007
- Annual energy consumption per m²: *not available*
- Energy consumption per night sold: *not available*

The hotelier's approach

Hotelier's motivation, historical background, etc.....

- In view of the importance of making real reductions in carbon emissions, it has always been the aim of this resort to approach the project from a standpoint of pro-active environmental responsibility in every aspect of our operation. The most effective way of achieving this is by designing and building to the highest standards of energy efficiency and sustainability, and doing so enables us to provide a leading example of what is possible. Increasing public awareness and concern over climate change and environmental issues also places AlmaVerde in a visible and attractive position in terms of profile in the current market.

Levels of satisfaction regarding energy conservation measures in place, etc.

- There is little more that could have been achieved with our building stock in energy and environmental terms, and the financial benefits of enormous reduced energy costs are appreciated throughout. These benefits will of course increase as energy costs continue to rise.

Factors that helped in the process:

- Involvement of architect and design team with experience and knowledge of best energy efficiency and environmental practices.
- EU *Thermie* part-funding for The Cool house Project under the Fifth Framework for research and development as a demonstration project to develop a low energy alternative to air-conditioning
- The strong motivation of the owners.

For further information:

- <http://www.almaverde.com/green-development.html>
- <http://www.almaverde.com/villa-designs/building-specifications.html>

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: Consumption is monitored to assess the performance of the resort.

Involve your guests

Information to guests: All guests are made aware of the environmentally-friendly methods used during construction, the lower energy costs to operate the hotel and the health benefits of using this construction system.

Involve your staff

Staff information and involvement: All staff are trained to understand the environmental philosophy of the resort in order to incorporate it into all aspects of their job.

Protect the building from the extreme temperature

Building materials: By manufacturing adobe (sun-dried clay) blocks on site, and building with this traditional sustainable material, the thermal mass of the walls stores and radiates warmth and maintains the internal relative humidity at comfortable levels. The energy savings from the construction materials AlmaVerde used are calculated to be at least 15% lower than average.

Envelope insulation: A flexible, low maintenance, external insulation system reduces heat gains and losses and eliminates cold bridging. The insulation extends into the roof by means of timber sandwich panels laid over laminated timber beams. External doors and windows are made from sustainably sourced timber frames with high performance low-E argon filled solar-control glazing units.

Bio-climatic principles: Buildings are designed on passive solar principles to maximise heat gain from the sun in winter whilst remaining shaded in summer.

(Note: Local weather conditions: The very high humidity leads to unhealthy black mould and water condensation in many buildings.)

Improve equipment efficiency

- **Lighting and electricity**

Lighting efficiency: All lighting is low energy and LED. Streetlights are also low energy and were selected to avoid glare and light pollution.

Electricity use control: In tourist apartments, all electrical systems are designed to have access control which shuts off electricity when the rooms are not occupied. All appliances are A rated.

- **Space conditioning, ventilation and domestic hot water**

Residential buildings alone are responsible for 30% of European energy use, the greatest part being due to heating and cooling with energy peaks moving to the summer months in Portugal due to local air-conditioning.

Cooling system: Through the Cool house project, AlmaVerde has developed a virtually zero carbon Cool house cooling system that brings fresh air into the building via underground tubes. In summer the subsoil cools the air, and in the winter it is warmed.

In tourist apartments cooling is designed to be provided by geothermally cooled fan coil units or a chilled slab, and a heat recovery system will operate the resort laundry.

Ventilation: Building design ensures passive stack natural ventilation and permanent trickle ventilators enable continuous air displacement and avoid the need for mechanical ventilation. This is provided in bathrooms to remove humidity at its source, and is operated by presence detectors.

Water saving: hot water is partially supplied by solar water collectors backed up by 97% efficient modulating condensing gas boilers, where hot water return reduces heat waste and also saves water. Further water conservation measures include dual low flush WC's, airflow water taps and showers in all bathrooms.



Integration of renewable energies —

Space heating is done by controlled solar gains coupled with thermal mass, backed up by 97% efficient modulating condensing gas boilers driving a low temperature radiant skirting system in the smaller residential buildings when necessary. In larger apartment and administrative buildings, space heating is done by biomass boilers or reverse cycle geothermal heat pumps which also provide cooling.

Fresh ventilated air is supplied in winter through the Cool house geothermal system which generally preheats incoming outside air to 13-14 degrees.

Hot water is supplied by solar water collectors with a high efficiency gas boiler backup.

Benefits for the hotel



Economic performance

Energy savings

The building method incurs approximately a 15% - 20% extra cost over contemporary building techniques. However the operating costs will be lower than with traditional methods.

"Using a specific loss comparison table, with variables adjusted to current building regulation requirements in the Algarve region, there is a 65% energy use reduction in the Cool house building."

"There is little more that could have been achieved from our building materials in terms of energy savings or reducing our environmental impact, plus the financial benefits of bio-energy savings are appreciated throughout. These benefits will of course increase as energy costs continue to rise."



Market visibility

Improved market visibility

Benefits include: potential for market differentiation/green marketing.



Increase comfort

Healthier humidity level

The combination of AlmaVerde's unique adobe breathable wall construction and Coolhouse reduces internal humidity levels by up to 30%RH compared to outside levels, bringing these levels down into the 40 to 60%RH band considered necessary for the health of occupants.

Improved control of temperature

One year of performance monitoring of the Cool house construction system showed that when external day-to-night summer temperature drops by 20°C (from 38 to 18°C), the internal temperature remains constant at about 26° C.



Environment

Lower environmental impact

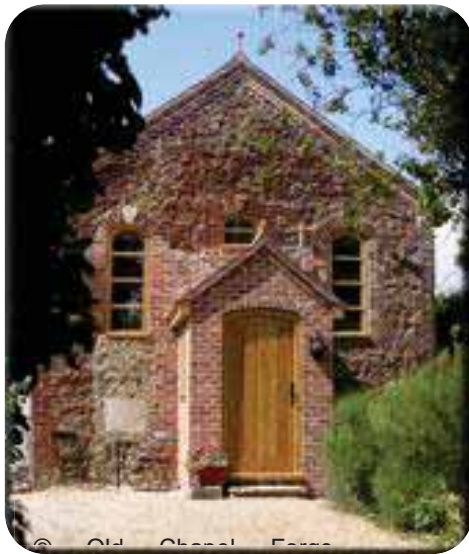
Monitoring has shown that the cooling system generates only 810 kgCO₂/ year. Independent engineers Faber Maunsell (London) have calculated that the same building built to local building regulations and cooled to an equivalent level with conventional air conditioning would generate 15,200 kgCO₂ / year, a saving of 94% in CO₂ emissions.



Energy Efficiency Case Study

« Old Chapel Forge » Chichester (England)

General information on the hotel



Hotel name & type:

- Hotel name: Old Chapel Forge
- Type of hotel: rural eco-lodge
- Type of business: private, independent
- Services offered: bed & breakfast
- Category: four star rating from the AA
- Staff number: 2 people (the owners)

Building characteristics:

- Number of buildings: 2 buildings for the guests (the Chapel & the cottage house), the main house being used by the family
- Year of construction: the Chapel was built in 1611 and the cottage house in 1919. Both buildings were renovated in 2005-2006 as totally sustainably built projects.
- Climatic zone: Temperate
- Size of the building: 48 m² + 35 m² (Chapel + cottage house)
- Number of guest rooms: 4 guest rooms

Environmental aspects:

- Environmental label:
 - Green Tourism Business Scheme (GTBS) gold
 - winner of the Tourism ExSEllence Awards 2006 for the South East of England
 - winner of a International Green Apple award in 2006 for the sustainable renovation of the Chapel
 - winner of the GTBS best performer award for best benchmarking of utilities in the UK in 2009
- Annual energy consumption (kWh) per m²:
 - 207 kWh/m² (electricity + gas)
- Energy consumption (kWh) per night sold:
 - 9.79 kWh/bednight (electricity + gas)

The hotelier's approach

A true commitment to sustainability

"As a family, we have always been eco-friendly. But it wasn't until 2005, when we entered into a pilot scheme for GTBS (Green Tourism Business Scheme), that I realized you could then tell your customers that you had a green policy."

The owners of Old Chapel Forge have a real commitment to sustainability, and this commitment runs throughout the business: "to us green tourism is not a product to be tagged on to a holiday, it is integral to the way we run the Old Chapel Forge. Our aspiration and aim is to offer our guests a 'green tourism' experience."

A cost-effective renovation

"I decided to renovate the Chapel into a green building, and I wanted to use techniques that were simple and cost-effective, because I wanted our business to be as inexpensive to run as possible. The thermal insulation of the building was clearly part of this strategy."

"It worked well because our business turns out to be incredibly cheap to run!"

"I think it is important when running a business to have control over energy costs. Indeed, energy costs have risen incredibly in the last few years..."

The lodge received some support that helped in the process:

"Because the solutions we wanted to install were quite new at that time, we had to make real efforts to find information. We also had to make sure we were complying with the regulations. But in fact, we received a lot of help from the local and central governments, and from environmental agencies."

In addition, the owner of the lodge took part in a training program that was co-funded by the European Union through the European Social Fund (ESF), which contributed to making her a pioneer in 'green tourism'.

"We also received some financial support through the ECA Energy Scheme (Enhanced Capital Allowance Scheme). This scheme is a key part of the UK Government's programme to manage climate change. It provides businesses with tax relief for investments in equipment that meet published energy-saving criteria. We actually benefited from this scheme for the boiler and the thermal insulation of the building."

For more information:

<http://www.oldchapelforge.co.uk>

An interview and a video are also available from the European Commission European Social Fund Project:

- *interview:*
http://ec.europa.eu/employment_social/esf/video/features/article_9025_en.htm
- *video:*
http://ec.europa.eu/employment_social/esf/video/videos_en.htm#

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the owners monitor the energy consumption of the chapel and cottage house every month.

Involve your guests

Guest involvement: The owners of Old Chapel Forge pro-actively encourage guests (and other tourism businesses) to promote sustainability and encourage environmentally friendly policies and behaviour.

A brochure explaining the environmental policy of the lodge and the reasons for this policy is available in each room. The brochure also provides some examples of good behaviour the guests can adopt.

"Surveys in the UK tend to show that guests are not really interested in their energy consumption. But they do care about the policy and about the actions one takes to develop a more sustainable business".

Involve your staff

Energy saving behaviour: As a family, the owners have always been eco-friendly and have always adopted energy saving behaviour. For instance, electric equipment is never left on stand-by mode and the TV is turned off when not in use: "It's a way of life".

Protect the building from the extreme temperature

Building thermal insulation: the floor, walls and roof of the Chapel were thermally insulated during the renovation of the building – the level of the roof was raised to accommodate the insulation.

In fact, the building has been over-insulated, so the insulation level is still much higher than today's regulation requirements.

As for the cottage house: the exterior walls were originally insulated with cavity wall insulation, and the roof was insulated during the renovation.

Window insulation: triple glazing installed on all windows.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: energy saving light bulbs are used everywhere in the lodge. Compact fluorescent lights are used inside the lodge and halogen-saving lights are used in the garden areas.

Lighting control: motion detectors are used for the outside lighting.

Use of energy efficient equipment: all equipment is energy class A: washing machines, dishwashers, refrigerators... Moreover, small kettles, rather than large ones, are used in the guest rooms to reduce electricity consumption.

- **Space conditioning, ventilation and domestic hot water**

Efficient space heating: a gas condensing boiler is being used for the Chapel (while an electric boiler is used for the cottage house). In addition, the boilers are on timers to avoid unnecessary energy consumption, and the water temperature is limited to 60° C.

Hot water saving: water saving devices have been installed in the showers and the taps.



Integration of renewable energies

- **Hot water production**

Solar water heating: solar panels are used for water heating.

- Electricity

Green power tariffs: the lodge purchases its gas and electricity from a green power company. The energy purchased is either coming from renewable energies or is carbon-compensated (tree planting, etc.).

Benefits for the hotel



Economic performance

Energy savings

“The lodge only costs 20 pounds per month for light and heating, which is quite negligible!”

Global economic performance

Even though we pay more for our energy (because we are on green power tariffs), our energy policy is financially beneficial due to the energy savings we make.

“The energy savings we make enable us to increase our gross profit and our profit margin and we can spend more on food or other services to increase the quality of our service.”



Market visibility

Improved market visibility:

“It is incredible to see the number of guests who come to our lodge because of our sustainable policy, and the publicity we get from the media.”



Guest satisfaction

“Guests usually don’t notice that we use very little energy, but they do notice the efforts we make on food and other services”



Benefits for the local community

“We work for the local community as well, and it is really a win-win situation”



Energy Efficiency Case Study

« Le Morgane » hotel

Chamonix (France)

General information on the hotel —



- Environmental label: has applied to the EU Eco-label
- Annual energy consumption (kWh) per m²: *not available*
- Energy consumption (kWh) per night sold: *not available*

Hotel name & type:

- Year of construction: built in 1988-1989 and retrofitted in 2007
- Climatic zone: mountainous
- Size of the building: 1,898 m²
- Number of guest rooms: 56 guest rooms, including 17 suites

Building characteristics:

- Year of construction: built in 1988-1989 and retrofitted in 2007
- Climatic zone: mountainous
- Size of the building: 1,898 m²
- Number of guest rooms: 56 guest rooms, including 17 suites

Environmental aspects:



EU Ecolabel

The hotelier's approach —

"The hotel manager has always been committed to sustainability, and he has always wanted to apply his commitment to his business."

Reduction of the hotel's energy consumption was part of his strategy. The hotel manager first had a Building Energy Management System (BEMS) installed to regularly monitor the hotel's energy consumption and to facilitate the regulation and control of the equipment in place. When the hotel had to be retrofitted: "it was a great opportunity to improve the energy efficiency of the hotel".

Indeed, the renovation of the hotel gave the opportunity to upgrade the thermal insulation of the building and to install energy efficient solutions. A design office working in the environmental field was hired to assist the hotel manager to make the right choices.

"Energy consumption reduction and integration of renewable energies were two of the objectives of the renovation; besides having a limited environmental impact during the renovation we created an environmental standard for the hotel."

For more information:

<http://www.morgane-hotel-chamonix.com>

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the energy consumption of the hotel is monitored monthly.

Involve your guest

Guest information: a welcome booklet was edited in 2008. In addition to explaining the hotel's environmental policy and values, this booklet also invites guests to help the hotel reduce the environmental impact of its activities ("keep the windows closed in winter, turn off the television when leaving the room, pull out the energy saving card when leaving the room").

Involve your staff

Staff information: the employees are informed about the technical solutions which are in place for the reduction of energy consumption about twice a year.

Protect the building from the extreme temperature

Building insulation: the exterior walls of the building have been insulated externally during the retrofit of the hotel. The roof has also been thermally insulated.

Window insulation: double glazing has been installed everywhere.

Improve equipment efficiency

- **Lighting & electricity**

Description of the technical solutions used to reduce the energy consumption for lighting and for other electrical appliances.

Efficient lighting: wherever possible, low-wattage energy bulbs were installed (these bulbs consume 80% less energy than conventional bulbs, while still providing the same level of lighting). As of today, energy saving light bulbs represent 70 to 80% of the light bulbs installed.

Energy saving card for guests: electricity in guest rooms is automatically shut down when guests withdraw the energy saving card. This turns off lights automatically when the guest leaves the room.

Installation of a Building Energy Management System (BEMS): this system was installed before the renovation of the building. It is a technical computerized system that collects and processes all energy data in the hotel. By facilitating the regulation and control of the equipment in place, there are important energy savings (20-40% compared with a building that is not equipped with this system).

- Space conditioning, ventilation and domestic hot water

Automatic control of heating: A system has been installed to shut off the heating system automatically when the windows and balcony doors are open (sensors on the windows and balcony doors detect whether they are open).

Heat recovery to preheat hot water: A heat recovery system was installed on the swimming pool's room ventilation system to pre-heat the entering air.



Integration of renewable energies —

- Hot water production

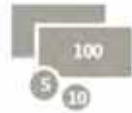
Solar panels for hot water production: 55 m² of solar panels are being installed on the roof of the hotel. They will generate 38,500 kilowatt annually, which should cover about a quarter of the hotel's annual hot water needs, with a CO₂ emission reduction of 1692 kg/ per year.



- Electricity

Green electricity: all the electricity purchased from the energy provider is from renewable energies.

Benefits for the hotel



Economic performance

Energy savings

“Even though it is difficult today to evaluate the benefits of the energy conservation measures put in place, it is clear that we will get financial benefits from them.”

The total reduction in energy consumption resulting from the investments we made was estimated by the design team to be about 14%.



Market visibility

Improved market visibility

“Guests are more and more sensitive to the environmental policy of hotels. Also, we notice that many companies want to held a seminar in our hotel because of our environmental policy”

Cost of the overall retrofitting of the hotel: 4 million Euros (this includes the investment in energy efficiency solutions and in renewable energies).



Energy Efficiency Case Study

« Les Aiglons » hotel

Chamonix (France)

General information on the hotel —



Hotel name & type:

- Hotel name: Les Aiglons
- Type of hotel: tourist and business hotel
- Type of business: chain-affiliated hotel (Best Western Premier) with an independent management
- Services offered: restaurant (120 covers), bar, heated swimming pool (72 m²), spa (sauna, hammam), 3 seminar rooms (200 m² in total)
- Category: 3 star hotel
- Staff number: about 30 employees

Building characteristics:

- Year of construction: built in 1988-1989; retrofitted and expanded in 2008
- Climatic zone: mountainous
- Size of the building: 5,249 m²
- Number of guest rooms: 107 guest rooms

Environmental aspects:

- Annual energy consumption (kWh) per m²: *not available*
- Energy consumption (kWh) per night sold: *not available*

The hotelier's approach —

“Reduction of space heating energy and lighting needs, implementation of a low energy solution for space cooling (free cooling), and reduction of carbon emissions were the main objectives of the hotel's retrofitting”

The hotel manager wanted to take sustainability into account in his business and to limit the environmental impact of the hotel's activities, which is why he took advantage of the hotel renovation to improve its energy efficiency.

In order to make the right technical choices, a design office working in the environment field was hired.

For more information: <http://www.aiglons.com>

Description of energy conservation measures in place —

Make a first assessment

Energy consumption monitoring: the energy consumption of the hotel is monitored monthly

Protect the building from the extreme temperature

Building insulation: the thermal insulation of the existing building's roofs were upgraded along with the insulation of the extension's roof (2 layers of rock wool 150 mm thick). In addition, the exterior walls were insulated externally (with a Stotherm Classic solution), and a new type of balcony was built to avoid thermal bridges in the extension.

Window insulation: triple glazing was used in the extension (double layers of argon gas)

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: 90% of the light bulbs are compact fluorescent lights (CFL)

Energy saving card for guests: in the 2008 extension, electricity saving cards were installed in the guest rooms so electricity is automatically turned off on removing the card when guest leaves the room. For example the lights are automatically turned off when the guests leave the room.

- **Space conditioning, ventilation and domestic hot water**

Free cooling through ventilation: a double flux, mechanical ventilation was installed ("all air" type). Besides providing fresh air to the building, this system can be used in summer as a low energy space cooling solution.

Integration of renewable energies —

- **Hot water and space heating**

Wood boiler: a wood-chip boiler was installed to heat the swimming-pool. It was designed to cover all the heating needs of the swimming-pool and it is also used to preheat the air into the spa.

- **Electricity**

Green electricity: half of the electricity purchased from the energy provider comes from renewable energies.

Benefits for the hotel —



Economic performance

Energy savings

"Although it is still too early to evaluate the energy savings, it is clear that we will save on energy costs."



Market visibility

Improved market visibility

"We notice that more and more companies want to hold a seminar in our hotel because of our environmental policy".

Cost of the overall retrofitting of the hotel: 10 million Euros (including the investment in energy efficiency solutions and in renewable energies).



Energy Efficiency Case Study

« Auberge Les Liards » Egliseneuve des Liards (France)

General information on the hotel —



© Auberge Les Liards, France

Hotel name & type:

- Hotel name: Auberge Les Liards
- Type of hotel: inn, guesthouse
- Type of business: private, independent
- Services offered: half-board, restaurant (55 covers)
- Category: *n.a.*
- Staff number: the owners (plus a few other inhabitants of the village in summer)

Building characteristics:

- Number of buildings: 2 buildings (1 main building with a lounge, a kitchen, 2 guest rooms and the owners' room – and a smaller building with 2 guest rooms)

- Year of construction: old farmhouse from the 15th century – fully renovated from 1998 to 2000
- Climatic zone: between a continental and an oceanic climate (elevation: 780m)
- Size of the buildings: 476 m² (main building) and 90 m² (smaller building)
- Number of guest rooms: 4 guest rooms (up to 17 persons)

Environmental aspects:

- Environmental label: has recently applied for "La Clef Verte"
- Electricity consumption (kWh) per m²:
 - 84 kWh/m²/month (on average from May to September 2009)
- Electricity consumption (kWh) per night sold:
 - 4.76 kWh/guest night sold
- Other energy consumption: 2 bottles of gas (for the kitchen) and 6 to 7 steres of wood (for space heating)

The inn's energy consumption is seasonal. It is lower in winter (because the inn is closed during the winter season) and higher when the restaurant opens (10 times a year approximately).

The hotelier's approach —

The owner of the inn was born in the Netherlands and was brought up with an awareness of environmental issues. Since then, she has always tried to work with respect for the natural environment.

Involve your guests

After spending ten years in Africa, she decided to settle in France, renovate an old farm and convert it into an inn. *"To us, it was natural to renovate the farm with respect for the natural environment"*.

The renovation started in 1998. As the owner wanted to achieve the lowest energy consumption possible for the inn, she asked the architect to insulate the building wherever applicable. At that time, only the roof was insulated however, only the roof was insulated at this occasion, and the owner decided to further insulate the building on her own initiative, using natural materials.

"We learnt how to renovate the building step by step, and we worked with local builders using local and natural products. But we always feel we can do more, in particular in the area of energy. In fact, we expect our electricity consumption to decrease even further once we install the solar water heater."

For more information:

<http://www.lesliards.com/pages/english/homepage.php>

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: The owner of the inn monitors its electricity consumption and production every 10 days.

Guest information: the owner likes to discuss the inn's green policy and to exchange ideas and experiences with the guests, especially at dinnertime. In addition, a brochure explaining the environmental policy of the inn has recently been edited. "We are keen on discussing ecological issues with our guests, but also try not to be too overwhelming".

Involve your staff

Good housekeeping: the owner of the inn always tracks non-useful energy consumption. For instance, devices on stand-by are systematically switched off and electrical equipment is switched on only when necessary (e.g. refrigerators, freezers, coffeepot...).

Protect the building from the extreme temperature

Building insulation (small building): the exterior walls of the small building have been insulated internally with a mixture of natural hemp fibre hemp and lime.

Natural hemp fibre is an insulating material that has the ability to absorb and release moisture without affecting thermal performance, while lime improves the walls' waterproofing capability allowing them to breathe (thanks to the vapour permeability of the lime). The risk of moisture penetration is reduced and the walls' thermal resistance is conserved.

As for the roof, it was insulated with a thin insulation material (mineral, wool based).

Building insulation (large building): The roof was insulated with rock wool. In addition, the owner is planning to have the north-facing wall insulated externally with straw.

Window insulation: Double-glazing was installed during the renovation in 1998-2000.

Improve equipment efficiency

- **Lighting & electricity**

Efficient lighting: energy saving light bulbs are used throughout the inn.

Efficient equipment: electrical appliances have an energy classification of A or A+ whenever possible (dishwasher, washing machine...). Still, some of the professional equipment used doesn't have any energy classification because no energy labelling was available at the time they were bought.

Integration of renewable energies —

- **Space heating and hot water**

Space heating: heating is partly done with a wood-burning stove. In addition, a wood-chip boiler is under construction to cover the additional heating needs of the inn.

Solar hot water: the hotel still works with an electric boiler for water heating, but this was to be replaced with solar panels in 2009.

- **Electricity**

Solar photovoltaic system: 24 m² of solar panels, generating 3,000 Wc, were installed in June 2008. The electricity is sold back to the public grid, thus providing financial income to the inn (the installation of an additional 180 m² of solar panels on another building is being studied).

Also the electricity for the electric bicycles will be produced by solar panels (1.5 m²). A battery will produce the minimum wattage for uploading the bike-batteries (150W).



Benefits for the hotel —



Economic performance

Financial savings

"Selling the electricity produced by our photovoltaic system is very profitable. Also, we expect our energy costs to decrease a great deal once we get the solar water heater installed."



Market visibility

Improved market visibility

"We have attracted new guests. They come to us because they know our inn is eco-friendly."



Environment

Personal satisfaction

"It is a great challenge but also a great personal satisfaction to be environmentally friendly". For information, here is the detailed cost of the solar photovoltaic system installed in 2008:

	Cost (euros)
Installation and materials	19,236
VAT 5,5%	500
Connection to the grid	1,084
TOTAL	21,395

Financial incentives received for the solar photovoltaic system:

- Subsidy from the Auvergne Region: 1,500 euros
- Deduction on taxes: *to be determined.*



Energy Efficiency Case Study

« Ecolodge des Chartrons » Bordeaux (France)

General information on the hotel —



© Ecolodge des Chartrons, France

Hotel name & type:

- Hotel name: Ecolodge des Chartrons
- Type of hotel: guesthouse
- Type of business: private – independent
- Services offered: bed & breakfast
- Category: *n.a.*
- Staff number: 2 people (the owners)

Building characteristics:

- Number of buildings: 2
- Year of construction: old building from the XVIIIth century, eco-renovated in 2006-2007
- Climatic zone: oceanic
- Size of the building: 350 m²
- Number of guest rooms: 5 guest rooms (up to 12 guests)

Environmental aspects:

- Environmental label: EU Eco-label (May 2009)

- Annual energy consumption per m² (2008 data):
 - gas : 108 kWh/ m²/year
 - electricity : 22 kWh/ m²/year
 - gas + electricity : 130 kWh/ m²/year
- Energy consumption per guest night sold (2008 data):
 - gas : 22.35 kWh per guest night sold
 - electricity : 5.13 kWh per guest night sold
 - gas + electricity : 27.5 kWh per guest night sold.

The hotelier's approach —

"It was natural for us to have the house renovated with the aim of limiting its environmental impact. Reduction of fossil energy consumption was part of our strategy".

When the hotel owner bought the house in 2006, she decided to eco-reno-vate it and she paid a great deal of attention to the reduction of fossil fuel energy consumption.

For the renovation of the house, she received advice from an architect first, and then decided to look for more information on her own.

"It can be costly for small structures she received some support from the CREAC (a local agency for energy and environment) and hired some craftsmen for part of the renovation. She received some financial support from the ADEME for the solar system.

To invest in energy efficient and renewable energy solutions. But you don't have to make all investments at once: you can proceed step by step. The important thing is to take advantage of every opportunity you may have: replacing equipment, renovation ... This way, the investments made can be very cost effective".

For more information:

<http://www.ecolodgedeschartrons.com>

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the owner of the guesthouse monitors the energy consumption monthly.

Involve your guest

Guest information: guests are provided with an information brochure about the activities they can adopt to help the guesthouse reduce energy consumption (switching off lights, etc.).

Involve your staff

No staff

Protect the building from the extreme temperature

Building insulation

Roof insulation:

- 3 layers of sheep's wool was used for the insulation of the unoccupied attic space of one of the buildings (each layer was 8 cm thick).
- 10 cm thick cork panels, plus panels of compacted wood fibre, and FERMACELL panels (80% gypsum, 20% wood cellulose) were used for the insulation of the occupied attic space of the other building.

Insulation of north facing wall:

- a mixture of hemp and lime was used for the waterproofing and thermal insulation of the interior side of the wall, in one bedroom. These materials improve the walls' waterproofing capability and at the same time allow them to breathe (thanks to the water permeability of the lime). The risk of moisture penetration is reduced and the wall's thermal resistance is preserved.
- 4 cm thick cork panels were used for the insulation of the interior side of the wall in the other bedroom.

Courtyard covering:

- the 27 m² courtyard was covered by a double glazing structure to heat the living area below and reduce space heating needs in winter. In summer, the windows overlooking the courtyards are kept closed to keep the fresh air inside.

Building waterproofing: lime was used for the waterproofing of the interior side of the walls in one bedroom.

Window insulation: windows with double glazing were installed during renovation to reduce space heating needs in winter and to keep the fresh air inside the house in summer.

Improve equipment efficiency

- **Lighting & electricity**

Use of natural light: tubular day lighting devices were installed in the bathrooms without windows: light is captured on the roof and redirected into the interior through the tubular device (Solatube brand).

Efficient lighting: 90% of the light bulbs used are energy saving light bulbs (compact fluorescent light bulbs and LED for the ceiling).

- **Space conditioning, ventilation and domestic hot water**

Efficient heating equipment (mainly for space heating): a gas condensing boiler was installed for space heating. It is also used as a back up to the solar installation producing hot water.

As for the living area under the light well: a wood-chip stove is to be installed.

Use of energy efficient equipment: the washing machine is of energy classification A and the refrigerator A+.

Hot water saving: the bathtubs have been replaced by showers to reduce hot water usage; in addition, low flow devices have been installed on guest rooms' water taps and showers.



Integration of renewable energies —

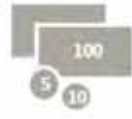
- **Hot water and space heating**

Solar hot water: 10 m² of solar panels were installed for hot water heating.

- **Electricity**

Green electricity: The hotel purchases electricity from an energy supplier that delivers green electricity only.

Benefits for the hotel



Economic performance

Energy savings

"We have been running the business for only 1 year, so it is difficult for us to calculate the energy savings, but we clearly expect to make important energy savings over the coming years."

30% energy saving is expected from the gas condensing boiler, compared to a normal gas boiler.



Meet guest expectations

Improved comfort

"Guests tell us they feel good in our guesthouse, because of the thermal comfort and the use of natural materials."



Environment

Personal satisfaction

"We are happy that our guesthouse has a low environmental impact".

For information, here is the cost of some energy saving measures that have been implemented:

	Cost (euros, tax included)
Renovation of 9 windows (wood frames, double glazed, low emissive glass)	13,500
Gas condensing boiler + 10 m ² of solar panels	23,500
Three tubular daylighting devices	5,200



Energy Efficiency Case Study

Chateau Montagne

Troyan (Bulgaria)

General information on the hotel —



Hotel name & type:

- Hotel name: Chateau Montagne
- Type of hotel: urban hotel
- Type of business: business visitors and tourists
- Services offered: accommodation, restaurant, lobby bar, fitness hall, massage, sauna, swimming pool, an open-air bar at the swimming pool, room service
- Category: 3 stars
- Staff number: 26

Building characteristics:

- Year of construction: 2007
- Climatic zone: temperate, mountains
- Size of the building: *not available*
- Number of guest rooms: 26

Environmental aspects:

- Environmental label: UNIDO CP & CSR evaluation
- Annual energy consumption per m²: *not available*
- Energy consumption per night sold: 58,7 kWh / night sold

The hotelier's approach —

The hotel is quite new – it began operating in 2007 and was constructed with the idea to save as much energy as possible with the available funds.

Description of energy conservation measures in place —

Make a first assessment

Energy consumption monitoring: Each month, energy consumption is compared with the previous month and with that of the previous year. It is measured per guest night.

Involve your staff

Good housekeeping: The staffs turn off the TVs and mini bars in unoccupied rooms, close the curtains in summer and open them in winter.

Involve your guests

Guest involvement: Guests are asked to leave towels that they want to be changed on the floor – otherwise they will be used for one more day. This method conserves energy.

Protect the building from the extreme temperature

Building insulation: Insulation to conserve heat loss during the winter and maintain cooler temperatures during the summer has been installed.

Window insulation: All the windows are insulated to prevent energy leaving the building

Improve equipment efficiency

• **Lighting & electricity**

All bulbs are energy efficient; there are motion sensors for lights in the corridors.



© Philips

• **Space conditioning, ventilation and domestic hot water**

Each room has a separate air conditioner – for a hotel with less than 30 rooms this saves energy compared to larger units that work 24/7.

Integration of renewable energies -

• **Hot water and space heating**

Hot water is produced by solar panels that are installed on the roof of the hotel.

Benefits for the hotel _____

Sign for changing the towels - a 25% reduction in laundry costs, which adds up to about 550 Euros per year.

Turning off the minibars and TVs – about 800 Euros per year.

For a temperate climate in a mountainous region with four seasons where temperatures can vary from 30 plus in summer to minus 20 in winter, energy efficiency is quite satisfactory.



Energy Efficiency Case Study

« Cristallina Eco-Hotel » Coglio (Switzerland)

General information on the hotel —



© Cristallina Eco-Hotel, Switzerland

Hotel name & type:

- Hotel name: Cristallina Eco-Hotel
- Type of hotel: tourist hotel and seminar hotel
- Type of business: private – independent
- Services offered: bar, restaurant-pizzeria
- Category: 3 stars
- Staff number: 9 (4 full time, 5 part time)

Building characteristics:

- Number of buildings: 1
- Year of construction: 1955-1956 (renovated and extended in 2002-2003)
- Climatic zone: mountainous (elevation: 356 m)
- Size of the building: 881 m² heated surface
- Number of guest rooms: 12 guest rooms + 1 room for seminars or classes (45 m²)

Environmental aspects:

- Environmental label:
 - Solar Swiss prize 2005 (renovation category)
 - WWF South Switzerland Award “The sun on the roof 2005”
 - Swiss Pure 2006 (Swiss Tourism)
- Annual energy consumption (kWh) per m²: *not available*.
- Energy consumption (kWh) per night sold: *not available*.

The hotelier’s approach —

“To me, all businesses should think about their sustainability”.

From his youth, the hotelier always cared about energy consumption and its impact on the environment. So when he opened his business, he decided to make efforts towards reducing energy consumption. “To me, all businesses should think about their sustainability”.

Before retrofitting the hotel, he asked for some advice from a person specialized in environmental issues. The advice helped him make decisions as regards renovating the hotel.

The hotelier is now quite satisfied with the energy conservation measures in place, although he thinks it is always possible to do better!

Factors that helped in the process

At the same time the hotel was being retrofitted (in 2002-2003), the state decided to provide financial support for the wood heater and the photovoltaic panels to help cover the investment for these technologies.

For more information:

<http://www.hotel-cristallina.ch>

Description of energy conservation measures in place

Make a first assessment

Energy consumption monitoring: the hotel mostly uses renewable energy (solar energy, and wood) Therefore there is not much need to monitor energy consumption. Still, the hotelier is planning to compare its energy consumption with benchmarking values (of the hotel sector) to get a better idea of the hotel's energy efficiency.

Involve your guests

Guests information: a digital panel shows the electricity production coming from the solar panels on the roof, in order to draw guests' attention to energy consumption. The hotel also offers guests the possibility of renting an electric car.

In addition, guests are asked to switch off the heaters in their rooms when they open their windows. This winter, the hotel manager will design a leaflet telling how everyone can contribute to saving energy and natural resources with just a few simple gestures.

Involve your staff

Staff training: the hotel manager provides his employees with some advice to reduce energy consumption (in particular, it is recommended to switch off lights that are not in use and not to open windows in the dining room as the ventilation system already provides fresh air).

He also gives advice regarding water usage and waste management (the staff recycle everything possible and compost the kitchen waste for use in the garden).

Protect the building from the extreme temperature

Building insulation: for the extension of the hotel, prefabricated wood panels with internal insulation made of recycled paper (16 cm for the walls and 20 cm for the roof) were used.

Window insulation: during the renovation, windows with upgraded thermal insulation were installed (with a k value of 1,5 W/m²K).

Improve equipment efficiency

- **Lighting & electricity**

Automatic control of electricity in guest rooms: 2 rooms are equipped with “bio-switches”: a small device that shuts off all the electricity in the room.

Efficient lighting: almost all the lighting is energy efficient.

- **Space conditioning, ventilation and domestic hot water**

Thermo-regulation: thermostatic valves are used in the hotel to adjust room temperature according to the guests’ needs.

Efficient ventilation: the salon on the ground floor is equipped with a heat recovery ventilation system: the heat of the exhaust air is used to pre-heat the incoming fresh air.

Integration of renewable energies —

- **Hot water and space heating**

Wood boiler for space heating: the hotel changed from an oil heater to a wood heater: the central heating system is now using wood chips.



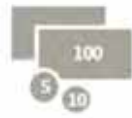
Solar hot water: drinkable hot water is produced by solar panels installed on the roof (the solar panels have a total surface of 10.4 m² and cover 55% of the hotel’s hot water needs)..

- **Electricity**

Solar photovoltaic system: the 40 photovoltaic panels installed on the roof are used to generate electricity (4 kWp). This system covers 8% of the hotel’s electricity needs.



Benefits for the hotel



Economic performance

Energy savings

"By replacing our oil heater with a wood heater, we save about CHF 2000 (1350 €) every year."



Guest satisfaction

"The German-Swiss and Germans are quite sensitive to environmental aspects and they prefer to stay in a hotel which has a clear environmental policy!"

"Green: it's in!"



Environment

Personal satisfaction

"We are quite satisfied to have a sustainable business... although we think it is always possible to do better!"



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