

"RELACS" and Save Energy!



*A Guide for Energy Sustainable
Tourist Accommodation Buildings*

RELACS



Renewable Energy
for Tourist Accommodation Buildings



FOREWARD

Welcome to the RELACS Guide about energy efficiency and renewable energy sources in the tourism sector.

Energy Efficiency (EE) and Renewable Energy Sources(RES)... what does that words make you think?
Maybe insulation, draught proofing, high investments, low quality service, low performance, advanced management, big enterprise?

Here we are to help you realize how energy efficiency and renewable energy represent for the tourism sector a major opportunity to reduce operating costs, to improve economic performance and increase competitiveness.

Why should you take care of energy related issues and read this guide? Here are our top five reasons:

- Reduce energy costs. Many measures, especially those related to energy saving, actually save money so increase competitiveness
- Implement Responsible Marketing to attract the growing number of green consumers who look for companies that are taking substantive steps and have made a commitment to improve their environmental impact.
- Maintain Environmental Quality. An attractive environment is the main motivation for guests to visit and return.
- Improve consumer services and enhance the perception of comfort and satisfaction. Many measures such as provision of walking and cycling opportunities, add value to the visitors' experience.
- Improve your management approach and system.

This small but thorough Guide helps you to get an overview of the existing practices and technologies and make energy management an opportunity to improve the sustainability of your business. This way not only you will manage to decrease your operational costs, but also to improve your attractiveness and competitiveness.

To address all aspects of tourist accommodation buildings' energy performance, the Guide is organised in seven (7) sections: introduction, energy efficiency, renewable energy, sustainable mobility, users' energy and transport behaviour, funding opportunities and certification schemes. At the last (8th) section information on RELACS Network is provided.

You can read this Guide also skipping between sections, using the section headings as your guide to identify the information you need.

CONTENTS

INTRODUCTION	5
Energy & Tourist Accommodation Buildings	5
REDUCE ENERGY NEEDS	6
Reduce Heating & Cooling Needs	6
<i>Building Envelope</i>	6
<i>Heating Systems & Cooling Systems</i>	8
<i>Water Efficient Devices & Appliances</i>	8
Reduce Electricity Needs	9
<i>Electrical Appliances</i>	9
<i>Lighting</i>	9
<i>Electricity Saving Systems</i>	10
Combined Heat, Cooling and Power Systems	11
Control Systems	12
<i>BEMS- Building Energy Management Systems</i>	12
RENEWABLE ENERGY	13
Renewable Heating & Cooling	13
<i>Solar heating/cooling</i>	13
<i>Biomass heating</i>	14
<i>Geothermal heating/cooling</i>	14
<i>Ground, Water and Air Source Heat Pumps</i>	15
Renewable Electricity	16
<i>Photovoltaic Systems</i>	16
<i>Small Wind Turbines</i>	17
SUSTAINABLE MOBILITY	18
Entrepreneurial Sustainable Mobility	18
Guests' Leisure Travelling	18
IMPROVING ENERGY & TRANSPORT BEHAVIOUR OF USERS	19
Staff	19
Guests	19
FUNDING OPPORTUNITIES	20
CERTIFICATION SCHEMES	21
RELACS NETWORK	22

INTRODUCTION

The main aim of European tourism policy is to stimulate competitiveness in the sector, while being aware that in the long term, competitiveness is closely linked to the “sustainable” way in which it is developed. The sustainability of tourism covers a number of aspects: the responsible use of natural resources, taking account of the environmental impact of activities (production of waste, pressure on water, land and biodiversity, etc.), the use of “green” energy, protection of the heritage and preservation of the natural and cultural integrity of destinations, the quality and sustainability of jobs created, local economic fall-out or customer care. (EC COM (2010) 352)

Hence, a greener and more energy efficient management of Tourist Accommodation Buildings ensures the competitiveness of the tourist accommodation enterprises in the long term, while it decreases their operational costs and improves their image in the short term.



The European Union remains the world's No 1 tourist destination, with 370 million international tourist arrivals in 2008, or 40 % of arrivals around the world. These arrivals generated revenues of around EUR 266 billion.

Energy & Tourist Accommodation Buildings

Energy costs represent a significant part of the operational costs of a Tourist Accommodation Building. Annual delivered energy consumption in accommodation buildings can range from 200 kWh/m² to over 1000 kWh/m², while annual energy costs can range from €600 per guestroom to well over € 2.000. Moreover, a typical hotel releases annually about 160kg of CO₂ per square metre of floor area, equivalent to about 10 tonnes per guestroom. The main areas of energy consumption in a Tourist Accommodation Building are: space heating, water heating (bathrooms, swimming-pool, spas), cooling, lighting, ventilation and catering. Space and water heating represent approximately 70% of the annual energy consumption and 40% of the energy costs of a typical hotel operating all year round, while lighting contributes about 8% of energy

consumption and 21% of energy costs respectively. A more detailed analysis of delivered energy by use and costs for a typical hotel is illustrated at the Chart below.

Tips for improving the energy sustainability of your Tourist Accommodation Building:

1. Understand where energy is used. Knowing what you pay for energy (electrical, heating or cooling) and how it is used are essential parts of good energy management.
2. Reduce your energy needs and improve the efficiency of your energy operating systems.
3. Install renewable energy systems to produce heating, cooling and electric power.
4. Select low fuel consumption and low emissions company cars. Encourage your guests to use sustainable transport modes.
5. Involve staff by explaining your energy saving plan and ask for their suggestions. Involve your guests by informing them about your sustainable energy policy and kindly asking them to contribute in your efforts.
6. Search for available funding tools to help you implement your sustainable energy plan.
7. Visualise your efforts by applying eco-labelling and/or environmental management systems.
8. Join the RELACS Network and enjoy free energy consultancy services and advertisement.

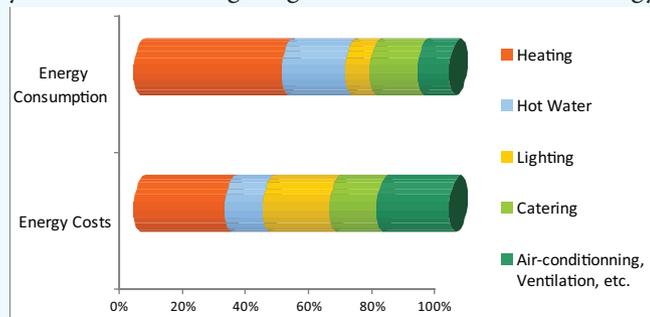


Chart: Distribution of energy consumption and energy costs for a typical hotel

REDUCE ENERGY NEEDS

Reduce energy needs means providing the similar comfort conditions to your guests by using less energy!

Reduce Heating & Cooling Needs

Optimal insulation of building envelope, wise selection of glazing systems, good solar shading during summer and optimal performance of cooling and heating systems could significantly decrease heating and cooling needs and costs.

Building Envelope

A building envelope includes all the components that make up the shell or skin of the building and separate its exterior from the interior. In other words, it includes walls, roofing, foundations and windows. Improvements of building envelope are a cost effective way to reduce energy needs of tourist accommodation buildings.

Walls, Floors & Roofs Insulation

Good thermal insulation of walls, floors and roofs is the most effective way to reduce building heat loss in winter and heat gain in summer; thereby decreasing energy consumption for heating and cooling respectively. Improvements in insulation are usually part of a more general building renovation project, aiming not only to improve energy performance but also to upgrade facilities and services offered to guests. Insulation can be placed either on the inside (interior) or on the outside (exterior) of the walls.

There is a wide variety of insulation materials. The effectiveness of these materials is evaluated by their resistance to heat flow, called R-value ($m^2 \cdot C^\circ / W$). A good insulation material will have a high R-value. Some of the most common insulation materials are: Fibreglass, Rockwool, Expanded Polystyrene Foam (EPS), Extruded Polystyrene Foam (XPS), Rigid Polyurethane Foam (PUR), Wood Wool Boards, Glass Foam (CG), Phenol Foam (PF), Cork Boards, Expanded Perlite Boards and Wooden fiber boards.

A quite innovative and effective way to insulate the building' roof is to transform it to a "green roof". A green roof is a roof that is partially or completely covered with vegetation and a growing medium (usually soil), planted over a waterproofing membrane. Green roofs not only provides insulation, but also offers solar protection, improves micro-climate, absorbs the rainwater and helps to lower urban air temperature. Moreover, they serves aesthetical purposes.



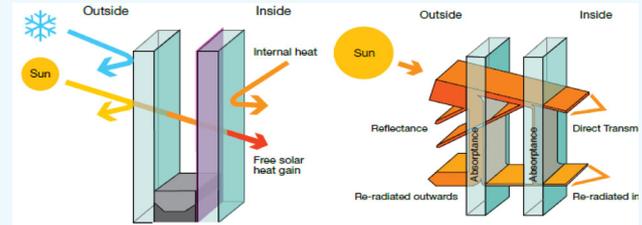
Make your roofs "green" to decrease operating costs, save energy and look extraordinary! (Source: www.efb-greenroof.eu)

Windows and Doors

Using advanced glazing solutions like Low-Emissivity and solar protection glass can significantly reduce the need for heating and cooling in buildings.

Low-E glass is specially treated with a microscopically thin, transparent coating. The coating reflects heat back into the building, thereby reducing the heat loss through the window. It also allows large amounts of solar energy to enter the building, thereby heating it passively. Further innovations such as triple glazing products can offer additional improvements in the window's insulating properties.

Solar control glass is a high performance coated product that reflects and radiates a large degree of the sun's heat while allowing daylight to pass through a window or façade. The indoor space stays bright and much cooler than would be the case if normal



Left: Low-E glass, Right: Solar Control Glass (Source: Europe's Manufacturers of Building, Automotive and Transport Glass)

glass were used. In addition, solar control glass units are also typically double glazed and can also combine both Low-E and solar control properties, to maximize insulation in cooler periods and maximize solar control properties in summer.

Solar Protection



Source: European Solar Shading Organisation



Source: inhabitat.com

Proper building shading could greatly decrease heat gains during summer; thereby reduce cooling needs. The most common shading techniques are:

- Static horizontal external solar shading devices (swivelling or rigid): i.e. solar fins, louvers and balconies.
- Dynamic external vertical shading devices, mainly for openings at eastern and western façades: i.e. shutters, venetian blinds, roller shutters, roller blinds awnings, light directing blinds.
- Indoor shading products: curtains, blinds, roller blinds etc.
- Vegetation: climbing plants mainly on eastern and western façades and deciduous trees at southern façades (solar radiation pass through deciduous trees during winter and is absorbed during summer). Moreover, vegetation through water transpiration cools the air and improves micro-climate.

External shading systems are more effective than indoor ones. The main reason is that the indoor systems although block the direct incidence of solar energy inside the building, permit the heating of air between the window glass and the shading system. Hot air is further transmitted in the building interior.

Surfaces' colour and materials selection is also important in decreasing heat gains. Light painting and low solar absorption materials reflects the sun and keeps the building cool under the sun, while dark surfaces and high absorption materials cause overheating (in case of colder climate conditions, dark surface are recommended to increase "passive" heat gains during winter). It is estimated that "Cool roofs", in other words roofs using materials of high solar reflectance (ability to reflect sunlight) and high thermal emittance (ability to radiate heat), can generate air-conditioning savings and peak demand reductions of 10-30%.

Heating Systems & Cooling Systems

Regular maintenance, decrease of heat/cool losses and proper settings of temperature could significantly enhance the efficiency and performance of heating and cooling systems.

Heating Systems

To improve the performance of your central heating system and make it more energy efficient:

- Check if the size of the boiler (or other heat source) and the sizes of radiators are appropriate for the heating requirements of the building as a whole and of rooms respectively. In case of over-sizing you might consider installing a completely new system.
- Service your boiler equipment regularly to ensure efficiency and safe operation.
- Insulate your boiler and pipelines and check the system for leaks and corrosion.
- Use a digital thermometer to make sure that temperature set points are correct – heating costs are about 8 % for each 1°C over-heating.
- Heat your boiler water to correct temperature – use thermostat to ensure that the water is not heated more than necessary.
- Install programmable thermo-

stats to schedule the temperature of a heating system during a day or a week, i.e. decrease the temperature during the night.

- Transform your heating system



Place thermostatic valves on your radiators and significantly decrease your heating costs (Source: homewoodheating.co.uk)

to combined space-water heating system (the heat produced is both used for space and water heating).

- Use thermostatic valves on radiators to manually regulate the temperature in the rooms.
- Install control system for the temperature in the hotel rooms. i.e. temperature is set to 21°C when the guest checks-in and it is decreased to 18°C when he checks out.

Cooling Systems

To improve the performance of your cooling system and make it more efficient:

- Service your cooling system regularly to ensure efficient operation.
- Use filters of high quality and low air flow resistance. Change filters frequently.
- Install economizers for cooling of fresh air before it enters the conditioning unit. Economizers can save energy in buildings by using cool outside air as a means of cooling the indoor space.
- Make sure that appropriate set points are used – ideal set point for cooling buildings is 24°C. Cooling below this temperature costs more.
- Install programmable thermostats to set the temperature of a central cooling system during a day or a week.
- Install window/door sensors, to turn off the power to the air-conditioning if the window/door is left open.
- Recover heat from cooling systems and use it for heating purposes (i.e. heating of domestic water or spa centre water).

Water Efficient Devices & Appliances

Heating needs could be greatly decreased by using water saving showers. There are two types of water saving showers. Aerated, which mixes air and water forming a misty spray and Low Flow which have a mechanism that reduces the flow from the shower or shower head but maintains the power to still provide a forceful full shower feel, like a normal Power Shower. Water saving showers could decrease water consumption and subsequently hot water demand by 50-60%.

Moreover, hot water demand could be further decreased by using water efficient washing machines and dishwashers. Thus, when buying and selecting new washing machines and dishwashers, don't forget to check water consumption characteristics!

Reduce Electricity Needs

Careful purchase of appliances optimal utilisation of natural lighting, clever choice of bulbs and installation of electricity saving systems, could greatly decrease electricity bills.

Electrical Appliances

The energy costs for electric appliances represent an important part of a tourist operator's electricity bill. Thus, it is important to look for energy efficiency and environmental criteria reflected by labelling schemes, when buying and selecting new electrical appliances.

EU Energy Label declares the energy efficiency of a product, using an A to G scale. A-class products mean less energy consumption and therefore less money for electricity! For refrigerators, dishwashers and washing machines the existing EU label scheme was updated at the end of 2010 as new technologies would allow reducing by half the energy consumption of an A-class product. The EU has therefore extended the scale upwards with three new classes: "A+", "A++", and "A+++" for products with a better than A-performance.

To improve the energy performance of existing electrical appliances:

- Install electronic expansion valves on refrigerators and save up to 20% of energy.
- Recalibrate your restaurant equipment to stay efficient. Do a regular thermostat check on your appliances and reset them to the correct operating temperature.
- Maintain and repair your equipment. Leaky walk-in refrigerator gaskets, freezer doors that do not shut, cooking appliances that have lost their knobs add up to money wasted each month.



Save energy and money by buying A-class energy products! And don't forget refrigerators, dishwashers and washing machines can rate even better! (Source: ec.europa.eu)

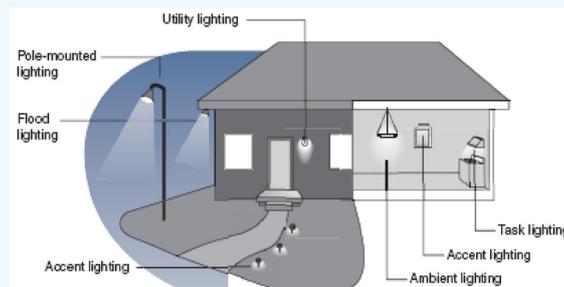
Lighting

Good lighting is important for the comfort of guests and staff, as well as for the appearance of tourist accommodations.

To save up to 30-50% electricity for lighting, without any impacts on comfort:

- Make optimal use of daylight
- Make a good lighting plan and select efficient lamps and bulbs
- Use A-class energy-efficient bulbs.

Lighting can be placed into six categories: ambient, task, accent, utility, flood and pole-mounted. A good lighting plan takes into consideration the type of activities that will take place in a certain area and places a combination of lighting types accordingly. In other words, a proper selection of lamps and bulbs are required for optimal lighting results! Nowadays, there is a wide variety of energy efficient bulbs that con-



Source: www.green buildingblocks.com

sume less energy for the same light output. The following table could help you to choose the right ones and save maximum energy.

Electricity consumption for lighting could be further decreased by installing lighting control systems. The main lighting control systems are listed and shortly described below:

- Dimmer switches are devices used to manually vary the intensity of the light output, by decreasing or increasing the mean power to the lamp. They can be used in rooms.
- Time switches are devices that are programmed to turn on and off the light at specified time (for instance during night hours 8.00 p.m.-7 a.m.). They can be used in outdoor areas, parking, corridors, stairs and indoor public areas (hall, lobby etc.).
- Motion detectors are devices that turn on lights when they detect any presence. This way the energy consumption decreased up to 80%, as waste of energy when no one occupies the place is avoided. They can be used in low-trafficked outdoor areas, parking, corridors, stairs and public WC.

	Type of Bulb	Operating Hours	Applications
	Energy Saving Bulb	12.000	Hotel rooms and offices
	LED - Light- Emitting Diode	50.000	For ambient, task and accent lighting Background lighting in hotel lobbies Swimming pools lighting
	Optimized Halogen Bulb Infrared Coated Halogen Bulbs	2.000 4.000 - 5.000	Accent lighting in hotel lobbies or conference rooms
	Electrode less Bulb	60.000	Indoor: Entrance Halls or Storage Outdoor: Roofs, Buildings
	Low & High Pressure Sodium Vapour Lamp	30.000	Public places, street lighting
	Halogen-metal Vapour Bulb	60.000	Street lighting

Table: Types of Energy Efficient Bulbs (Photos: www.pixelio.de)

- Light level sensors are devices that turn on artificial lighting when detect that the ambient light falls below a predetermined level. They can be used in outdoor areas, corridors, stairs and indoor public areas (hall, lobby etc.).

Electricity Saving Systems

Decrease up to 80% the energy consumption of the rooms by installing a smart key cards system. The system is consisted by magnetic cards and card readers placed on the lockers (external readers) and inside the rooms (internal readers). When a guest inserts a valid smart card at the external reader, a green led shines to indicate the normal operation of the system and the door opens. Then, the guest inserts the same card on internal reader and powers on electrical appliances (including air-condition) and lighting. When the guest leaves the room, he/she takes the card out of the reader (as the card works also as room key) and powers off the electrical equipment (except refrigerator) few seconds later. Smart key cards system is quite an effective method to avoid unnecessary power consumption when the rooms are vacant. Other efficient measures that can be used (through the help



Source: product-image.tradeindia.com

of a professional) include nstallation of inverters in electricity control panels and correction of the power factor through capacitors.

Combined Heat, Cooling and Power Systems

Combined Heat and Power (CHP) units may use diesel, natural gas, biomass or biogas, to generate electricity on site, and recover the “waste” heat from the process for space and water heating. Waste heat recovery increases the performance of the system up to 90%, achieving primary energy savings of 15% to 40% relative to conventional electricity or heating (boiler) production system.

However, the times when use can be made of this heat is limited to certain seasons, especially if the main part of the waste heat is applied for space heating. Depending on the building site and building standard the heating season often lasts for 6 months or less. For the economic viability of the CHP systems, it is important that it is used as much as possible. Therefore, other uses of the waste heat are awakening more interest. One of the possible uses of waste heat during the non-heating season is cooling. Therefore, the combination of combined heat and power (CHP) and thermally driven chillers (TDC) operated with the CHP’s waste heat seems to be a logical step. These units are called Combined, Heat, Cooling and Power (CHCP).

Success of CHP/CHCP depends on: accurate appraisal of the hotel’s potential for CHP; the correct sizing of the CHP unit to suit the hotel’s pattern of energy use; and a well engineered, well controlled and reliable installation. CHP/CHCP could easily replace conventional central heating/cooling systems and could be installed in the former boiler-room.



A partial view of CHPC system operating in a hotel (Source: REACM-ANATOLIKI S.A)

Most of CHP/CHCP systems are well developed, have high reliability and long maintenance intervals (up to 5 years). For end-users, reliable CHP/CHCP solutions exist in the large and medium capacity range, i.e. systems with several hundred kW of capacity or more. Initial solutions exist in the small scale capacity range, but the

end-user should be aware that a high level of expertise is necessary at all levels of the design and installation process in order to achieve an efficient system which guarantees long-term, reliable operation.

Control Systems

Central energy management systems can be used for heating, cooling, lighting, power and ventilation systems of the tourist accommodation building and allow the regulation of indoor comfort, at the same time minimize the wasted energy.

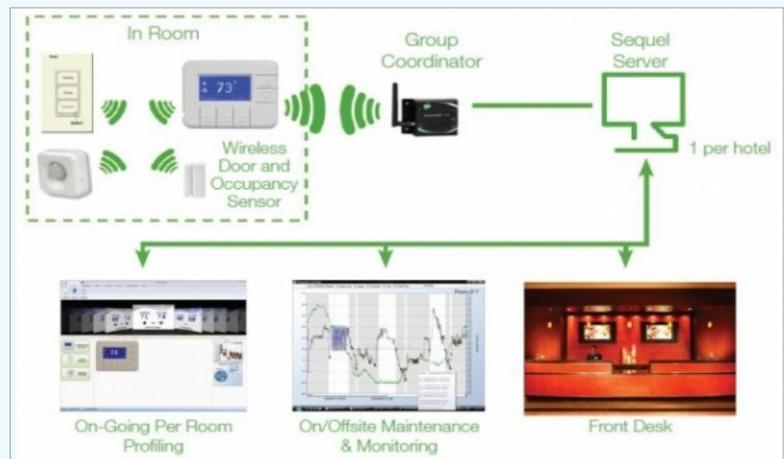
BEMS - Building Energy Management Systems

Building energy management is the process of monitoring and controlling the operating systems within a building (i.e. heating, air conditioning, ventilation, lighting, power, security). Most building energy management systems are operated using specially designed software programs. These programs are operated using a traditional computer and are capable of providing feedback on system operations and energy consumption. Most types of building energy management software also allow operators to make changes to building automation systems, though some may require changes to be made manually. These energy control systems are usually operated by building management or maintenance personnel, who must be trained to interpret the building performance data generated by the software.

The software used to control building energy management systems typically measure temperature changes, humidity levels, and occupancy patterns to calculate energy use. Many energy control systems also measure air quality and carbon dioxide levels to help maintain healthy buildings. Based on this information, these programs may recommend techniques to maximize occupant comfort while minimizing energy consumption. Building energy management systems also monitor operational failures and routine maintenance tasks.

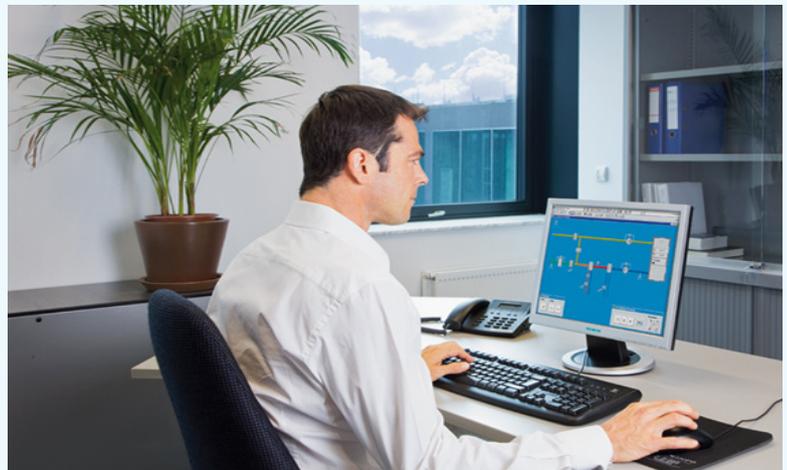
In summary, there are a number of important benefits associated with proper building energy management. First, these systems help ensure that the building is operating at its maximum level of efficiency and performance. They are also critical to regulating occupant comfort and well-being,

and in preventing poor air quality and insufficient ventilation. These systems also help to minimize wasted energy, which can make a significant impact on monthly expenses.



Source: www.schneider-electric.com

Source: www.industry.siemens.com



RENEWABLE ENERGY

Increasing renewable energy use means making your business “greener” and more energy-efficient!

Renewable Heating & Cooling

Exploit the energy of sun and earth, release the energy stored in forests and crops to meet your heating and cooling needs while saving energy and money.

Solar heating/cooling

Solar thermal systems are especially well suited for tourism accommodation buildings, who have their highest energy demand during summer. Although, they are mainly used for water heating, space heating and cooling applications are possible as well.

The main advantages of solar thermal systems are the independence from fuel, the easy maintenance and the silent, zero-emission operation. Depending on needs and the local share on solar irradiation, thermal solar systems are available in all shapes and sizes and there is a large number of different applications to chose from.

A typical solar thermal system for water heating consists of a solar collector (flat plate, vacuum tubes or plastic absorber) a very good insulated hot water storage tank, a control unit and a pipelines pumped circula-

tion system to transfer the heat from the collector to the store. The system components in space cooling and heating applications are the same as for water heating with the addition of a thermally driven cooling ma-

chine (i.e. absorption chillers) and radiators for space heating or under floor heating coils respectively.

The best time for the installation of a solar thermal system is in the course of reconstruction or expansion of the accommodation building. The challenges are the integration of the collector surface in the building envelope, preferably on the roof, the installation of the pipes and integration with your thermal system and the placement of the storage tank (space re-

quirements vary according to size).

Solar thermal applications could be coupled with the buildings' space heating and air conditioning facilities. Adsorption cooling systems use the heat energy for air cooling in summer. Heat pumps and biomass boilers supplement the thermal energy balance of the building for a complete cover of demand. This way, the building gets largely self-sufficient in its heating and cooling needs.



Areas of Application	Collector Surface	Technology
Solar Heating for Swimming Pools	0.5 – 1 m ² / m ² pool surface	Flat plate or Plastic absorber
Solar Hot water	0.6 – 1.4 m ² /bed	Flat plate
Solar Hot water and Space heating	1.5 – 2.5 m ² /kW heat requirement	Flat plate or Vacuum tubes
Solar Air conditioning	3 – 3.5 m ² /kW cooling requirement	Flat plate or Vacuum tubes

Table: Technologies and Applications of Solar Thermal Systems

Biomass heating

Biofuels are fuels made out of wood and plants. Biofuels are renewable energy sources. When burning biomass, carbon dioxide is released and emitted via exhaust gases. Trees and plants absorb CO² in their lifetime therefore, the carbon dioxide released during combustion of biofuels does not contribute to increased amounts of carbon dioxide in the atmosphere.



Biomass pellets for space heating
(Source: (ESS) Energikontor Sydost)

Geothermal heating/cooling

Geothermal energy is heat coming from the interior of the earth. Geothermal waters are heated by the magma and hot rocks. Naturally occurring large areas of hydrothermal resources are called geothermal reservoirs.

If your tourist accommodation building is located on or near a geothermal reservoir, you can take advantage of

The main traded forms of biofuels are logs/firewoods, woodchips, pellets and briquettes. Woodchips are medium-sized pieces of wood made by cutting or chipping larger pieces, while pellets and briquettes are products of compressed wood or plant pulp. Briquettes and pellets can be made of the same materials, but differ in size (briquettes are considerably larger).

There are great opportunities for those who use fossil fuels or electricity as an energy source to shift to bioenergy. The easiest way is to use pellets that have greater heat content than wood, are easy to transport in bulk or sack and are in a modern facility fully automated.

Depending on energy needs and the local availability of solid biofuels there are several biomass systems. Logs can be burnt in modern stoves and fireplaces, or in boilers. Pellets can be burnt in pellet boilers and pellet stoves. Briquettes are usually burnt in larger boilers or as a complement to wood logs in wood boilers or stoves.

this inexpensive and renewable energy not only to meet your energy needs, but also to improve your guests' perception of comfort and luxury by offering spa and recreational services.

The energy use of geothermal waters depends on the water temperature: Water with a very high temperature (>150°C) is used for electricity production (applicable to a larger scale than



Source: www.archiexpo.com

To change from oil to pellets it is usually sufficient to replace the boiler's burner. However, you should take into consideration that in some EU countries, there can be limitations of biofuels use in urban or densely populated areas.

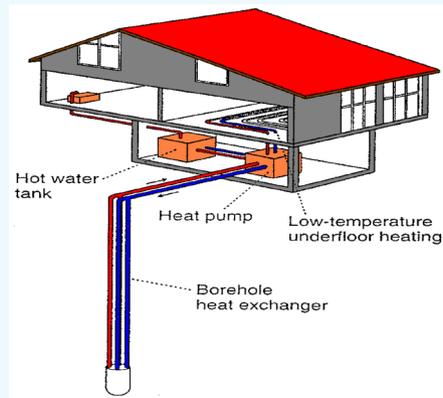
A typical pellet boiler installation consists of a storage container for biofuel, an automatic pellet feed-in system, a boiler, a well insulated heat storage water tank and finally a water-based heating system in the building. In general, investment costs for oil and pellet boilers are roughly the same, while an electric boiler has a little lower purchasing cost. However, maintenance and wear is greater for a pellet boiler compared to oil and requires more oversight. Life expectancy is estimated at least 15 years for a pellet heating unit.



Geothermal heat pump system with heat exchanger for space and water heating
(Source: REACM-ANATOLIKI S.A)

tourist accommodation), while waters with a lower temperature for space and water heating, space cooling and spas. Cooling, in particular, is restricted to areas with geothermal resources of about 100 °C and above. However, in case of lower temperatures, geothermal energy could be used auxiliary to other thermally driven cooling systems.

The techniques for exploiting the resources are very simple in principle. One or more borehalls are drilled into the reservoir and the hot fluid flows or is pumped to surface. The hot water is usually too saline and corrosive to be allowed directly into heating or cooling systems, so it passes through a heat exchanger where much of its heat energy



Source: geothermal-energy.org

is transferred to clean water in a separate district heating circuit. The heated “clean” water is then pumped to provide central heating to radiators, or it

is pumped to thermally driven cooling systems to provide cooling services. After the geothermal fluid completes its cycle, it is re-injected to the reservoir, through another borehall. Re-injection is essential to keep the hydraulic and thermodynamic properties of the reservoir and also to avoid the potential risk of pollution from disposal of geothermal fluid to superficial recipients. Due to drilling works, geothermal energy applications have high initial costs. However, their running and maintenance costs are quite low.

Moreover, permission from the owner or manager of the geothermal field should always be sought before you proceed in drilling works.

Ground, Water and Air Source Heat Pumps

Heat pumps are central heating and/or cooling systems that pump heat from one place to another. They can use the earth, the water or even the air as a heat source in the winter and/or as heat sink in the summer.

Although heat pumps use electricity to run the pump, they produce more heat/cold than the electricity they consume, using considerably less energy than direct electric heaters or air-conditioning. Ideally heat pumps should be connected to underfloor heating or larger low temperature radiators as they work most efficiently at lower temperatures than traditional fossil-fuelled boilers. As heat pumps work better with underfloor heating or low temperature radiators, there is less risk of guests ‘burning’ themselves on hot radiators. In fact, as the heat pumps run for longer time pe-

riods, meaning radiators stay warm for longer, guests may feel more comfortable.

Geothermal heat pumps demand a horizontal or vertical external ground collector. Horizontal collectors are often simpler, but they require longer lengths of pipe and land and cause a lot of disruption and mess during installation. Where less space is available or where there is an accessible rock shelf, vertical pipes are preferable. Though vertical pipes usually imply a more expensive installation, they are usually more efficient.

Water source heat pumps require a large body of water on site; this could be the sea, a river, lake or well, but a small stream will not be sufficient. Permission from authorities or the owner of the water source needs to be



Horizontal and vertical ground heat pumps systems
(Source: Ground Reach Project)

granted prior to installation.

Air source heat pumps are the most versatile as the external unit does not take up a large amount of space. However, there can be planning issues with air source heat pumps; as in some EU counties they are not yet included as ‘permitted development’.

Renewable Electricity

Use the power of sun and wind to decrease the electrify bills and increase your gains.

Photovoltaic Systems

Carbon and cost free electricity can be generated directly from sunlight using solar photovoltaic (PV) cells. Cells are assembled into modules or panels, which in turn can be linked together into larger arrays.

PV panels are usually mounted onto the structure of buildings, or built into appliances. In other words, electricity is generated close to where it is needed, minimising transmission losses. With grid connected systems, electricity is imported or exported completely automatically, depending on the balance of the building's supply and demand.

There are a number of different panel types, which are suited to different uses: PV shingles, roof-mounted PV modules, thin film PV glass laminates and PV tiles. PV can be placed on the ground, on pitched or flat roofs, on a

pergola in the garden or even on vertical walls. On horizontal surfaces, such as flat roofs, panels can be frame-mounted to raise them to optimum elevation. PV can be also integrated in roofs, fully replacing roofing materials and provide weatherproofing. Moreover, PV can be placed on or integrated in outdoor lamps to provide electricity for lighting.

The efficiency of PV systems is of course connected with the solar radiation potential of the interested region. Look for a roughly SE to SW facing location (the closer to due south the better). Shading of PV panels severely reduces the amount of energy produced, so it is vital to choose a site that is unshaded for the majority of the time. The total output of a PV system depends on the size and efficiency of the panels.



Source: PURE Project

Solar PV has long remained quite expensive compared to other power generation technologies, but costs have fallen consistently over the last years. Moreover, renewable electricity feed-in tariffs schemes available in each EU country, make PV feasible and cost efficient.

PV panels are very easy to be installed and require minimal maintenance. They are designed for a 25-year working life, with performance even after 30 years being 80% of that when new.



Install photovoltaic systems to cover part of your electricity needs and increase your profits (Source: (AESS) Agenzia per l'energia di Modena)

Small Wind Turbines

Energy from the wind can be harnessed with a wind turbine whenever there is enough wind to move the turbine blades. Wind energy has been used for centuries, but unlike traditional windmills, modern turbines convert wind energy into electricity which can be connected to the grid, or charging batteries in off-grid situations.

If positioned correctly, wind turbines are very effective at producing electricity. Wind turbines have no running costs and apart from annual maintenance checks there are few other on-going costs.

Wind-turbines are usually placed in rural areas with high wind potential in form of wind parks. However, the last year, it is rapidly developed the small wind turbines market. Small wind turbines are much smaller sized and are more suitable for urban areas and building applications.

Depending on the position of the axis where is mounted the rotor, the small wind turbines are classified in horizontal and vertical axis ones. The last years, have been developed and two innovative horizontal axis turbines models, the Energy Ball and WindWall. The Energy Ball model has an innovative rotor construction, six half-circular blades forming a spherical construction, while the in WindWall is the axis is fixed to the roof so that it can catch the wind from just one direction.

Conventional horizontal small wind turbines can be both mounted on the ground and on flat roofs, while vertical and innovative horizontals are mainly dedicated for building applications (roofs).

Usually wind turbines are designed to start running at wind speeds of 3-5 m/s but some can cut-in at lower wind-speeds and particularly small wind turbines usually have lower cut-in speeds.

Planning permission should always be sought for installation of a wind turbine. It is also important to discuss any proposed installation with neighbours.

Practical issues to take into consideration include:

- Ensuring the turbine is sited at an appropriate distance from any buildings, to avoid noise, flicker and any risk of damage to the building;
- Any nearby obstructions that could reduce the wind speed;
- Notification to the electricity distribution network operator, to ensure the installation meets the relevant regulations.



Source: Wineur project



Source: SevernWye Energy Agency

SUSTAINABLE MOBILITY

Make smart “moves” to save money and keep your guests healthy and happy!

Entrepreneurial Sustainable Mobility

Although frequently transport is not part of the core business or a main cost factor in tourism facilities, there are great opportunities to reduce energy consumption and emissions.

Try to encourage cycling in company level by creating safe bicycle parking



facilities, acquiring business bikes for small distance business trips and offering free bicycles to staff members leaving in close distance (<10km).

A more intelligent procurement policy could greatly decrease transport costs. Set high standards on CO₂ emissions and fuel consumption, when buying and selecting new vehicles. If you are buying a passenger vehicle make sure CO₂ emissions are below 120 gr/km and try to focus on a 100 gr/km target. If you are buying a van, set a limit of 200 gr/km.

To achieve low fuel consumption, choose energy efficient vehicles. Hybrid

vehicles has an extra cost of roughly 15-20% but also 15 – 30% less fuel consumption. Electric vehicles are especially adequate for golf courts or for replacing light duty vehicle that work primarily within the borders of the facility.

In case that biofuels (biodiesel, bioethanol or biomethane) are available on local market, consider shifting from fossil fuels to biofuels and getting carbon free. Moreover, in case of diesel engines, consider shifting to LPG and Natural Gas. It can provide a 10% energy saving and up to 30% fuel cost savings.

Guests’ Leisure Travelling

Encourage your guests to use sustainable transport modes and enhance their visiting experience.

Invest in some bicycles for your hotel and make them available for your guests for free or as an extra service. A bicycle for this kind of use can be bought by no more than 300 euros. If you don’t want to invest in this equipment, find a local rental service, ask for some bicycles and share the fees with them in a joint venture.

Organize a good mini-bus transportation system for your guests. Optimize the system by having joint shuttles with neighbouring tourist enterprises and setting routes to main transport hubs not just the airport.

Create a flyer with routes for pedestrians and bicycles for getting to places of interest from your premises. Organize in cooperation with tourist agencies walking or cycling sightseeing and recreational tours. An extra service that will make your guests’ visiting unforgettable!

Create information material on public transport. Add extra personal information according to your visitor profile and do not limit yourself by available maps and schedules. A much more effective way is to include daily public transport tickets in your room rates as an offer to the guests.



IMPROVING ENERGY & TRANSPORT BEHAVIOUR OF USERS

Enhance your staff and guests energy behaviour to minimize energy costs and carbon emissions.

Staff

Staff members' motivation, commitment and involvement are key elements in implementing your sustainable energy strategy. Thus, make sure to engage them early in the process and make them feel that they are part of the company's energy vision. Always inform them about your energy plans and ask for their feedback and suggestions. Moreover, keep them updated about progress and achievements and link energy savings to bonus and/or holidays schemes (extra days off).

Further engage and empower staff members showing them where to look for energy savings and how to achieve them. Organize energy behaviour enhancement/change training seminars

and prepare individual information packages for each staff category (administration, reception, room service, restaurant, technical service etc.).



To encourage a sustainable shift in staff members' mobility behaviour, away from the personal car and towards

clean and energy efficient transport, provide them with information (leaflets, brochures, maps, e-mails etc.) about local public transport and safe walking and cycling routes for coming to work. Moreover, you can offer them free public transport tickets or monthly cards. You can also try to promote car-pools. In other words, to promote arrangements between two or more staff members to travel together in one vehicle towards work.

Furthermore, make sure your employees respect the rules of eco-driving (low speeds, avoidance of unnecessary breaking or accelerations,). Ask for professional training if you think it is necessary.

Guests

Inform your guests about your energy policy and kindly ask them to contribute in your efforts. This way not only you decrease energy consumption, but also improve their perception of comfort and service.

Give information on your energy strategy early in the booking process. Describe your energy plan and achievements on your web-site, and indicate at your offer and/or reservation confirmation that you provide green energy accommodation services. Moreover, include information on how to get to your place and your city using sustainable transport modes.

Up on their arrival briefly describe

your energy policy and how they could contribute to your efforts. Inform them about the renewable and energy saving systems installed at your premises and give them tips for energy saving during their stay (i.e. never open windows/doors when the air-conditioning is turned on, avoid waste of hot water). Furthermore, provide information (leaflets, brochures, maps etc.) about local public transport and safe walking and cycling routes for getting from your premises to the major points of interest, as well as available bike-renting services and guided walking or cycling tours. Include all this information in welcome packages to be handed

during check-in or placed in the room next to the other practical information. Moreover, place certain stickers and



posters at key spots (corridors, guestrooms, elevators etc.) indicating your sustainable energy measures and your accomplishments in decreasing energy consumption and carbon dioxide emissions.

FUNDING OPPORTUNITIES

Enhance your staff and guests energy behaviour to minimize energy costs and carbon emissions.

Take advantage of available funding opportunities to implement your energy plan easier!

There is a great range of financial instruments that the tourist accommodation buildings, located in RELACS partners' countries, could use in order to implement investments in renewable energy and energy saving. These financial instruments can be classified in two (2) categories:

- Instruments that support investments for installation of RES systems and energy saving equipment: incentives, capital grants, subsidies, VAT reduction, tax reductions or exemptions, grants, call for tenders, free or low subsidised interest rate loans, third-party finance.
- Instruments that support operation of systems producing renewable energy and save energy: feed-in tariffs, premium tariffs, tax reduction or tax exemption, white certificates.



	Renewable Energy	Energy Saving
Austria	regional incentives, subsidies	regional incentives
Bulgaria	national incentives, feed-in tariffs	national incentives
Greece	national incentives, tax reduction or exemption	national incentives, tax reduction or exemption
Germany	regional grant	regional grant, low subsidised interest rate loans
Hungary	national incentives, tenders	national incentives
Italy	tax reduction, feed-in tariffs, premium tariffs	white certificate, tax reduction
Portugal	national incentives, VAT reduction, tax reduction or tax exemption, feed-in tariffs	
Spain	national/local incentives, third-party finance	national/regional/local incentives, third-party finance
Sweden	incentives premium tariffs	incentives
UK	feed-in tariffs	interest free loans

Table: financial instruments for tourist accommodation buildings

CERTIFICATION SCHEMES

Visualise your efforts and improve your image!

Apply eco-labelling to capitalize on your energy accomplishments and increase your sales. Eco-labelling is a voluntary approach to environmental performance certification and identifies a product that meets specified performance criteria or standards. EU Eco-label and Green Key are the two widespread environmental performance (energy is included) eco-labels awarded to tourism and leisure establishments and are available in European and global level respectively. Moreover, in some RELACS partners' countries there are national and regional eco-labelling schemes: Viabono in Germany, The Green Hotel award in Hungary, Climahotel and Legambiente in Italy, Green Tourism Business Scheme in United Kingdom. Building certification schemes are also applicable to tourist accommodation. The Energy Performance Building Directive (EPBD), implemented in all EU countries, foresees classification of buildings in an A to G scale based on their energy performance. Moreover, the GreenBuilding Programme (GBP, www.eu-greenbuilding.org), initiated by European Commission, as-



EPBD Building energy certification scale (Source: buildup.eu)

sists and awards non residential buildings that reduce their primary energy consumption by at least 25%. In some RELACS partners' countries there national and regional building energy or environmental certification schemes as well: FEBY Certificate in Sweden, klima:aktiv Gebäudestandard and Total Quality Bauen in Austria. Environmental and energy management systems like

EMAS, ISO14001 and ISO 16001 could also apply to tourist accommodation enterprises. Environmental and energy management systems refer to the management of an organization's environmental or energy programmes in a comprehensive, systematic, planned and documented manner. It includes the organisational structure, planning and resources for developing, implementing

and maintaining policy for environmental protection and energy saving respectively. Hence, after conclusion of energy upgrading works, get an energy inspection in your tourist accommodation buildings and try to apply an eco-labelling or energy certification systems. Place the performance label or certificate in the entrance hall to share your achievements with your guests.

RELACS NETWORK

**Do want to become a green tourist accommodation enterprise or even better are you already a green one?
If so join RELACS Network and enjoy free advertisement and free energy consultation services!**

The RELACS Network is a European Network of Tourist Accommodation Buildings dedicated to reduce environmental impact of tourism. It currently runs over ten (10) European Countries: Austria, Bulgaria, Germany, Greece, Hungary, Italy, Portugal, Spain, Sweden and United Kingdom.

Owners/directors of hotels (or any other type of accommodations) wishing to join the RELACS network should commit to meet at least one of the following criterion within each of the 4 crucial RELACS areas (therefore at least 4 criteria over the 10 identified):



The most motivated new members of the network (at least 10 per region partner) will then get free services such as:

- building energy audits,
- feasibility studies for RES,
- training, to employees and to managers
- technical assistance

In order to get and display the RELACS logo, accommodations should reach (approximately in 1 year time) the 25% energy saving goal, through the implementation of some of the measures listed within the RELACS criteria.

Finally, those accommodations reaching the best energy results will be candidates to be awarded with a national as well as European prize delivered in Brussels.

Energy Consumption:
1. Documentation of monthly energy usage
2. Annual evaluation of documented energy usage data
3. Aim to reduce energy consumption by 25%
Creating Awareness:
1. Staff training
2. Information for guests
Investment in building improvements:
1. Rational Use of Energy (energy saving)
2. Renewable Energy Sources
Sustainable Resource Management:
1. Input (use of sustainable /regional products, water saving systems)
2. Output (waste avoidance, separation, recycling, water treatment)
3. "Sustainable Transport" (public transport, non-motorized traffic, call & collect, mobility management)

For joining the network, fill in the template available online <http://www.relacs.eu/join.php> or download it and send it by fax to the number.....!

We hope that the information contained in this Guide will help small and medium sized hotels, B&B and in general all accommodation providers, to see the benefits of investing their limited time and money in reducing energy costs, and encourage them to take up energy saving and renewable energy investments. Therefore we wish that this Guide is a useful starting point to get involved in a greener business for the good of the environment and your own benefit.

To learn more about the RELACS Project, at the framework of which this Guide was elaborated, please visit the web site www.relacs.eu

www.relacs.eu

This publication is developed in the course of the IEE Project “RELACS Renewable Energies for tourist accommodation buildings”, AGREEMENT n° IEE/09/894/SI2.558309



The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.