Suitable GHG reduction measures for Cypriot and Greek hotel industry

Structural characteristics, energy and GHG emissions performance indicators

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On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

European
Climate Initiative
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Aim of the report

This report identifies 21 measures in seven categories, classified according to on three criteria:

- Investment cost.
- Energy and GHG emission savings
- Payback period

These criteria are defined as low, medium and high. Calculation of Payback period or return on investment numeric is important to be calculated before any investment.

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Classification of measures

Investment	<10.000 €	10.000-50.000 €	>50.000 €
Energy & GHG savings	<15%	15-35%	>35%
Payback Time	<2.5 years	2.5-7.5 years	>7.5 years

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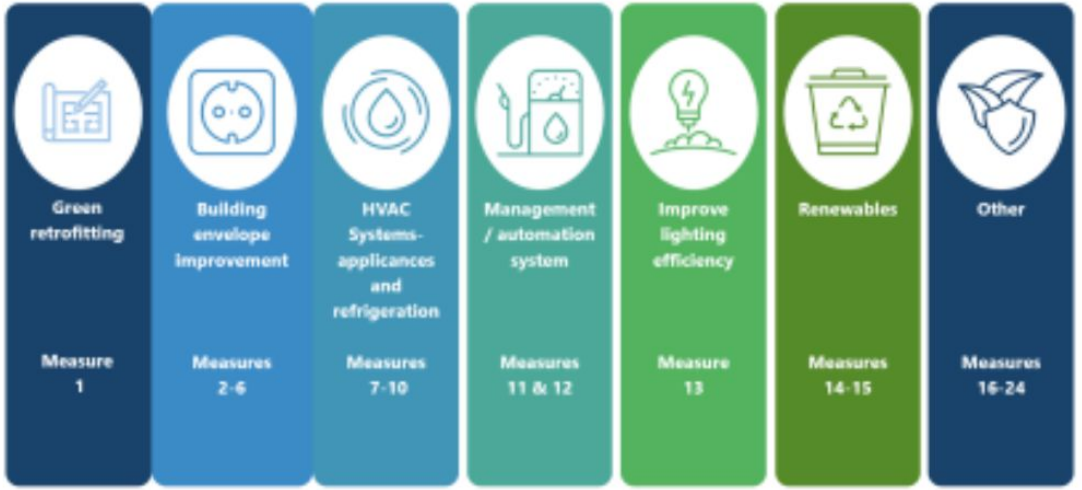
Presentation of suitable GHG reduction measures for Cypriot and Greek hotel industry



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Measure 1 - Green design / retrofitting

New EE requirements came into force on 1st July 2020, including specific requirements for hotels.

The new hotel buildings should consume a maximum of 220 kWh/m2/yr and the minimum RES contribution to the primary energy consumption should be at least 9%.

Moreover, according to the Law 31(I)/2009, it is mandatory for non-SMEs, including hotels, to undergo an energy audit every 4 years.

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Measure 1 - Green design / retrofitting

In terms of new designs and retrofitting the following parameters should be taken into consideration:

- Orientation of the building
- Microclimate and vegetation
- Openings and orientation of openings (solar gains, natural ventilation and natural lighting)
- Installation of passive systems like mass wall and Trombe walls etc
- Solar protection
- Building envelope design and Um calculations
- Mechanical systems, hot water production, HVAC, mechanical ventilation
- Onsite Renewable energy systems
- Lighting efficiency
- Systems management

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Measure 2 - Shading Installation

Shading systems can have a major impact on the buildings energy requirements, as lower operation time and reduced load of the cooling systems can be achieved.

There are various shadings options, with the most common being:

- Fixed shading (horizontal and vertical);
- External shading with removable shutter;
- External shading with removable rolling blind (translucent);
- External shading with removable rolling blind (opaque).
- Linen covering / curtains, usually called as black outs.
- Awnings that could prevent the panoramic view from being blocked in hotels while still shading windows.

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Measure 3 - Energy efficiency frames and double-glazed windows

Energy efficient windows are made of two or three glass panes sealed in a single unit, surrounded by a frame made from Unplasticized Polyvinyl Chloride (uPVC), wood, or another material.

- double-glazed windows have two sheets of glass with a gap in between, usually about 16mm;
- triple-glazed windows have three sheets of glass, and two gaps. This can make them better at insulating than many double-glazed windows and that is why it is recommended;
- The gaps between the glass panes are filled with air, or an inert gas such as argon. The air or gas is completely sealed.

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Measure 4 - Thermal insulation of the building envelope

Thermal insulation acts as a **"protective layer"** for the building, which reduces heat transfer to and from the interior. Thermal insulation reduces the heat loss to the outside during the winter months, while the heat flow in the building is reduced during the summer months.

The greatest heat loss in a building usually comes from the roof of the building.By only insulating the roof of the building, the percentage of the total estimated energy savings amounts to about 40% per year, as the needs for space heating and cooling are significantly reduced.

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Measure 4 - Thermal insulation of the building envelope

For the selection of the most efficient envelope thermal insulation, a number of factors must be taken into consideration , such as:

- the existing waterproofing situation of the building,
- the climatic zone of its location
- its use and of course the variety of the specialized thermal insulation materials available

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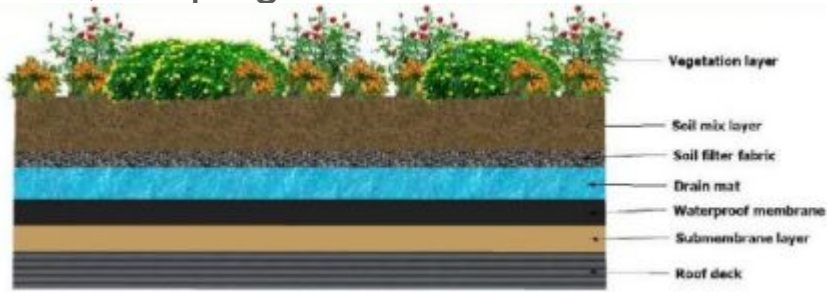
Measure 5 -Green facade and green roof

A “green façade” refers to a vertical structure where climbing or hanging plants are directly or indirectly supported to grow up or down the structure.

“Green roof” refers to vegetated landscapes that are installed on a roof surface in a loose-laid or modular format.A green roof could reduce annual building energy consumption by enhancing the roof insulation properties.

“Green wall” refers to a vertical structure that is normally fitted with modular, pre-planted panels containing wall-bound vegetation. Vertical green protects a building against the heat of the sun in the summer, keeping it cooler.



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Measure 6 - Heat rejection films

The installation of sunscreens/films on the windows, are usually recommended for those with south, east and west orientation. These films prevent excessive sunlight to enter the building and consequently, the indoor temperature is not increased. It should also be taken into account that these films can likewise reduce light levels

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Measure 7 - Heat pumps

Air-to-water heat pumps transfer the low temperature heat of the environment to high temperature heat for hot water application.

The advantage of these systems is that the transfer needs less energy than the production of heat.

Heat pumps can replace electrical heating rods. They can save up to 75% of electrical energy.

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Measure 8 - Energy labelling

The energy label indicates that a product is graded on an A+++ to G scale depending on its energy consumption, with the A+++ class representing a product with a high energy efficiency rating.

The new energy label is applied from March 1, 2021 and concerns products such as dishwashers, washing machines, washer-dryers, refrigerators and electronic screens (TVs). From September 1, 2021, the new energy label is also applied to light bulbs.

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Measure 9 - Energy saving in refrigeration

Energy management for refrigerators should include:

- Insulation improvements
- Defrost control
- High efficiency fans and compressor
- Lightning
- Central system technologies
- E-Cube temperature
- Intercharger to reduce purge water losses in ice machines

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Measure 9 - Energy saving in refrigeration

Hotels should manage the F-gases they apply by trying to focus to the following strategies

1. Reducing the demand/use of appliances and consequently the production of refrigerants by decreasing leaks through better management practices.
2. Replacing refrigerants with friendly alternatives for all the new installations
3. By increasing the cooling efficiency of appliances, the use of refrigerants is also reduced
4. Ensuring recovery, reclaiming/recycling, and destruction of refrigerants at end of their life cycle.

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Measure 10 - Heat recovery

Heat recovery in central air conditioning units

Heat recovery technology can make use of the waste heat to get hot water, providing it to the hotel and have a better understanding of the importance of heat wastage and its utilization or use.

Drain Water Heat Recovery

A water heat recovery device installed under a shower tray or a bathtub can recover energy from the warm water heading down the drain. The heat is transferred to the cold water mains before arriving to the shower tap mixer. The cold water reaches the mixer tap that has already been preheated thus requiring less hot water to reach the ideal temperature

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Measure 10 - Heat recovery

Heat Pipe technology

Heat pipes are thermal transfer devices capable of transferring heat and energy several hundred times faster than conventional methods. By using this type of technology can recover up to 70% of the heat energy.

Steam Energy Recovery

Energy recovery technology is attracting an increasing amount of investment and the global energy recovery devices market is estimated to witness a considerable growth for the forecast period 2015 to 2025.

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Measure 11 - Building / Energy management system (BMS/EMS)

A building management system (BMS), otherwise known as a building automation system (BAS), is a computer-based system that controls and monitors the building's mechanical and electrical equipment.

The EU legislation requires the following: “Member States shall lay down the necessary requirements in order to ensure that, where technically and economically feasible, non-residential buildings with effective rated capacity for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air conditioning and ventilation of over 290kW being equipped with building automation and control systems by 2025.”

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Measure 12 - KNX systems

KNX is an open standard (see EN 50090, ISO/IEC 14543) for commercial and domestic building automation. KNX devices can handle lighting, blinds and shutters, HVAC, security systems, energy management, audio video, white goods, displays, remote control, etc.

KNX evolved from three earlier standards; the European Home Systems Protocol (EHS), BatiBUS, and the European Installation Bus (EIB or Instabus).

KNX is ideally suited to fulfilling the tightened energy consumption requirements for buildings allowing up to 50 % energy savings.

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Measure 13 - Improve lightning efficiency

In order to reduce the energy consumption for lighting between 10% to 80% depending on the percentage of LED lights already installed in your accommodation:

- Replace incandescent or halogen bulbs and T12 fluorescent tubes with newer type LED lamps and T5 tubes; savings in electricity consumption from lighting could reach 70%.
- Install lighting controls connected to high end centralized systems, such as BMS or KNX47.
- Install light, motion sensors and timers in appropriate locations.
- Install occupancy sensors or a master light switch in every guest room.
- Install a magnetic or key-card power switch in every room.

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Measure 14 - Install Photovoltaics (PV) on site

PV is a mature, commercially available renewable energy technology. The arrays convert sunlight to electricity without producing air pollution or greenhouse gases (GHG). They require very little maintenance, make no noise, and can be mounted on various types of buildings and structures.

The energy saving potential is high. The energy production per kW of installed PV system is about 1.600 kWh/kW. The GHG emission saving potential is also very high as electricity production by RES has no emissions.

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Measure 15 - Install solar water heaters and solar thermal systems

Hotels that combine the main DHW heating system with solar thermal panels have significantly lower energy consumption per guest-night for DHW. The energy saving for DHW production that can be achieved is between 30-40%.

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Measure 16 - Voltage optimization system

Voltage optimization is a transformer-based technology that stabilizes and optimizes the incoming current grid voltage to return.

This technology is crucial in islands or areas where the electricity is not stable.

The basic principle of this technology is, supplying an optimized voltage level more suitable to the actual electrical device in order for it to perform its task more efficiently and in accordance with limits of European harmonized voltage while basic design is a low loss series connected transformer designed to optimize a whole site or individual loads to target the most optimized loads (overvoltage).

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Measure 17 - Soft mobility - E-mobility (E-bikes, E-cars)

Soft mobility can be described as an environmentally friendly mode of transportation, including the electromobility, like electric cars/bikes. Soft mobility is on the rise and presents multiple benefits with the most important being the improvement of physical health and the reduction of GHG emissions.

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Measure 18 - Water saving devices

There are several devices that can be easily installed at low cost. The list below presents the water devices that are widely available in the market.

- Low flow showers
- Shower timers
- Shower flow restrictors
- Low flow toilets
- Dual flush converters
- Tank bags
- Faucet aerators
- Motion sensor faucets
- Rainwater tanks
- Greywater diverters
- Rainfall shutoff devices (for outdoor irrigation)
- Soaker hoses (for outdoor irrigation).

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Measure 19 - Energy sensors, occupied sensors and timers

Occupancy and vacancy sensors are devices that detect when a space is unoccupied and therefore automatically turn OFF (or dim) the lights, thus saving energy. The device may also turn the lights ON automatically upon detecting the presence of people, providing convenience and a potential security aid.

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Measure 20 - Smart metering

Smart meters will allow users to receive real time data and evaluate them as well as they can provide much more information when compared with traditional meters, allowing consumers to be well informed about their consumption.

Greece is expecting to start installing smart meters by 2022. In Cyprus the project to install smart meters in all electricity meters is planned to be completed by 2027 according to Cypriot energy regulatory authority.

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Measure 21 - Departemental good practices

The following is a list of various hotel operating departments that can be implemented by all hotel businesses at no cost and create significant environmental, energy and financial benefits.

- Guests rooms
- Laundry
- Restaurants / Bar
- Kitchen
- Conference rooms
- Gym and spa management
- Office and information technologies (IT)
- Lobby and reception
- Technical department
- Preventative maintenance

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Measure 22 - Employees training

Trainings can help employees to understand energy and GHG targets as well as their contribution to each department, as the results of the above can benefit not only the environmental but also the local community.

It is necessary to include a simple, concise narrative about the hotel's energy strategy and goals in the basic staff training. Thereafter, additional training sessions, focused on the specific role and position of each employee, can be offered.

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Measure 23 - Waste management

Reuse and Recycle Cardboard Boxes: Save almost 4 tons of CO2 for every ton of corrugated cardboard boxes kept from entering the landfill.

Recycle Plastic Film: Avoid the upstream energy necessary to produce one ton of new product saves about 2 tons of CO2 annually.

Recycle Paper: The amount of energy and materials it takes to make a ton of office paper is reduced by 4.3 tons of CO2 when recycling paper.

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Measure 24 - Beach cleaning and volunteering

Each hotel should undertake and promote voluntary environmental activities through various ways of raising awareness and engaging both guests and personnel.

Cleaning a beach is essentially a volunteer activity among concerned citizens that takes place on a regular basis along various coastlines around the world.

Cleaning the beach also improves the coastal and ocean ecosystem by making sure that none of the trash kills the marine life or is too toxic to disrupt the marine life cycle.

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Thank you very much for attending

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