



Renewable Energy Solutions

Solar thermal energy – Solar COMBI + systems

1. General Information

The demand for air conditioning in the hotel sector is increasing due to a demand for improved comfort, but also because of the higher temperatures that have occurred during the last decade. Solar Combi Plus systems can supply energy for solar cooling, and combined solar space heating-cooling and domestic hot water systems.



How does a solar combi plus system work?

Solar combi plus systems use heat from solar thermal collectors to provide heating in winter, cooling in summer and domestic hot water all the year round. A solar combi plus installation consists of a typical solar thermal system made up of solar collectors, storage tank, control unit, pipes and pumps and a thermally driven cooling machine.

- Coincidence of solar gains and cooling loads
- Reduce Electric Peak loads created by air-conditioning
- High use of solar gains during the entire year
- Reduce summer surplus solar gains in solar systems designed for heating application (solar combi systems).

How well developed are thermally driven cooling machines?

As strange as this may sound, thermal powered air conditioning is a well-established technology used for decades in air conditioning for office buildings, hotels, hospitals, and many other applications. All components of a solar combi plus system are now market available.

Is there enough sun in my region to install a solar combi plus system?

A solar combi plus system can be installed anywhere in Europe; just the size of the solar system must be changed to achieve enough solar yield. There is a large potential, in particular in Mediterranean countries.

What can my hotel use a solar combi plus system for?

Solar combi plus systems can cover all hotel building thermal demands (domestic hot water, space heating and cooling), this can lead to better annual utilization of the solar collector field, resulting in higher solar fractions and more economical systems.

Do the solar combi plus systems still operate when it's cloudy?

On a cloudy day when there is little or no direct sunlight, there is still solar radiation sufficiently enough to be usefully collected by solar collectors. While the highest amounts of monthly solar radiation are obviously experienced in the summer months, there is enough radiation coming from the sun in spring, autumn and winter to make a very useful contribution to your hotel's energy needs for both space heating and domestic hot water.





And if the sun isn't shining, will I only have cold water and no space heating or cooling in my hotel?

No. Storage tanks can hold cold water (for cooling) or hot water (for space heating and domestic hot water). The tanks hold the cold/hot water produced until it is required for air/conditioning or space heating and ensures that the solar combi system covers the demand for domestic hot water, space heating and cooling even when there is not enough sunlight. All hot water tanks for solar combi plus system have a backup water heater (e.g., electricity, oil, pellets or natural gas), so there is always hot water when needed.

Where do I mount the solar collectors in my hotel?

Solar collectors are most of the times installed either on the roof of your hotel, or on a freestanding installation in your hotel yard. There are also facade collectors or installations for balconies.

When choosing a location for the installation the primary consideration should be the amount of sun exposure the collectors will get. For maximum daily output the collectors should face due south, be in the direct sun (no shading at all), and be mounted at an angle to the sun that will maximize their performance. A certified installer will be able to advise you on the best way to integrate a system into the space available in your hotel.

How many collectors do I need for my hotel?

The number of solar collectors you'll need for your hotel will depend on the number of guestrooms, the heating/cooling demand, the amount of water used, your local climate and the location of the collectors (whether they're facing south or in a shaded area). For an accurate assessment of how many collectors your hotel needs consult a qualified installer for specific size and model specifications.

Do I need any planning permissions in order to install a solar combi system?

Most solar collectors generally not require permission. Nevertheless, it is worth checking with your local administration or authorities to find out about any local laws that may restrict solar collector placement, especially if you live in a listed building or conservation area.

Also solar obligations have now been adopted in Spain for example, where the new Spanish Technical Buildings Code (CTE Código Técnico de la Edificación) was adopted in March 2006, and its solar thermal section came into force in September 2006 where an obligation to provide 30-70% of the domestic hot water demand with solar thermal energy has to be complied with. This applies to all new hotel buildings as well as those undergoing major refurbishment.

How much does it cost to install a solar combi plus system, and how much can my hotel save?

The cost varies based on the size of a system, and how it fits into your hotel existing plumbing. You may find cheap and efficient solar hot water systems for warm regions (thermosyphon systems), but more complex systems for colder regions (with vacuum tube collectors, pumps, heat exchangers, antifreeze mixtures, controls...).

Total savings depend on the amount of hot water and the type of fuel your hotel uses to heat water. Savings are the greatest for electricity users, and less for natural gas users. Typically in Europe, solar hot water systems are sized to provide approximately 50-70 percent of the heating load per year. On sunny summer days the system may provide nearly 100 percent of the heat required, while during extended cloudy periods, the output may drop to 20-30 percent. A certified installer will be able to estimate the output of the solar hot water system and to give you a general cost/saving estimate for the system.





What is the lifetime of a solar combi plus system?

Well maintained systems will usually last over 20 years so they should pay for themselves many times over in energy savings.

How much maintenance does a solar combi plus system need?

A solar combi plus system is almost maintenance-free. However, the system should be checked periodically by a qualified service technician. Every three years the solar system should be tested to make sure it is frost-proof. The circulating pump, the tank, the non-toxic antifreeze mixture and other minor components are subject to wear and tear and may need to be replaced eventually. The thermally driven cooling machines will need also a special maintenance plan.

What is the payback time of a solar combi plus system?

The payback time for solar combi plus systems can be relatively short. In very favorable cases (closely related to good solar radiation). Average paybacks of 10 years are common.

Climate is important when calculating the payback of an investment in a solar combi plus system, since it also determines the type of collectors, system, needs, etc



To minimize payback period and maximize savings you need to aim for the biggest possible running capacity for the minimal possible investment in solar collectors. Installers should be able to work out the optimal size and type needed in respect to your hotel hot water, space heating and cooling needs and usage.

How can I finance a solar combi plus system?

You may fund your renewable energy system in several ways. Many financial incentives which can benefit your hotel are available for example. However, these have not been used to their maximum potential. Incentives can save you in some cases more than 50% of the cost of your solar combi plus system. Check for national incentives and don't forget that your local utility company or other local organization may also provide additional support. There also banks promoting the use of solar hot water systems by granting long-term, low interest loans.

Visit www.iea.org/country/index.asp under 'related country and regional information' for more information about available incentives in your country (available for IEA member countries only)



Who can help me with the paperwork for applying to receive financial incentives?

Installation companies are more and more taking over of the application paperwork to receive an incentive. Local energy agencies may also help you.



Should my hotel receive an energy audit?

Definitively yes. Doing an energy audit before investing in a solar combi plus system is in your best interest, because it will help make the existing system as efficient as possible and will lower your energy consumption and monthly energy bills. By reducing your hot water, space heating and cooling demand you will need to pay much less for a solar combi plus system that's capable of meeting your lowered-new hot water, heating and cooling demand.

You can improve the performance of your solar combi plus system and reduce the energy requirements of your hotel by for example:

- Installing low-flow showerheads and faucets
- Installing body shaped bathtubs
- Installing new more efficient water pumps
- Insulating all hot water pipes
- Installing ozone laundry systems
- Insulating your hotel building
- Insulating your hotel windows

- Preventing air infiltration and unnecessary outdoor air supply
- Installing automatic control systems to switch Heating/cooling systems on and off in guestrooms
- Installing a good thermal insulation around boilers, water systems, domestic hot /cold water tanks and water pipes

Who can install a solar combi plus system for my hotel?

A qualified installer or an Energy Service Company (ESCO). Installers will estimate the overall cost, and will also inform your hotel about rebates and incentives for which you may qualify.

What is an ESCO?

An Energy Service Company (ESCO) reduce the hotel energy costs, by taking care of the investments involved of installing a solar combi plus system and sharing the resulting future cost savings with you by letting the ESCO install the system in your hotel.

Follow the next steps to make your solar combi plus system a reality:

- Learn as much as you can about solar combi plus systems before you make a decision.
- Schedule an on-site energy audit
- Call an installer and obtain estimates
- Check zoning, permit and utility requirements, insurance, and other legalities
- Look for financing options
- Install and learn how to safely maintain your system



 If you want more detailed information about the solar combi system please click here!

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