

Crowne Plaza Copenhagen Towers

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Background

In recent years, rising sea levels and rocketing amount of carbon dioxide levels in the world have put sustainability at the forefront of many policy and business decisions. Europe, in particular, has put itself at the vanguard of the fight against global warming. Initiatives such as the EU Green Building Program have constantly encouraged the commercial sector to cut down on energy consumption. One particular industry, tourism, has accepted the challenge on full throttle. The race to build the most eco-friendly hotel in the world has resulted in a vast pool of innovative technologies.

In America, each one of our approximately 47,000 hotels spends an average of \$2,196 per available room on energy, representing 6% of operating costs. The US Department of Energy estimates that decreasing energy consumption by 10 percent can be equivalent to that of increasing the daily room rate by \$0.62 in limited-service hotels and by \$1.35 in full-service hotels. While \$2,196 may not seem like such a large number, the entire world houses more than 5.9 million hotel rooms, with many unlisted and over half of them in Europe. In addition, hotels account for one of the highest expenditures in the tourism industry. With tourism growing faster than ever due to the increased ease in transportation, incorporating sustainability into the hospitality industry can both spread the message of energy conservation to the public and decrease our carbon footprint.

Goal

The Crowne Plaza Copenhagen Towers wanted to create the most sustainable solutions for its hotel without compromising the quality, comfort, safety and the experience of luxury at the hotel.



Progress?

Location

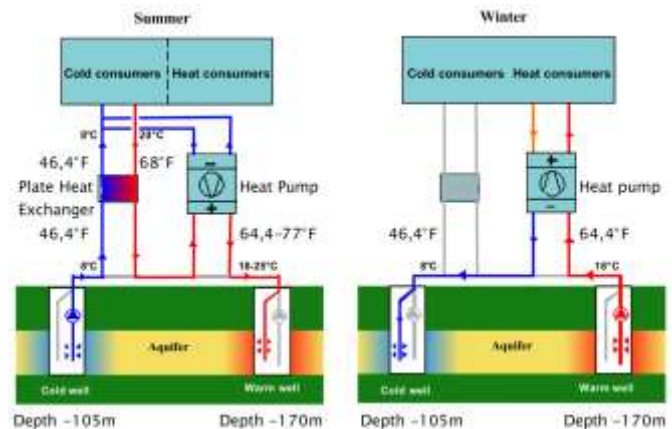
So far, it is on its way to exceed such expectations. The 85 meter tall Crowne Plaza Copenhagen Towers is located at the heart of Copenhagen, Denmark.

- Across the street are shopping malls and store markets that limit the amount that guests have to travel to enjoy the amenities of cities.
- The nearby train station encourages both staff and guests to use public transportation to decrease the carbon impact left by cars in the city.
- While the lack of restaurants nearby may seem dismal to many guests and reduce the comfort level, it urges the guests to eat inside the hotel, which utilizes locally grown organic food within a radius of 300 kilometers.

Green Features – Aquifer Thermal Energy Storage

Opened in 2009, Copenhagen Towers has installed Denmark's first ever groundwater-based cooling and heating system. Known as the Aquifer Thermal Energy Storage (ATES), it utilizes the cold groundwater for cooling during the summer and stores the ejected heat for heating during the winter. During the summer, groundwater from an 8°C well circulates through an exchanger that cools the water in the hotel's hydronic air-conditioning system. Once the loop finishes, the groundwater is heated to approximately 16°C and returned to a warm well located further away. The flow of the warm groundwater is reversed during the winter season. An ammonia chiller and heat pump is located nearby to handle peak loads between 50-100%. The entire system actually only occupies 8x10

meters of space. The three cold water well and three hot water wells are located in the building's basement at depth of 110 meters. With this system in place, the hotel's total annual energy consumption for heating, air-conditioning, hot water and ventilation only amounts to 51 kWh per



square meter, a 90% reduction compared to conventional heating and cooling.

While the ATES system holds the crown in Copenhagen Tower's energy saving, it could also have potential for causing the most environmental degradation. The excessive warming and cooling of the aquifer over long periods of time can lead to system inefficiency if the waste heater is not properly removed at a later time. To achieve thermal balance, the excess heat is removed by using a back-up cooling tower. With a payback period of 6 years, the system will not only save energy for the future but also have a high return on investment.

Green Features – Solar Panel Park

In addition to the first ever groundwater-based HVAC system in Denmark, the hotel has also installed the largest privately owned Solar Panel Park in the country. Ultra-thin solar panels cover all facades exposed to sunlight,



generating more than 200,000 kWh per year, enough to supply 65 Danish family houses. While this only comprises of 15% of the hotels' annual power consumption, the rest do not stray far from clean sources; the other 85% are produced by energy generated from wind turbines.

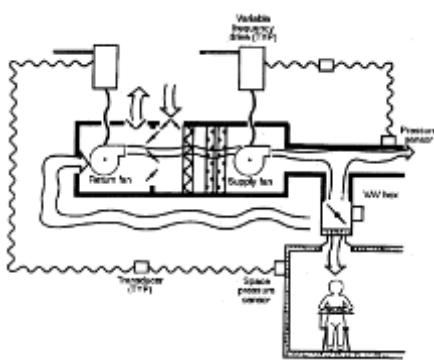
Green Features – Electricity Generating Bikes



One of the most innovative environmentally friendly features to generate energy does not come from the hotel, but rather from the guests themselves. Exercise bikes are hooked up to generators that can produce 10 watt-hours of electricity upon pedaling for 15 minutes. Generating certain amounts of electricity can even count towards points for a free meal in the hotel restaurant. The bikes also include attached iPhones that display the amount of power being generated. "The bikes invite the guests to move in new ways that benefits their personal

health and wellbeing as well as the environment at large. The guests literally provide the energy in the hotel. On one hand, the biking might represents a symbolic sustainable act. Yet on the other it also presents that the socio-eco-awareness now also apply for the service sector,” says Crowne Plaza manager Allan Agerholm.

Green Feature – Variable Air Volume



The Variable Air Volume (VAV) valves, linked up to central computers for controlling the hotel’s entire HVAC system, ensure that all the rooms are electronically cooled, heated and ventilated to match the individual load. For example, a room receiving much sunlight for the majority of the year contains higher cooling load compared to a room hidden in the shade. Furthermore, a huge conference with hundreds of people may require higher load compared to an empty space. The mechanism through which it functions is simply a box that can constrict a valve to decrease the amount of air passing through, which reduces the energy needed by fans to direct the air throughout the building. As the advancement in technology flourished during the 21st century, current boxes are equipped with control systems that have small pressure sensor detectors, opening and closing doors to manipulate airflow. This innovative technology is in fact currently used by many commercial buildings around the world. As air conditioning constitutes a major part of energy consumption in hotels, expansion of such energy efficient investment should be and can easily be implemented to other hotels.

Green Features – Others

Through an email correspondence with the hotel’s Corporate Social Responsibility Manager Mireille Jakobsen, she states that the guests “literally get to feel the green profile of the hotel.”

- Smart sensors for lightings equip every corridor and stairway to ensure minimum energy usage.
- Shampoo bottles and tooth brushes are made from corn and potato starch that emulate the properties of plastic but without the carbon footprint. After three months, the biodegradable products will simply dissolve if buried in dirt.
- Instead of paper information sheets, an interactive TV system delivers everything the guests need to know.
- In the kitchen, all the foods are bought from organic and locally grown farms to reduce environmental impact. Energy efficient dishwashers lie in all the rooms while heat waste is minimized through installation of induction technology.
- The wastes are emptied into tanks that get transported to nearby bio-gas plants, which used the processed good to fertilize farm land.
- The furniture upon which the guests relax on is made from 40% recyclable materials.

With sustainability high in the priority list, practically every detail such as LED lighting, IT infrastructure and even the restroom's hairdryers are energy efficient.

Goal Achieved?

From the outside, this shiny, black façade with standard rectangular building design reveals nothing of the hidden gems inside. It juxtaposes comfort, service, and most importantly sustainability in the perfect balance to provide its guest with a luxurious and environmentally friendly stay. The hotel is the first hotel in Denmark to have joined UN's Global Compact and meet the standards of the EU Green Programme.

- Features such as intelligent light control, LED flat screens, solar panels, aquifer thermal energy storage systems, and even exercise bikes that generate electricity are all part of the innovative technologies that have helped the hotel save an estimated amount of 1,373 tons of CO₂ per year.

- The hotel has reduced energy consumption to 42,6 kWh/year which is approximately a 53% reduction.
- The conference facilities have also decreased energy consumption to 65,2 kWh/year, which is approximately a 32% reduction.
- The Copenhagen Towers has also achieved carbon neutrality though getting energy from 100% renewable sources such as wind and solar.

Last year, it was the Winner of the European Sustainability Award at the European Hotel Design Awards 2010. Additionally, it won the coveted “World’s Greenest Hotel” in 2010 as well, an EcoTourism Award given out by Skål International.

There is no doubt that on the sustainability front, the Crowne Plaza Copenhagen Towers has achieved its goal. On the comfort and luxury front, there may be some setbacks:

- The lack of easily accessible restaurants creates a challenge for guests who do not wish to dine at the hotel every day.
- Completely electronic information access through the use of an interactive TV can be challenging and discomforting for those not born during the technology age or who prefer paper materials
- The Aquafer Thermal Energy Storage system could potentially cause ground aquifers to warm if not controlled properly.

Overcoming these challenges as well as continuously improving its sustainability goal will help the Crowne Plaza Copenhagen Hotel, as well as Denmark, and all of the world see that energy conservation and carbon neutrality is possible without costing quality, comfort, service, and safety for buildings.

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