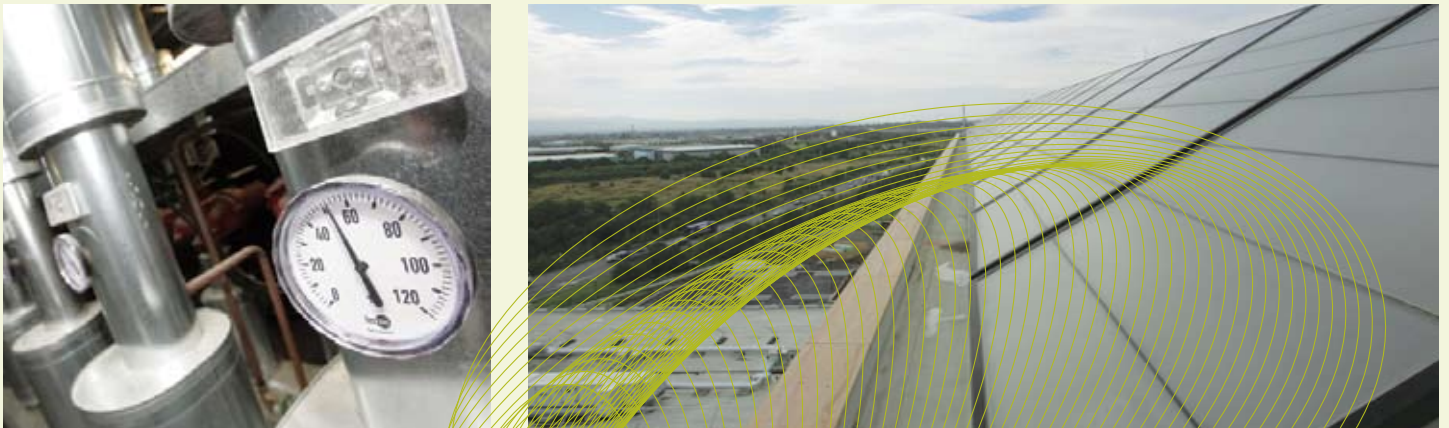


Bewleys Hotel Dublin Airport

SOLAR THERMAL SYSTEM INSTALLATION



Introduction

Bewleys Hotels is a small family-owned group with four hotels in Dublin and two in the UK. Each hotel is built to a four-star specification, with sites chosen in gateway locations, including three on the M50 in Dublin, one in Dublin city centre, one in the terminal at Manchester airport, and one close to Leeds city centre. Since opening their first hotel in May 1996, Bewleys Hotels have been keen to take advantage of new technologies. The 500-bedroom Bewleys Hotel Dublin Airport is located just 2.5 km away from the airport. The hotels' primary business is bedroom sales, however small meeting rooms, a restaurant and bar/lounge are also provided.

Building Design Principles

The Bewley's Hotel at Dublin Airport was a new addition to the Bewley's Hotel Group and first opened its doors in June 2006. From the outset of the hotel design, the group sought to address energy management and include sustainable energy systems.

In the design stages estimates indicated that energy consumption for hot water, for baths, showers, kitchen etc, would constitute approximately 50% of the hotel's total energy use. This led the hotel to examine methods of lowering the impact of the hotel's hot water production on both energy costs and the environment. The solution considered most feasible was the installation of solar collectors.

The largest part of the Bewley's Hotel project is the installation of 56 solar panels or 308m² of collector area on the roof of the hotel. Along with the solar collectors, the hotel invested €800,000 into incorporating numerous other energy saving features to reduce overall energy use. These features include:

- Multi-glazed windows to improve thermal insulation and soundproofing.
- High efficiency condensing boilers.
- Insulation levels in excess of the building regulation requirements.

- Building Energy Management System to control all heating and hot water systems.
- Energy consumption is automatically reduced in unlet rooms.
- Energy efficient lighting is installed throughout the hotel.
- Frequency-controlled pumps in the heating system which adapt the water flow to water consumption, and so reduce energy consumption.
- The hotel's electricity is produced on a wind farm with 42 MW capacity, which belongs to the group of companies.

Bewley's Hotel, Dublin Airport, received part funding from SEI for the solar collectors and the energy saving features in the hotel.

Technology Principles

Solar thermal systems utilise solar radiation collected via panels to provide hot water. The panels, also known as collectors, are fitted to a building's roof and use the sun's heat to warm water, or another fluid, which passes through the panel. The fluid is then fed to a heat store e.g. a hot water tank and helps provide hot water for direct use or for the building's central heating system. Solar panels work

throughout daylight hours, even if the sky is overcast and there is no direct sunshine (although the energy absorbed is less in these conditions), which means they can make a useful contribution even during the winter by pre-heating the water in the storage tank. Generally systems work in conjunction with boilers to boost the water to the desired temperature. The technology is among the most advanced renewable energy technologies to be used in the built environment. Though a relatively new development in Ireland, in most EU countries it is now becoming a mainstream application. This growing interest is due to the fact that solar water heating has very low running costs once installed. With the drive to find more effective renewable heating systems, and with increases in current and predicted energy prices, an increase is likely in the numbers of solar thermal applications. In the Irish climate, typical solar contributions to water heating systems can range between 30% and 60%, and can have paybacks in the region of 6-10 years, depending on the application.

Project Development and Operation

The installation of a solar water heating system in the Bewley's Dublin Airport Hotel took place during construction of the building in 2005/2006. The system comprises 308 m² of solar collectors and two 5,000 litre storage cylinders. The estimated cost of the solar system was €210,000, approximately 25% of this was obtained from SEI for the purchase and installation of the solar panels.

Based on hot water consumption in other hotels in the group, an estimate was made for the daily demand for hot water (15° – 65°C) in the hotel.

Utility	Hot Water for Baths, Showers and Kitchen
Hot Water Demand	22,000 litres per day

Based on the Irish climate and the maximum contribution from solar energy, it was estimated that operating at optimal conditions, the solar system could provide approximately 40% of the hotels hot water requirements.

The Bewley's hotel building at Dublin Airport faces slightly east of pure south. As the effect on performance was minimal, the solar collectors were oriented parallel to the façade of the building and not directly south, for visual reasons. The solar collectors are located on the roof of the 7th storey, while the storage cylinders, which are well insulated, are located in the basement adjacent to the main boiler system. Highly insulated pipes run from the solar collectors to the storage cylinders. The roof was of a design sufficient to support the weight of the collectors and supports. The collectors are also mounted on a steel frame support designed to meet wind loads at that height and location. The solar panel system pre-heats water for three 5,000 litre indirect gas heated cylinders which provide hot water for the hotel at all times.

The solar panel system at Bewley's contains innovative design features including the drain-back system. There are a number of advantages to this system including:

- no additives are needed
- inherent safety in the event of overheating or power failures
- minimum maintenance levels are required
- the performance compares well with other installations
- system durability is increased
- the lifetime of the solar system is extended to more than 30 years

Once installed, the solar system is clean, fully automated in operation and requires low levels of maintenance. The solar system interacts with the building management system and gas heaters to ensure that the hotel has a sufficient supply of hot water at all times.

Economic and Environmental benefits

By filling the collector circuit with water, saving costly chemicals, and by minimising the need for maintenance, the cost is reduced, while performance is kept high (by maximising heat transfer). As a renewable energy technology, the solar system also benefits the environment through 46 tonnes of CO₂ emissions avoided per annum. It is estimated that the solar system is saving Bewley's hotel €15,000 per year in energy costs for hot water heating.

Clio O'Gara, Brand Manager of BewleysHotels.com commenting on the solar thermal system:

Heat Supply

"Our solar system is supplying 30-40% of our hot water needs."

System Operation

"The system supplying green heat to the hotel is completely automated."

Customer Opinion

"Our guests value the fact that we are environmentally conscious."

Environmental Impact

Natural Gas Reference System

Heat Demand	Heat Source	Total Emissions from Heating Fuel
466,000 kWh	Natural Gas	100 tonnes CO ₂ /yr

Solar System supported by Natural Gas

Heat Demand	Heat Source	Total Emissions from Heating Fuel
268,000 kWh	Natural Gas	54 tonnes CO ₂ /yr
198,000 kWh	Solar Energy	0 tonnes CO ₂ /yr ¹

CO₂ Emission Savings 46 tonnes CO₂/yr

Estimated Payback Analysis

Total Project Cost	€210,000
SEI Grant	€52,500
Annual Fuel Cost Savings	€15,000
Payback Period	10 years

¹ CO₂ produced from electricity consumed in pumps is small compared with CO₂ saved by using solar panels.