
Alton Towers,
Proposed Lodge Development
Energy Statement

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Introduction

The issue of sustainability will be with us for some considerable time and will certainly increase in profile. Increasing emphasis is being put on good design to reduce the environmental impact new build commercial developments have. This document shall demonstrate how the proposed Lodges development at Alton Towers will reduce its environmental impact through energy efficient design and use of renewable technology.

The proposed development is to be located within the grounds of the Alton Towers Resort, to the east of the site near the existing hotels.

Merlin Attractions Operation Ltd are proposing to construct a number of Lodges for accommodation. There are 122 Lodge units proposed and 10 Tree Houses. There is also an arrivals building which will include a kitchen, restaurant, reception and servicing facilities which is located at the entrance to the Lodge site and 3 service huts.

Energy Efficiency

Implementing renewable technology will obviously significantly reduce the energy consumption of the development and impact on the overall carbon footprint. However reducing the energy requirement of the development through good design practices can be equally effective in reducing energy consumption. Addressing the efficient use of energy within the development not only reduces energy consumption and therefore running costs but also reduces the carbon footprint of the development.

1. Lighting

Lighting has a major and direct impact on carbon emissions. Electricity has considerably higher carbon intensity than other fuels, although there is little choice to its use for modern lighting. Therefore there is more incentive to examine lighting design and specifically with this development, emphasis shall be given to:

- Prevention of Overlighting
- Lighting Efficacy
- Control

1.1. Overlighting

There are well established design criteria for internal lighting. However these are often regarded as minimum lighting levels, which tend to result in areas being overlit. During the detailed design process each area of the development (Lodges, Tree Houses and restaurant/arrivals building) shall be designed to achieve optimum lighting levels and care shall be taken to ensure overlighting does not occur within lit zones. Increased internal gains from lighting will increase the likelihood of overheating in summer months and therefore to achieve the desired omission of comfort cooling it is essential that designed lighting levels are not exceeded.



1.2. Lighting Efficacy

The Building Regulations (Part L2A) detail stringent minimum efficacy levels to be achieved in all areas. To demonstrate compliance with these Regulations the building's lighting efficacy must be greater than 55 lm/W (lamp lumens per circuit watt) in general areas and 22 lm/W for display lighting within the restaurant area. It is the desired intent to better the target lighting efficacy by at least 10% averaged across all of the internal light fittings installed.

1.3. Lighting Control

There is a strong desire to eliminate unnecessary lighting of unoccupied areas, as this is believed to be an often overlooked discipline. Good robust technologies such as presence detection (PIR devices, detecting a person's presence within a room and switching lighting accordingly) shall be employed wherever possible. All store rooms and "back of house" areas shall employ occupancy detection to switch lighting.

Internal lighting to the Lodges and Tree Houses will be controlled by energy switches operated via a room key card. On entry to the accommodation the key card will have to be inserted into the switch to make the lights operational. On removal of the key card the lighting circuits will be isolated after a delay, ensuring all internal lighting is switched off when not occupied.

2. Building Fabric

The insulation values of the building must also be addressed to ensure the optimum envelope construction and reduce the heating requirement of the building. Part L building regulations require certain minimum values of fabric thermal performance (U-values) be met for all components of the building's external thermal envelope.

The Lodges and Tree House buildings are individually of a size (<50m²) where they are not required to comply with ADL2A. However to ensure an energy efficient design of these units, an improvement on these values will be considered in order reduce heat loss from the units and therefore reduce their individual heating requirement. The units have been designed by the architect, with U-values for external walls, floors, roof areas, windows and doors in excess of the current Building Regulations standards

Similarly the restaurant/arrivals building have been designed with U-values for external walls, floors, roof areas, windows and doors in excess of the current Building Regulations standards. Consideration shall also be given to ensuring the development's buildings are not subject to overheating from large solar gains during the summer months. Typically this leads to the installation of comfort cooling when in fact in many cases this can be designed out using design simple techniques to reduce solar gains such solar treatment of glazing or external shading devices (brie solei etc.).

The Lodges, Tree Houses and restaurant/arrivals building have been designed to reduce solar gains and provision of natural ventilation so installation of comfort cooling is not necessary.



3. Ventilation

The Lodges and Tree Houses will each be fitted with low energy fans to extract air from the bathrooms. The fan will be set to run in continuous trickle mode with a boost mode operated when the bathroom light is switched on. Fresh air will be provided via trickle vents within the windows. The constant running of the bathroom fan will ensure that sufficient fresh air will be drawn through the bedroom via the trickle vents.

The restaurant/arrivals building will be mechanically ventilated by heat exchange units, recovering heat energy from the extract to pre-heat the supply air and reduce demand on the heating system.

Renewable Energy

The individual Lodges and Tree Houses are designed to be as energy efficient as possible given their singular nature. As such the renewable technology possibilities for individual units are limited and in some cases would actually reduce the overall efficiency of the units whilst incurring additional maintenance. The development is ideally suited for installation of a district heating system to provide both heating and domestic hot water to the individual units. Central plant, consisting of gas-fired boilers and CHP units (combined heat and power) will supply the heating network with plate heat exchangers in each unit transferring heat as required. Whilst not strictly a renewable energy source, implementation of CHP units will reduce the building's energy consumption through generation of electricity at a carbon intensity much less than that from grid-supplied electricity. Any electricity generated by the CHP units can be used to reduce the development's grid electricity demand.

The restaurant/arrivals building however, does provide opportunity for the implementation of renewable technology by installing an air source heat pump system to provide heating to the building. ASHP technology has been demonstrated to be an energy efficient option for use within restaurants. Advances in heat pump technology over recent years have meant that systems with a Coefficient of Performance (COP) in excess of 3.5 are far more commonplace than 5 years ago. Heat exchange units providing ventilation to the area provide further efficiency by reducing the heat demand on the system.

We have found that modern air source heat pump system can actually give a comparable carbon footprint per annum to that of a more expensive ground source heat pumps.



Water Conservation

The installations of greywater and rainwater harvesting systems have been considered. However due to the nature of the site with regard to the random siting of the accommodation these systems would not be suitable.

All greywater would need to be pumped from each accommodation to a central storage point and cleaning tanks and then pumped again to each accommodation. The distances between the accommodation and the central cleaning/storage tanks will be significant in most cases drawing a higher energy demand by the pumping system. Therefore the benefits of any potential water savings will be overshadowed by the increased energy usage of the system.

Consideration has also been given to the complications of installation of the systems with regard to linking the accommodation up with the central tanks and the length of pipe runs. This intricate piping system would also potentially increase maintenance issues.

To reduce the usage of water all sanitary ware will be compliant with the requirement of Building Regulations and WRAS. These items include dual flush cisterns to W/C's and aerated taps to the wash-hand basins.

Conclusion

The proposed development of Lodges and Tree Houses intends to reduce energy consumption through efficient design & a district heating system partially powered by gas-fired CHP. The Lodges and Tree Houses will also reduce water consumption by installing water saving sanitary ware. Additionally renewable technology will be utilised within the restaurant/arrivals building in the form of an air source heat pump system providing heating to the building.