

APPENDIX B – KEY FACTS

Predicting the heat demand of a building, and therefore the performance and running costs of heating systems, is difficult to predict with certainty due to the variables discussed here. These variables apply to all types of heating systems, although the efficiency of heat pumps is more sensitive to good system design and installation. For these reasons your estimate is given as guidance only and should not be considered as a guarantee.

Seasonal Coefficient of Performance:

MCS Seasonal Coefficient of Performance (SCoP) is derived from the EU ErP labelling requirements, and is a theoretical indication of the anticipated efficiency of a heat pump over a whole year using standard (i.e. not local) climate data for 3 locations in Europe. It is used to compare the relative performance of heat pumps under fixed conditions and indicates the units of total heat energy generated (output) for each unit of electricity consumed (input). As a guide, a heat pump with a MCS SCoP of 3 indicates that 3 kWh of heat energy would be generated for every 1 kWh of electrical energy it consumes over a 'standard' annual cycle.

Energy Performance Certificate

An Energy Performance Certificate (EPC) is produced in accordance with a methodology approved by the government. As with all such calculations, it relies on the accuracy of the information input. Some of this information, such as the insulating and air tightness properties of the building may have to be assumed and this can affect the final figures significantly leading to uncertainty especially with irregular or unusual buildings.

Identifying the uncertainties of energy predictions for heating systems

We have identified 3 key types of factor that can affect how much energy a heating system will consume and how much energy it will deliver into a home. These are 'Fixed', 'Variable' and 'Random'. Most factors are common to ALL heating systems regardless of the type (e.g oil, gas, solid fuel, heat pump etc.) although the degree of effect varies between different types of heating system as given in the following table.

The combined effect of these factors on energy consumption and the running costs makes overall predictions difficult however an accuracy $\pm 25-30\%$ would not be unreasonable in many instances. Under some conditions even this could be exceeded (e.g. considerable opening of windows). Therefore it is advised that when making choices based on mainly financial criteria (e.g. payback based on capital cost verses net benefits such as fuel savings and financial incentives) this variability is taken into account as it could extend paybacks well beyond the period of any incentives received, intended occupancy period, finance agreement period etc.

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Factor	Impact
'Fixed' which include:	
Equipment Selection Performance figures (SCoP) from ErP data	System Efficiency
Energy Assessment via the EPC (e.g. assumptions as to fabric construction and levels of insulation; the variation in knowledge and experience of Energy Assessors)	Energy Required
'Variable' which are affected by the system design and include:	
Accuracy of sizing of heat pump- i.e. closeness of unit output selection (kW) to demand heat requirement (kW)	System Efficiency
Design space and ambient (external) temperatures	Energy Required
Design flow /return water temperatures, and weather compensation	System Efficiency
Type of Heat emitter (e.g. Under-floor; natural convector (e.g. 'radiator'), fan convector etc.)	System Efficiency
'Random' which cannot be anticipated and include:	
User behaviour:	
<ul style="list-style-type: none"> Room temperature settings 	Energy Required
<ul style="list-style-type: none"> Hot water usage and temperature settings 	Energy Required
<ul style="list-style-type: none"> Occupancy patterns/times 	Energy Required
<ul style="list-style-type: none"> Changing the design HP flow temperatures 	System Efficiency
<ul style="list-style-type: none"> Ventilation (i.e. opening windows) 	Energy Required
Annual climatic variations (i.e. warmer and colder years than average)	Energy Required

Key:

The statement at the end of each item indicates the major factor affected as follows:

Energy Required: the heat energy output requirement of the system which directly impacts on running costs. This requirement exists regardless of the heating system chosen as it is the heat required to keep the space comfortable. Opening windows or increasing room temperatures will demand more heat output, which means more energy input but this would NOT directly affect the efficiency. Thus increased energy demand does NOT automatically mean reduced efficiency.

System Efficiency: the efficiency of the system has been directly affected and will therefore demand more input energy to achieve the same heat output thus increasing running costs. However, increased energy input does NOT necessarily mean lower system efficiency (see above).