

ErP ratings for ground source versus air source

From the 26th September 2015 any heat pump, ground, water or air sold into the European Union has to be supplied with a EU product label indicating the units efficiency rating. This takes the form of an efficiency band rated from G to A++ and has been used for many years on goods such as fridges, TVs etc.

The rating is there to provide the consumer information about the items efficiency so that he can make an informed choice as to what unit suits his efficiency requirements best.

The ratings are derived from manufacturers tests of the unit over a set of conditions equating to a 'standard' heating season for an average European climate. (Europe is split into three climate zones, average, warmer and colder).

Within the UK the decision has also been taken to use these results to calculate the payments due under the Renewable Heat Incentive, however instead of using a simple banded system i.e A+ gets 'x' amount and A++ gets 'y' amount, the RHI uses the actual seasonal space heating energy efficiency (which is used to determine the energy efficiency band).

The same energy efficiency scale is used for ground source, water source and air source and at first glance it could mistaken to believe that a direct comparison of efficiency could be made between the different technologies, however it is important to remember that the actual tests carried out by the manufacturer to determine the seasonal space heating energy efficiency are at different conditions for different technologies.

Key details:

- From the 26th September 2015 every heat pump sold within the European Union has to have a product label detailing the units energy efficiency.
- Although the same efficiency scale is used the testing points are much more onerous for ground source.
- Real life experience shows ground source is significantly more efficient than air source and receives a higher tariff from the RHI.

Technology	Air Source		Ground Source		Water Source	
	Source	Load	Source	Load	Source	Load
Temp range	-7 to 12C	24 to 55C	0C	24 to 55C	10C	24 to 55C

It can be seen that the source temperatures used in the air source tests vary from -7 to 12C (with the majority of the time greater than 0C) where as the ground and water source temperatures remain constant throughout the year and in fact in all climates including the Warmer climate. Within the UK MCS standards also dictate that the ground array for a ground source heat pump must be designed for a minimum temperature of the thermal transfer fluid entering the heat pump of 0C and that the average ground temperature is actual equal to the average ambient air temperature which ranges from 8.5 to 11.3C in the UK.

As efficiency can vary with inlet temperature it can be seen that the test conditions for ground source

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are very stringent and not really representative of the 'true' UK climate and conditions. This leads to a lower seasonal space heating energy efficiency than would be recorded in actual installations. This is backed up by in-field monitoring programs such as the project carried out by the Energy Saving Trust.

It is therefore reasonable to assume that the performance of a ground source heat pump or water source will actually be higher than that reported on the seasonal heating energy efficiency figure and certainly higher than an air source.

Installation design can also have an effect on the actual performance of the heat pump for example if the ground arrays are oversized the temperature of the thermal transfer fluid increases and hence the efficiency of the unit increases.

Having said all this the RHI payments are simply based on the seasonal heating energy efficiency figure that the manufacturer has determined in order to generate an energy rating figure and installation is not taken into consideration. Even increasing the type of control of the heating system, which under ErP can increase the package efficiency, does not change the figure that the RHI is paid out on. (There are moves to get this changed in the future).

It is also worth remembering that the tariff that ground source heat pumps attracts from the RHI is also significantly higher than those available for air source, i.e. a tariff rate of 19.1p / kWh against 7.43p / kWh for air source heat pumps.