

Comparison of using immersion heater or boiler to heat water at home

Step 1. Calculate energy required to heat a standard, 115 Litre, hot water tank:

Specific heat of water, S = 4.184 kJ/kg°C
 Standard hot water tank size, W = 115 litres or 115 kg
 Assumed temperature rise required, T, is 50 °C i.e. From 10°C to 60°C

Therefore energy required in kilo Joules, E = S x W x T which is 24058 kJ

A Watt is equivalent to 1 joule per second.

To convert kJ into kWh simply divide by the number of seconds in an hour i.e. 3600.

Energy required in kWh = (E in kJ)/3600

Therefore energy required to heat water in a 115 L hot water tank to 60 °C = 6.68 kWh

Step 2. Compare using different fuels to heat water

Using figures from SEAI website (seai.ie) contained in "Comparison of Energy Costs - Domestic Fuels"

Approx delivered energy cost (cent per kWh) including VAT, ignoring efficiency of heating methods

Standard Electricity, 20 cent /unit	20 cent/kWh
Oil, Kerosene at 90 cent per litre	8.81 cent/kWh
Night Saver Electricity, 9.03 cent /unit	9.03 cent/kWh
Gas, natural	6.54 cent/kWh

Step 3. Adjust delivered cost of energy for efficiency of the heating method used

Standard Electricity, 100% efficient	20.00 cent/kWh
Oil boiler, 85% efficient boiler, 30% heat loss in pipes + 2 cent to run pumps for hour	16.81 cent/kWh
Oil, condensing boiler, 95% efficient, 30% heat loss in pipes + 2 cent to run pumps for hour	15.25 cent/kWh
Natural Gas boiler, 85% efficient, 30% heat loss in pipe work + 2 cent to run pumps for hour	12.99 cent/kWh
Night Saver Electricity, 100% efficient	9.03 cent/kWh

Note 1: Ignore heat loss from tank, assume well insulated tank.

Note 2: Boilers have to heat the water in the boiler and in the pipe circuit. This circuit then indirectly heats the water in the tank. In the summer the heat used to heat the circuit water is wasted. However in winter it helps to heat the house. I have included a 30% reduction above which assumes the water circuit contains 50 litres.

Step 4. Calculate the actual cost to heat hot water tank using different methods

Standard Electricity	133.7 cent or €1.34	dearest
Oil, standard boiler	112.3 cent or €1.12	
Oil, condensing boiler	101.9 cent or €1.02	
Natural Gas boiler	86.8 cent or €0.87	
Night Saver Electricity	60.3 cent or €0.60	cheapest



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