

TIPS & ADVICE ON SPECIFYING EFFICIENT STEAM BOILERS



Save fuel, save money, save the planet!

Many steam users are running old boilers, still reliable, but how efficient are they? At what point would it become more economical to replace them with new? A spokesman for Future Energy Solutions has advised that replacement should be considered for all boilers over 15 years old, as efficiency drops over the life span of even a well maintained boiler. Also, new manufacturing techniques and insulation materials ensure that today's boilers are more efficient than those available 15-20 years ago. Combine a new boiler with the latest burner and control technology, and the chances are that you will see a marked reduction in fuel bills. Find out how much you could save by an Energy Survey (see back).

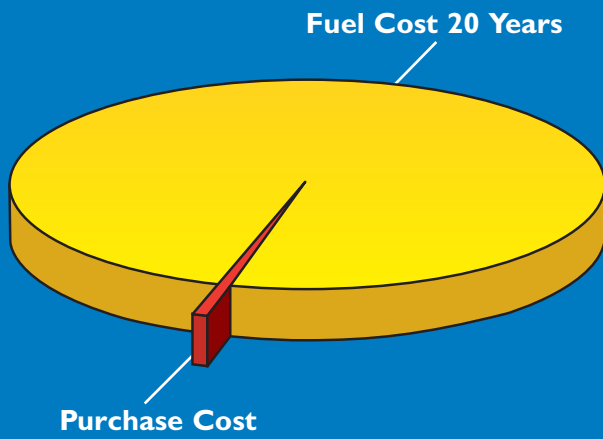
"A more efficient boiler will save fuel, which in turn saves increasingly more money as fuel prices continue to rise, but more globally important it will save CO². As boiler systems account for 60% of the world's CO² output, collectively we can make a difference."

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B O I L E R S

Lifetime cost

Always base financial decisions on the lifetime running costs of your boiler plant, not purely on purchase price.

For example a 10 tonne boiler running on gas on even a light load for 20 years would use almost £6million pounds worth of fuel. The boiler would only cost in the region of £70,000, so a few extra thousand pounds invested in a well designed, more efficient boiler is a very wise move.



Boiler Size

Boilers are rated from and at 100 °C (abbreviated to F&A100 °C). This is a measure of energy, not steam output. For example a boiler rated at 5000kgs/hr F&A100 °C can produce enough energy to change the state of 5000kgs of liquid water at 100 °C to 5000kgs of steam in one hour. However in operation boilers take water at 80 °C, therefore requiring more energy. Consequently the boiler rated at 5000kgs/hr F&A 100 °C in operation at 10 barg will actually produce 4616 kgs/hr. This is important to bear in mind when calculating the size of boiler required to supply the demand of the process plant.

To supply applications where a sudden high demand for steam occurs, a steam accumulator may reduce the size of boiler required. Steam is stored in the accumulator vessel to even out the peaks and troughs of demand. Your boiler manufacturer will be able to offer advice.

Boiler type

For most industrial applications the three pass wetback firetube design is the boiler of choice, a robust design suited to long arduous workloads.

For lighter loads a reverse flame boiler involves less capital investment but is still efficient to run. For very light loads a vertical boiler offers a small footprint but this would compromise efficiency.



Energy saving features

On gas only systems a flue gas economiser can increase efficiency by up to 5%. Heat in the flue gas, which normally would just be lost to atmosphere, is utilised to pre-heat feedwater. 5% may not sound much but considering the 10 tonne boiler example used above, over 20 years fuel savings could be up to £600,000 for a heavily loaded boiler, and emissions of CO₂ would be down by, unbelievably, several million tonnes. Economisers are integral if purchased with a new boiler, or alternatively can be retro-fitted.

Options on add-on equipment such as variable speed drives on burners and feed pumps are definitely going to save fuel when purchased with new boiler plant. However do be careful when investing in new energy saving equipment to fit on old boiler plant, as the efficiency gains may significantly less than for a completely new boiler. The boiler design, age, condition and maintenance regime are the prime aspects of energy efficiency.



107% efficient?

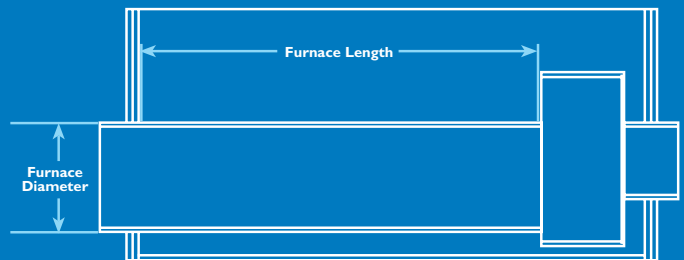
Beware of taking published boiler efficiency figures at face value. The most common method is to measure losses from the heat content of the fuel, but there are several variables in this calculation which will result in a wide range of efficiency percentages. Firstly ascertain the standard to which it has been calculated. In the UK, BS or DIN could be encountered, which do not directly compare, so ask for DIN figures to be recalculated in the BS standard. Next, ascertain whether nett or gross calorific values have been used, as using a mixture of these values can produce bogus results such as 107% boiler efficiency!

Design features

Both shell and furnace diameters should be generous. The shell should be adequately proportioned to produce good quality dry steam. Too small a steam space increases the risk of priming and “carry over” of water into the steam system. This will lead to wet steam and possibly dissolved solids in your process, scaling and an increased risk of water hammer.

The furnace length to diameter ratio is critical to minimise NO_x formation and is ideally 3.5 :1. Likewise, a lower volumetric heat release rate would form less NO_x as the flame temperature is cooler. Combustion should be complete by the end of the furnace, however some manufacturers include reversal chamber dimensions in the calculation resulting in misleadingly low heat release rates.

Recently many advancements have been made in materials for insulation. Ceramic fibre has exceptional insulating properties and is often used on smokebox doors with good results. Shell insulation can be compared by the “U” value which is a measure of energy released per m², therefore the lower the value the better. This is a better comparison than the material thickness.



Furnaces expand at a different rate to the shell. Bowling hoops are incorporated by Byworth in furnaces over 3 mtrs long to absorb the expansion. Claims have been made that corrugated furnaces improve heat transfer, but as most heat is transferred by radiation or convection the insignificant improvement doesn't warrant the extra investment.

Further information is available on www.byworth.co.uk, or by calling the Byworth sales team on 01535 665225.

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ENERGY SURVEY OF YOUR BOILER HOUSE

An energy survey of your boiler house by a Byworth energy consultant will give you:

- > Specialist advice on boiler energy usage not available from general energy consultants.
- > Analysis of current fuel usage (may require the installation of meters).
- > In depth report of recommended improvements.
- > Calculations of fuel savings if improvements are undertaken.
- > Full turnkey project management of any equipment replacement or retrofitting if required.

Please complete below, and a Byworth energy consultant will contact you to arrange a survey.

Contact Name	
Contact Telephone	
Company Name	
Industry Sector	
Site Address	

Please complete boiler details where known below:

Make	Year	Output	Working Pressure
Other relevant information:			

Please fax to 01535 680997

Or simply post to Byworth Boilers
Parkwood Boiler Works, Parkwood Street,
Keighley, West Yorkshire BD21 4NW

Web: www.byworth.co.uk

Tel: 01535 665225

Email: sales@byworth.co.uk

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