



Expert Report

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BOSCH
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Heat recovery with Economisers

It must be possible to manufacture products of all different types, including foods, efficiently and cost-effectively, so that they are tasty, easy to digest and keep well. To meet these requirements, heat treatment is generally required, whether this is for the treatment of the raw materials or the production of intermediate or finished products. Special machines of all different types allow industrial production in large quantities. Steam is generally used as the heat medium in a wide range of thermal processes for indirect or direct heat treatments with temperatures up to 220 °C.

Energy prices are rising

In industry, steam generators have been heated with the classic energy media of oil and gas for 50 years and probably for decades before that. Because of limited world stocks and the cartel of producers that exists for petroleum, constant increases in the price of energy are to be expected in the medium and long term. In Germany, the prices for light heating oil have almost doubled in recent years. The link between oil and gas prices leads to a corresponding adjustment in gas prices after a delay of around 6 months. Only the efficient use of the primary energy media will increase the length of their availability and delay the rise in prices.



Figure 1: UNIVERSAL steam boiler with ECO 1 Stand-Alone for 1 – 28 t/h steam capacity

Steam boilers without Economisers offer a high energy-saving potential

Water-tube boilers for major power stations are still fitted with additional convection heating surfaces for preheating of the feed water in order to minimise flue gas losses and maximise efficiency. In industry, the steam is mostly generated with flame tube/smoke tube boilers. With the traditional designs, no additional convection heating surface is integrated to preheat the feed water. At these steam boilers, designed for operating pressures from 8–12 bar for saturated steam temperatures of 170–190°C, flue gas temperatures of up to 260 °C are measured. Up to 12% of flue gases are passed unused via the chimney into the atmosphere. Higher operating pressures, dirty heating surfaces (soot and calcium deposits) and burners which are set wrongly can increase the flue gas losses even more. These flue gas losses cost money. They mean that higher quantities of primary energy are necessary and are a burden on the environment.

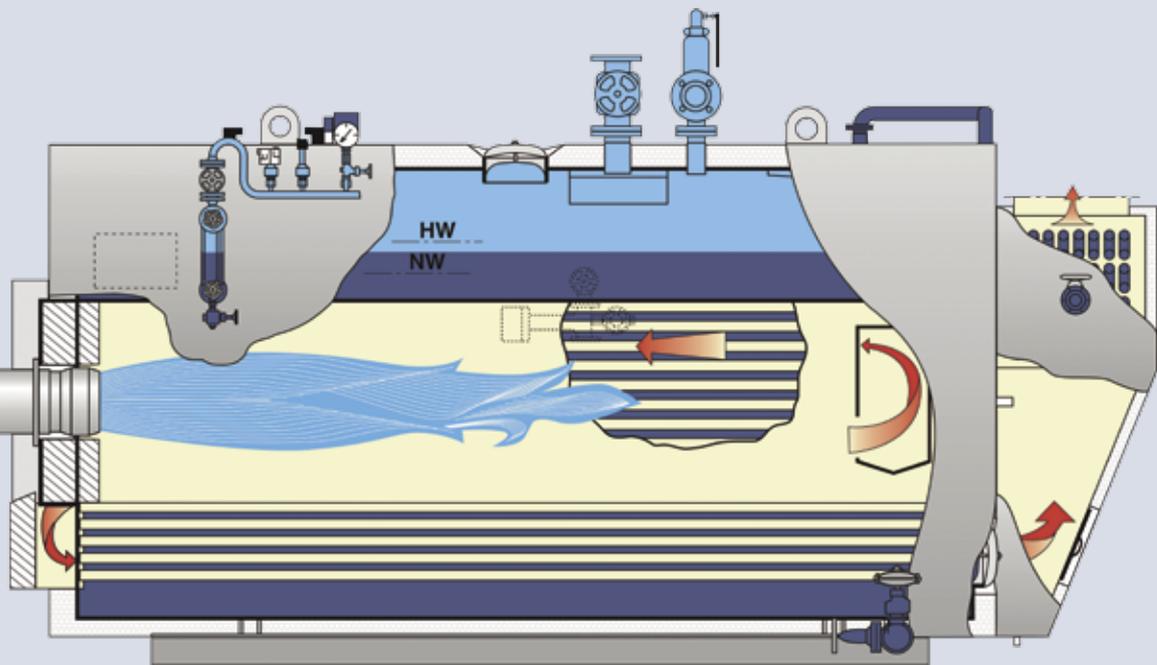
Economisers save primary energy and reduce the burden on the environment

lame tube/smoke tube boilers of all sizes can be retrofitted with an Economiser. With this in mind, Bosch Industriekessel GmbH has developed the compact ECO, which has been TÜV-tested, and which is delivered on a transport frame, with full heat insulation and ready to install. The Economiser is integrated into the flue gas line immediately behind the boiler and is incorporated into the feed water pressure pipe.

New boilers with integrated Economiser

Bosch Industriekessel GmbH new boiler models with completely integrated Economiser offer particular advantages. A variable, specially developed heat exchanger bundle with highly efficient finned tubes is integrated as part of the boiler in the flue gas collection chamber and connected with the water room; it can be closed off if necessary. The investment costs for these boilers are considerably lower than the costs of traditional boilers with separate Economiser. Lower manufacturing costs, no separate transport, no foundation and no additional in-situ assembly mean that costs are soon recovered.

Figure 2: UNIVERSAL UL-S steam boiler with integrated Economiser



What are the advantages of the Economiser?

The feed water for steam boilers is treated chemically and thermally and prepared in accordance with the regulations, and passed into the Economiser at 103 °C (full deaeration) or 90 °C (partial deaeration). It cools the flow of flue gas and is heated up itself. A flue gas temperature reduction from 260 °C to 120 °C reduces flue gas losses by 6%. A steam boiler with this Economiser requires 6% less fuel at the assumed load point for the quantity of steam produced. The heat extracted from the flue gas is taken to the boiler through the heated feed water. On the basis of current prices for Economisers and fuels, the investment will be recovered in 9–12 months, with single shift operation and 70% average boiler performance.

Useful options

Economisers can be designed individually for a wide range of different flue gas intake and output temperatures. Consideration should be given to the permitted minimum temperature of the

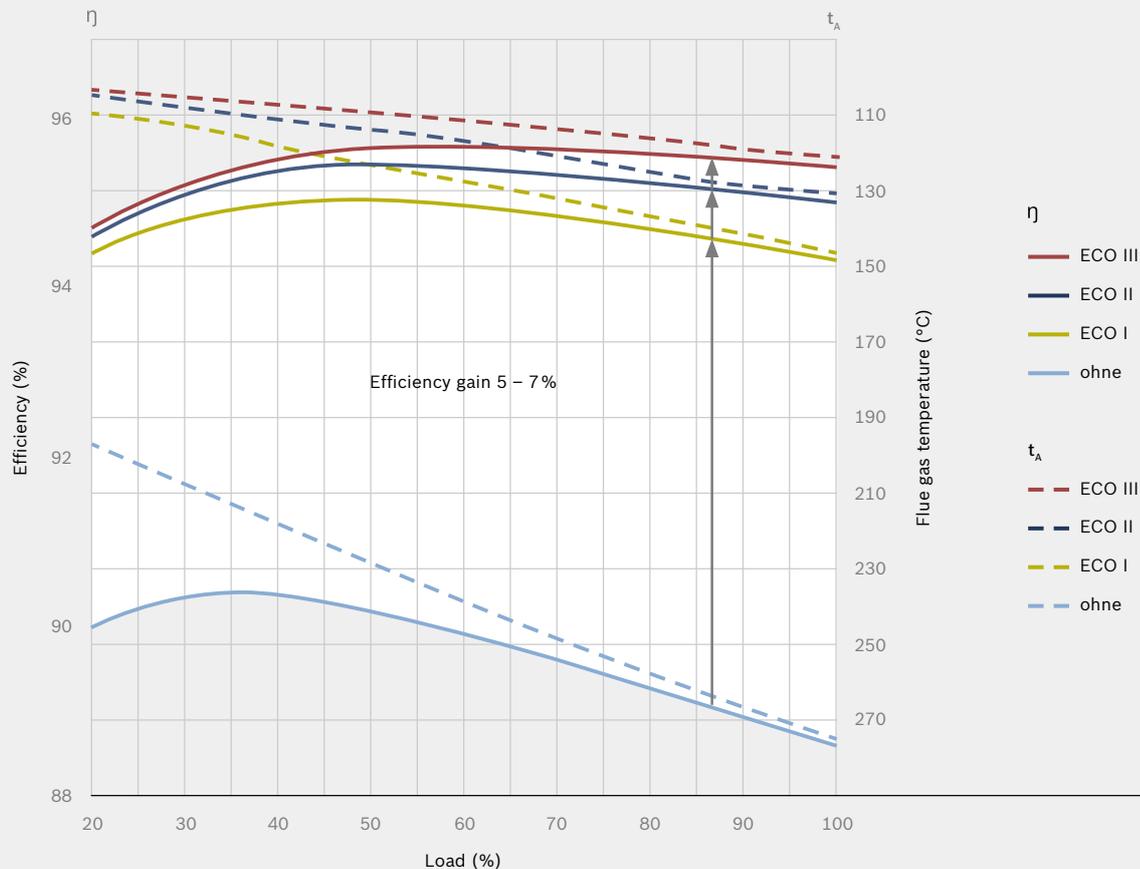
chimney. With chimneys that are sensitive to acid and moisture, the flue gas temperature at the head of the chimney should be above the dew point of the flue gas throughout the whole load range. In order, on the one hand, to achieve maximum economic efficiency and, on the other hand, to maintain a permitted min. flue gas temperature for the chimney, constant feed water regulation and by-pass regulation on the water side are useful options.

The ECO 1 Stand-Alone for retrofitting has an integrated flue gas bypass and can be fitted optionally with a flue-gas-side bypass regulation.

Individual specialist advice

The new ECO systems simplify flue gas heat usage and improve economic efficiency and environmental protection. Individual advice is given and calculations of economic efficiency are carried out for new boilers and for the retrofitting of existing systems.

Graphic 1: Improvement in economic efficiency for various ECO sizes





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