Working together for a healthier world™

Bornem, Belgium: Condensing Steam Boiler — recovering every last drop and kilowatt

Resource conservation is critical to reducing our environmental impact and continuously improving our environmental performance. To help meet our environmental commitments, Pfizer facilities seek to minimize waste of vital resources including energy and water using a prioritized approach of **'reduce, reuse, recycle'**.

The Bornem, Belgium site develops new technologies for Pfizer's Capsugel business, the leading global gelatin capsule manufacturer, and has piloted many energy conservation projects aiming to reduce energy use. Having maximized the 'reduction' potential for their site, they also looked at ways to reuse heat and water.

One especially innovative technology was a condensing steam boiler piloted at Bornem 10 years ago and now being applied to a new boiler specification. This technology remains very uncommon in industrial steam boilers despite offering up to 10% fuel savings.

Conventional efficient steam boilers have exhausted their flue gases at temperatures between 120°C – 200°C (250°F – 400°F). By reducing this temperature to 60°C (140°F) a condensing boiler will recover not just the heat from the hot air but also, more importantly, the heat of condensation resulting from the significant percentage of water vapor present in these gases.

This technology allows boiler efficiencies to reach 93% instead of 83% for conventional technologies (indeed some boiler manufacturers still quote their efficiency relative to the 'lower calorific value'- LCV - excluding the recoverable heat from the water vapor).

Condensing boiler technology is starting to become more common in hot water boilers but is still quite rare in steam-raising applications because of the potential difficulties in transporting the large volume of medium temperature water that is produced in the condensing part of the boiler.

The 5 tonnes/hr (11klb/hr) boiler at Bornem has operated successfully for 10 years and is now being complemented by a second new boiler, also with condensing technology to provide more reliable steam supply. The 10% fuel saving (proven by temperature measurements) provides on an annual basis:

- A reduction of gas use of 2,600 MWh
- A reduction of carbon dioxide emissions of more than 280 tons
- A payback or ROI of less than 2 years (boiler location close to the hot water circuit)
- A reduction of site water use of more than 1000 m^3, since the condensed flue water vapor is reused in site cooling towers

Innovative, practical, and energy efficient!