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Application: District heating plant
Efficiency solution: Infrasound Cleaning
Cleaning area: Finned tube economizer and evaporators

General info

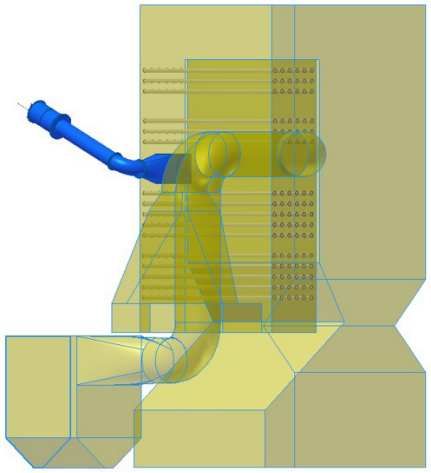
Plant: District heating plant
Boiler: Kvaerner/ Metso, grate (1997)
Fuel: GROT, wood chips
Capacity: 15 MW_{th}

Installation

Type: APL1000
Year of installation: 2011

Situation description

This bio-fueled district heating plant produces 60 GWh per year for households near the plant. The tube bundles in the economizer and the evaporator had to be steam soot blown at least once daily to prevent soot accumulation and ensure boiler operation. The existing erosion and corrosion had ultimately led to leakage in the economizer and unplanned maintenance outages were required frequently.
During the last year of operation before the economizer replacement in 2011, and after a steady decrease in the boiler output over the years, the output was between 10 and 12 MW.



To compensate for the power loss, another boiler, which uses a more expensive fuel (log chips) had to be operated, as well as an oil-fired boiler occasionally.
The economizer needed to be replaced three times during the period between 1997 and 2011 due to worn-out tubes.
The boiler is partially unmanned and personnel from the maintenance department need to be on duty in case the boiler requires assistance all days in the week including weekends.

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Technical results

The combination of a new economizer and a new soot cleaning technology has led to high and stable boiler output during the entire operational season, without any unplanned outages, reaching production peaks of 17 MW when required, 2 MW over the boiler's nominal power. This eliminated the need of operating the additional bio-fueled boiler during the winter season, reducing the energy production costs.

More stable boiler operation due to stable heat transfer resulting from the continuous cleaning effect of the heat transfer areas. This has led to:

- Reduced need for adjustment of the economizer's water temperature as the energy transfer is more stable.
- Reduced the need for direct boiler supervision, making the life of the maintenance staff easier and reducing the need for overtime and work on weekends.

Increased boiler efficiency. The higher water temperature, which results from the cleaner heat exchange areas, has led to a decrease in the amount of fuel required for a certain production level and consequently reduced energy production costs.

Steam soot blowing drastically reduced. When the boiler is operated at 13 MW or less, no steam soot blowing is required. When the boiler is operated at more than 13 MW, the steam soot blowers are operated once a week in the economizer and two times per week in the evaporator. This has resulted in:

- Reduced fuel consumption
- Reduced wear on the economizer and evaporators, reducing maintenance costs and prolonging the lifetime of the tube bundles.
- Reduced water consumption for the soot blowers.

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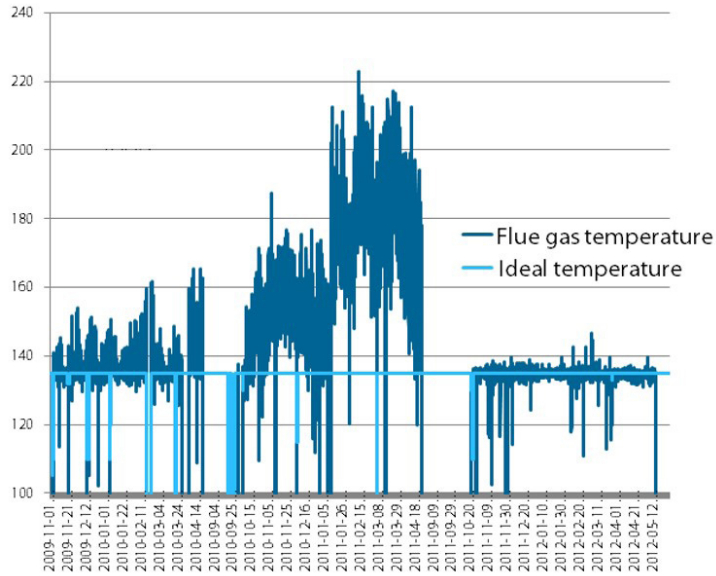


Fig 1. The flue gas outlet temperature of the economizer 2009-2012. The Infrasound system was installed when exchanging the economizer in the autumn 2011. The flue gas temperature is now more stable regardless of boiler load. The heat exchange has increased.

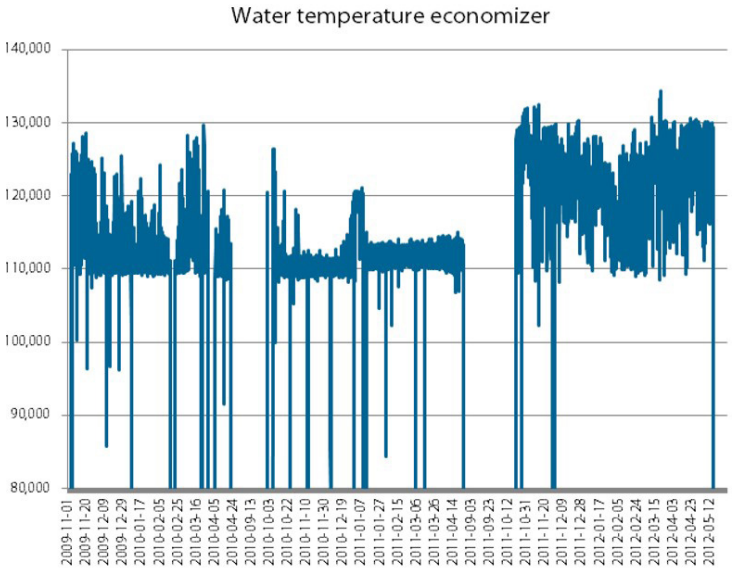


Fig 2. The water temperature of the economizer has increased and can now be regulated with better precision.

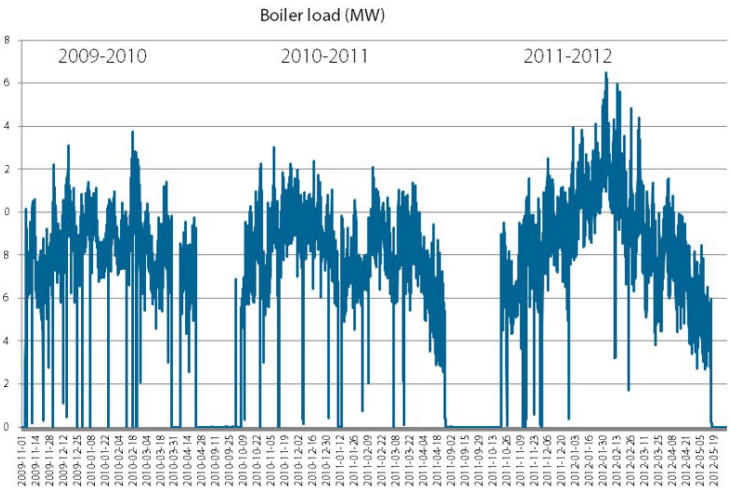


Fig 3. The boiler can now be operated on higher load. Up to 2.5 MW higher peak load is now possible.