Efficiency Solutions for Boiler Plants

A significant share of energy in biomass and industrial boiler plants is lost due to inefficient combustion, fuel quality variability, and unused low temperature heat. Studies show that typical industrial boilers operate at **83-90% efficiency**, while **5-15% of industrial energy input can be lost as low temperature heat**. Unlocking this hidden potential through better system optimization and energy recovery can significantly improve plant efficiency, fuel utilization, and overall energy performance.

OUR MAIN SOLUTIONS:

BIOMASS FURNACE OPTIMIZATION

Upgrades designed to ensure stable and efficient combustion of complex or low-grade biomass fuels.

REMOTE DATA ANALYSIS SYSTEM

A next-generation tool for monitoring boiler performance and delivering expert operational insights.

HEAT PUMP INTEGRATION

Absorption and compression heat pumps for biomass plants, enabling low temperature heat recovery and improving overall energy efficiency.

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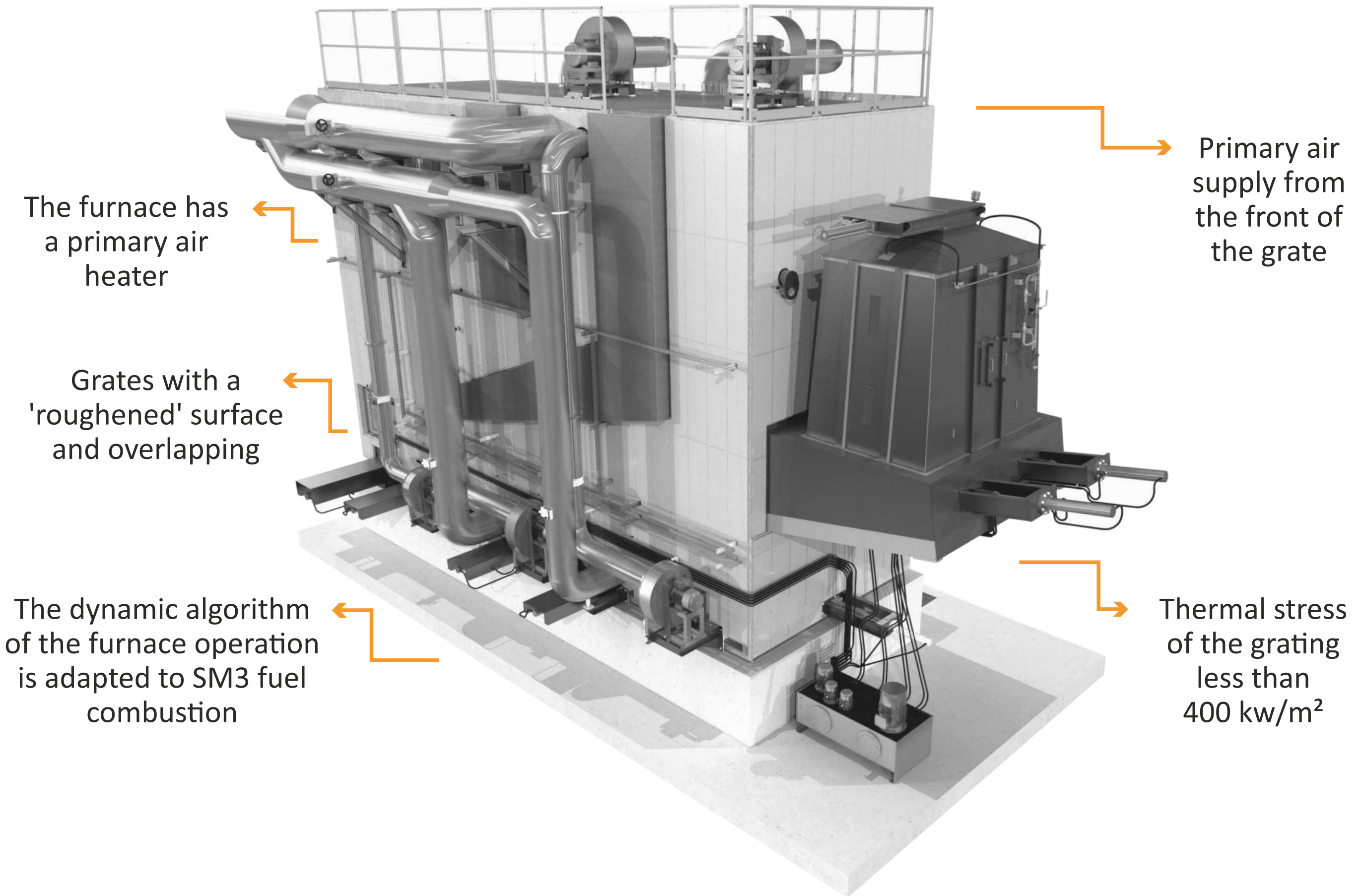
1 BIOMASS FURNACE OPTIMIZATION

Biomass fuel quality in Europe is gradually changing over time due to increasing demand and limited availability of high-quality raw materials. As a result, fuels tend to contain higher moisture, ash, chlorine, and potassium levels and higher amount of fines. In the future, this trend is expected to continue, requiring more advanced combustion technologies.

1.1 EON_BioT



EON BioT is an adiabatic counter-current furnace. The returning hot flue gas efficiently dries the incoming wet fuel, while a primary air preheater improves combustion efficiency. The system is designed to operate with fuel moisture content ranging from 35% to 60%.

2 REMOTE DATA ANALYSIS SYSTEM

Based on more than 30 years of experience in energy engineering and the implementation of technological solutions, we have developed an advanced tool for analyzing the operating parameters of boiler equipment.

This system enables monitoring and analyzing the operating parameters and trends of boiler equipment. It is a new-generation tool that allows to analyze boiler operation and provides expert advice.

2.1 PRACTICAL VALUE

Clarity, control, and real-time monitoring
The system visually displays how your boiler plant is operating. All activities are monitored in real time, so you can view the situation anytime, anywhere.

Increasing efficiency and optimization
The system enables the identification of deviations in efficiency and work parameters.

Expert assistance
Our engineers provide remote consultations to your team's operators based on real-time data – quickly and accurately.

2.2 TECHNICAL SECURITY AND DATA TRANSMISSION ARCHITECTURE

System deployment is carried out in strict compliance with industrial IT security standards, ensuring full protection of your operational processes:

OT/IT Integrity
Based on the Purdue Model, the data acquisition layer is separated from control processes.

Standards Compliance
The solution complies with ISA-95 and IEC 62443 requirements, ensuring secure data transmission.

One-Way Communication
Data is transmitted exclusively from the boiler plant to the analysis server. The physical data transmission architecture prevents any external commands or interference with your control systems (PLCs).

CONFIDENTIALITY

All collected data is treated as confidential information. We sign an NDA (Non-Disclosure Agreement), committing not to use non-anonymized data for any purposes other than analysis and improvement of control algorithms, and not to disclose such data to third parties.

3 HEAT PUMP INTEGRATION

Absorption and compression heat pumps are increasingly used in biomass plants to recover low-temperature heat and improve overall plant efficiency. These technologies enable the utilization of energy that would otherwise be lost, converting it into useful heat for district heating or internal processes.
As a result, biomass plants can achieve **higher energy efficiency, lower fuel consumption, and reduced environmental impact.**

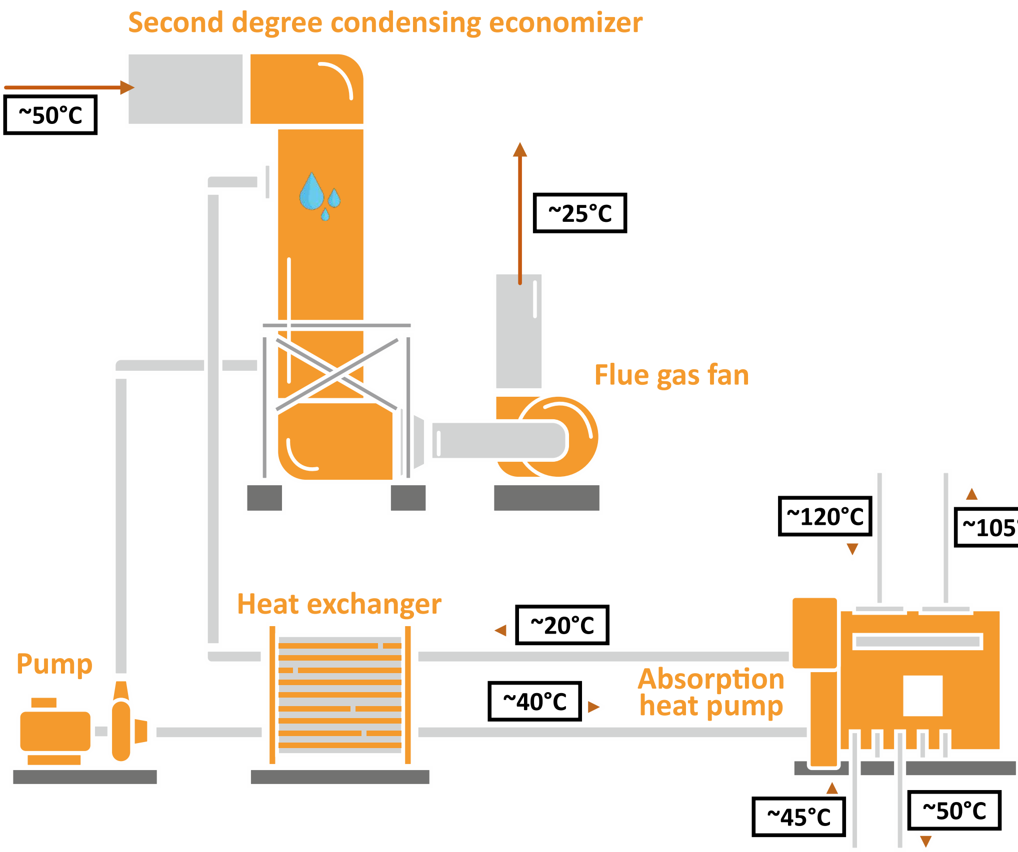
3.1 ABSORPTION HEAT PUMP

Absorption heat pumps are an efficient solution for recovering low-temperature heat in biomass boiler plants and industrial processes. Unlike conventional compression heat pumps, they use thermal energy instead of electricity as the driving force, making them particularly suitable for facilities with available high-temperature heat sources such as hot water or steam.

Operating principle

In the evaporator, low-temperature heat causes the refrigerant to evaporate. The vapor is absorbed by the absorbent solution in the absorber, releasing heat that can be transferred to the heating network. The diluted absorbent is then pumped to the generator, where high-temperature heat (such as steam or hot water) drives the regeneration process, separating the refrigerant from the absorbent. The refrigerant vapor condenses in the condenser and returns to the evaporator, completing the cycle.

This process enables the transfer and upgrading of heat from low-temperature sources to useful temperature levels for district heating or industrial applications.



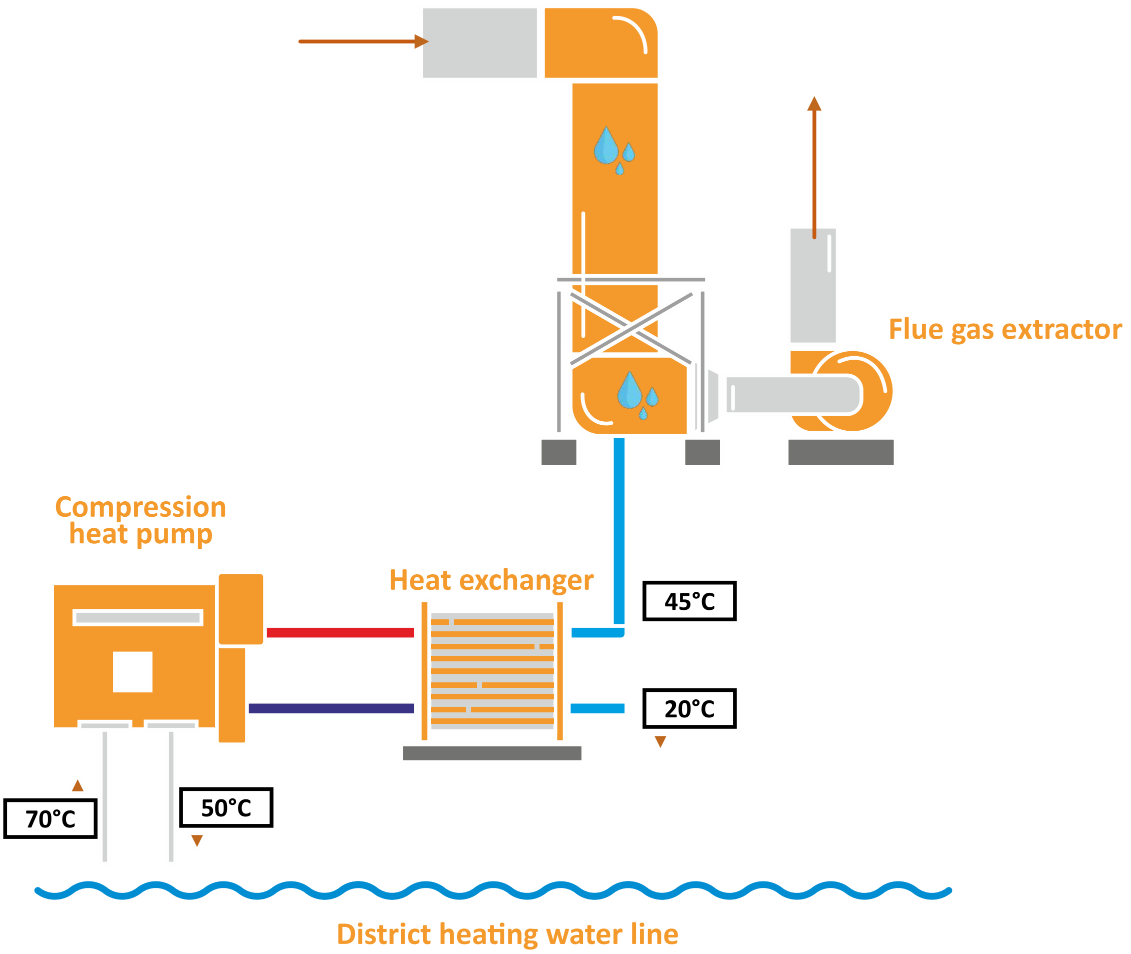
3.2 Compression Heat Pump

Compression heat pumps efficiently recover and upgrade low-temperature waste heat in biomass plants and industrial processes. They use electricity to drive a mechanical compression cycle that transfers heat from a low-temperature source to a higher temperature level. Due to their high efficiency and flexibility, they help increase plant efficiency while reducing energy consumption and emissions.

Operating principle

In the evaporator, a refrigerant absorbs heat from a low-temperature heat source and evaporates. The refrigerant vapor is then compressed by the compressor, which increases both its pressure and temperature. In the condenser, the high-temperature refrigerant releases heat to the heating network or process water. Finally, the refrigerant passes through an expansion valve, reducing its pressure and temperature before returning to the evaporator to repeat the cycle.

By consuming electrical energy for the compression process, the heat pump can deliver several times more useful heat than the electricity it consumes. This is reflected in the coefficient of performance (COP), which typically ranges from 3 to 6.



HEAT PUMPS: TYPICAL APPLICATIONS

Biomass boiler plants.
Recovery of waste heat from flue gas and condensate to increase plant efficiency.

Industrial processes.
Recovery and reuse of waste heat from industrial operations and cooling systems.

Industrial cooling systems.
Recovery of excess heat from cooling processes for heating applications.

District heating systems.
Upgrading low-temperature heat for use in district heating networks.

Wastewater heat recovery.
Utilization of thermal energy from municipalor industrial wastewater.

COMMON BENEFITS OF HEAT PUMP TECHNOLOGIES

EFFICIENT LOW-POTENTIAL HEAT UTILIZATION
Low-temperature heat from sources such as flue gas condensate, wastewater, and industrial cooling processes can be recovered and reused.

REDUCED FUEL CONSUMPTION
By utilizing recovered heat, heat pumps decrease the need for primary fuel in heat production.

INDUSTRIAL PROCESSES
Recovery and reuse of heat from industrial operations and cooling systems.

FLEXIBLE SYSTEM INTEGRATION
Heat pumps can be integrated into both new and existing biomass plants, district heating networks, and industrial processes.

SUPPORT FOR DECARBONIZATION
Utilization of low temperature heat and increased use of renewable energy, heat pumps contribute to low-carbon heat production.