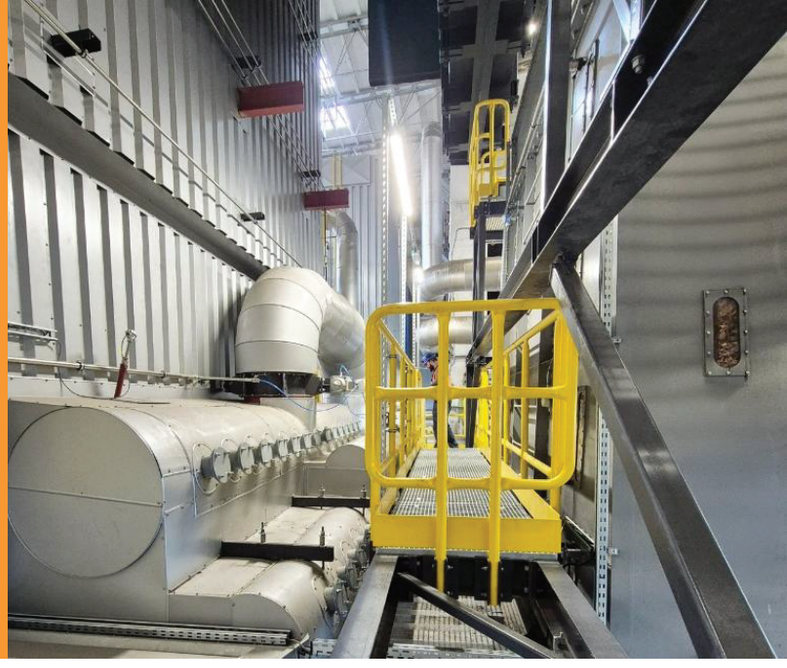
Energy ON

SWITCHING FROM COAL TO BIOMASS

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ABOUT US

BIOMASS ENERGY PROFESSIONALS

For more than 25 years our people create solutions for high-potential biomass energy equipment, specialized efficiency solutions and emissions control projects for a wide range of industries.

TRANSITION FROM COAL: BIOMASS AS A SUSTAINABLE ALTERNATIVE

Although coal consumption in the European Union is steadily declining, hundreds of coal-fired power and heat generation units remain in operation. As EU regulations increasingly restrict high-emission energy sources, a regulated transition away from coal is underway.

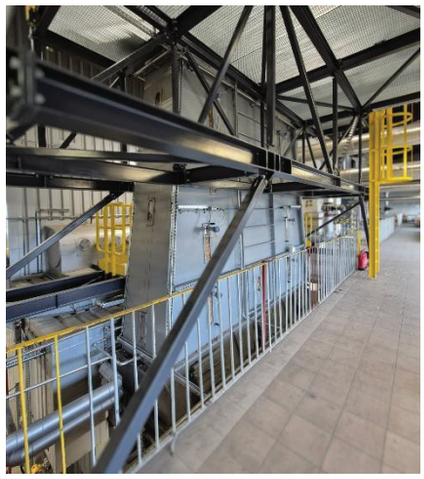
FUEL CONVERSION WITHOUT NEW CONSTRUCTION

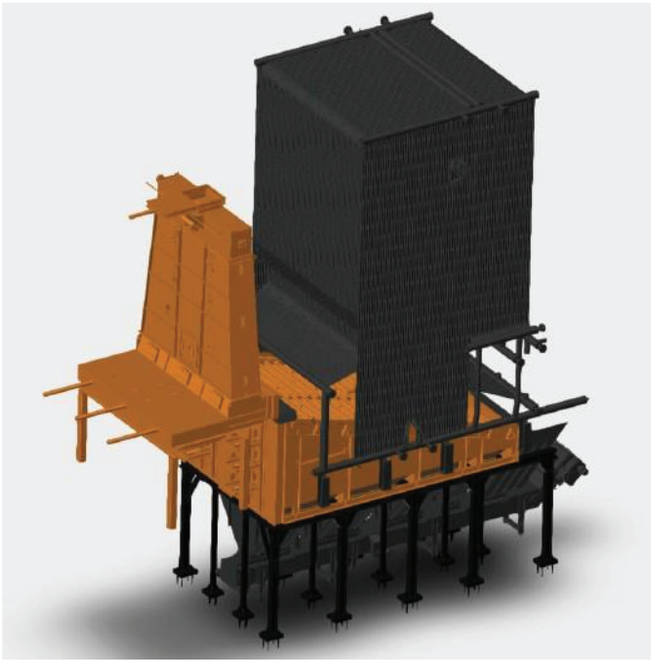
Adapting boilers for biomass combustion offers both environmental benefits and strong economic value – especially because **no new boiler house construction is required.** The conversion can be carried out within the existing infrastructure and engineering networks, which cuts investment costs, shortens project timelines.

CASE STUDY

CONVERSION OF AN EXISTING WR-TYPE COAL-FIRED BOILER TO BIOMASS FUEL

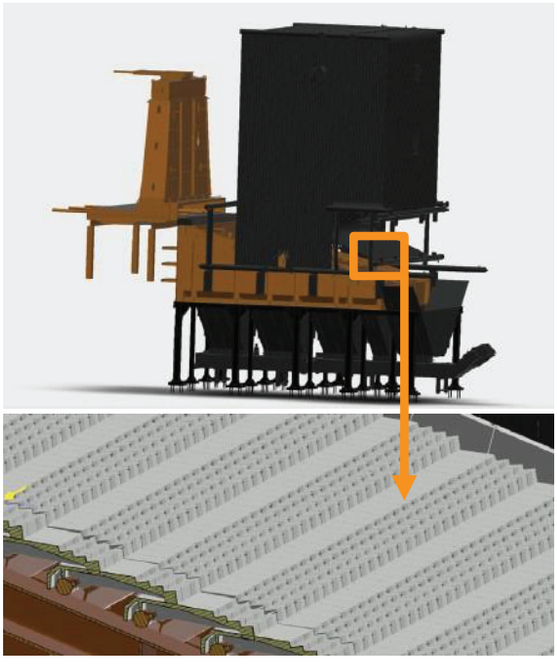






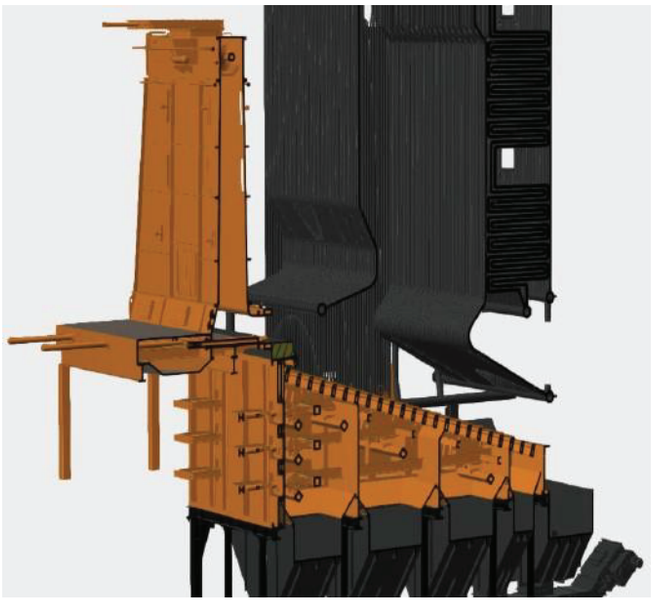
The Energy ON's integrated grate technology

enables precise adaptation of its geometry during the design phase to align with both existing and newly developed boiler configurations, as well as the specific type of biofuel being used.



The uniquely designed air holes in the grates ensure even air distribution

allowing for precise control of the combustion process location and significantly reducing the carryover of solid particles from the combustion surface.



Additionally, the system features three independently controlled moving grate zones

providing a dynamic solution for adjusting fuel layer thickness in different areas of the grate and optimizing combustion based on fluctuating biofuel quality parameters.



The grate's specialized relief structure enhances fuel layer mixing

which is especially beneficial when burning less homogeneous or high-moisture biofuels.

MAIN PARAMETERS

PARAMETER	OLD COAL BOILER	RETROFITTED BIOFUEL BOILER
Nominal Power	29.1 MW	23.5 MW
Efficiency (η)	81%	91%
Dust after boiler	1000–5000 mg/m³	114 mg/m³
Dust after cleaning	88 mg/m³ (cyclones)	1.9 mg/m³ (ESP)
NOx	371 mg/m³	162 mg/m³
SO_2	579 mg/m³	4.5 mg/m³
CO	81 mg/m³	32 mg/m³

FURNACE DESIGN & CAPABILITIES	
A continuous output range	7.2 MW to 23.5 MW
Rated thermal power	30% to 100%
Biomass fuel	With a wide moisture content range from 25% to 55%

ADDITIONAL PARAMETERS

FORMATION OF THERMAL NOX IS NEGLIGIBLE

Since the biomass boiler operates in a low-temperature regime, the formation of thermal NOx is negligible. Nitrogen oxide emissions are almost exclusively derived from the nitrogen (N) content inherently present in the fuel (fuel NOx).

AUTOMATIC SNCR (SELECTIVE NON-CATALYTIC REDUCTION) SYSTEM CAN BE INSTALLED

If the biomass contains a high nitrogen content (e.g., N >0,3%), an automatic SNCR (Selective Non-Catalytic Reduction) system can be installed to ensure compliance with emission limits and minimize environmental impact.

THE SYSTEM REQUIRES MINIMAL FLUE GAS RECIRCULATION (FGR)

By operating at relatively low combustion temperatures, the system requires minimal flue gas recirculation (FGR). This results in a more stable combustion process with reduced internal variability and lower solid particle emissions from the boiler.

THE FURNACE SWITCHES TO AUTOMATIC MODULATION

The biomass furnace features automatic start-up/primary combustion via a liquid or gas-fired ignition burner. Once operating parameters are reached, the furnace switches to automatic modulation.

ENVIRONMENTAL PERSPECTIVE



Old coal boiler (29.1 MW, η = 81%)

Emissions were high. Dust levels reached 1000–5000 mg/m³ after the boiler and remained 88 mg/m³ even after cyclones. NOx (371 mg/m³) and SO_2 (579 mg/m³) were significant due to coal's sulfur and nitrogen content, while CO (81 mg/m³) indicated incomplete combustion. Overall, the system had a substantial environmental impact, contributing heavily to air pollution and greenhouse gas emissions.



Retrofitted biofuel boiler (23.5 MW, η = 91%)

Emissions were significantly reduced. Particulate matter after the ESP dropped to 1.9 mg/m³, well within modern standards. NOx decreased to 162 mg/m³, SO_2 to 4.5 mg/m³, and CO to 32 mg/m³, indicating cleaner combustion and low sulfur content of biofuels. Overall, this represents a clear environmental improvement and strong alignment with EU emission requirements.

ENGINEERING PERSPECTIVE

Old coal boiler (29.1 MW, η = 81%)

The system delivered high capacity but operated at a modest efficiency of 81%, resulting in considerable energy losses. At the same time, elevated SO_2 emissions increased environmental impact, contributing to air acidification, formation of fine secondary particles, and associated risks to ecosystems and public health.



Retrofitted biofuel boiler (23.5 MW, η = 91%)

Although nominal capacity is slightly lower (23.5 MW), efficiency increased to 91%, generating more useful energy per unit of fuel. An electrostatic precipitator (ESP) reduces particulate emissions to 1.9 mg/m³, while optimized combustion lowers NOx and CO levels. The transition to biofuel has practically eliminated SO_2 emissions. Overall, the upgrade delivers cleaner combustion, improved air quality, and a substantially reduced environmental footprint.



LET'S GET IN TOUCH!

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