Heating with Biomass

8000kW Sunnyside Greenhouses Ltd

Automated Boiler Systems

for Commercial, Industrial,

Communal, and Residential

Applications

1 200 kW

840 kW

200 kW

300 kW

300 kW

400 kW

1 000 kW

2 200 kW

840 kW Steam

www.binder-gmbh.at

Energy from biomass

EN 08

BINDER – Sophisticated Boiler Systems

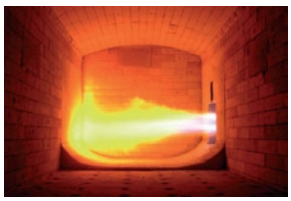
Biomass Fuels

Combustion Systems →	EBF	RRF	SRF-S	SRF-H	TSRF
Sander dust	●				
Sawmill shavings		●	●		
Shavings from planing and milling, briquets		●	●		●
Wood from furniture making etc.		●	●		●
Woodchips, forestal		●	●		
Arboricultural wood residues			●	●	
Woodchips, cut-offs, industrial			●	●	

Combustion Systems →	SRF-S	SRF-H	PRF	TSRF
Bark		●		
Clean recycling wood, shredded		●		
Wood based energy crops, chaffed	●			●
Pomace and other residues from food processing, etc.	●			●
Wood pellets			●	●
Industrial wood pellets				●
Peat pellets, agro-pellets				●

Upon request, we would be pleased to individually test your fuel at BINDER's own firing laboratory.

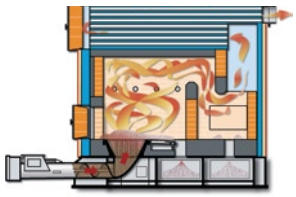
Combustion and Stoker Systems



EBF – Injection burner with stoker auger

For dusty kinds of fuel:
- up to max. 10 % moisture content
- ash content ≤ 1 %

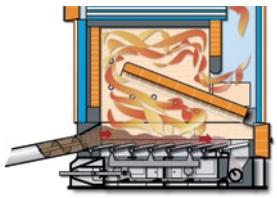
Dependent on the required heat capacity, the correct amount of fuel is fed from the dosing silo, swirled into the combustion chamber by means of a high-pressure fan and then lit by the burner nozzle.



RRF – Solid retort burner with underfeed stoker auger

For semi-dry, low-ash fuels:
- up to max. 30 % moisture content
- ash content ≤ 1 %
- for granulated fuels up to size class G100*

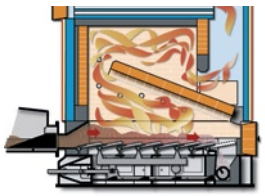
Fuel is metered from beneath into the solid boiler retort by means of an underfeed stoker auger. Supply may be either from front or from the sides.



SRF-S – Moving grate burner with horizontal stoker auger

For wet, high-ash fuels:
- up to max. 50 % moisture content
- ash content > 1 %
- for granulated fuels up to size class G100*

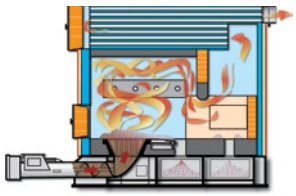
Fuel is metered into the combustion chamber from the front by means of a large stoker auger and then distributed along the chamber by the reciprocating grates.



SRF-H – Moving grate burner with hydraulic stoker ram

For wet, high-ash fuels:
- up to max. 50 % moisture content
- ash content > 1 %
- for coarse and shredded fuels up to size class G150* (with slivers up to 35 cm long)

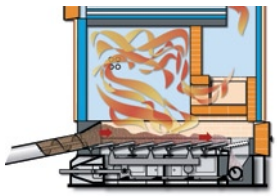
Fuel is metered into the combustion chamber from the front by means of a horizontal hydraulic ram and then distributed along the chamber by the reciprocating grates.



PRF – Solid retort burner for pellets with underfeed stoker auger

- for wood pellets

Pellets are metered from beneath into the solid boiler retort by means of an underfeed stoker auger. Supply may be either from front or from the sides.



TSRF – Moving grate burner for dry fuels

- for pellets made of wood or peat, agro-pellets
- for dry fuels up to max. 25 % moisture content
- ash content > 1 %

Fuel is metered into the combustion chamber from the front by means of a stoker auger and then distributed along the chamber by the reciprocating grates.

*)…Size class specifications depend on the kind of fuel used and are for guidance only.

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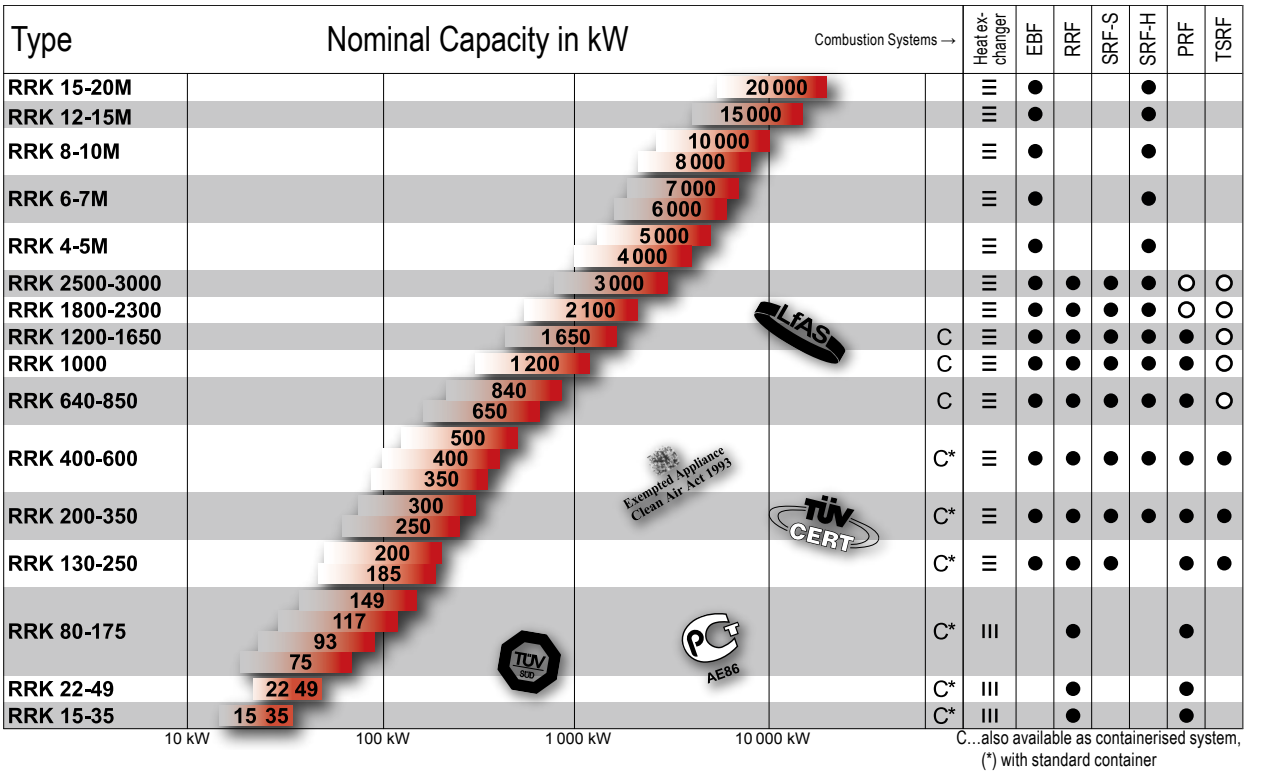
Optimised for Your Needs



PS – Pellet auger

- with adjustable pressure relief device for rectangular silos
- suitable for the transport and silo discharge of wood pellets

KA – Sweep arm agitator

- for granulated fuels up to size class G100*
- for storage heights* up to 20 m using pressure relief cover
- also available in FK design for smaller silos with lower storage heights

SS – Tapered sweep auger

- for silos accessible from the bottom with a diameter of up to 7 m
- for granulated fuels up to size class G100*
- for storage heights* up to 20 m

WS – Horizontal sweep auger

- for silos accessible from the bottom with a diameter of up to 10 m
- for granulated fuels up to size class G100*
- for storage heights* up to 30 m

SBA – Push floor

- for coarse and shredded fuels up to size class G150* (slivers up to 35 cm long) with hydraulic ram or conveyor transport
- up to size class G100* with auger transport

*)...Size class specifications and storage heights are for guidance only, as they depend on the actual kind of fuel and design variant. Beware of bridging which might occur on a storage height that exceeds twice the silo width.

BINDER – A One-Stop Shop

As a systems supplier, BINDER provides and installs complete boiler systems – from the fuel container to the stainless-steel chimney, from the accumulator tank to the fully-fledged, mobile and containerised heating centre – with all components produced and works tested.

- fully-fledged containerised boiler systems
- control systems, from the boiler control downstream to network control
- transport systems for fuels and ash
- fuel storage containers, accumulator tanks, stainless steel chimneys, shredders, etc.

Type Survey Supply Systems

www.binder-gmbh.at

Energy from biomass

Start – and Have Heat Generated Around the Clock

The BINDER range of biomass boilers sets a benchmark for convenience and comfort in handling:

- automated de-ashing*
- automatic cleaning of the heat exchanger*
- computer based capacity/combustion control* and accumulator tank management*

Start the boiler and have heat generated around the clock – with only bi-annual servicing for routine inspection and cleaning.

"Ease-of-use and the level of maintenance are comparable to conventional oil fired boiler systems. The only difference is an extra two or three fuel deliveries per heating period, and even those could be triggered automatically."

Mayor Franz König,
municipal 500 kW pellet boiler

High Overall Efficiency Across the Output Range

BINDER boilers achieve efficiency ratings of over 92 percent[1] with woodchips.

- The CVP control package* gives fully modulating capacity control from 25 % to 100 %.
- Speed-control* on all fans minimises the electric power consumption.
- The Lambda O_2 regulation improves efficiency and brings out the most of your fuel.
- High quality engineering with a minimum on maintenance required provides for high availabilty.

1)…Test report A-1211-1/18d-06, NUA-Umweltanalytik GmbH

Lambda O_2 Regulation

This sensor system uses the exhaust O_2 level as an efficient indicator for complete combustion and ensures optimum combustion at all times.

- It reacts to fuel variations by automatically adjusting the air intake and/or fuel supply.
- It provides for stable combustion without emission peaks even where fuel quality varies.

Secure and Safe Systems

- The modem interface* with the boiler permits immediate remote support through the internet and will ensure that future software extensions are available promptly.
- Using the BINDER Tele-package* you'll be notified automatically about any upcoming message – such as the silo's fuel level control – even during a local power failure.
- Quadruple safety devices, approved and certified, prevent any fire reaching the fuel silo.

BINDER systems are built to last. Robust materials and good design ensures increased reliability, low maintenance costs, and a long lifespan.

Clean Emissions

BINDER boilers are 'carbon-neutral' systems with low pollution levels for NOx, CO and particulates well within the limits[1]. As a result, BINDER boilers are approved for smoke control areas under the Clean Air Act, due to:

- low-NOx design*,
- a superb combustion zone design, allowing sufficient residence time to minimise unburnt gases,
- Lambda O_2 regulation to optimise the combustion on varying fuel quality,
- excellent exhaust gas cleaning, using mono/multi cyclones, electrostatic or baghouse filters*.

Low-NOx Design*

For fuels with a high nitrogen content, such as bark etc:

- Controlled flue gas recirculation* regulates combustion temperature and fuel-to-air ratio.
- Regulated air supply allows air staging in the pyrolysis, the gasification, and the oxidation stage.
- The optimum design of the combustion chamber permits a long residence time for the fuel and good mixing of the flue gases.

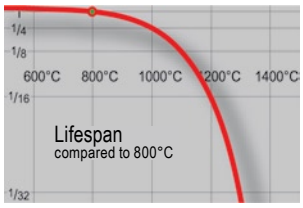
The net effect is a highly efficient, low-NOx boiler system.

Flue Gas Recirculation*

Depending on the temperature in the combustion chamber, this feature adds a regulated amount of flue gas to the combustion air, thus:

- preventing over-high temperatures in the combustion chamber,
- reducing the risk of clinkering and deposit formation,
- enabling a reduction in the exhaust O_2 level which improves the boiler efficiency.

This feature is particularly recommended for fuels with either a high calorific value, low ash fusion point, or a high nitrogen content.



Because of the greater volume of flue gas in the combustion chamber, more heat is dissipated from here towards the heat exchanger. Lower overall temperatures also increase the lifespan of firebricks and the grate.

*…dependent on unit size and system configuration

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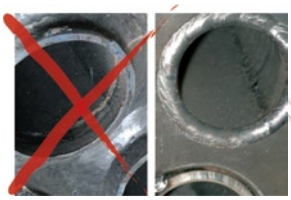
Tried and Tested Technology



Boiler tubes, best-practise chamfered and root welded, individually exchangeable if needed

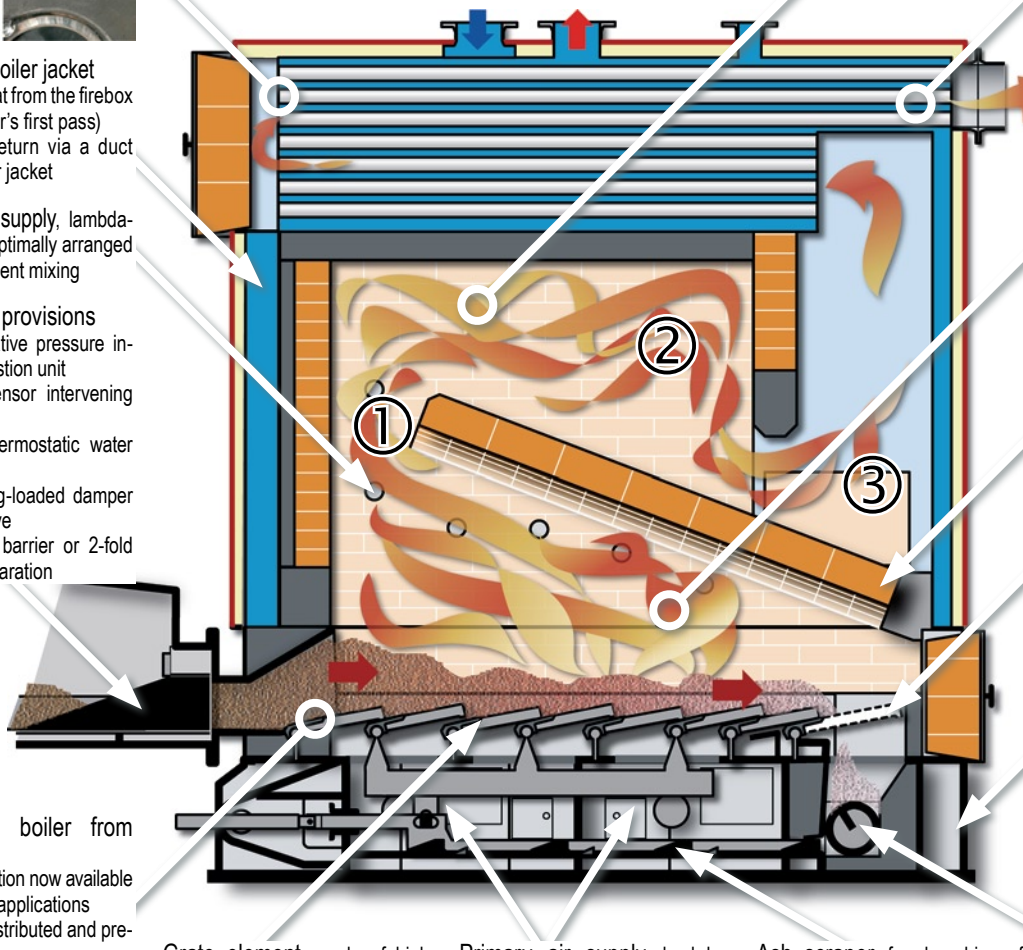
Lining with standard firebricks instead of manufacturer specific moulded bricks: simple and cheap to repair

Boiler tube cleaning
- unique high-velocity fluegas circulation system
- avoids emission peaks generated by air blasts
- automatic de-ashing in preset intervals, with cleaning effect over the entire tube length
- no interference with the combustion process

Water-cooled boiler jacket
- absorbs the heat from the firebox (heat exchanger's first pass)
- preheats the return via a duct along the boiler jacket

Secondary air supply, lambda-controlled, with optimally arranged nozzles for excellent mixing

Anti-burnback provisions
- controlled negative pressure inside the combustion unit
- thermostatic sensor intervening PLC routine
- direct-acting thermostatic water dousing system
- approved spring-loaded damper or rotary air valve
- monitored fuel barrier or 2-fold mechanical separation



Combustion chamber
- stoichiometrically designed three zone system
- completey lined with refractory brickwork

Radiation arch, with optimised air flow, made of high temp firebricks

Grate screen, prevents damage from debris to the ash auger

Industrial quality
- Wall thickness (standard):
  Exchanger: 6 mm
  Boiler base: 10 resp. 5 mm
- heavy-duty cleaning doors and inspection apertures, functionally arranged

Moving grate boiler from > 150 kW
- large-scale solution now available for commercial applications
- fuel is evenly distributed and predried
- automatic de-ashing into a single ash container
- powered by heavy-duty hydraulic unit

Grate element, made of high temperature cast chromium alloy, sectional for easy replacement

Primary air supply, lambda-controlled, with load-dependent distribution to combustion and burnout zone

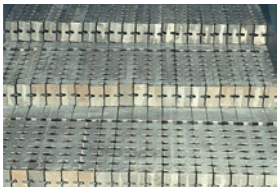
Ash scraper, for de-ashing of the entire boiler base

Ash auger, for removal of the ash into the central container

Ideal Combustion Zoning

The flue gas flow complies with the TTT-principle – time, temperature, turbulence. It generates stable combustion resulting in low pollution and maximum efficiency under all load conditions.

- Rotation zone ①– permits the optimal mingling of the unburnt flue gases
- Turbulation zone ②– the hottest section of the combustion chamber provides for the complete oxidation of CO into CO_2
- Expansion zone ③– the turbulent flue gases calm down, and most of the fly ash descends and settles.



Years of experience in material selection and in designing the combustion chamber safeguard the boiler's longevity, even if operated with troublesome fuels.

Combustion Chamber

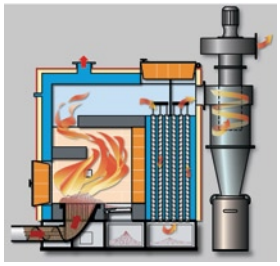
At temperatures up to and exceeding 1000°C, materials are exposed to hostile conditions that have to be compensated for:

- fully lined firebox for wet fuels: the combustion chamber is completely lined with high quality refractory brickwork and cooled by the boiler's water jacket.
- semi-lined firebox for dry fuels: avoids clinkering on fuels with low ash melting point
- High-grade anti-scale/heat-resistant chromium cast steel alloy is used for grates and the boiler hearth, which are cooled from below with primary combustion air.

Know-how and Reliability

Well Designed Heat Exchangers

- BINDER fire tube heat exchangers are highly efficient and are made to match your heating needs.
- Manual maintenance is minimised through a fully automatic high-velocity cleaning system*.
- Boiler steel tubing with 4.5 mm walls and optimum welding guarantees a long lifespan.



Boilers up to 150 kW are equipped with vertical fire tubes. Spring turbulators provide for optimum heat transfer as well as automatic tube cleaning.

Biomass-fuelled fluegas-to-air heat exchangers are available from 200 to 3 000 kW for drying plants or for the production of thermowood. Typically such warm-air systems are also applied for factory or warehouse heating

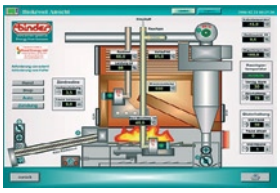
Low-temperature hot water boilers are designed for operation at 3 bar with 95°C flow temperature. Boilers up to 10 bar are available for the generation of high temperature hot water or steam.

Automatic De-Ashing

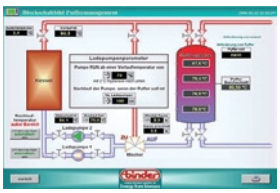
- Fly ash and bottom ash are automatically conveyed into a central ash container, using augers* or conveyors*, or
- Ash is collected in integrated containers. Depending on the fuel ash content, these containers can be left for several weeks before emptying.

Central ash-container* with a capacity of 0.06-1.25 m³ depending on the boiler size, on request up to 3 m³

Tube cleaning: part of the exhaust gas is returned to the heat exchanger and blown through the fire tubes at such a velocity that particles already deposited are removed and then collected in the cyclone.



With the BINDER graphics package*, a computer terminal serves for the data input and display. The plant's parameters are monitored, displayed, and trend data may be sampled and evaluated for longer periods of time. The system can be linked via a modem to allow remote monitoring of the unit.



The integration of an accumulator tank – which may also be combined with solar heating – is perhaps the utmost efficient heating concept, ideal for district heating systems. It also allows a smaller capacity boiler unit to be used for the same peak load.

Fully Automatic Tube Cleaning System*

This feature provides high velocity de-ashing of the heat exchanger's fire tubes at preset intervals without interfering with normal operation:

- prevents the formation of deposits, thus maintaining a constant and efficient heat transfer,
- reduces the de-ashing maintenance to 1-2 basic procedures per year, depending on operation hours
- protects against boiler corrosion.

Capacity Control

- Air supply and fuel inputs are coordinated to attain the actual heat demand using PLC control and Lambda O_2 regulation.
- When heat demand drops, the unit is operated in part-load mode or is shut down.

Capacity and Combustion Control (CVP Control Package*)

Features a fully modulating computer control with 3 interdependent loops that permanently assess the actual load, adjust the fuel feed accordingly, and match it with the continuously variable air supply.

- Reacts dynamically to changes in the combustion process through the Lambda O_2 control which immediately adjusts the secondary air supply.
- Variable air volumes are automatically compensated by the integrated negative pressure control.
- Speed-controlled fans minimise electric power consumption.
- Provides an optimal efficiency over the entire output range of the boiler.

Accumulator Tank Management*

The use of a low-temperature hot water accumulator tank system works well with BINDER biomass boilers:

- Daily peak demands during full load periods are met through the accumulator tank.
- Heat demands during part-load periods are met through the boiler using modulating capacity control.
- Should the heat demand decrease further, the accumulator tank – now serving as the sole heat source – determines the boiler demand.

Repeated cycling is substantially reduced, which increases the boiler's lifetime and minimises air pollution as well.

4 Good Reasons to Choose Biomass Heating

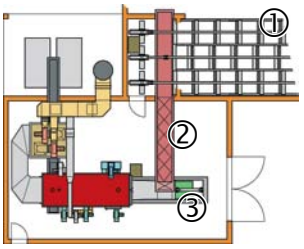
Industrial Large-Scale Systems

BINDER systems are available for the generation of process heat or for co-generation in CHP plants.

- Among other options, push floors ①, slat conveyors ② and/or hydraulic ram feeders ③ with integrated cutting edges are on-hand, which can accept even the coarsest of fuels.
- High-moisture fuels can be sufficiently pre-dried in a moving grate system.

BINDER systems are therefore suitable for a wide range of low-cost fuels.

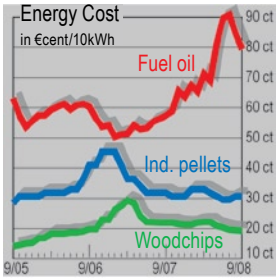
Installation of an 8 000 kW boiler



Steam dome of an 840 kW boiler

① Cost-effective Heating for the 21st Century

State-of-the-art biomass systems are more capital intensive than conventional oil or gas fired equipment, though many countries now offer capital grants and other incentives.
However, because of lower fuel costs, this investment is usually recovered in a short period of time – the higher your heating requirements, the quicker the payback period.



Whether your project is a district heating network, a hotel, or a residential care home: you are going to profit from low and predictable heating bills, that are up to 60 % lower than those for oil heating. Independent from price increases and crises in other regions of the world.

Indicative for Central Europe, excl. VAT

② Widespread Availability of Fuels

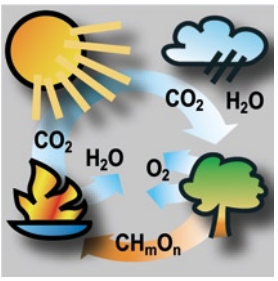
Sander dust, forest wood waste, bark or other biomass fuels – the by-products of your enterprise will contribute in reducing your heating bills as well as your disposal costs.
Even wet materials, stored in the open, can be used by BINDER boilers.

③ Climate Protection Campaigns

As a local authority you may have committed yourself to implement the ideas and goals of Sustainable Development, deriving from 'Local Agenda 21' or 'Climate Targets'.
Biomass boilers are 'carbon-neutral' systems, which reduce global warming and replace fossil fuels with a truly renewable source. Plus, they could make use of your waste from landscape management too.

④ Biomass = the energy source of the future

- In the near future, carbon will have a value and will be traded on commodity markets.
- Biomass is a renewable source of energy that virtually grows just around the corner. It is energy crisis-proof, is locally available, and doesn't cause ecological disasters.
- Biomass supports and creates domestic job opportunities, increases buying power in your region and lessens our dependency on fuel imports.



Biomass is "carbon-neutral", i.e. its combustion emits just that amount of CO_2 which has been previously absorbed from the atmosphere by photosynthesis under the influence of light – in exchange for mankind's indispensable oxygen.
Biomass therefore is pure, stored solar energy.

What You Should Consider When Selecting a Biomass Heating System

- Make sure you size the boiler system to your needs. Oversized or undersized boilers are less efficient and have a shorter lifespan.
- To which extent can you be guaranteed a constant fuel quality? Make sure that the boiler is capable of consuming a wide range of fuels and that it comes with a compensating control such as Lambda regulation.
- Check that the boiler system complies with local and national pollution limits. Check your own fuel through laboratory sample firing.
- The materials in the hot sections of the boiler are exposed to severe stress. Therefore, scrutinise the quality and temperature limits of the refractory lining, the wall thicknesses, as well as the serviceability of parts. Complex solutions aren't necessarily the most durable ones.
- Insist on visiting some reference units and talk to their owners. Check your supplier's experience in the field of biomass combustion.

25 Years of Experience

Josef jr., Josef sr., Stefanie, and Johannes Binder

The products we develop make sense from both an economic as well as ecological point of view. They are truly a technology that meets all the criteria for successful Sustainable Development. This is a principle we also follow in all our business activities:

- through honest, fair, and long-term partnerships with our customers and suppliers
- through constant improvements in the systems we offer
- through the appreciation of staff initiative, teamwork, and self-motivated employees
- through the resource-efficient manufacturing of products that have been designed for durability
- in the long tradition of a family firm with solid growth and sound foundation. We don't aim at short-term profit, but long-term growth and sustained development.

We look forward to working with you and your organisation.

Josef Binder sr., Managing Director

Our sales partner nearest to you:

Made in Austria

On its two premises spread over 11 hectares and with 6.200 m² of shop-floor area, BINDER manufactures more than 200 boiler systems per year.
The co-operation with nearby university research facilities and related organizations – with Austria being recognised for her expertise in wood heating with stringent pollution limits – as well as the know-how of its high-skilled 120-plus employees secure the high technological standard of BINDER boilers.

Worldwide Service

With more than 3.000 boilers installed all over the world – from Canada to Japan – BINDER has become a major player in this field. Reliable service and maintenance is provided through our own service team headquartered in Bärnbach, Austria, and supported by 13 sales and service organizations in 11 countries – all of them experts in biomass boilers and often credited for their efforts like our UK distributor, winner of the prestigious Ashden Award 2007.

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