

AXIS Tech

BIOMASS ENERGY EQUIPMENT



ABOUT US

AXIS Tech is one of the leading biomass energy equipment companies in the Baltic states that have been supplying green and sustainable energy solutions to cities and individual enterprises for three decades. This experience made our company an expert in generating energy from renewable biomass. Converting biomass into clean energy with a minimal environmental impact is a huge challenge that requires complex engineering of combustion processes with the highest standards. **AXIS Tech** is a reliable partner in biomass energy solutions - the company is compliant with the ISO and OHSAS quality standards.

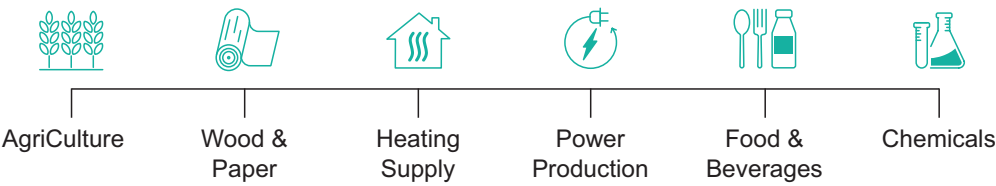


30 MW biomass boiler plant in Suwalki, Poland.

STANDARDS

ISO 14001:2015	ENVIRONMENTAL MANAGEMENT SYSTEM
QUALITY MANAGEMENT SYSTEMS	ISO 9001:2015
OHSAS 45001:2018	OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS

INDUSTRIES WE WORK IN



PRINCIPLES OF OPERATION



INNOVATIVE SOLUTIONS.

We can use our long-term experience in the completion of projects to offer innovative and unique solutions for the delivery of projects of various sizes and types.



FLEXIBILITY.

The priority of the company's qualified specialists is to provide professional services that meet the client's individual needs.



48 MW biomass boiler plant in Lithuania.



WIDE CHOICE OF SERVICES.

By delivering the complex services, we can fully accomplish the project targets, reach the accepted management, and control standards and ensure technological compatibility.



RESPECT FOR THE ENVIRONMENT.

Biomass is one the largest and still growing sources of energy. The use of biomass fuels for heating and for electricity generation is increasing in many developed countries as a means of avoiding carbon dioxide emissions from fossil fuel use. While carrying out our biomass-based energy solutions, we focus on the fulfilment of high environmental requirements.

FUEL RANGE

Biomass combustion properties can be species-specific and site-specific. Fertilization and the characteristics of the ground, where the biomass is grown, have an effect on ash content and ash melting, fouling and slagging temperatures, as well as emissions. For example properties of tree bark, branches and stem wood are all different. AXIS Tech fuel range consists from various biomass-based fuels to solid waste fuels. We can provide a range of combustion technologies suited for agricultural and wood residues, recycled wood and energy crops.



BIOMASS	TYPE
Stem wood	Deciduous and coniferous trees
Wastes from sawmills and wood processing	Plates Slices Cutting dust (limited quantity) Chips (limited quantity) Bark (limited quantity)
Trees found	Deciduous trees Coniferous trees Mixed
Deforestation waste	Tops, branches, trunk trim, stumps Small trees Shrubs
Non - forest wood	Wastes from unloading, self - sowing and road cutting

BIOMASS-BASED ENERGY SOLUTIONS

Depending on the desired types of energy and their applicability, we offer the following solutions:

- **Cogeneration heat and power plants** - the produced thermal energy can be supplied to the municipal heating network and the electric energy - to the national electric grid.
- **Water heating plants (boiler facilities)** - the thermal energy produced can be supplied to the municipal heating network or used to support process operations.
- **Steam supply plants (boiler facilities)** - the produced steam can be used both for heating and for maintaining process operations in industrial facilities.
- **Thermal oil power plants** - the output heat is used for maintaining process operations.
- **Mixed purpose heat and power plants** - heat and/or electric energy produced by means of various utilities (thermal oil, water, steam, flue gas) is supplied to external networks or used to maintain system operations.
- **Container boiler facilities** - the heat output is used to satisfy low demands for heat energy: heating of residential houses or other buildings.
- **Straw-fuelled boiler facilities** - the heat output is used to maintain system operations or supplied to municipal heating networks.



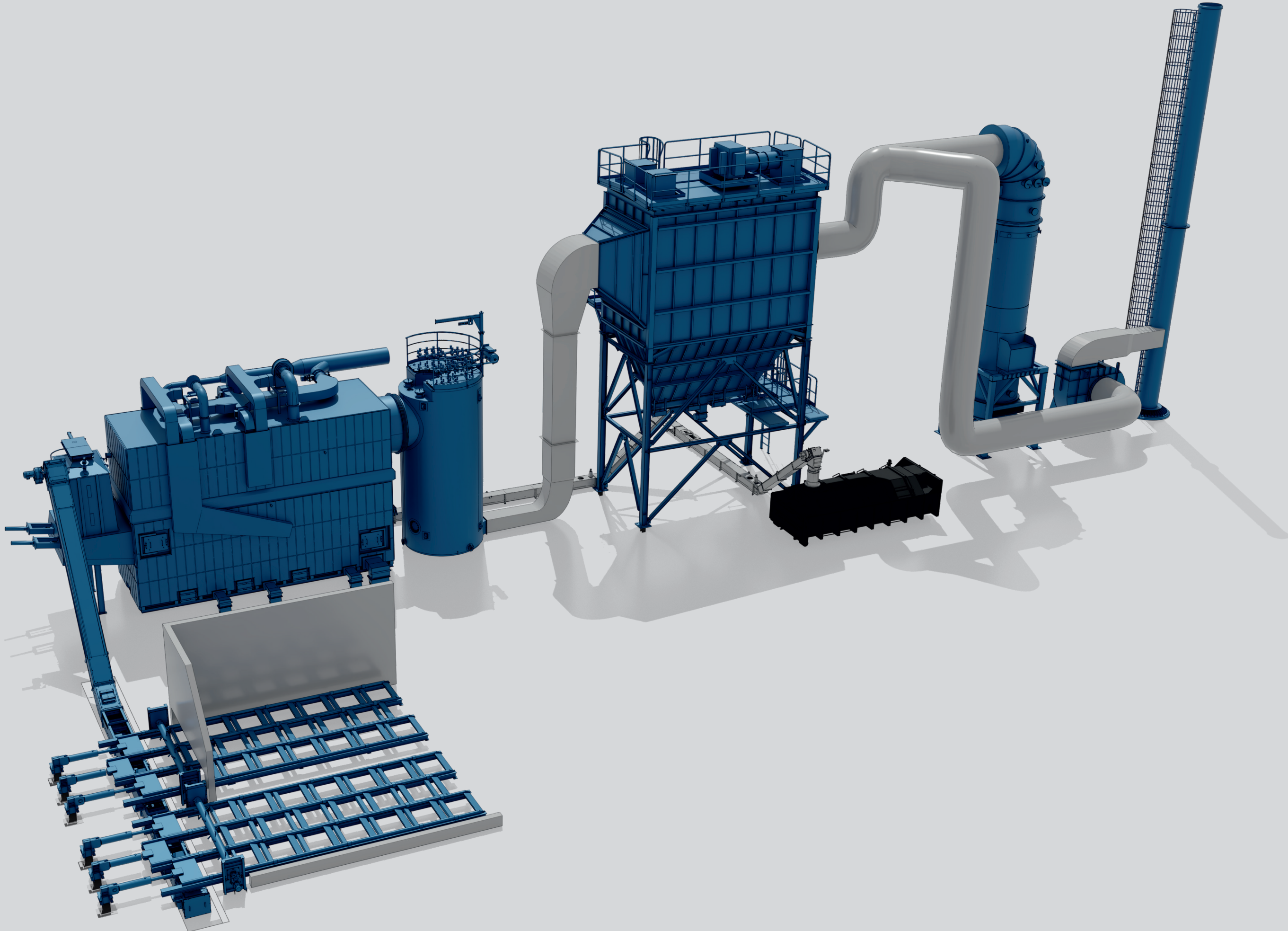
BIOMASS COMBUSTION TECHNOLOGIES

The biomass combustion technologies are designed for the combustion of economical and environmentally harmless fuels which have been used by humans since the earliest days. This kind of fuels belongs to the renewable energy sources, the use of which is the priority of the EU energy policy.

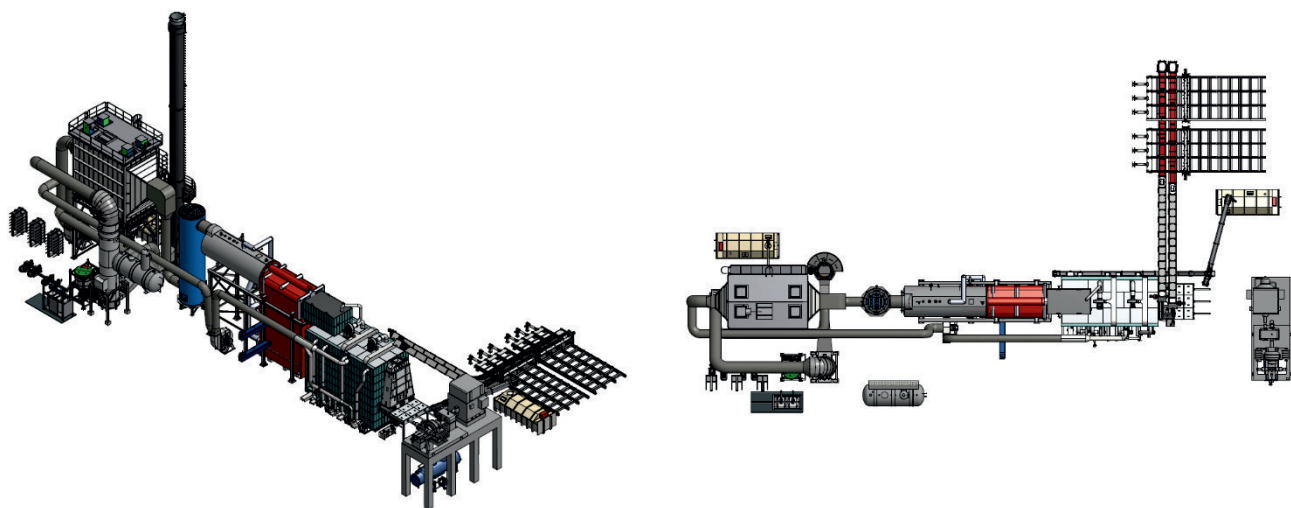
Depending on the biomass type planned to be used and the demand for heat, we offer the following combustion technologies:

- **Fuel combustion system with a moving step grate system.** Since the fuel layer can be arranged in a more uniform way, technologies including a moving or vibrating grate, are the most popular fuel combustion systems. They maximise the amount of heat produced while significantly reducing the amount of pollution which gets out into the environment as incompletely burnt particles.
- **Fluidized bed fuel combustion system.** One of the key advantages of this technology is the capability to burn various solid fuels of low and very low quality and to reduce amounts of the pollution discharged in the process.





BIOMASS-FIRED COGENERATION HEAT AND POWER PLANTS



-  Furnace
-  Steam boiler
-  Steam turbine with generator
-  Electrostatic precipitator (ESP)
-  Condensing economizer
-  Flue treatment duct and chimney
-  Ash removal system
-  Electric and automatic devices
-  Water treatment system with degasser
-  Water and steam pipelines
-  Biomass storage and transport systems

Standardised biomass heat and power plants employ the principle of cogeneration. Cogeneration is a process where electric energy and heat are produced simultaneously in a single process. The thermal energy of biomass burnt in a cogeneration heat and power plant is used for water evaporation. The additional thermal energy is produced in the condensing economizer and it is also transferred to the boiler water.

ADVANTAGES

- Fast project completion with minimised costs.

► Equipment energy specifications guaranteed in the design are ensured.

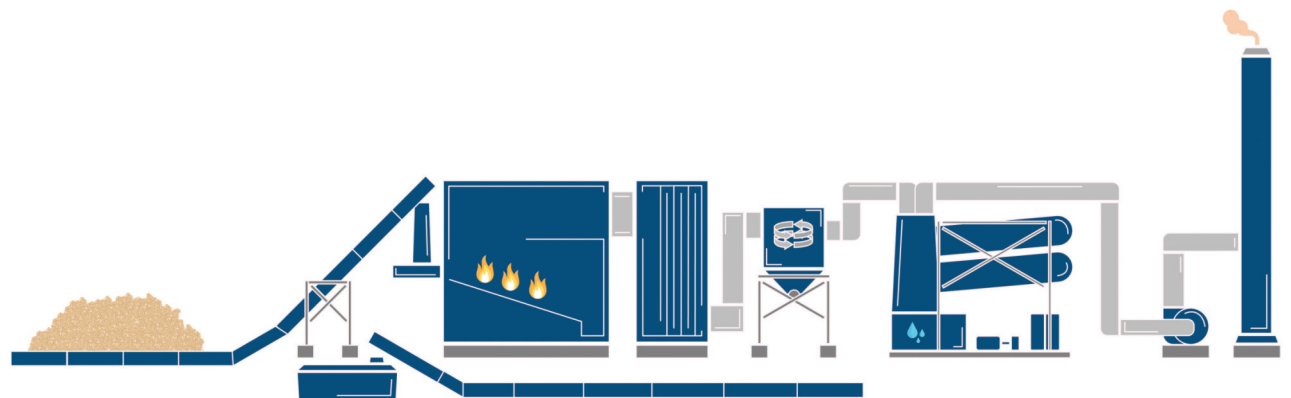
► High environment protection indexes: < 100 mg/Nm³.

► Easy maintenance and repairs.
- Faster and easier completion of the project ensured thanks to the use of reliable standardised solutions.

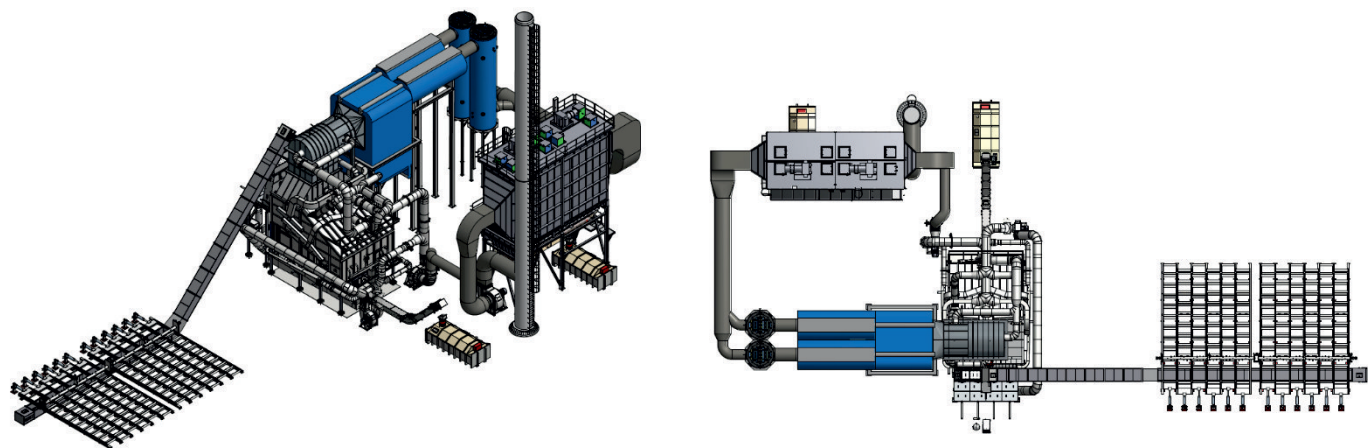
► High efficiency level: > 8000 working hours per year.

► Possibility to burn low quality fuel wood and peat.

Heat and power plant type	Electric power, MWe	Thermal power, MWh
2.5	1-2.5	12
5.0	1.5-5.0	20
10.0	3-10	40
20.0	4-20	70



STEAM SUPPLY PLANTS



-  System for the storing and transporting of fuel to the furnace
-  Furnace
-  Boiler
-  Flue gas treatment system
-  Water treatment system and degasser
-  Flue gas condensing economizer (if necessary)
-  Ash removal system
-  Chimney
-  Control system

The steam produced in steam heat plants can be used both for heating (external networks) and for process purposes in industrial facilities and heat and power plants.

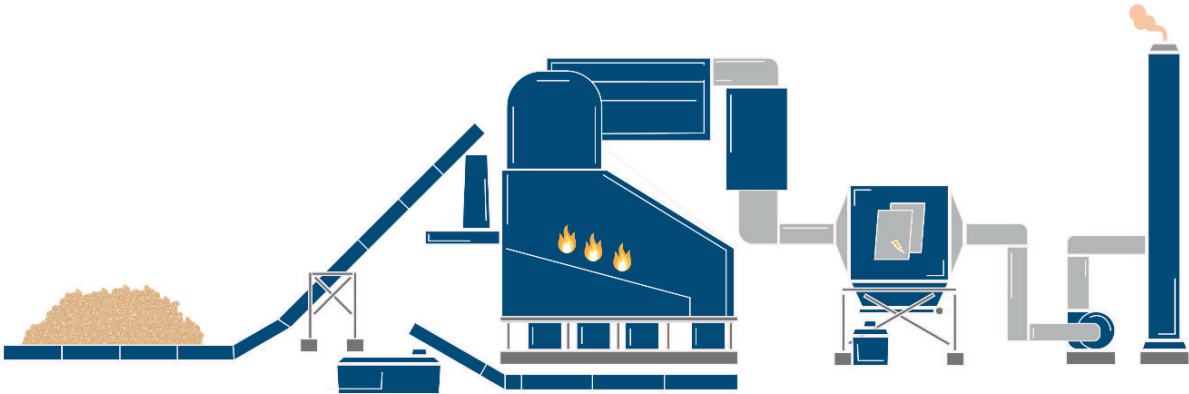
ADVANTAGES

- Faster and easier completion of the project ensured thanks to the use of reliable and standardised solutions.

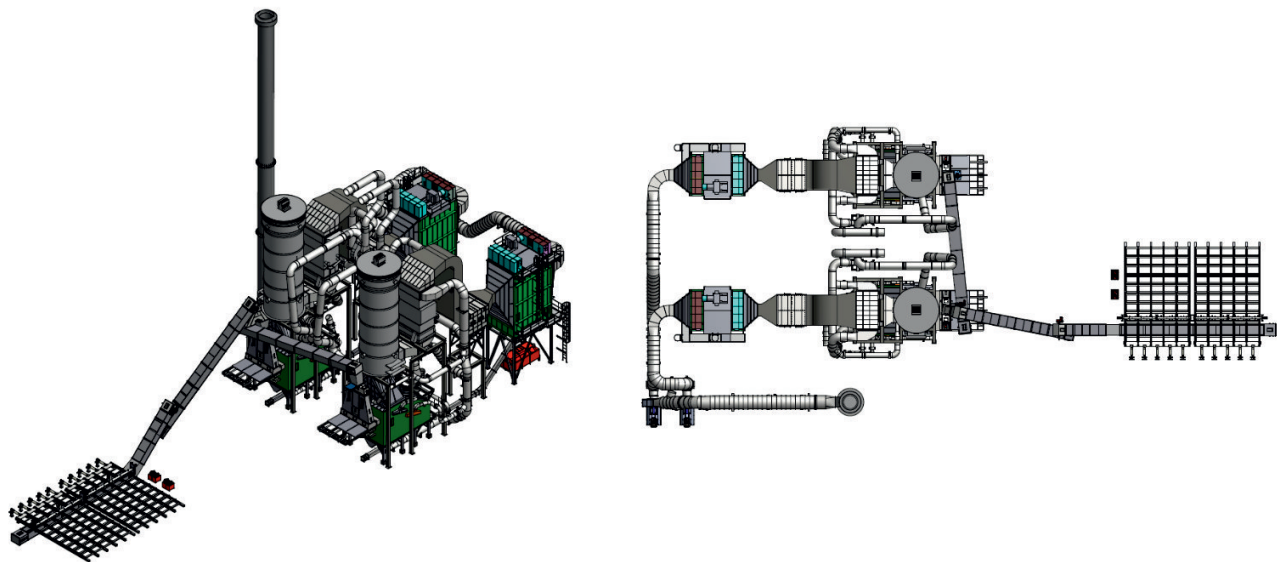
► High efficiency level: > 8000 working hours per year.
- Easy maintenance and repairs.
- Stability of parameters guaranteed through the use of a fully automated control system.

► Conformity of the systems to the highest environmental requirements.

Characteristics	Unit of measure	Value
Furnace (boiler) power range	t/h	1-30
Load range	%	30-100
Steam temperature	°C	to 500
Boiler general efficiency coefficient depending on the type of fuel	%	~ 87
Nox concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm ³	< 300
CO concentration (downstream of the boiler)	mg/Nm ³	< 200
Dust concentration (solid particles) in chimney flue gases	mg/Nm ³	< 30



THERMAL OIL HEATING PLANTS



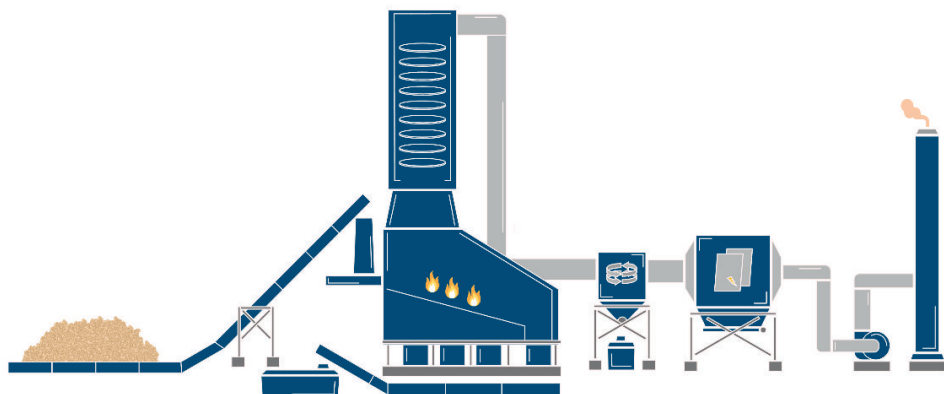
-  System for the storing and transporting of fuel to the furnace
-  Boiler
-  Flue gas condensing economizer (if necessary)
-  Chimney
-  Furnace
-  Flue gas treatment system
-  Ash removal system
-  Control system

Thermal oil heat plants use thermal oil as heat medium, which makes it possible to obtain high temperature without using water steam and high pressure.

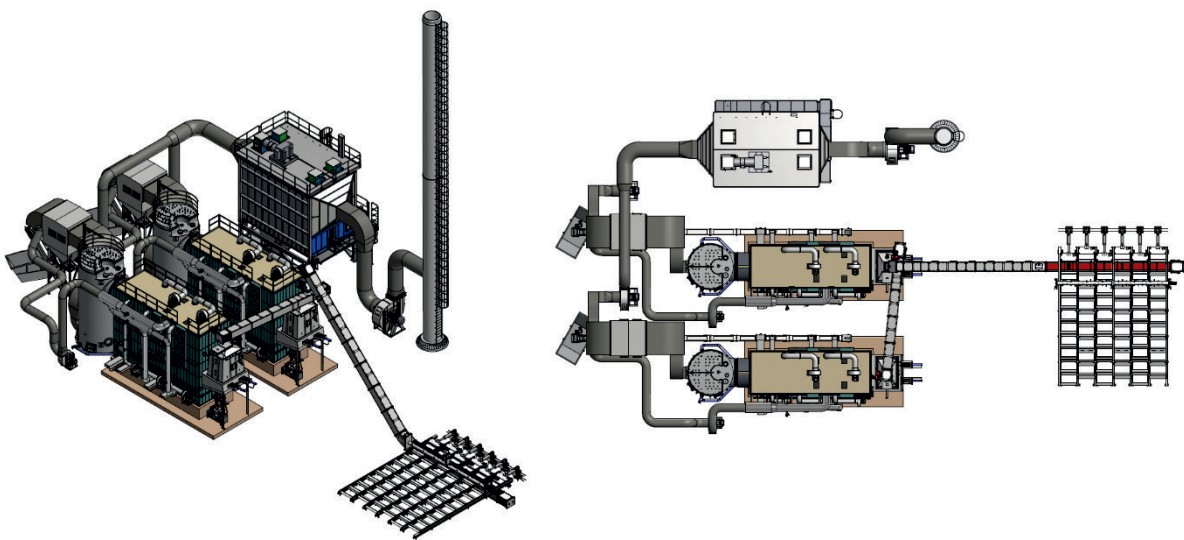
ADVANTAGES

- Temperature up to 350 °C at low operating pressure (up to 10 bars).
- Stability of parameters guaranteed through the use of a fully automated control system.
- Conformity of the systems to the highest environmental requirements.
- Easy maintenance and repairs.

Characteristics	Unit of measure	Value
Furnace (boiler) power range	MWt	1-20
Load range	%	30-100
Thermal oil temperature	°C	to 350
Boiler general efficiency coefficient depending on the type of fuel	%	> 80 %
Nox concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm ³	< 300
CO concentration (downstream of the boiler)	mg/Nm ³	< 200
Dust concentration (solid particles) in chimney flue gases	mg/Nm ³	< 30



WATER HEATING PLANTS



-  System for the storing and transporting of fuel to the furnace
-  Boiler
-  Flue gas condensing economizer (if necessary)
-  Chimney
-  Furnace
-  Flue gas treatment system
-  Ash removal system
-  Control system

Warm water produced in water heat plants can be used both for interior space heating and for the preparation of warm utility water.

ADVANTAGES

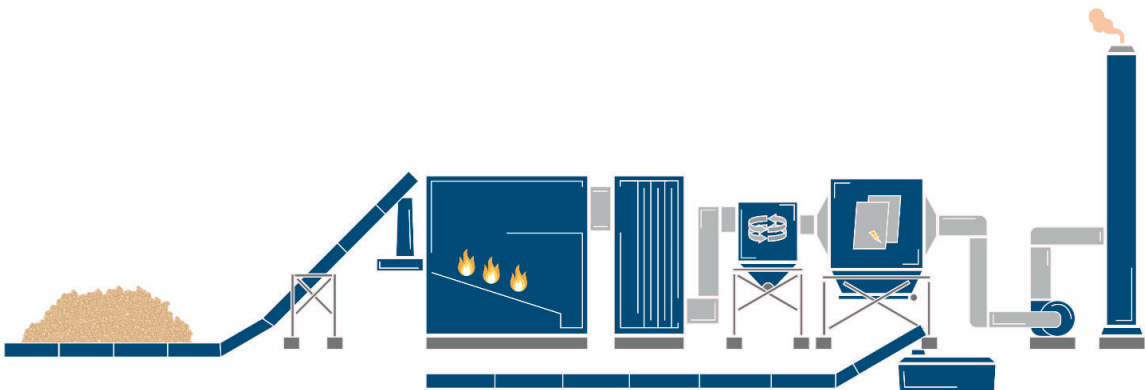
- High efficiency level: > 8000 working hours per year.

► Guaranteed stability of parameters through the use of a fully automated control system.
- Faster and easier completion of the project ensured thanks to the use of reliable and standardised solutions.

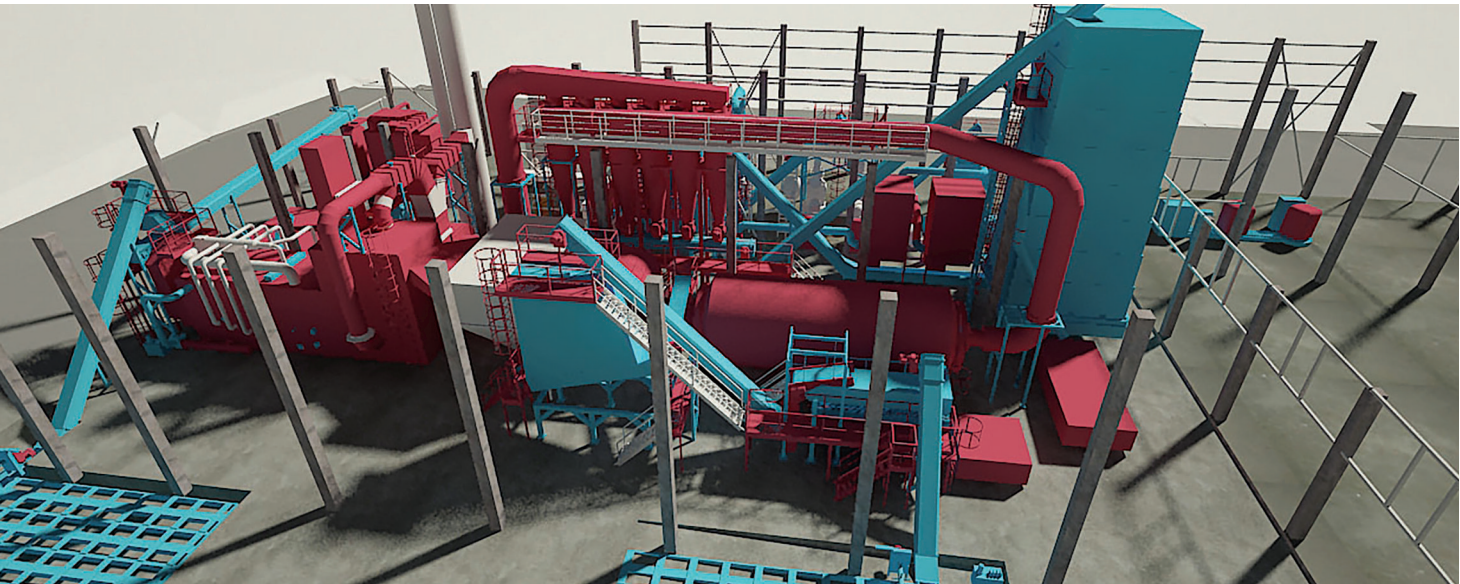
► Low operation costs
- Conformity of the systems to the highest environmental requirements.

► Easy maintenance and repairs.

Characteristics	Unit of measure	Value
Furnace (boiler) power range	MWt	5-20
Load range	%	30-100
Water operating temperature	°C	to 150
Water operating pressure	bar	to 16
Boiler general efficiency coefficient depending on the type of fuel	%	~ 87
Nox concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm ³	< 300
CO concentration (downstream of the boiler)	mg/Nm ³	< 200
Dust concentration (solid particles) in chimney flue gases	mg/Nm ³	< 30



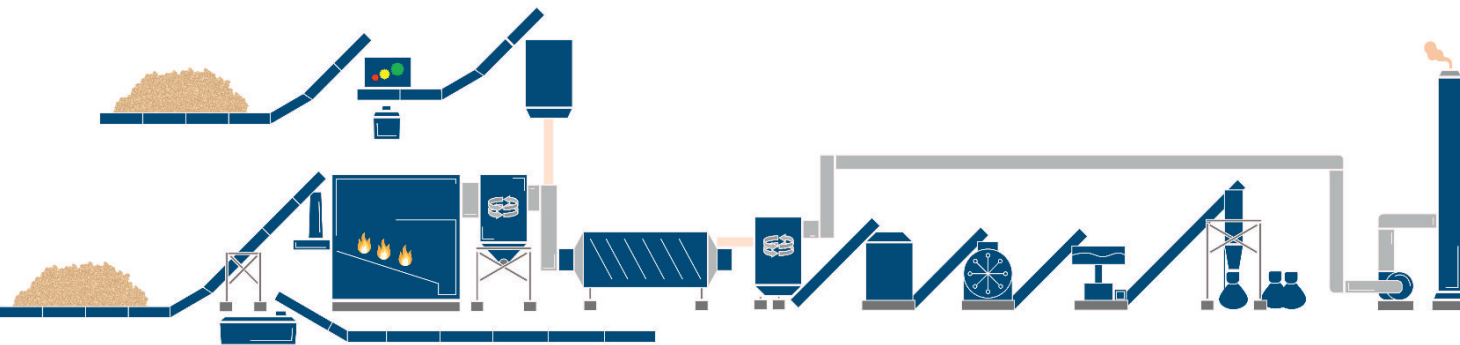
PELLETING LINE



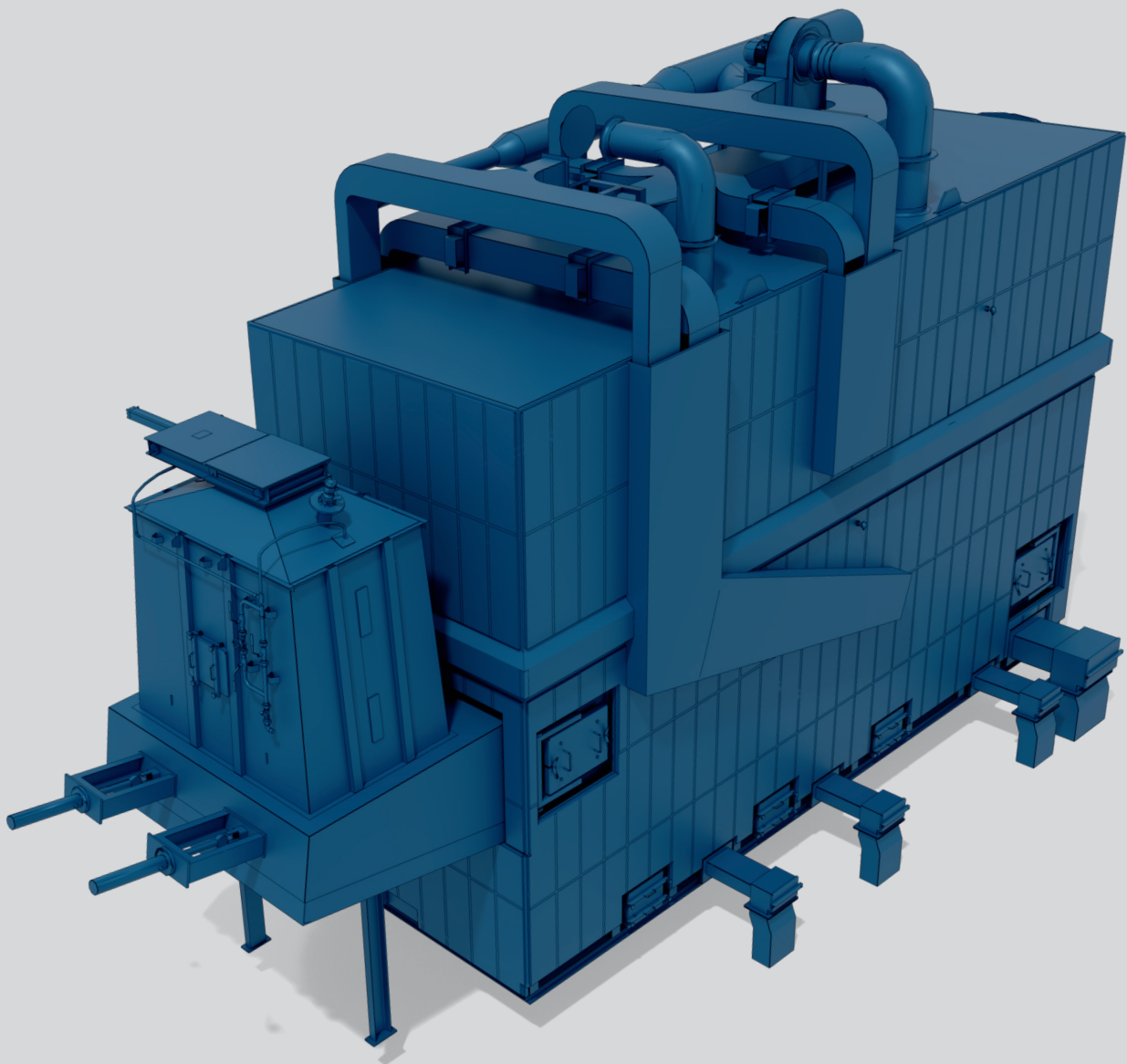
-  Raw material and fuel storages with moving floor
-  Raw material drying and sawdust transport systems
-  Sawdust granulation systems
-  Granulate transport and packaging systems

Raw materials from the warehouse with a moving floor are supplied to transporters which convey them to granulators. Sawdust is compressed in granulators and then transported, as granules, to packaging systems.

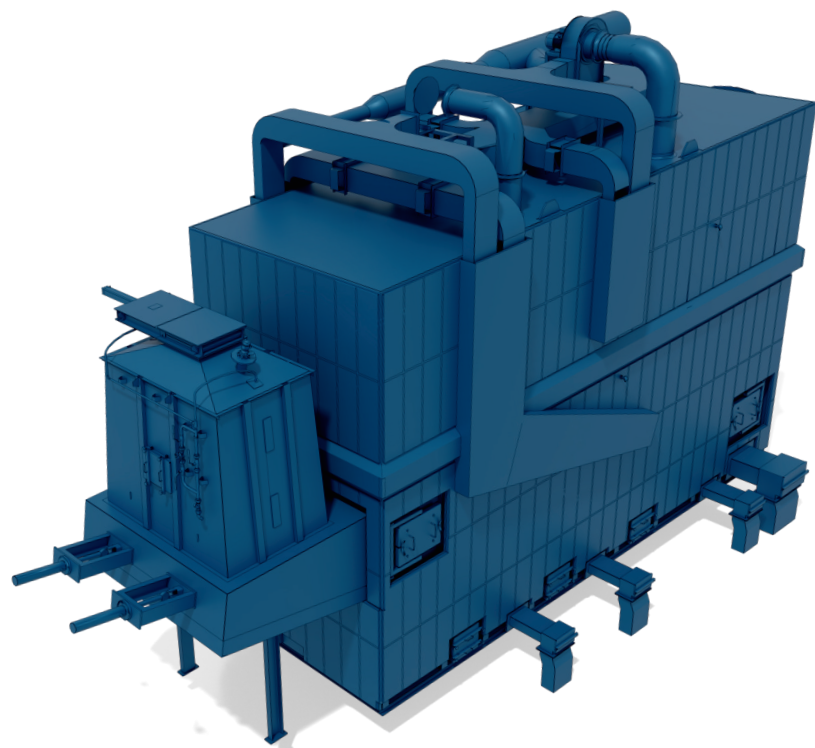
Characteristics	Unit of measure	Value
Drying line furnace power	MWt	7
Granulation line output capacity	t/h	6
Annual granulate production	t	50 000
Fuel		sawdust, woodchips, bark
Relative fuel moisture	%	35-55
Fuel calorific value	MJ/kg	7.16
Fuel tank capacity	m ³	150
Raw materials		debarked conifer sawdust, shredded wood (woodchips)
Raw material storage capacity	m ³	200



PRODUCTS



FURNACE WITH MOVING GRATE



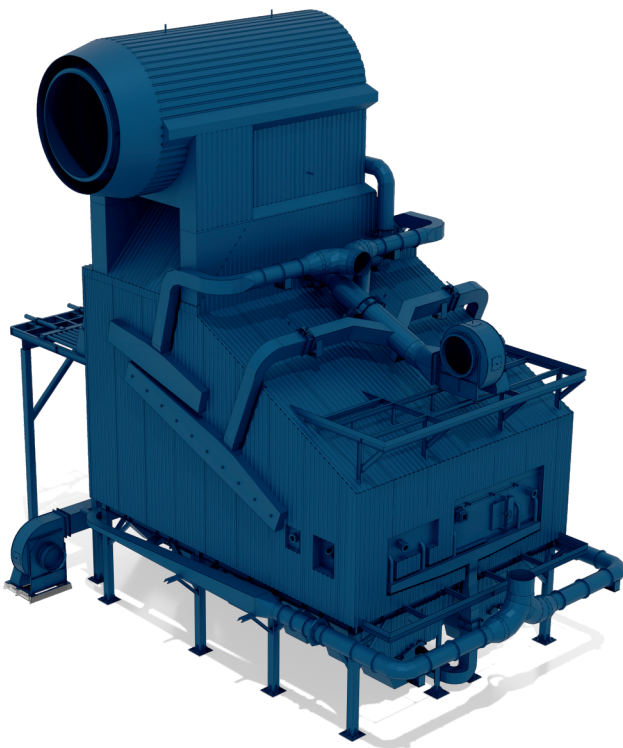
PKS line furnaces are a modern solution for burning biomass with a moving step grate, designed for burning shavings, sawdust, shredded wood waste, bark and peat with 30-60 % humidity and up to 65 % with an air preheater. Depending on the temperature in a specific firing zone, moving grate elements made of a cast iron alloy containing 16-25 % chromium are used, which ensures durability of the moving grate even at the highest temperature in the furnace. Temperature and pressure sensors installed inside the furnace as well as the permanent supervision system for the furnace operation contribute to the high quality of the furnace operation.

ADVANTAGES

- Thanks to the installation of an additional combustion chamber, combustion of unburned fuel components is ensured while maintaining the highest environmental requirements.
- By dividing all the air required for the combustion of biomass into primary, secondary and tertiary streams, high quality fuel combustion can be achieved and the amount of harmful waste emissions can be reduced.
- Automatic operation of the furnace and of the entire combustion system according to specified parameters.

Characteristics	Unit of measure	Value
Possible furnace (boiler) power	MWt	6(5)-15(13)
Load range	%	30-100
Fuel moisture	%	30-60
Fuel consumption (at 50 % humidity) per 1 MWt	kg/h	~ 530
	(m³/h)	~ 1.7
Excess air coefficient		1.4 (O ₂ = 6 %)
Demand for air per 1 MWt	Nm³/h	1700
Debit of combustion products per 1 MWt	Nm³/h	3180
Temperature of combustion products downstream of the furnace	°C	900-1000
Emission factors (dry smoke, at O ₂ = 6 %): NO _x concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm³	< 300
CO concentration (downstream of the boiler)	mg/Nm³	< 200
Dust concentration after the furnace	mg/Nm³	< 600-1000

FURNACE WITH MOVING GRATE



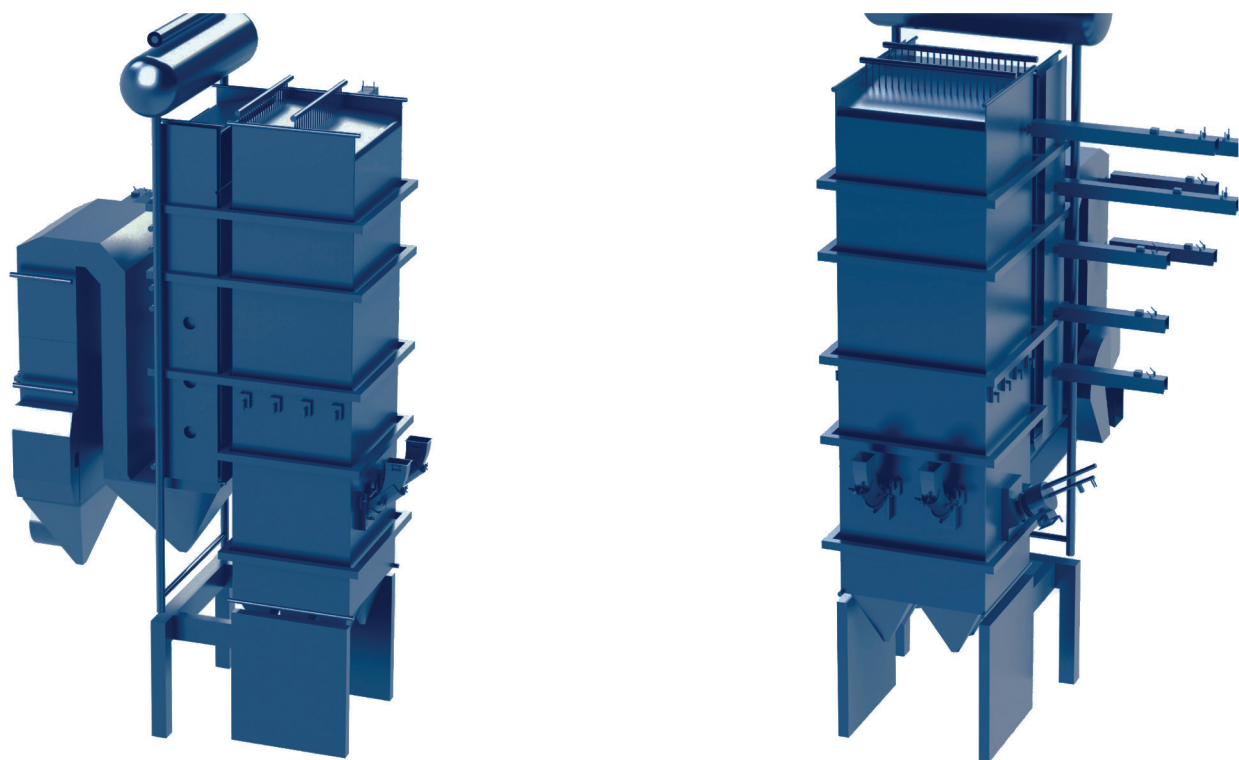
Furnaces of this type can offer power ranging from 9 to 30 MWt and are compatible with various boiler types. Biomass of various kinds: wood chips, bark, sawdust and wood dust, logging waste, etc. is used as fuel in such furnaces. The furnace makes it possible to maintain the pre-set parameters of the boiler operation with a maximum biomass humidity of up to 30-60 % and up to 65 % with an air preheater. Moving grate elements made of a cast iron alloy containing 25-27 % chromium are used in the furnace which ensures durability of the moving grate. The patent-protected design of the moving grate contains replaceable components, which makes it possible to double their operational lifetime.

ADVANTAGES

- The increased thermal power of the furnace is achieved through the use of a step moving grate only for fuel combustion (the grate is not designed for supplying fuel).
- More precise supply of the fuel to the furnace thanks to an improved geometry makes it possible to control the combustion process on the moving grate.

Characteristics	Unit of measure	Value
Possible furnace (boiler) power	MWt	9(8)-25(24)
Load range	%	30-100
Fuel moisture	%	30-60
Fuel consumption (at 50% humidity) per 1 MWt	kg/h	~ 530
	(m³/h)	~ 1.7
Excess air coefficient		1.4
Demand for air per 1 MWt	Nm³/h	1700
Debit of combustion products per 1 MWt	Nm³/h	3180
Temperature of combustion products downstream of the furnace	°C	900-1000
Emission factors (dry smoke, at O ₂ = 6 %): NO _x concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm³	< 300
CO concentration (downstream of the boiler)	mg/Nm³	< 200
Dust concentration after the furnace	mg/Nm³	< 1000

FLUIDISED BED FURNACE



Furnaces of this type can offer power ranging from 5 to 50 MWt and are compatible with steam or water boilers. Fuel is burnt in a fluidised furnace in space between walls cooled with water. The fluidised bed consists of sand with a grain size of 0.5 - 1.2 mm and a layer thickness of 300 - 600 mm. The primary sand stream scarifies the sand layer, in result of which it then begins to rise and “boil”, forming a suspension of air and sand. The boiler screens in the “boiling” layer zone are covered with a fire-proof concrete.

Biomass of various kinds: wood chips, bark, sawdust and wood dust, logging waste, etc. is used as fuel in such furnaces. The furnace makes it possible to maintain the pre-set parameters of the boiler operation with a maximum biomass humidity of up to 60 %. The “boiling” layer is controlled depending on the aerodynamic resistance value of the layer by adding or removing a proportional amount of sand.

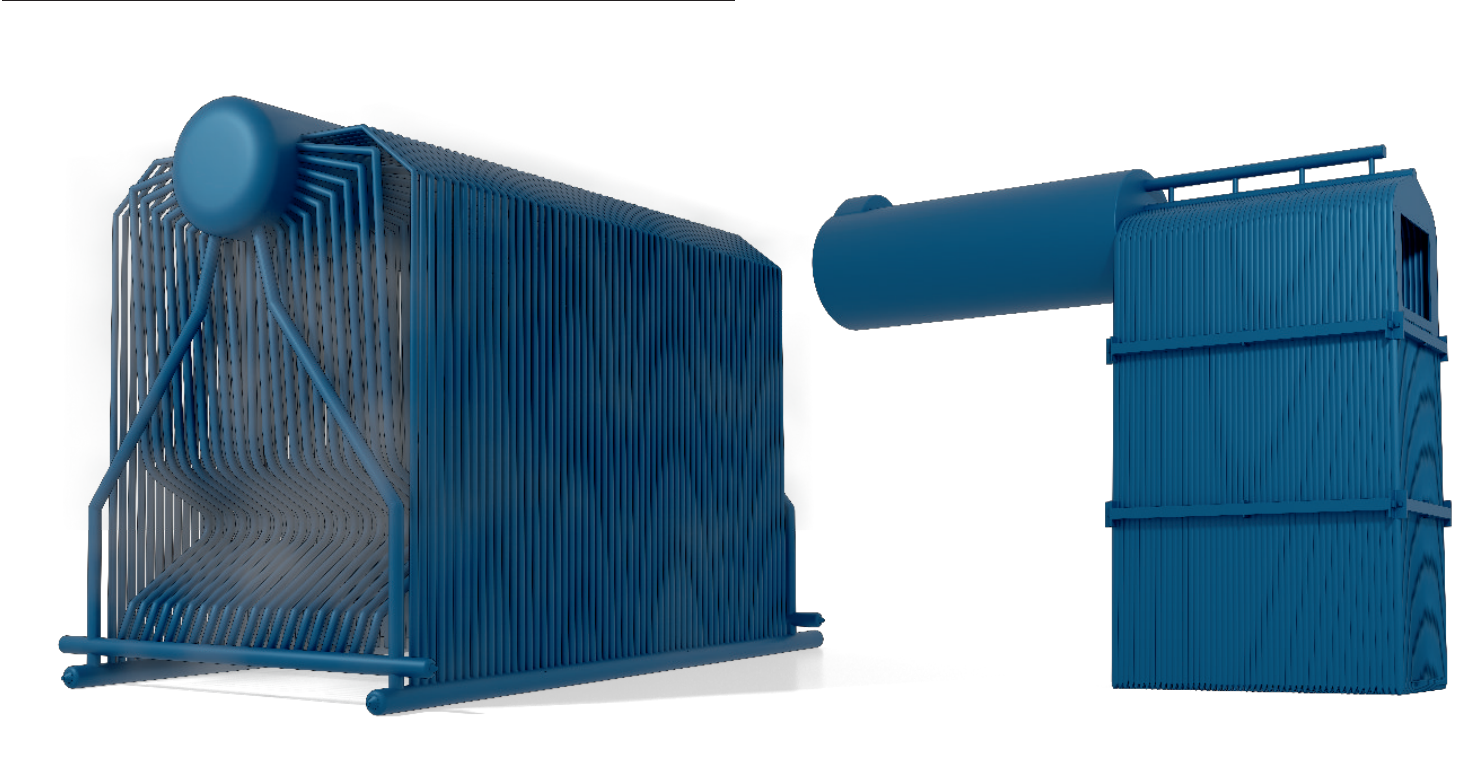
In a fluidised bed, less fuel is simultaneously consumed as compared to a furnace with a moving grate and therefore it is highly compact and dynamic.

ADVANTAGES

- ▶ High reliability level: > 8000 working hours per year
- ▶ Small amounts of harmful CO and NOx emissions.
- ▶ Wide power adjustment range of 25 - 100%.
- ▶ Very small amount of unburnt fuel.
- ▶ Fast power adjustment 4 %/min.
- ▶ Low repair and maintenance costs due to no wearing moving parts.

Characteristics	Unit of measure	Value
Available furnace (boiler) power	MWt	6-60 (5-50)
Load range	%	25-100
Fuel moisture	%	30-60
Excess air coefficient		1.2
Temperature of combustion products downstream of the furnace	°C	900-1000
Emission factors (dry smoke, at O ₂ = 6 %): NOx concentration (downstream of the boiler, at the nitrogen content in fuel up to 0.3 %)	mg/Nm ³	< 300
CO concentration (downstream of the boiler)	mg/Nm ³	< 200
Dust concentration after the furnace	mg/Nm ³	< 1000-4000

STEAM BOILERS



Boilers of this type are highly popular due to their reliability, durability and easy operability. The standard equipment includes the ash removal system which cleans the boiler tubing surface of residual ash by blowing and transfers more heat to water or steam.

-  Vertical, horizontal
-  Flame
-  With moving step grate BFB, CFB
-  Water-pipe (water in pipes, smoke outside the pipes)
-  Producing saturated or overheated steam

ADVANTAGES

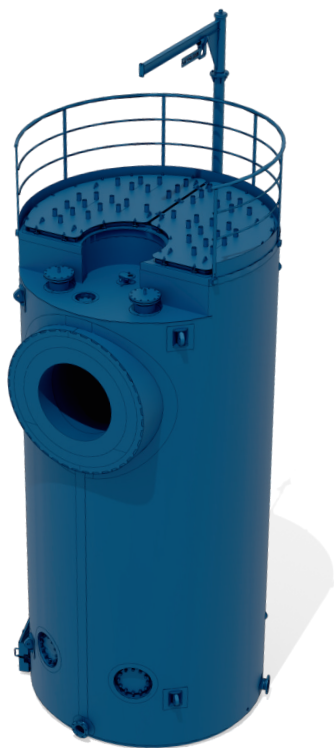
- Possibility to adapt old gas boilers to biomass.

► Variant with modified furnaces which accommodate an additional combustion chimney installed above the ceiling of the main combustion chamber.
- High efficiency demonstrated by the thermal energy output increase at a smaller fuel consumption.

► Reduced thermal losses by better thermal insulation.

Characteristics	Unit of measure	Value
Output capacity	t/h	1-30
Steam temperature	°C	up to 500
Steam pressure	bar	up to 60
Temperature of the water supplied to the boiler	°C	104-130
Boiler efficiency	%	87

WATER HEATING BOILER



Water boilers can have a vertical or horizontal structure. The former have 3 passes and their minimal power is 5 MWt. The set also includes furnaces with a moving step grate. The key component of these boilers is a drum with flame tubes and an overheating protection installed in the lower part. Boilers with the horizontal structure can offer power from 5 to 20 MW. A boiler of this type consists of a cylindrical body with a chamber and two vertical ducts of flue convectors.

ADVANTAGES

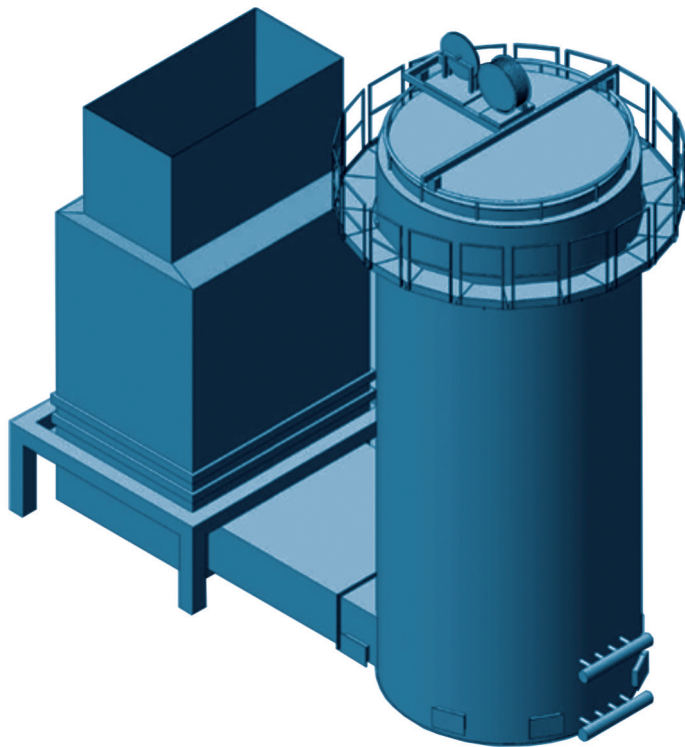
- Installation of boilers including all required sensors (automatic control).

► Easy maintenance and repairs.
- Full protection ensured in case of a failure by explosive valves installed in boilers.

► Reduced thermal losses by better thermal insulation.

Characteristics	Unit of measure	Value
Boiler type		water-tube or flame-tube (smoke-tube)
Furnace type		moving step grate
Boiler purpose		water heating
Furnace and boiler power	MWt	5-20
Load adjustment range	°C	30-100
Furnace and boiler efficiency	%	~ 87

THERMAL OIL BOILERS



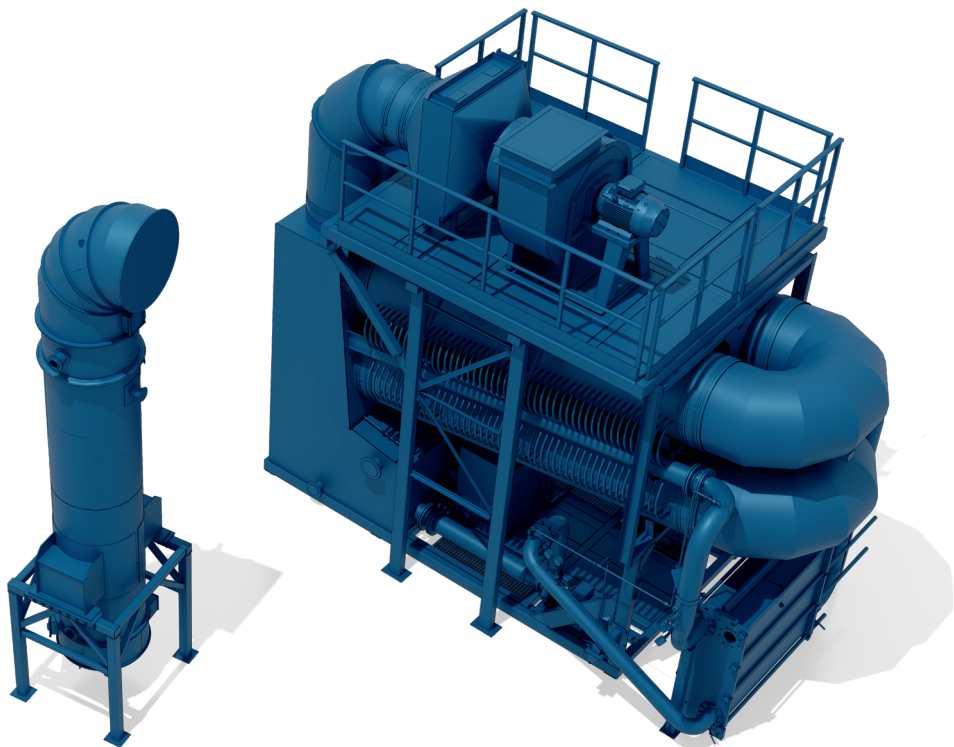
Boilers of this type employ the principle of transferring the thermal energy of the smoke to the thermal oil. These boilers have to comply with particularly high requirements concerning safety and reliability and therefore they are manufactured in conformity with the Pressure Equipment Directive of the European Union, AD-Merkblätter and DIN 4754. Thermal oil boilers are installed on steel structures. The heat exchanger consists of concentrically arranged pipes which are installed in an unstrained state in a welded housing. In order to ensure permanent flow, the tubes are interconnected in a serial mode. The boilers are equipped with a patent-protected ash blow system to ensure long-lasting and effective operation.

ADVANTAGES

- Temperature up to 350 °C at low pressure (up to 10 bars).
- In case of a varying demand for heat, it is possible to use the ORC cycle (Organic Rankine Cycle) in which electric energy can be produced.

Characteristics	Unit of measure	Value
Furnace type		moving step grate
Boiler type		spiral
Boiler purpose		thermal oil heating
Furnace and boiler power	°C	5-20
Thermal oil temperature	°C	350
Load adjustment range	%	30-100
Furnace and boiler efficiency	°C	> 80
Type of fuel used		woodchips

FLUE GAS CONDENSING ECONOMIZER



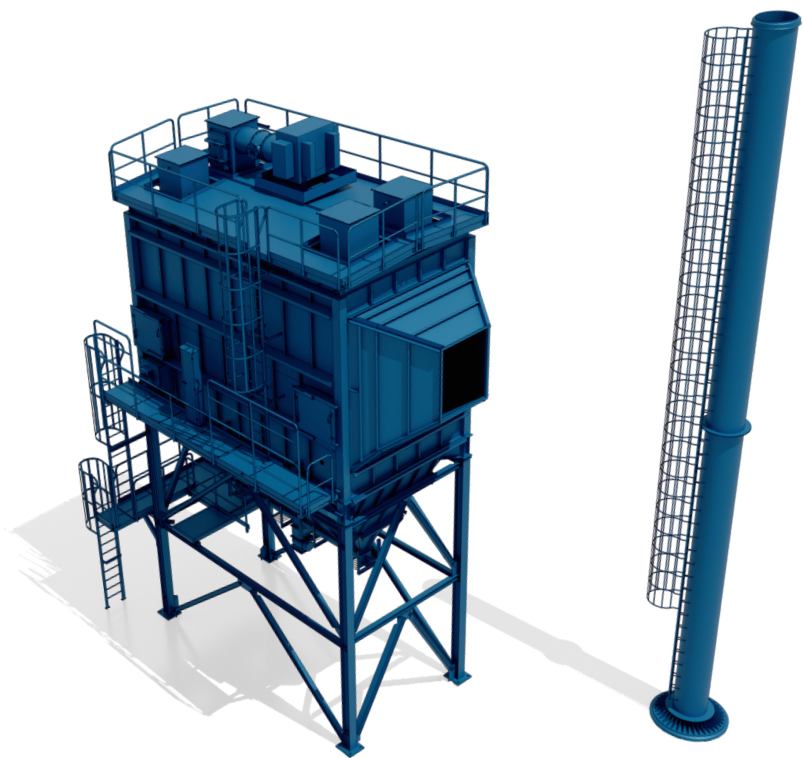
Flue Gas Condensing Economizers (hereinafter: FGCE) recover energy while condensing water steam produced in the biomass burning process and contained in flue gas going out of the boiler. The condensing system recovers energy from flue gas by cooling down the smoke gases going through the economizer chamber made of stainless steel. Water particles atomised in the flue gas stream by means of specially designed nozzles form mist with a very large heat exchange area. Hot flue gases intensely give away heat when coming in contact with water spray drops, which makes the water steam contained in the flue gas condensate. The liquid condensate produced in this way is used in a closed circuit where it transfers heat through a plate exchanger e.g. to a central heating system. Depending on the degree of contamination and the type of flue gas cleaning system used, equipment for cleaning water from solid particles (suspended solids) and for precipitating sludge may be installed together with the condensation flue gas energy recovery system (economizer).

ADVANTAGES

- Increase of the overall efficiency of the heat plant even by 25% by cooling down the products of combustion and using the condensation heat.
- Additional flue gas treatment E.g., when multicyclones are used, the content of solid particles in smoke gases downstream of the economizer is up to 50 mg/Nm3 and less.
- The so produced and treated condensate can be used to refill circulating water, which significantly reduces freshwater consumption.

Characteristics	Unit of measure	Value
Boiler power range	MWt	5-20
Range of thermal power recovered in FGCE	MWt	1-7.5
Fuel moisture, average	%	50
Returning water temperature	°C	45
Flue gas temperature downstream of the boiler (upstream of FGCE)	°C	180
Flue gas temperature downstream of FGCE	°C	48

ELECTROSTATIC PRECIPITATOR



The electrostatic precipitator (hereinafter - ESP) is intended for the treatment of biomass combustion products which were produced in the furnace and gave off a greater part of energy in the boiler from solid particles (dusts) contained therein. Depending on the amount of solid particles contained in the flue gases and the degree of cleaning required, the electrostatic precipitators may have one or two fields or, in exceptional cases, a precipitator with three fields may be necessary. The precipitator design and the number of fields are determined for each project on an individual basis depending on the flue gas stream size, the composition of the fuel used, the concentration of solid particles upstream of the precipitator and the required concentration of solid particles downstream of the precipitator.

The electrostatic precipitator is equipped with a totally automated control system.

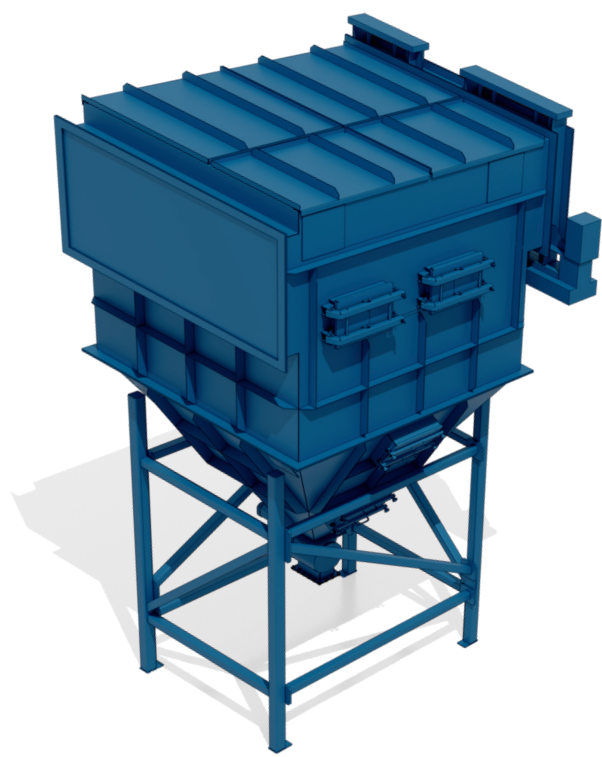
Ash is removed from ESP in two ways: by means of a bottom scraper or conical ash containers. In the former case, a bottom scraper with a hydraulic drive and a control system is installed inside ESP. The ash is scraped into a screw conveyor which transfers it to a centrally located dispenser. In the latter case, the ESP bottom design is not flat but it consists of several conical ash containers interconnected at their lower part with a screw feeder.

ADVANTAGES

- ▶ Highly purified smoke which meets the most stringent requirements.
- ▶ Possibility to use low quality fuels leaving large quantities of ash.
- ▶ Intuitive range of supply, proven solutions and equipment.
- ▶ Simple operation.

Characteristics	Unit of measure	Value
Filter inner pressure	Pa	± 2500
(Design) temperature	°C	350
Smoke velocity inside filter	m/s	~1.0
Aerodynamic resistance	Pa	200-300
Content of solid particles in ESP	mg/Nm ³	20-30

MULTICYCLONE



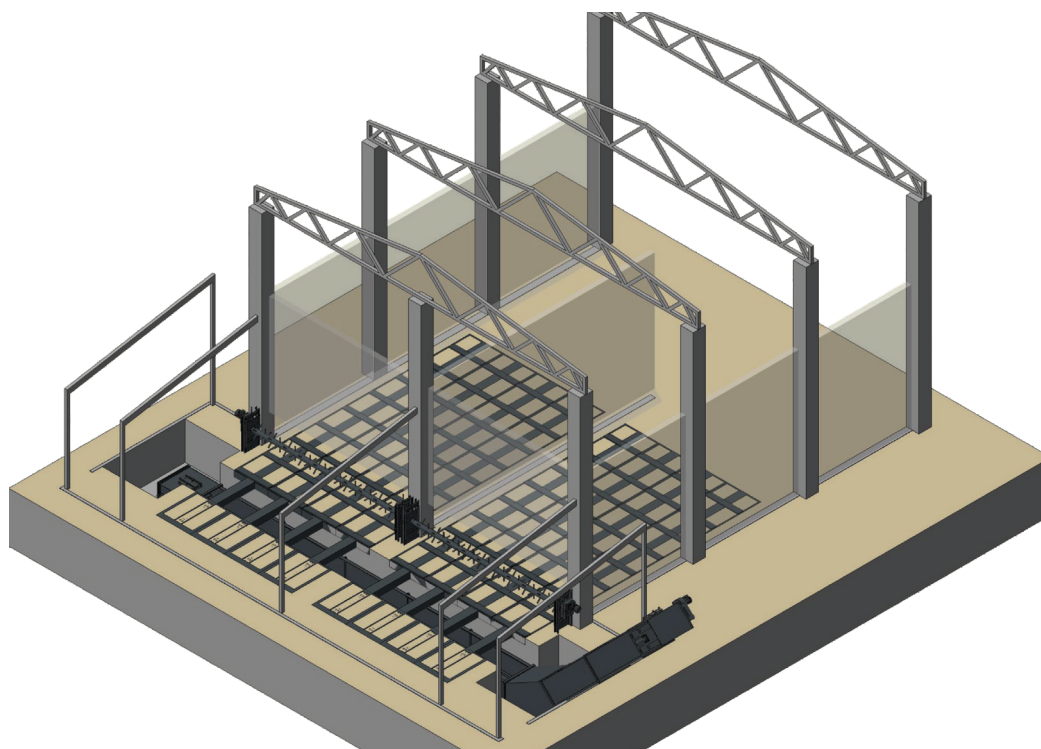
The cyclone housing is made of sheet steel. The centrifugal force in the cyclone's working elements is generated by means of guides installed in a star or screw arrangement. Under the centrifugal force, dust settles on the cyclone outer wall and falls into a collecting bin. The installation height is adjusted by supports of variable height by means of screws. After the supports height has been adjusted, they are permanently welded together. To remove ash, a hopper with a pressure compaction function is usually used, or ash is removed from the hopper by means of a geared motor driven dispenser. Door installed in the cyclone housing make it possible to inspect, clean or repair inlet and outlet flue gas chambers.

ADVANTAGES

- ▶ Fast project completion with minimum effort and resources.
- ▶ Intuitive range of supply, proven solutions and equipment.
- ▶ Compact structure and installation design
- ▶ Simple operation.

Characteristics	Unit of measure	Value
Type of cyclone		set (battery) of flow-through cyclones
Type of operating element		propeller
Amount of treated flue gases in one element	m ³ /h	~ 700
Maximum temperature of treated flue gases	°C	200
Flue gas flow velocity in the element	%	4.5 m/s ± 15
Aerodynamic resistance	Pa	550-700
Amount of solid particles downstream of the multicyclone	mg/Nm ³	100-300

STANDART FUEL SUPPLY SYSTEM WITH OVER-GROUND STORAGE UNIT



The fuel storage unit and transport devices are intended for storing fuel and supplying it automatically into the combustion chamber. The storage unit capacity and the number of moving fuel platforms depend on the heating system power (demand for fuel). The storage unit hopper size is usually designed so as to ensure that the boiler can work under a regular mode during 24 hours. Fuel reserve is stored on a site nearby.



Automatic scales for fuel registration



Storage unit fuel platforms with a front-end loader



Recessed scraper conveyor with a rising part



Intermediary fuel conveyors (if needed)



Fuel warehouse - roofed steel structure fenced with walls



Cylinders and central control facility for the hydraulic cylinder drive

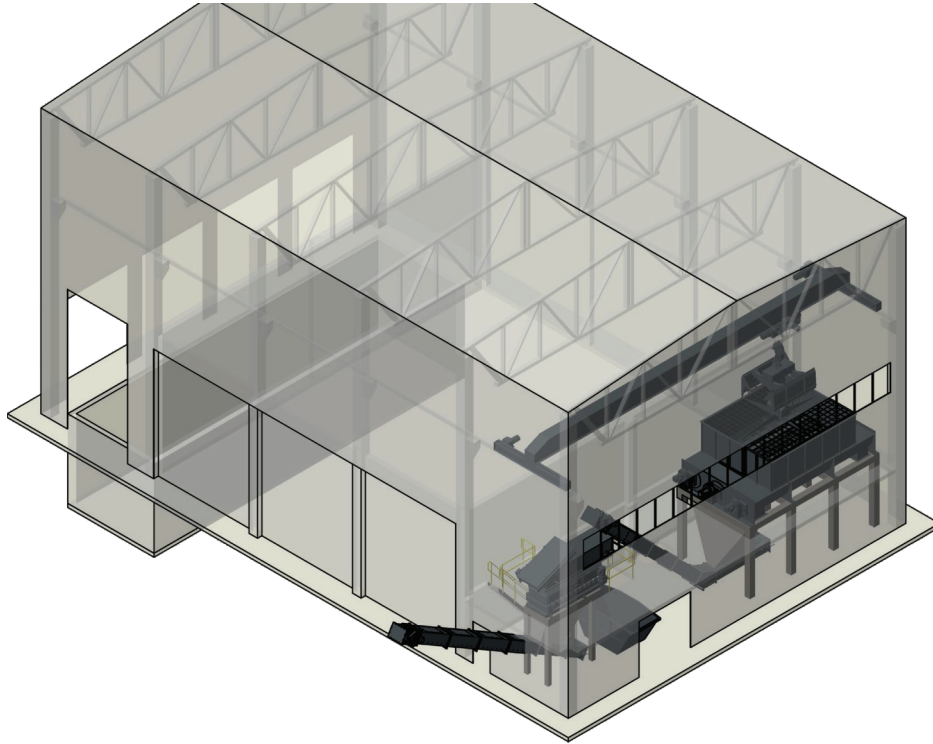


Fuel sorting system (vibration sifter)

ADVANTAGES

- ▶ Convenient fuel supply to the warehouse.
- ▶ Possibility to store various types of fuels on separated sections of the storage unit.
- ▶ When fuel is pre-sorted on a vibrating grate in the sifter, oversize fuel is retained. The risk of the fuel conveyors getting damaged or broken down is minimised in this way.
- ▶ Only sorted fuel of a required size is supplied to the furnace.

FUEL SUPPLY SYSTEM WITH GRAB CRANE



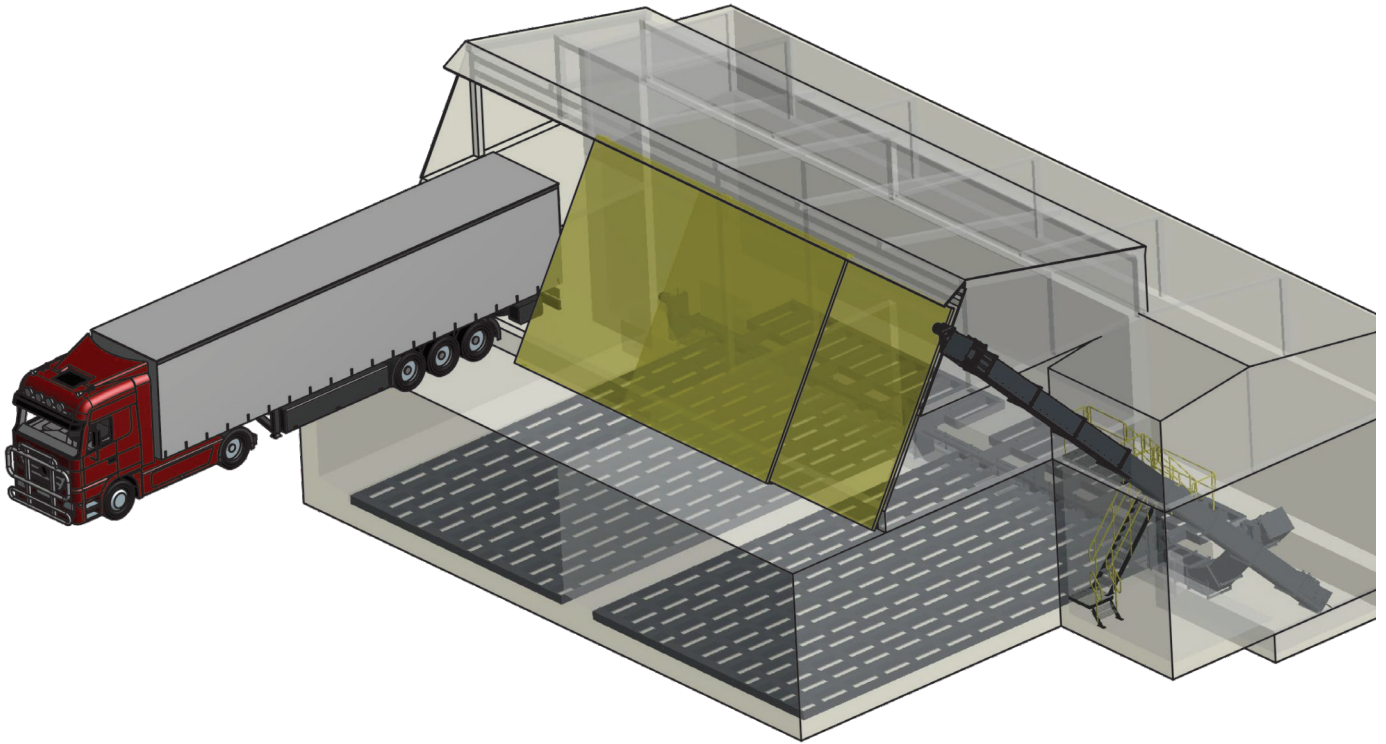
The supplied fuels are usually unloaded directly to the pre-hopper. Various types of fuels can be stored in various sections of the fuel storage unit. Mixing various types of fuel is acceptable. Fuel is weighed before being fed into the boiler. Fuel waste is separated from the required fuel size on the intermediary fuel tank vibrating grate.



ADVANTAGES

- ▶ Possibility to store more fuel on a smaller site.
- ▶ Easy and convenient fuel delivery to the storage unit.
- ▶ The fuel supply system is not hazardous to the natural environment. The storage unit is fully closed which minimises the dust and noise emissions to the environment.
- ▶ The use of the multi-stage sorting significantly reduces the risk of the fuel conveyors getting damaged and broken down.
- ▶ Possibility to provide a boiler facility which does not need to be attended by operation personnel.
- ▶ Small number of moving mechanisms.
- ▶ Only sorted fuel of a required size is supplied to the furnace.
- ▶ A front-end loader with a driver is not required to supply the fuel.
- ▶ Possibility to keep permanent and accurate register of fuel and to monitor boiler output capacity indicators.

FUEL SUPPLY SYSTEM WITH UNDERGROUND STORAGE



The supplied fuels are usually unloaded directly to the storage unit. The fuel is fed by means of the front-end loader onto the conveyor which takes the fuel to the sorter. Adequate fuel sizes are separated and metal contaminations are removed in the sorter. Sorted fuel is transferred to the furnace or buffer hoppers. Small fuel fractions and metal impurities are collected in special containers. Various types of fuels can be stored in various sections of the fuel storage unit.



Automatic scales for fuel registration



Storage unit fuel platforms with a front-end loader



Recessed scraper conveyor with a rising part



Intermediary fuel conveyors (if needed)



Fuel warehouse - roofed steel structure fenced with walls



Cylinders and central control facility for the hydraulic cylinder drive



Fuel sorting system (vibration sifter)

ADVANTAGES

- ▶ Convenient fuel supply to the warehouse.
- ▶ No loader is required to supply fuel to the moving conveyors of the storage unit platform.
- ▶ While fuel is pre-sorted on a vibrating grate, oversize fuel is retained. The risk of the fuel conveyors getting damaged or broken down is minimised in this way.
- ▶ Only sorted fuel of a required size is supplied to the furnace.
- ▶ It is not hazardous to the natural environment. The storage unit is fully closed which minimises the dust and noise emissions to the environment.
- ▶ It is possible to store various types of fuels in separate sections of the storage unit.

REFERENCES

2021	PAS Daugavpils siltumtīkli	Development of a change project, construction and author supervision works for the new biomass boiler house with a total capacity of 36 MW (4X7,5 boilers) (with additional condensing economizer (2x3MW))	Daugavpils, Latvia
2020	PEC Suwałki	Construction of 30 MW biomass boiler house by installing 2 x 12.5 MW biomass water heating boilers with 5 MW flue gas condensing economiser.	Suwalki, Poland
2020	Panevėžio energija	Construction of 8 MW biomass water heating boiler with 1.8 MW flue gas condensing economiser.	Panevėžys, Lithuania
2020	RK-Grand	Implementation of Phase II - construction of a steam boiler 20 t/h, ash removal systems, flue gas cleaning.	Pitkyaranta, Russia
2019	Litesko Marijampolės filialas	Assembly of 2 x 15 MW gas and liquid fuel powered water heating boilers with flue gas condensing economizers.	Marijampolė, Lithuania
2019	Klaipėdos energija	2 x 8 MW biomass water heating boilers with 2 x 1.8 MW condensing economizers. Flue gas cleaning with multicyclones and electrostatic precipitator.	Klaipėda, Lithuania
2019	Forest Investment	Construction of 48 MW biofuel boiler house by installing 2 x 20 MW biofuel boilers with two flue gas condensing economisers of at least 4 MW.	Vilnius, Lithuania
2019	Kraslesinvest	Construction of a 16 MW biofuel boiler house with two 8 MW water heating boilers.	Boguchany, Russia
2018	Hella	Construction of Hella plant, first module. 11 thousand m ² of manufacturing and office premises constructed on 8.9 hectare plot of land at Kaunas Free Economic Zone.	Kaunas, Lithuania
2018	NEO GROUP	Reconstruction of granule production and product warehouse building to increase production capacity up to 160 thousand tones per year.	Klaipėda, Lithuania
2018	Eidsiva Bioenergy	Addition of 3.8 MW economiser; construction, assembly, launch and adjustment works.	Lilehameris, Norway
2018	KijevEnego	Addition of 24 MW economiser with additional equipment; construction, assembly, launch and adjustment works.	Kyiv, Ukraine
2018	Elektroavtomatika	Supply and assembly of combustion chamber, 10 t/h steam boiler, fuel combustion system, ash disposal system, combustion gas control and process control system.	Pitkjaranta, Russia
2018	Comerc	Supply of 7 MW combustion chamber, multicyclones, fuel combustion system and ash disposal system.	Charkovas, Ukraine
2018	Comerc	Supply of 4 MW combustion chamber, multicyclone, ash disposal system.	Rubcovskas, Russia
2018	Rīgas BioEnergija	Construction of 48 MW biofuel boiler house by installing 2 x 20 MW biofuel boilers with two flue gas condensing economisers of at least 4 MW.	Riga, Latvia
2017	Latvias energoceltnieks	Construction of 4 MW biofuel power house: combined generated heat capacity – 26.9 MW, assembly of 21.4 MW boiler with 5.5 MW flue gas condensing economiser.	Riga, Latvia
2017	Savsjo Energi	Construction of 10.6 MW biofuel boiler house by installing 8 MW water heating boiler fitted with a tubular 2.6 MW flue gas condensing economiser.	Savsjo, Sweden
2017	AuraGen	Construction of CHP plant with 67 MW of thermal power (3 x 2.6 MW steam boilers) and 21.4 MWe of electric power.	Tallinn, Estonia
2016	Gislaved Energiring	Heat boiler house extension by installing a 1.2 MW flue gas condensing economiser.	Gislaved, Sweden
2016	Zespół Zarządców Nieruchomości	Assembly of two multicyclones and their ancillary equipment, installation of smoke ducts and treatment system in 11.6 MW and 5.8 MW coal boilers.	Warsaw, Poland
2016	Audrius Juška	Construction of 6 MW solid fuel boiler house by installing 4 MW and 2 MW water heating boilers.	Anykščiai, Lithuania

2016	Šilalės mediena	Installation of sawdust dryer drum, assembly of scrapper transporter and other ancillary equipment.	Šilalė, Lithuania
2016	Danpower Baltic	Construction of CHP plant with 21 MW of thermal power and 5 MWe of electric power with 6.3 MW flue gas condensing economiser.	Kaunas, Lithuania
2015	Alvora Utenos šilumos tinklai	Addition of fuel storage with bridge grab crane system for 2 x 20 MW bubbling fluidized bed (BFB) water heating boilers (combined capacity - 40 MW), electrostatic carbon filters with precipitator (ESP) system and flue gas condenser economisers.	Elektrėnai, Lithuania
2015	Utenos šilumos tinklai	Assembly of 14 t / h steam boiler with flue gas condensing economiser.	Utena, Lithuania
2015	Ekopartneris	Construction of 17.5 MW biofuel boiler house by installing 2 x 7 MW water heating boilers with 3.5 MW flue gas condensing economiser.	Kaunas, Lithuania
2015	Litesko Druskininkų šiluma filialas	Construction of 12.5 MW biofuel boiler house by installing a 10 MW water heating boiler with 2.5 MW flue gas condensing economiser.	Druskininkai, Lithuania
2015	Kauno energija	Construction of 12 MW biofuel boiler house by installing 8 MW water heating boilers with 4 MW flue gas condensing economisers that will operate with existing 9 MW biofuel boiler.	Kaunas, Lithuania
2015	Litesko Marijampolės šiluma filialas	Construction of 12.5 MW biofuel boiler house by installing a 10 MW water heating boiler with 2.5 MW flue gas condensing economiser.	Marijampolė, Lithuania
2015	Litesko Vilkaviškio šiluma filialas	Construction of 4.4 MW biofuel boiler house by installing a 3 MW water heating boiler with 1.4 MW flue gas condensing economiser.	Vilkaviškis, Lithuania
2015	Šalčininkų šilumos tinklai	Addition of an installation with electrostatic filter for 12 MW biofuel boiler house with 1 MW flue gas condensing economiser.	Šalčininkai, Lithuania
2015	Hilmer Andersson	Addition of an installation with electrostatic filter for 12 MW biofuel boiler house.	Liasevud, Sweden
2015	Litesko Kelmės šiluma filialas	Construction of biofuel boiler house by installing a 1.2 MW water heating boiler with 1.5 MW flue gas condensing economiser that will operate with new and with existing 5 MW biofuel boilers.	Kelmė, Lithuania
2015	Valmieras energija	Construction of 6.2 MW biofuel boiler unit by installing a 5 MW water heating boiler with 1.2 MW flue gas condensing economiser.	Valmiera, Latvia
2015	NEO GROUP	Construction of 20 MW thermal oil biofuel boiler house by installing two thermal oil heating boilers of 10 MW each.	Valmiera, Latvia
2014	Raseinių šilumos tinklai	Construction of 6.2 MW biofuel boiler house by installing a 5 MW water heating boiler with 1.2 MW flue gas condensing economiser.	Raseiniai, Lithuania

Projects for reducing NOx (nitrogen oxides)

2019	Vilniaus Šilumos Tinklai	Upgrading of PTVM-100 (116 MW) water heating boiler systems by reducing NO x emissions from 270 mg / Nm ³ to 80 mg / Nm ³ .	Vilnius, Lithuania
2018	ORLEN Lietuva	Upgrading of TGME-464 (450 MW 500 t / h) steam boiler by reducing NO x emissions to 200 mg / Nm ³ from gas combustion and to 450 mg / Nm ³ from fuel oil combustion.	Mažeikiai, Lithuania
2016	Vilniaus Energija	Upgrading of PTVM-100 (116 MW) water heating boiler systems by reducing NO x emissions from 160 mg / Nm ³ to 100 mg / Nm ³ .	Vilnius, Lithuania
2015	Vilniaus Energija	Upgrading of TVGM-30 (35 MW) water heating boiler systems by reducing NO x emissions from 280 mg / Nm ³ to 100 mg / Nm ³ .	Vilnius, Lithuania
2015	Vilniaus Energija	Upgrading of PTVM-100 (116 MW) water heating boiler systems by reducing NO x emissions from 200 mg / Nm ³ to 75 mg / Nm ³ .	Vilnius, Lithuania
2015	Vilniaus Energija	Upgrading of PTVM-100 (116 MW) water heating boiler systems by reducing NO x emissions from 270 mg / Nm ³ to 100 mg / Nm ³ .	Vilnius, Lithuania
2015	Vilniaus Energija	Design and installation of SNCR system for BKZ-50 (60 MW) steam boiler by reducing NO x emissions from 370 mg / Nm ³ to 300 mg / Nm ³ .	Vilnius, Lithuania

SEE SOME PICTURES FROM ONE OF OUR PROJECTS!

Client: Cēsu Siltumtīkli
Location: Cesys, Latvia
Construction of a 8.4 MW biomass boiler plant with 5 MW and 2 MW water heating boilers and a 1.4 MW flue gas condensing economizer.





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