



RUTH

Energietechnik

Biomass Air Heaters



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TABLE OF CONTENTS:

Problems associated with grain drying.....

The solution to your problems - Biomass as fuel!.....

Hot air generation systems.....

Methods of obtaining fuel.....

Information collected.....



Problems associated with grain drying

The problems that afflict the modern farmer are largely due to market volatility in the case of farmgate prices and fuel. With regard to the stability of prices at the Buying Agents, we cannot influence, while there is a possibility to reduce the fluctuations associated with the fuel market. After each harvest, cucurbit residue remains in the field, which is an untapped opportunity to achieve energy independence and minimize grain drying costs!

Currently, dryers are mainly powered by fuels such as fuel oil and natural gas. These fuels have a high price which affects competitiveness. The answer is to use alternative fuels, which are characterized by:

- **high availability,**
- **low price.**



Biomass fuels with the current energy market are a fast and cheap alternative to conventional fuels



The solution to your problems - Biomass as fuel!

DECREASE IN COSTS - INCREASE IN PRODUCTIVITY



With the investment in a dryer based on biomass fuels, you gain a decrease in costs due to the price of fuels. Biomass fuels have lower fuel costs compared to dryers powered by gas or oil fuels.

ENERGY INDEPENDENCE



The current situation in the fuel market can be described as unstable. However, the use of biomass fuels makes it possible to remain an energy-independent entrepreneur. These fuels are characterized by proximity, high availability and low purchase price.

NO CO2 EMISSIONS



Due to the natural process of photosynthesis, the process of burning biomass fuels does not generate additional carbon dioxide into the atmosphere. So this is a double benefit, for you as an entrepreneur, but also for the environment.

COMPARISON OF DRYING COSTS PER SEASON FOR DIFFERENT FUEL TYPES - EXAMPLE 500KW

	HEATING OIL	NATURAL GAS	STRAW	CORN WASTE
CALORIFIC VALUE OF FUELS (KWH/TON)	11800	9300	3880	3500
ANNUAL FUEL DEMAND (TONS)	96	122	308	342
DAILY CAPACITY (KG)	72 000			
FUEL COST PER TON - EUR	810	860	90	65
FUEL COST PER KWH - EUR	0,069	0,093	0,023	0,02
ANNUAL FUEL COST	78 thous.	104 thous.	27 thous.	22 thous.

COMPARISON OF DRYING COSTS PER SEASON FOR DIFFERENT FUEL TYPES - EXAMPLE 1500KW

	HEATING OIL	NATURAL GAS	STRAW	CORN WASTE
CALORIFIC VALUE OF FUELS (KWH/TON)	11800	9300	3880	3500
ANNUAL FUEL DEMAND (TONS)	285	361	913	1012
DAILY CAPACITY (KG)	202 000			
FUEL COST PER TON - EUR	810	860	90	65
FUEL COST PER KWH - EUR	0,069	0,093	0,023	0,02
ANNUAL FUEL COST	231 thous.	311 thous.	81 thous.	67 thous.



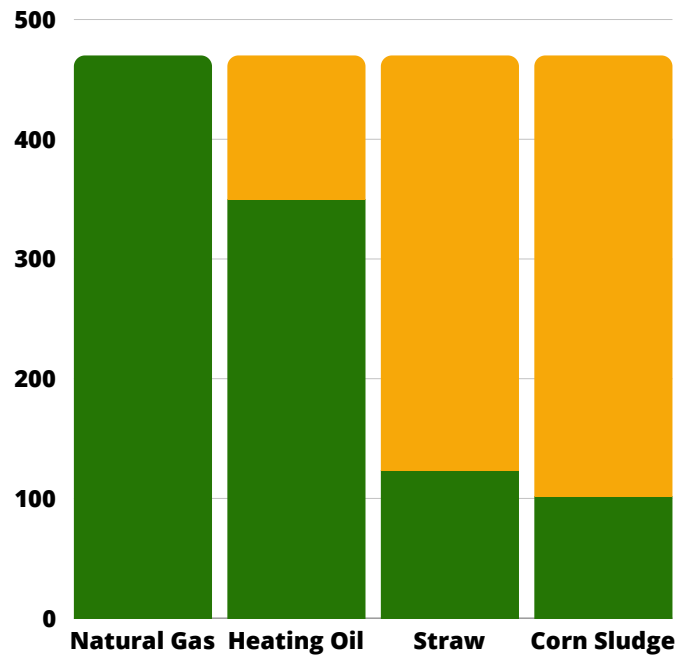
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SAVINGS FROM USING DIFFERENT TYPES OF FUEL

The savings poured out for an installed capacity of 500kW are shown in the graph on the right. On an annual basis, the most can be gained, on fuel alone, by considering a switch from supplying the dryer with natural gas to corn stover. It is also possible to use systems that allow ducklings to be harvested from the field. This multiplies the savings. More about the selector itself is on the next page.



Buying an add-on harvester forces higher investment costs, but in the long run, together with Ruth-Energietechnik's biomass combustion system, it allows savings and energy independence.

Efficient flexible district heating systems

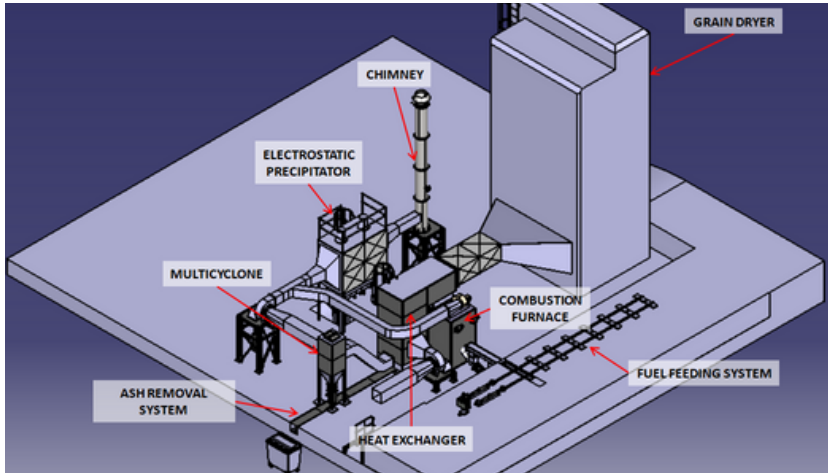
Ruth-Energietechnik brings together a group of experienced mechanical and energy engineers. Ruth-Energietechnik's mission is to make energy zero-emission and our solutions reliable.



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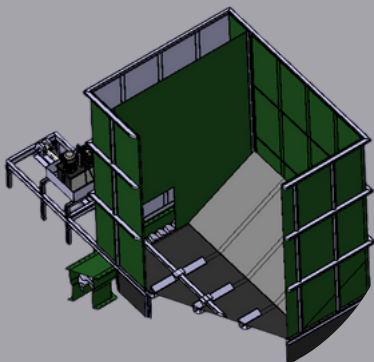


Introducing hot air generation systems - Zero Waste!

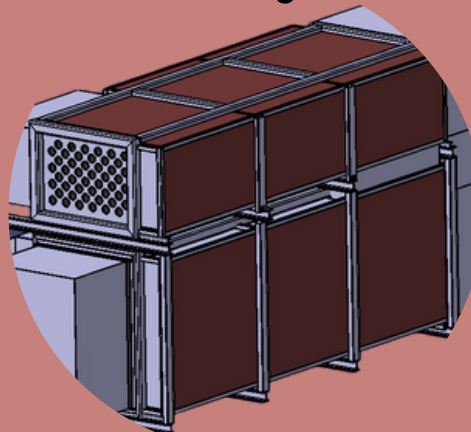


The Zero-Waste hot air generator technology we offer for the drying industry makes it possible to produce hot air for a wide range of applications. The fuel that drives the entire installation is renewable energy carriers of natural origin, among others: agricultural and forestry residues. The entire installation consists of: a fuel storage and supply system, a hot air generation system (a furnace with a moving grate together with a flue gas-air heat exchanger and an ash removal system), a flue gas cleaning system (Multicyclone with an electrostatic precipitator)

Fuel storage and delivery system



**Hot air generation system:
furnace with heat exchanger**



**Exhaust gas cleaning system:
multicyclone with electrostatic precipitator**



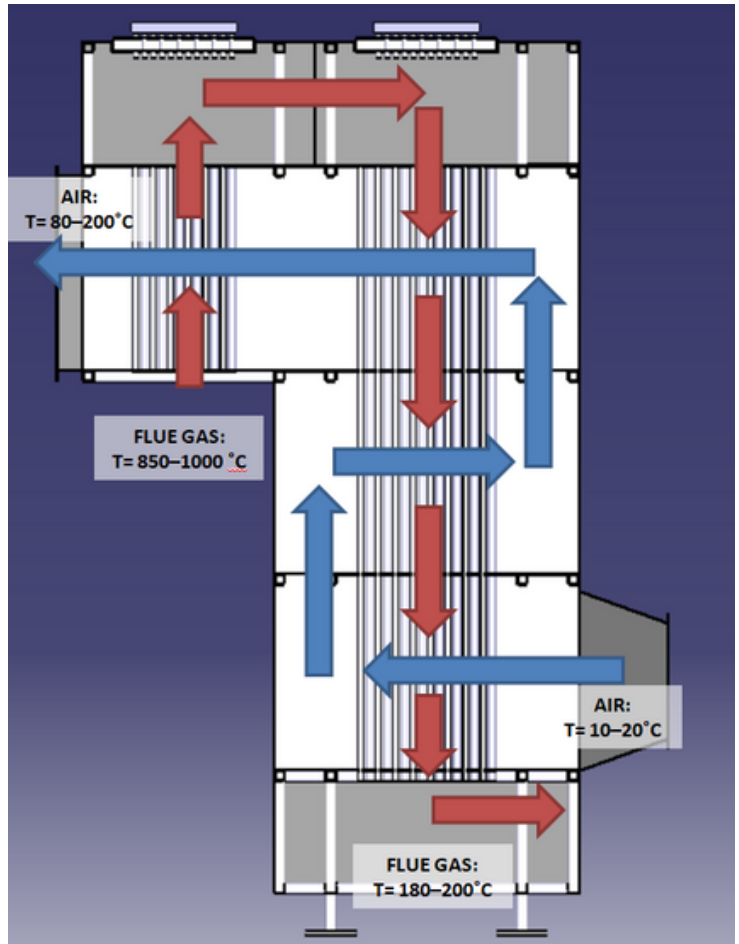
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Biomass air heaters from Ruth- Energietechnik can be powered by a wide range of biomasses

Exhaust gas-air heat exchanger

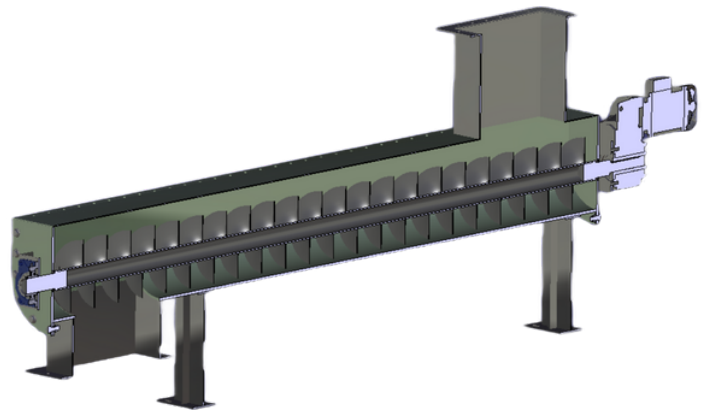
Heat exchange takes place between flue gases heated to about 1000 deg C and the air in the heat exchanger. The air is heated as it flows through the exchanger from a temperature of about 10 - 20 deg C to a target temperature of 80 - even 200 deg C. The temperature of the flue gas is controlled by controllers that dispense the amount of fuel through the feeders. The air temperature range, on the other hand, is determined by the temperature and volume flow on the flue gas side and the volume flow on the air side. After leaving the heat exchanger, the flue gases are directed to the Multicyclone and Electrostatic Precipitator, where they are dedusted to current standards. The hot air is directed to the grain dryer.



Fuel feeding system

Depending on the needs and type of installation, different fuel feeding systems are used. In each case, the fuel feeding system is integrated and automated so as to minimize the need to operate the installation.

Depending on the size of the installation, moving floor or screw feeder type systems are used. They ensure continuous operation of the plant while ensuring reliability.



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METHODS OF OBTAINING CORN RESIDUES

Corn cob selector - this is a technology developed through the University of Life Sciences in Poznań together with Power Maize Sp. z o.o., which formed a joint consortium in 2017. The technology was developed and tested by 2021, resulting in a machine in the form of a trailer, enabling the harvesting of cobs in one process pass during grain harvesting.



Possible annual domestic production of corn sludge

1 ha - 1.2 : 1.5 tons

500 ha - 600 : 750 tons

cała Polska - 2 mln tons

The potential behind the use of corn sludge for energy is shown in the table to the left. So far, the sludge has been undeveloped, but the entirety of the presented upgrade envisions an end to wasting the sludge and using it as fuel for furnaces, as well as fuel to power grain dryers.

An additional source of sourcing sediment is seed centers, which offer clean sediment ready for use as fuel. Seed centers can act as a safety buffer for sediment collected from their own field or as a full-fledged main supplier.



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Performance data of selected grain drying solutions

Ruth-Energietechni's dryers feature a power range from 250 kW to 6,000 kW. Below you can see a table with the most important data on technical solutions.



AIR HEATERS - RUTH - ENERGIETECHNIK

MODEL NAME	ZW-500	ZW-2000	ZW-4000	ZW-6000
POWER	350 - 500	1500 - 2000	3500 - 4000	5500 - 6000
FUEL	BARK / WOOD CHIPS / CORN SLUDGE/ AGRO-WASTE			
MEDIUM	AIR			
MAX MEDIUM TEMPERATURE	150*			
HOT AIR FLOW - 150 (MR3/H)	15 300 / 21 200	61 500 / 84 900	123 000 / 169 900	185 000 / 254 800
FUEL CONSUMPTION [KG/H]	192	770	1541	2311
FLUE GAS CLEANING METHOD	MULTICYCLONE / BAG FILTER / ELECTROSTATIC PRECIPITATOR			
TYPE OF DRIED MATERIAL	ESTIMATED DRYING CAPACITY			
CORN (30% -> 14%)	2,7	11,3	23,1	34,8

*Possible higher outlet temperature of the medium after individual analysis of technical possibilities.

** The given values are estimates and may vary depending on the parameters of the dried grains, the selected technology or external factors.

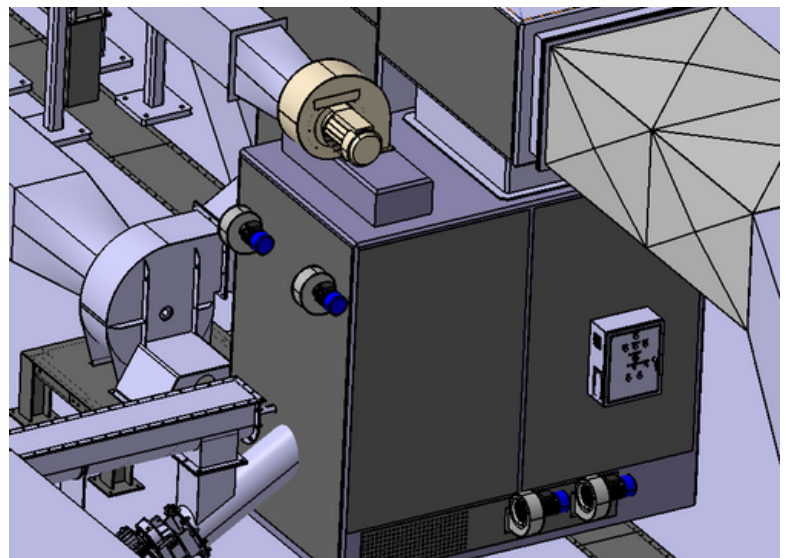
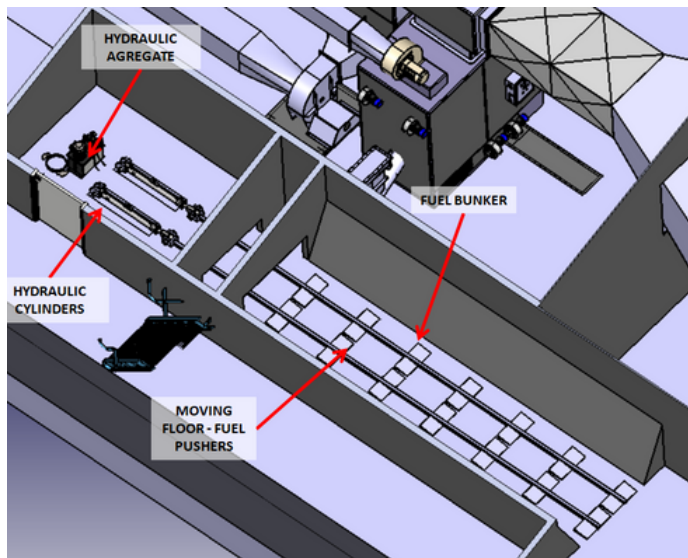
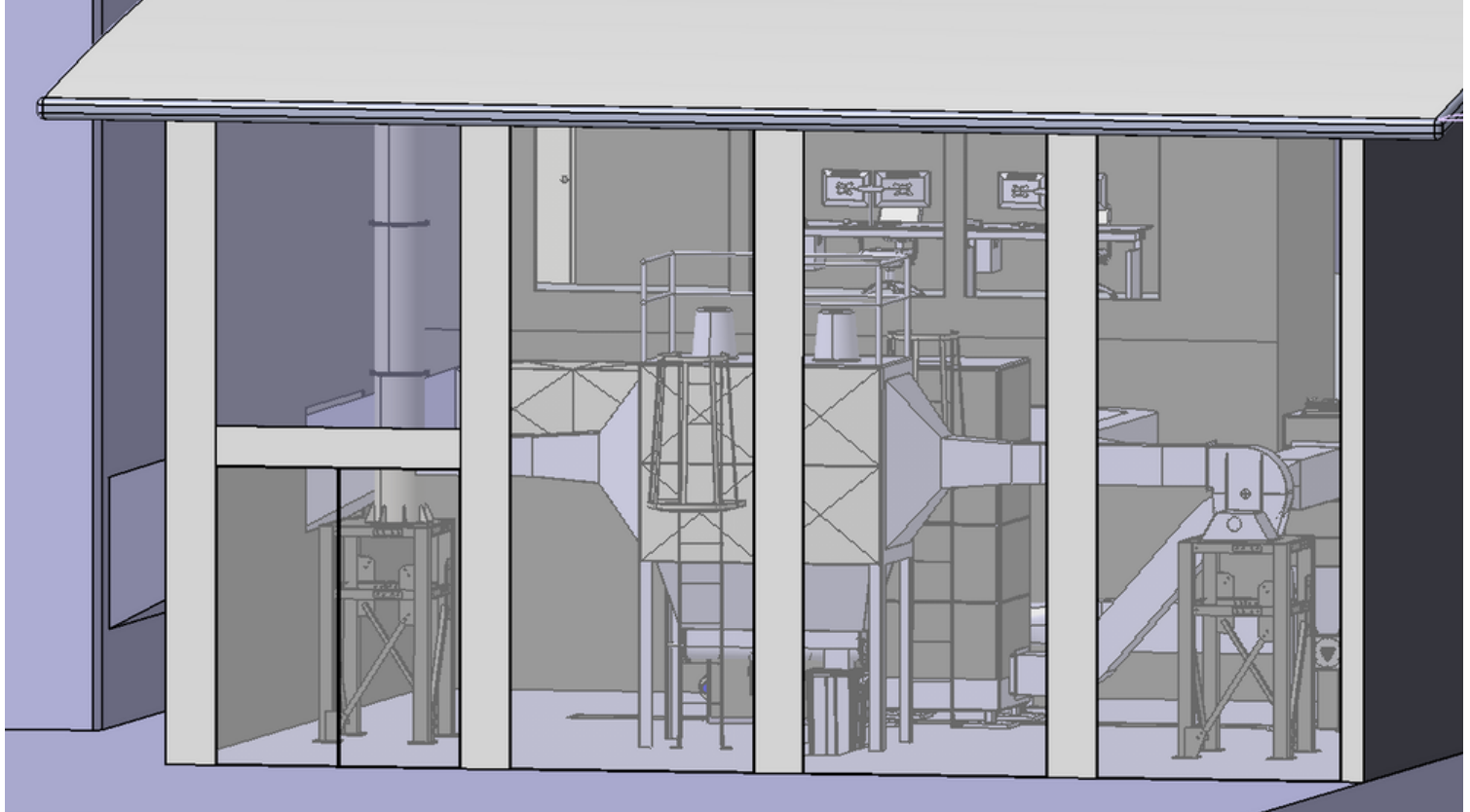
*** CORN SLUDGE - AVG. MOISTURE CONTENT - 30%



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Example of hot air generation plant - 3D visualization



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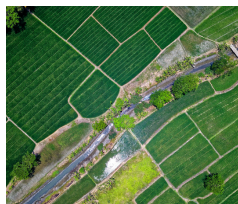


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Development of knowledge base

Today, Ruth-Energietechnik has the know-how of technical solutions for the design of biomass-fueled district heating and hot air generation plants. However, this is not our last word. The company continues to grow by investing in employees and in solutions, striving to provide you with ever-improving products.



heating
installations

air heaters

If you are interested in our proposal -
please contact us!



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Air
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