



# HAFFNER

E n e r g y   f r o m   W a s t e







“The deposit of untreated waste was yesterday. The future is to treat it an economical and ecological way.”

— Heinrich Hafner



State of the Art - Waste to Energy Technology Made in the Alps





## About Us

The **HAFNER group** provides full engineering and turn-key construction expertise for "Waste to Energy" plants with thermal recovery from hazardous waste, MSW and biomass.

HAFNER has been active for about 40 years in the field of waste incineration, with detailed experience in all facets of complex incineration plant development – from waste management techniques, to energy recovery in the form of hot water, steam and electrical power.

HAFNER relies on extensive engineering know-how and longstanding operational management skills built on years of experience from ground-up operations in numerous "Waste to Energy" plants throughout Europe.



Heinrich Hafner  
CEO - Hafner EfW

The waste management of the past decades left us and the next generations a number of time bombs.

The deposit of untreated waste belongs to the past. We must now move towards treating waste more economically and ecologically. Our „Waste to Energy“ plants contribute positively to our climate and guarantee safe disposal of waste at the same time.







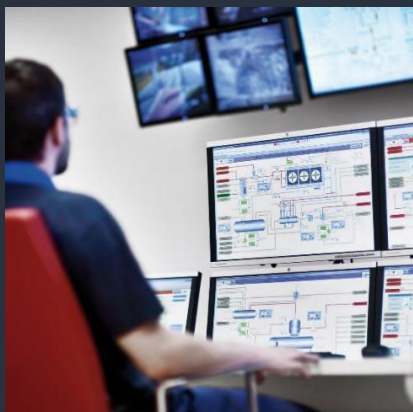
*Bunker with crane for waste feeding*



*Boiler with stair tower*



*Turbine & Generator*



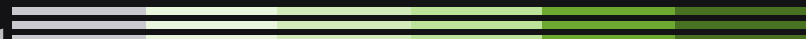
*Control centre for the plant*



*Combustion grate*



*Burner*





*Rotary Kiln*



*Structure with 4 chimneys inside*



*Bag filter*



*Turbine coupling*



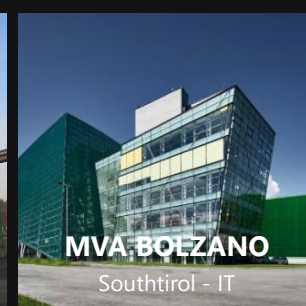
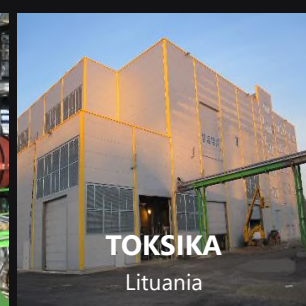
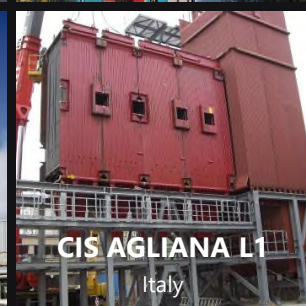
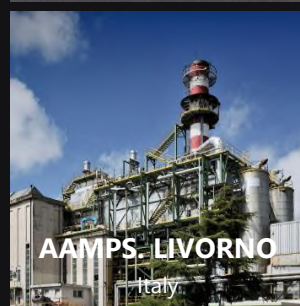
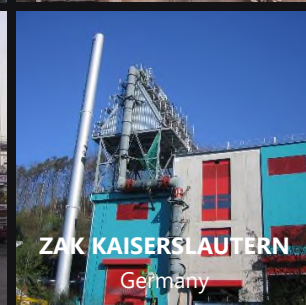
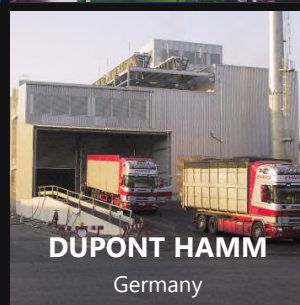
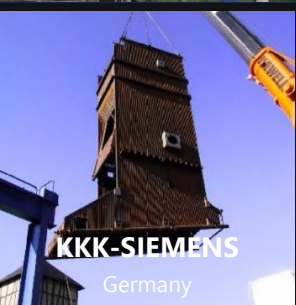
*Additive silos and boiler*



*Condensate system*







## Part of Our Works & References



**Experience with Hazardous Waste**  
Design and construction of "Waste to Energy" plants for special waste, hospital waste and industrial waste.



**Experience in Biomass**  
Design and construction of "Waste to Energy" plants for all types of biomass.



**Experience in MSW**  
Design and construction of "Waste to Energy" plants for municipal solid waste.





# Hafner's Main Activities



## Engineering

Hafner plans W2E systems from the basic engineering to the detail engineering.



## Construction Workshop

Hafner works with mechanical workshops that manufacture plant parts.



## Erection on Site

Hafner has its own and external assembly teams who assemble the complete plant system on site.



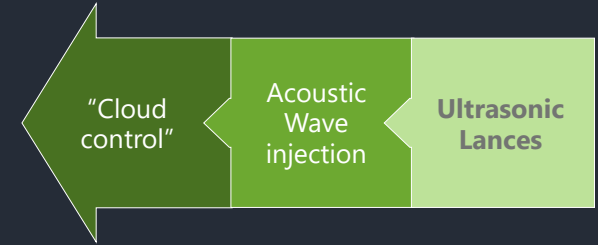
## Commissioning

Hafner brings the system into operation and carries out training of staff.





## Research and Development Waste to Energy



Hafner owns its own research facility, which is always dedicated to the research and development of new technologies, such as is used to improve combustion and flue gas emissions.

- ❖ Purpose of our research is at this time especially in the deepening of the ultrasonic waves input technology in the combustion process, choosing the best system on the applicable market for the experimentation campaigns of this project; in order to find the best balance and homogeneity of combustion gases, their volumetric reduction, the reduction of NOx formation. This will as a result best influence residence time, turbulences and the fumes temperature (850°C).
- ❖ This research also includes the deepening of the acoustic wave injection technology in the combustion process which serves to improve the oxidation of the combustion gases.
- ❖ The paradigms and the architectures of the remote control systems of thermal plants are increasingly approaching those adopted for corporate information systems, the monitoring and supervision functions are extended with business process management (BPM) and business intelligence (BI) functions, the tools and control technologies are integrated with decision support systems, thanks to the speed of data transmission over the Internet.

The current panorama sees the coexistence of the classical "monolithic" telecontrol systems, of the most recent distributed systems, whose architecture provides for different types of stations (processing units, communication front end, operator station, etc.), and its modern "service oriented" systems, in which the telecontrol system, integrating with higher level platforms, provides vertical services via the cloud, in PaaS mode.

A top-down approach or, otherwise guided by the technological innovation of the web 3.0 and of cloud computing, has very significant impacts on the traditional architectures of the local plant control systems, while a bottom-up approach favors the integration of new ICT technologies keeping the focus on the reliability, availability and safety characteristics of real-time systems.

**The potential** of methods used to improve conditions and the combustion process management **is not yet exhausted.** Future developments are to be realized, in particular, in the combination of measures for the global optimization of various sub-activities.







## Current Waste Situation in the World

Generating energy from waste instead of sending it to landfills prevents methane emissions (landfill gas), which equals over twenty times that of CO<sub>2</sub>. A Hafner "Waste to Energy" plant **can prevent millions of tons of CO<sub>2</sub> dispersion** each year while, at considerable savings, produce precious energy for businesses and communities.



**Even today,**  
A large majority of the world's waste is thrown into unauthorized and/or improperly utilized landfills.



Hafner "Waste to Energy" technology is a forward-looking solution for a faster journey towards combating **climate change**.



## The Hafner “Waste to Energy” Plants are essentially based on four main categories:

### Combustion Technology

Depending on the waste heat value, two different combustion technologies are used: grate firing with an integrated steam boiler plant for low to medium-calorific waste and a rotary kiln with steam boiler and integrated afterburning zone for highly caloric waste.

### Energy Recovery

The plant technology is designed to use upwards of 65% of the thermal energy (R1 - as defined according to Annex II of EU DIRECTIVE 2008/98/EC on Waste) including power generation, district heating or cooling and process steam.



### Flue Gas Cleaning

In the tradition of conventional simple flue gas cleaning, Hafner relies on a completely dry flue gas cleaning process with double flue gas filtration for increased dust retention and more efficient pollutant minimization. The achieved emission values are thus far below the EU limit values.

### Material Recovery

From the slag residues of combustion, valuable materials are recovered by further treatments and different selection processes.



## The Four Core Points of Hafner Technology

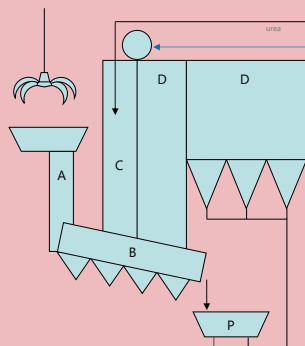




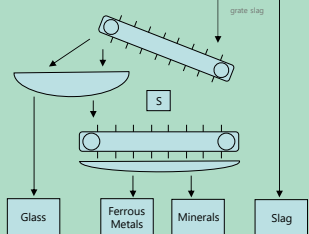


# The Hafner Technology – Process Flow Diagram

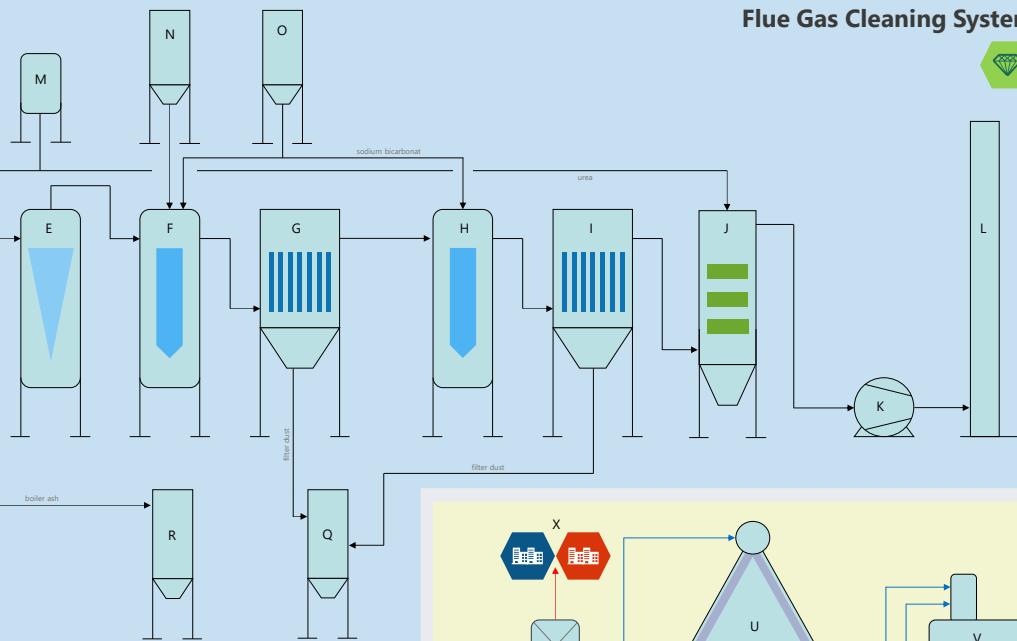
## Combustion Technology



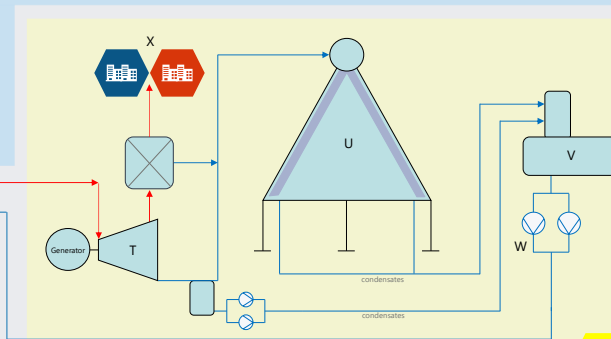
## Materials Recovery



## Flue Gas Cleaning System



## Energy Recovery



- A Feeding system
- B Grate furnace
- C Post-combustion chamber
- D Boiler
- E Cyclone
- F Reactor 1
- G Bag Filter 1
- H Reactor 2
- I Bag Filter 2
- J Catalyst
- K ID-Fan
- L Chimney
- M Storage tank urea
- N Storage activated carbon
- O Storage silo sodium bicarbonate
- P Slag container
- Q Storage silo filter dusts
- R Storage silo boiler ash
- S Materials recovery facility
- T Turbine with Generator
- U Air Condenser with vacuum station
- V Deaerator & Feed water tank for boiler
- W Boiler feed pumps
- X District heating/cooling decoupling with heat-exchanger



# Beneficial Outcomes of the Hafner Waste to Energy Plants



## CO<sub>2</sub> - Saving

Thanks to the combustion of tons of waste, the waste-to-energy plant achieves a very high level of CO<sub>2</sub> saving per year, and makes a contribution to climate protection in accordance to the Paris Climate Agreement of 2015.

With our specially enforced flue gas cleaning system, Hafner can also keep the emissions under the declared EU Limits.

## District Heating/District Cooling and a Part of Warm Water – approx. 50%

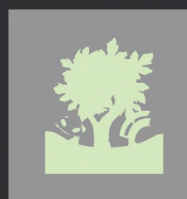
Hafner uses up to 50% of the thermal power produced in the combustion. This thermal load is used for district heating or cooling and also for hot water production.

These benefits are produced when a part of steam, divided in controlled way from the turbine, is directed to an integrated heat exchanger in the district heating process.

## Electricity – approx. 23-27%

Hafner manages to recover up to 27% of the thermal power produced in the combustion for the production of electricity.

Hafner's choice of turbines with a high degree of efficiency is important for achieving a high energy production value.







# Hafner's Technologies

A Life Cycle Assessment to be Proud of



**Small modular decentralized W2E plants** have a more favourable acceptance by the population.



**High quality** of metals and glasses extracted from the thermal treatment.



**CO<sub>2</sub> capture** from W2E plant for the food industry and E-Fuel production.



**Remaining materials** are also **recyclable** – such as rubble which is used by the building materials sector or in road construction.



**No production of contaminated water.**  
Dry flue gas treatment avoids the generation of contaminated waste water.



**Flue gas recirculation** with O<sub>3</sub> enrichment in the combustion chamber



The plant extracts **more than 80% metals** from the slag which is subsequently available for a new economic cycle.



# The Advantages of the Hafner Technology



## Use of

state of the art and environmentally friendly technologies.



## CO2 reduction

through the replacement of fossil fuels during the incineration process.



## Transport CO<sub>2</sub> reduction

due to the reduced road transport in our vision, in contrast to centralized waste sites, a further reduction of carbon dioxide is achieved.



## Waste to fuel

Due to the energy values of the waste (calorific value) the energy yield is about 80%, which is considered and "**declared**" as a **secondary** fuel according to EU directives.

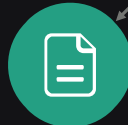


CE  
certification



## Emission values

comply with European Union regulations and **even stricter national requirements**.



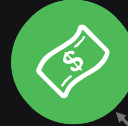
## Extracting of valuable energies

in the form of electricity, heat and refrigerants



## Low investment costs

construction techniques combined with state-of-the-art plant supervision techniques allow a significant reduction in operating costs.







Sales are carried out through worldwide agencies in the following countries:

**Europe:**

Italy (Hafner Headquarters) – Russia – Moldova – North Macedonia – Cyprus – Turkey;

**Asia:**

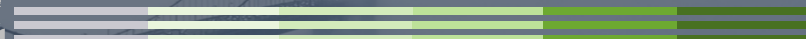
Uzbekistan – Kazakhstan – China – Japan – Myanmar – Thailand – Laos – Vietnam – Philippines – Indonesia – Brunei – Bangladesh – India – Iran – Iraq – Jordan – Kuwait – Bahrain – Qatar – Dubai;

**North & South America:** USA – Mexico – Costa Rica – Caribbeans – Peru – Brazil – Colombia – Chile;

**Africa:**

Tunisia – Morocco – Algeria – Ghana – Kenya – Angola – Namibia;

**Australia & Oceania;**





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**APP - Hafner  
Waste Calculator**  
for Android

## **HAFNER** Energy from Waste

Engineering and turn-key construction know-how for Waste to Energy plants with thermal and electrical recovery.



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