# Product Information

Intelligent solutions for heat recovery
and flue gas cleaning

www.saveenergy.ch

save energy

**IS SaveEnergy AG** is a dynamic and innovative company. We are consistently working towards improving clean air and increasing the efficiency of thermal systems. IS SaveEnergy AG sees itself as a solutions provider. In addition to supplying highly efficient products, we also provide support in the problem analysis and improvement of boundary conditions.

Highly motivated employees ensure that projects are processed smoothly and successfully.

IS SaveEnergy AG is consistently enhancing its products. These improvements are based on state-of-the-art calculation software and research projects in cooperation with various Swiss colleges.



***We develop, sell and maintain complete solutions for combined flue gas cleaning and heat recovery in wood-fired heating plants and industrial systems.***

### Increase in costs for energy sources

The International Energy Agency (IEA) forecasts a rise in the global energy demand. This increased demand will result in a price hike for energy sources in the medium term. As such, the efficient utilisation of primary energy will become even more important in the coming years.

### Stricter clean air ordinances

Many European states have made their clean air ordinances stricter. Air pollutants are to be reduced to a level that is harmless to both human health and the environment. These stricter regulations require the use of efficient particle filters for wood-firing systems.

# Market areas

IS SaveEnergy AG sees itself as a solutions provider. Highly efficient SaveEnergy products are optimally incorporated in the customer-specific environment by industry specialists. The ideal alignment of the components to the process and customer needs results in a sustainable ecological and commercial benefit. IS SaveEnergy AG offers you industry-specific solutions for:

**Heating networks**
**Pellet plants/sawmills**
**Greenhouses**
**Industrial applications**

# Pellet plants and sawmills

***Pellet plants and sawmills are under increasing commercial pressure. The efficient use of the raw materials is a crucial factor for success.***

At pellet plants, flue gas condensation can be ideally used to pre-heat the drying air on belt dryers. In such systems, the belt dryer is connected upstream of an air heater. This uses the heat from condensation to heat the drying air to 50–60°C. The percentage of low-temperature heat is equivalent to about 50% of the overall heat requirement. High temperature heat is only required for reheating to 90°C.

This means that high temperature heat is therefore available for other processes.

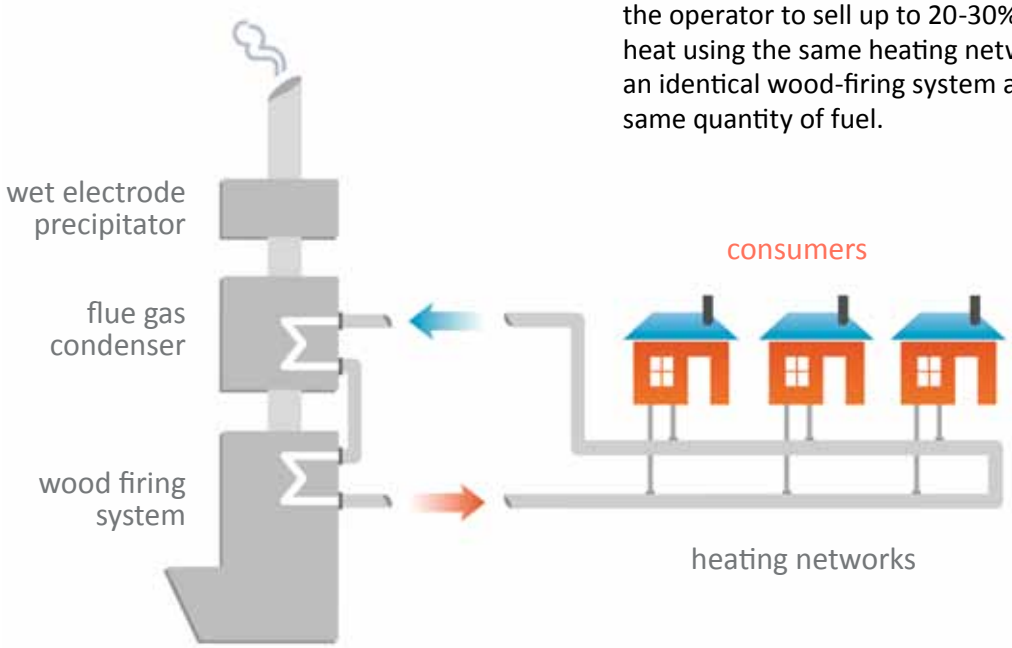
In drum dryers, SaveEnergy solutions can be ideally used for recovery from the drum dryer flue gas. Waste heat is often recovered at a high temperature. The temperature of this waste heat is usually sufficient to operate a belt dryer without further energy resources.

# Heating networks

With SaveEnergy solutions, the overall efficiency of heating networks can be increased by 20-30% without the use of additional primary energy. In heating networks the heat from condensation is a perfect means with which to raise the return temperature of the network. For the efficient use of heat from condensation, average return temperatures of below 50°C are required. In heating networks with unsuitable return temperatures, ‘bad’ consumers can be identified by the SaveEnergy temperature management system. The temperature analysis derives a specific plan of measures for the optimisation of the heating network on the basis of a profitability analysis.

## Existing heating networks

On the basis of the SaveEnergy temperature analysis, the return temperatures in the heating network can be reduced to an average of 50°C with acceptable measures. In addition to the ability to recover heat from flue gas, the heat losses in the network are reduced. The greater temperature spread also allows more heat to be transported through the existing network. Upgrade measures enable the operator to sell up to 20-30% more heat using the same heating network, an identical wood-firing system and the same quantity of fuel.

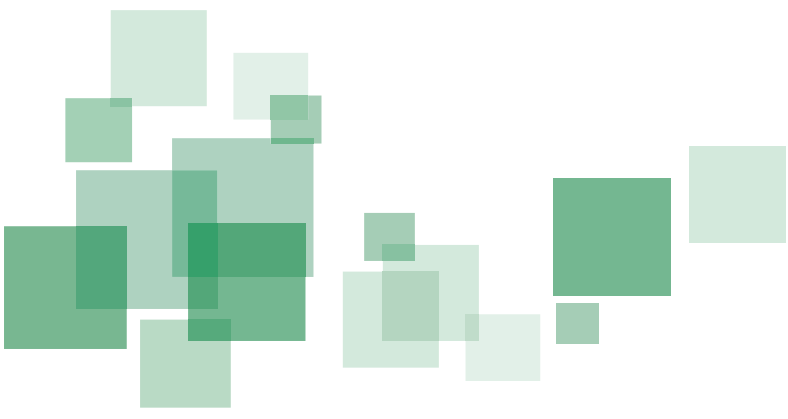



## New heating networks

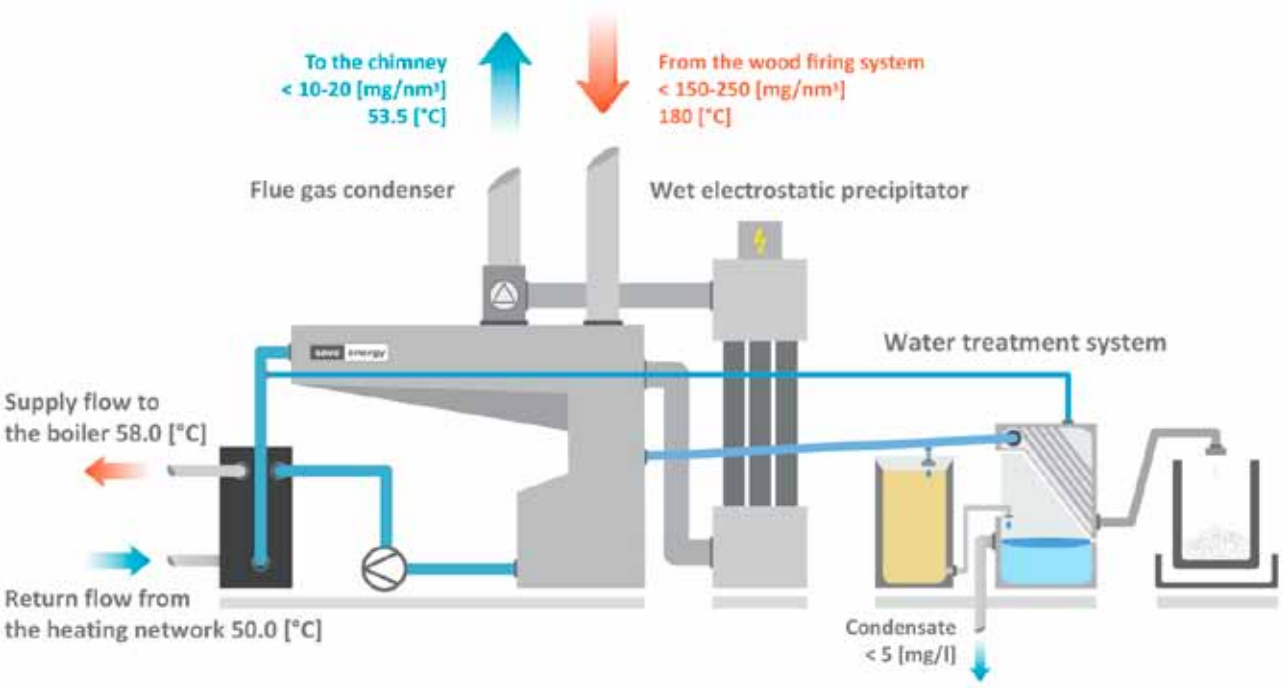
Efficiency-increasing measures also pay off when implementing new wood-fired heating plants. Targeted measures for an efficient hydraulic design can often be implemented at an early stage. An efficient design allows a greater temperature spread between the forward and return temperatures. This in turn results in a reduced mass flow rate in the heating network. This allows the heating network to be dimensioned on a smaller scale. The low return temperatures also allow heat to be recovered from the flue gas. An improvement of 20-30% in the overall degree of efficiency results in the use of a smaller wood-firing system with the same amount of heat. Part of the procurement costs incurred for the flue gas condensation unit is already financed by the lower investment costs for the wood-firing system. If profitability is considered from all angles, investments in efficiency-increasing measures pay off after only a few years. Increasing fuel costs will further improve the profitability of efficient systems.

# Our products

- SaveEnergy solutions have been specially developed to increase heat efficiency in compliance with top ecological standards.
- Thanks to its simple structure and high degree of standardisation, the availability of the sophisticated and robust SaveEnergy system meets the highest demands.
- The SaveEnergy system is modular in structure. It has been dimensioned to suit standardised operating ranges and is delivered as a turnkey solution. This has the benefit of clearer and simpler delivery thresholds and responsibilities.

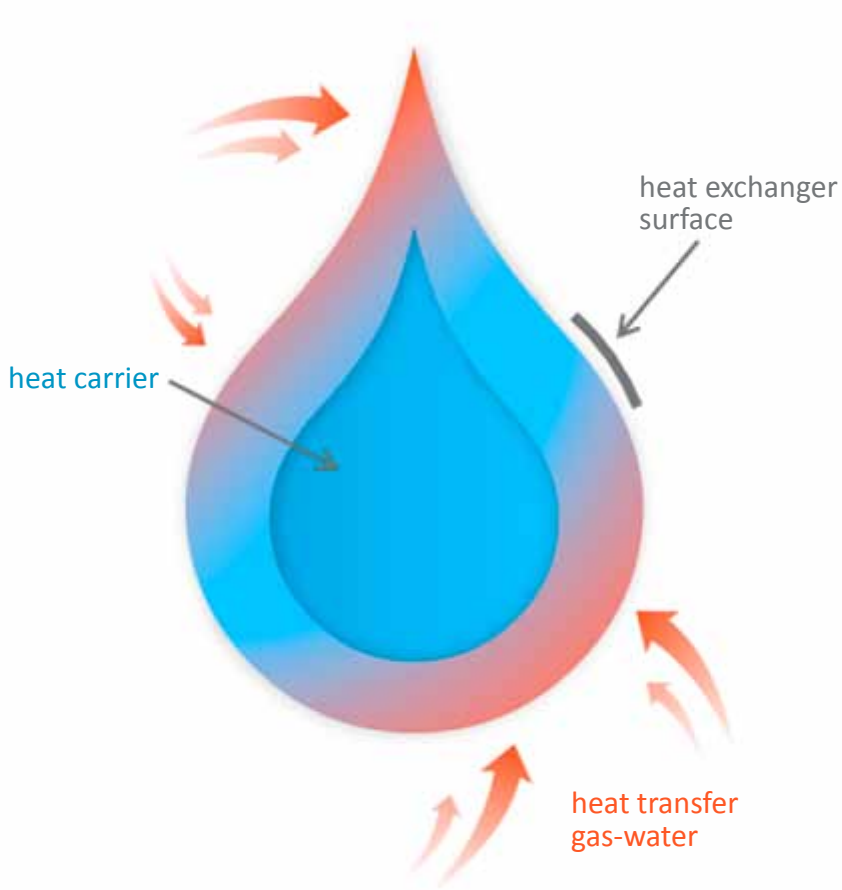


SaveEnergy components are combined in accordance with customer requirements. All components are ideally matched. The centrepiece of the system is the SaveEnergy flue gas condenser. The SaveEnergy flue gas condenser recovers the remaining heat from the flue gas. In addition to heat recovery, the flue gas is simultaneously cleaned. The condensate from the flue gas condenser is processed by the SaveEnergy water treatment system for use in the process and for feeding into waste water. The solid is dried cleanly and without emissions in a single-use big bag for disposal. The SaveEnergy wet electrostatic precipitator cleans the flue gas for compliance with the highest emission requirements. With the SaveEnergy devaporiser, in sensitive areas the vapours produced when the flue gas is discharged into the atmosphere are avoided.



# Flue gas condenser

The SaveEnergy flue gas condenser is a highly efficient system that recovers the sensitive, latent heat from polluted flue gas. The heat from the flue gas is extracted via the injected process water. In doing so, the sum of all water droplet surfaces creates a heat exchanger. This results in heat exchange surfaces that are the size of several football pitches. The water droplets continuously re-form. The SaveEnergy heat exchanger (water droplets) can neither become soiled nor corroded. This results in low-maintenance, robust operation and sets top standards regarding availability and durability.

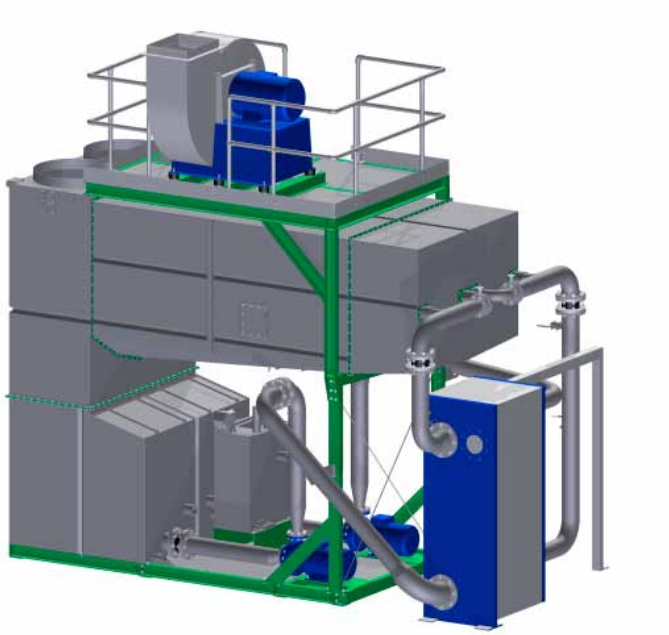


## The technology in detail

In the SaveEnergy flue gas condenser, the sensitive, latent heat from the flue gas is recovered. In doing so, the heat from the flue gas is extracted via the injected process water. The surfaces of the many small water droplets assume the function of a mechanical heat exchanger. The heat from the flue gases is absorbed by the liquid and emitted via a plate heat exchanger to the heat consumer (e.g. fed into the heating network). The large heat exchanger surface (the sum of all droplet surfaces) guarantees a high level of efficiency in heat recovery. The flue gas is cooled down to 2–3°C above the temperature of the heat consumer. As there is no mechanical heat exchanger in the flue gas, the SaveEnergy condenser is not subject to soiling.

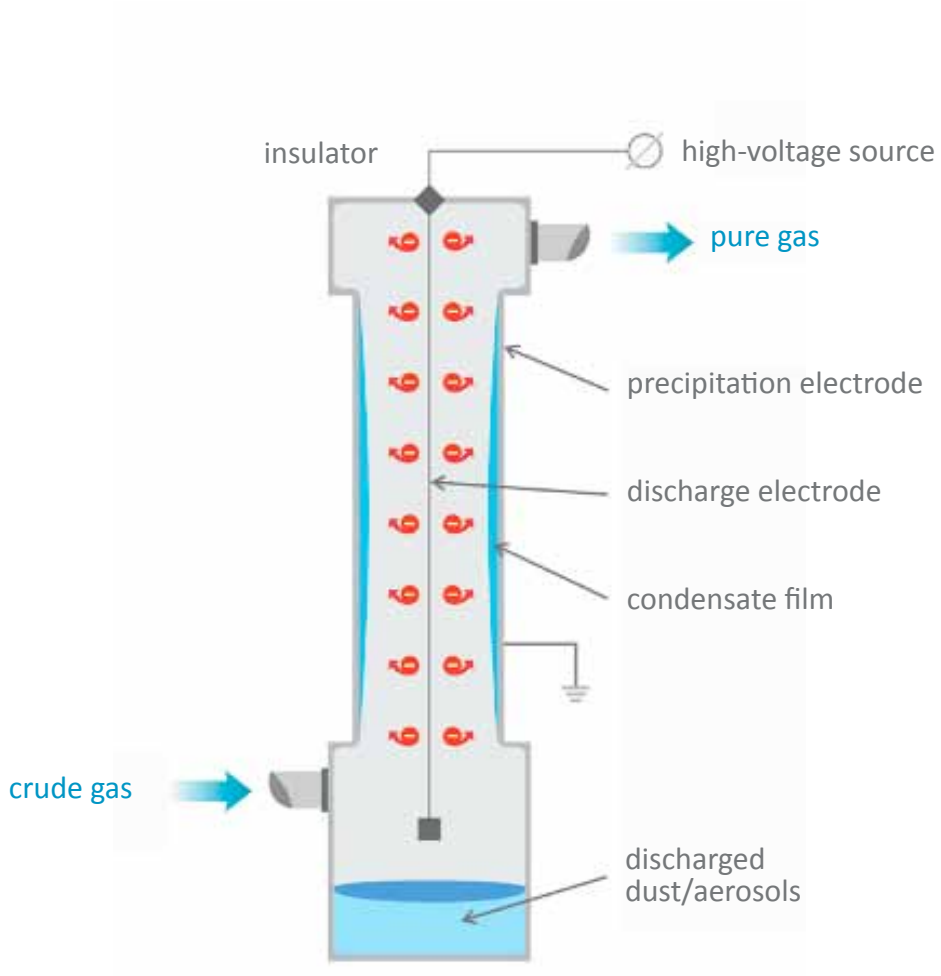
By cooling to below the dew point, the water from the flue gas condenses. The pH level of the condensate is neutralised and cleaned from the solids by the water treatment system. Only the cleaned condensate surplus is discharged into the sewage system. This means that the SaveEnergy condenser does not require any fresh water.

Thanks to the intensive injection of process water into the flue gas, the SaveEnergy flue gas condenser assumes the function of a flue gas scrubbing system. Here, coarse dust particles in the flue gas are bound to the surface of the liquid by the inertial forces. They are then transported into the water treatment system via the process water. The preliminary cleaning of the flue gas to remove coarse dust particles is crucial for the efficient functioning of the SaveEnergy wet electrostatic precipitator, which discharges the small dust particles from the flue gas downstream.



# Wet electrostatic precipitator

- The SaveEnergy wet electrostatic precipitator is a high-capacity separator. The wet procedure guarantees dust emissions of below 10 mg/nm$^3$ at an availability of around 99%.
- The separator pipes are predominantly cleaned in a natural process via the condensate film forming on the surfaces of the separator pipes. No mechanical installations are required for cleaning. This results in low-maintenance, robust operation and sets top standards regarding availability and durability.
- The SaveEnergy wet electrostatic precipitator is arranged downstream of the flue gas condenser. The cooled flue gas has a reduced volume. This means that the SaveEnergy wet electrostatic precipitator is compact and thus saves on space.



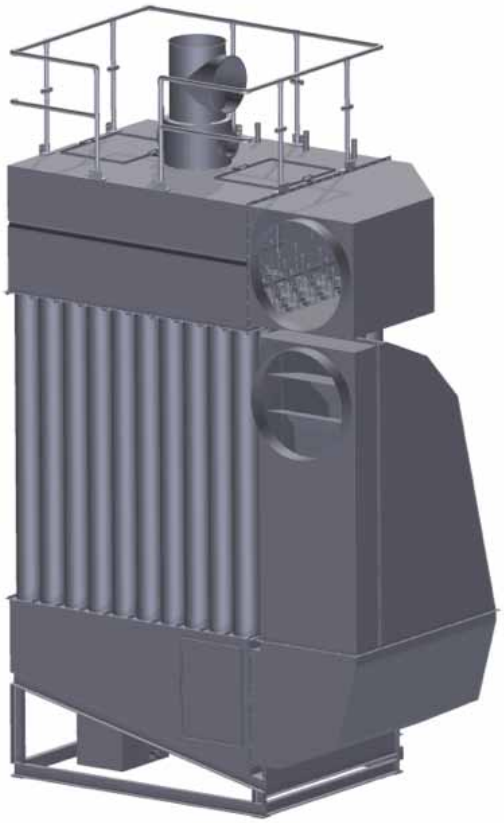
## The technology in detail

In the SaveEnergy wet electrostatic precipitator, the solids are separated from the flue gas by the impact of an electric field. The electrically neutral dust particles are charged by emission electrodes. The impact of the electrical forces transports the particles towards the precipitation electrode and thereby discharges them from the gas flow.

The SaveEnergy wet electrostatic precipitator is designed as a pipe separator. The sheath surfaces act as precipitation electrodes. The flue gas condenses on the free-standing sheath surfaces. The solids are continuously transported to the water treatment system via the condensate. This makes the wet electrode precipitator self-cleaning and insensitive to soiling. Thanks to this self-cleaning design, there is no need for a mechanical tapping device to clean the precipitation electrodes. This also results in a far lower maintenance requirement.

Thanks to the upstream SaveEnergy flue gas condenser, the flue gas is cooled down. The flue gas enters the wet electrode precipitator at a temperature of about 50°C in a fully saturated state. These low temperatures result in a reduced volume flow. This permits the compact design of the SaveEnergy wet electrode precipitator.

As the wet electrode precipitator is operated in a 'wet' condition in all operating modes, there is no risk of the dew point being undershot in partial load mode. In the dry separation procedure, if the dew point is undershot the precipitation electrodes gum up. In all modes the SaveEnergy wet electrode precipitator guarantees a maximum separation degree and thereby compliance with the highest ecological standards, which fall greatly below the legal requirements.



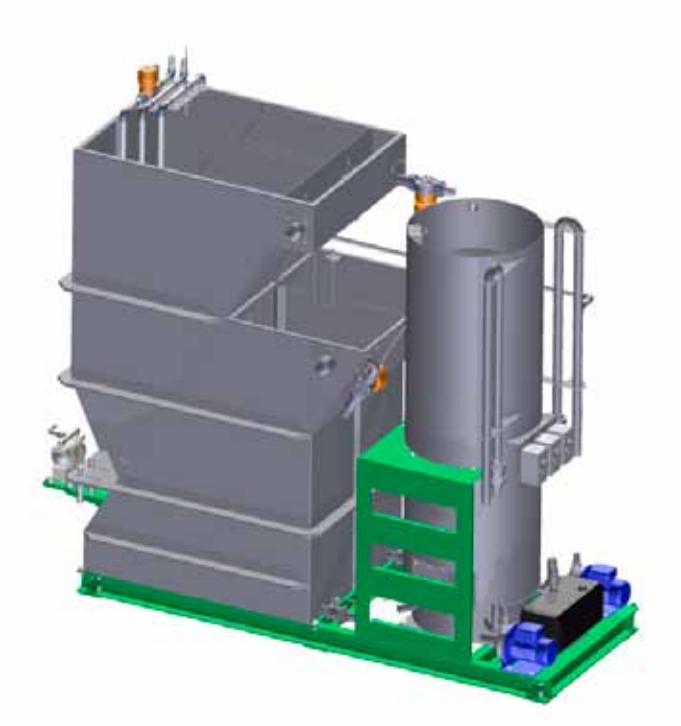
# Water treatment system

The SaveEnergy water treatment system cleans the condensate from the solids. The amount of contained solids is less than 5 mg/l after the SaveEnergy water treatment system. Part of the cleaned condensate is returned to the flue gas condenser as process water. The surplus condensate is directed into the sewage system. The SaveEnergy water treatment system is fully automatic and requires very low maintenance.

In the SaveEnergy water treatment system, the condensate is cleaned in a two-level process. At the first level the soiled condensate is directed through a lamella separator. The force of gravity causes the majority of the solids to be deposited. At the second level the pre-cleaned condensate seeps through a sand filter, where the remaining solids are filtered out of the condensate. The sand filter is cleaned automatically. The cleaned condensate is collected in the clean water tank. Surplus condensate is directed into the sewage system.

## Sludge drying

The solid is dried from the water treatment system in a single-use big bag. The solid is cleanly packaged and can be disposed of in a dry form.



# Temperature management

Older community heating systems in particular have high return temperatures of above 60°C in some cases. This can be caused by hydraulic short-circuits or badly controlled network pumps, for example.

In Scandinavia the heating networks have been consistently optimised for many years. A large-scale study has examined the average forward and return temperatures of 129 heating networks.

According to this, the average return temperature across all heating networks was an average 48.2°C.

In heating networks with unsuitable return temperatures, 'bad' consumers can be identified using the SaveEnergy temperature management system. The SaveEnergy temperature analysis derives a specific plan of measures for the optimisation of the heating network on the basis of a profitability analysis.

# Devaporiser

The SaveEnergy devaporiser prevents the formation of vapours when the flue gas is discharged into the atmosphere. In this process, the flue gas is directed through a cross-flow heat exchanger. The flue gas is further condensed in this cross-flow heat exchanger. The heat from the flue gas is discharged into the devaporised air. Devaporised air is ambient air that is directed through the cross-flow heat exchanger by axial fans.

The two gases (flue gas and devaporised air) are mixed together. When this mixed gas is discharged into the atmosphere, the saturated vapour line is not undershot. This means that no visual vapours can be seen downstream of the SaveEnergy devaporiser.

**IS SaveEnergy AG**
Hinterdorfstrasse 4
Postfach 174
CH-8309 Nürensdorf
E-mail: info@saveenergy.ch
Tel.: +41 (43) 204-2020