GÖTAVERKEN MILJÖ

Unique flue gas treatment and associated technologies

- Flue gas cleaning
- Energy recovery
- Water treatment
- Service commitments

We provide safe and reliable state-of-the-art solutions for a better environment

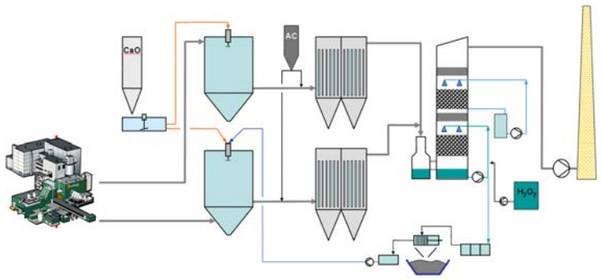
Götaverken Miljö is an international provider of innovative gas cleaning technologies primarily for flue gases emitted from Waste-to-Energy, co-incineration and hazardous waste incineration plants. Our undertakings include complete process engineering, project execution, installation and commissioning on a turnkey basis. We also supply associated water treatment, energy recovery as well as district and local cooling generation. Unique, integrated technologies ensure an efficient removal of toxic pollutants. Our service engineers stand ready to take care of plant improvements, retrofits and maintenance to make sure everything functions optimally.

Since January 2010 Götaverken Miljö is owned by Babcock & Wilcox Vølund A/S, one of the world's leading suppliers of equipment and technologies for converting waste and biomass into thermal energy and electricity.

Flue gas cleaning

Götaverken Miljö maintains a recognized strength and long tradition in building complete flue gas treatment systems for Waste-to-Energy plants. Our experienced engineering team, project expertise and reliable design ensure that we can deliver high-quality design and tailored state-of-the-art plants, regardless if a dry, semi-wet or a wet solution is needed or a combination of these. We consider ourselves as specialists in wet flue gas cleaning with associated water treatment.

Condensing wet scrubber at Vestforbrænding, Denmark



Semi-wet flue gas cleaning system at Sakab, Sweden.

Combined dry/wet flue gas cleaning

Dry or semi-wet flue gas cleaning can often be combined with a condensing scrubber for energy recovery and/or an integrated polishing function in order to meet the most stringent performance standards.

Benefits

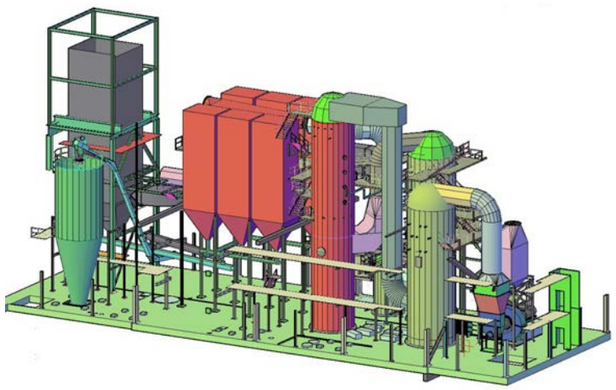
- Optimal chemicals costs/consumption
- High tolerance to peak loads
- Waste water free operation
- Enhanced energy recovery

Wet flue gas cleaning

Our wet scrubber systems provide extremely reliable and efficient flue gas treatment. Our core competence covers the complete process including water treatment technologies.

Benefits

- Most reliable emissions control
- Operation with high availability
- High buffer capacity to handle peak variations
- Minimum chemicals consumption
- Generates lowest amount of residues
- Most suitable to combine with flue gas condensation



Wet flue gas cleaning system at Dåva 1, Umeå, Sweden.

Energy recovery

Modern incineration plants are equipped with a boiler system, transforming a major part of the energy content in the flue gases into steam. The steam generates electric power in turbine generators and produces heat in turbine condensers. The heat is fed into a district heating system.

Flue gas condensation

We have taken the recovery of energy one step further. By cooling the flue gas to below its dew point, it is possible to recover large quantities of latent heat. If the flue gas temperature after the boiler is approximately 150°C it is possible, by means of flue gas condensation, to increase the energy efficiency by an additional 20%.

Condensation may take place either as a direct heat exchange between gas and district heating water, utilizing an intermediate cooling water circuit, or typically by using an absorption heat pump. For optimum energy efficiency, a combination of these methods are used.

The flue gas condensation should be combined with ADIOX® tower packings in the scrubber stages for dioxin removal and memory effect prevention.

Absorption technology

We supply absorption heat pumps for enhanced energy recovery (as described above) and absorption chillers to produce profitable comfort cooling in the summer. The chillers are placed locally in properties or centrally in a district cooling system and use excess heat from the district heating network as energy source. The installation requires very little maintenance. Besides the financial gains, the technology is eco-friendly and helps reducing CO_2-emissions.

Absorption heat pump at Vestforbrænding

Water treatment

The water from the wet scrubber system is to be treated in such a way that no unacceptable levels of harmful substances will end up in the groundwater system or be discharged to recipient. Our engineers have solid experience in designing the optimal plant for treating the waste water from our scrubbers.

Service commitments

Götaverken Miljö has extensive experience of servicing and maintenance of flue gas cleaning plants as well as compressor and absorption heat pumps. Our servicing activities include a complete programme, from delivery of spare parts to full servicing of entire plants.

Conversions, upgrades and optimizations are carried out in order to ensure optimum efficiency for the customers' equipment and to meet the demands of stricter environmental legislation. We offer service agreements for preventive maintenance including guaranteed call-out service to avoid unexpected stoppages. Our service organisation also takes on installation, commissioning and servicing of absorption chillers.

Unique technologies

Götaverken Miljö has developed a number of unique technologies that can be retrofitted into existing plants and integrated in our turnkey projects.

ADIOX® dioxin removal

The patented ADIOX dioxin removal process is based on the high affinity of dioxins to carbon. By dispersing small particles of carbon in PP-plastics, a material excellent for dioxin abatement is produced.

A dioxin molecule that is present in the flue gas is initially absorbed into the PP and then migrating to a carbon particle where it is strongly adsorbed (connected to its surface). The plastic material acts as a selective membrane with a preference for molecules like dioxins. When the service life of ADIOX material for dioxin removal has come to an end, the material is incinerated. The dioxins are destroyed during the incineration process and the dioxins are taken out from the ecocycle.

Tower packings and droplet separators, produced in ADIOX material, can be installed in both wet, saturated and dry applications.

View from within the dry ADIOX® absorber at Tekniska Verken in Linköping.

MERCOX™ mercury removal

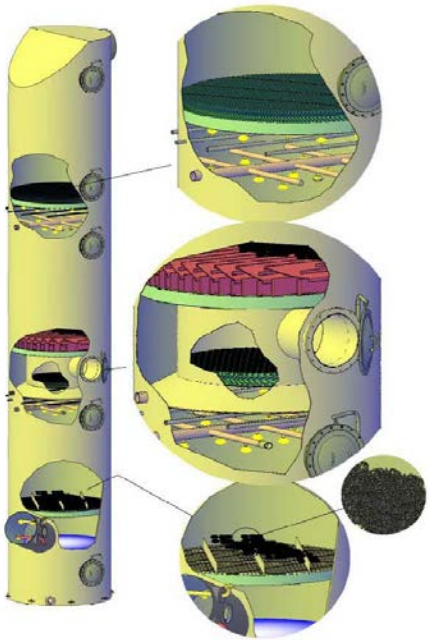
MERCOX is used in wet scrubber systems in order to oxidise metallic mercury, Hg^0 to Hg^{2+}, which is separated from the flue gas. MercOx is a very reliable process, where also extremely high mercury peak loads in the gas can be allowed without increasing emissions.

Sulphur Recirculation for corrosion reduction

It is well-known that with a higher SO_2/HCl ratio in the flue gas, the high temperature corrosion in a boiler is reduced. We have developed a process, where sulphur is recirculated from the flue gas system to the boiler. It has been documented that the Sulphur Recirculation process can decrease the corrosion rate by more than 50% in full scale operation. Also other positive effects derive from this technology, such as decreased dioxin formation.

Multifunctional scrubbers

Götaverken Miljö offers standardized gas treatment scrubbers based on our different gas treatment technologies including acids removal, gas condensation, ADIOX® dioxin removal and/or MERCOX™ mercury removal. The units are compact and designed for minimum on-site erection work.



Benefits

- High performance and availability
- Low maintenance requirement
- Flexible layout and small footprint
- Low total cost
- Several functions can be combined

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