



Emission Control

Achieving. Sustainability. Together.

Expect more

GEA Emission Control supplies abatement technologies to comply with ambitious limit values to protect the environment and stay competitive and profitable since more than 100 years.

ACHIEVING.

Grow together with your partner GEA

Reducing, avoiding and recycling are the keys to the treatment of emissions in addition to energy-efficient and resource-saving production methods.

We undertake to protect the environment and our customers' bottom line. The key are innovative solutions and the flexibility to evolve alongside changing regulations and the public's growing ecological awareness.

GEA is a world leader in the development, design and installation of industrial off-gas systems and technologies. Our profound knowledge on gas cleaning is shown by our numerous reference plants installed at leading producers worldwide that speak for themselves.

GEA is supporting customers in looking for ways to lower their emission levels, energy consumption, minimizing operating costs and reduce their carbon footprint. Approximately 2 million tons of pollutants are stopped by using GEA emission control plants each year and recently one of our customers is significantly reducing its carbon footprint by lowering the annual CO₂ emissions by 2.500 tones. The range of tailor-made solutions includes new installations, upgrades and retrofits in addition to advice, analyses and studies as well as commissioning and spare parts procurement.

SUSTAINABILITY.

Engineering for a better world

GEA's commitment to "engineering for a better world" highlights the central focus on sustainability of our business. Major global trends such as world population growth and urbanization call for production methods that are highly efficient and use fewer valuable resources. As an engineering company, we are harnessing our innovative strength to meet these challenges. GEA is continuously developing its equipment and processes, leading the way in sustainability and helping its customers build tomorrow's plants today. This is also proven by being:

- "A"-rated at CDP (Carbon Disclosure Project) Water security,
- "A"-rated at CDP Climate rating,
- gold rated at EcoVadis CSR rating 2021.

Process technology that makes a difference

GEA focuses on process technology and components for high-performance and efficient production processes in a variety of markets. GEA encourages its technological excellence by consistently fostering an innovation-led culture.

We supply technology and application solution packages that ensure measurable benefits with a short payback period.

The group's sense of responsibility is reflected on its mission statement:

GEA aims to be the world's most respected industrial technology group by providing state-of-the-art solutions for sustainable processes which improve people's everyday lives.

**"Becoming more sustainable
is the challenge we all face."**

- Johannes Giloth, Chief Operating Officer, GEA

Source: GEA's Sustainability Report 2021 on www.gea.com

TOGETHER.

Be innovative

Our unparalleled innovation and expertise allow us to fully understand our customers' needs, study their challenges, and explore the most appropriate technology. This is the way to achieve the agreed performance on the emission reduction. We are connected across the value chain.

Stay connected

Many of our customers are returning customers. Because GEA knows its customers, understands them and is "connected" with them, we are successful together.

However, this does not only mean a trusting cooperation with our customers. Driven by technological developments, key success factors are changing. Digitalization presents processes and people with ambitious challenges.

Digitalization at GEA is therefore primarily an engineering task. As an experienced plant developer, we support our customers in mastering these challenges with connected products and systems.

Digitalization and customer service of the future are digital twin, virtual reality and artificial intelligences (AI). Where can these technologies be used, how and what improvements can they achieve?

Contact us.



Long-term solutions

GEA sets the standards for the industry.

Our expertise is your benefit. We design most efficient, high performance technology to treat pollutants that otherwise would harm health and environment. Our equipment is capable of recovering energy and valuable materials which otherwise could be wasted throughout the industrialized world.

A unique combination of technology leadership, process insight and global presence enables us to deliver world-class systems along with quality, reliability and financing opportunities to minimize the air pollution impact.

GEA offers solutions for its customers in all industries.

Our current main activities are in the areas:

- non-ferrous industry,
- chemical, petrochemical and pharmaceutical industry,
- iron and steel industry,
- cement industry,
- glass industry,
- power and incineration industry,
- CO₂-saving technologies.



Scrubber:
Venturi, Jet, Submerged,
Annular Gap, RS Type,
Linear Flow & Radial Flow



Cooler:
Quench & Evaporation



Cyclones

Electrostatic Precipitator:
Dry, Wet, LT Process



PART

ANNULAR GAP SCRUBBER

CHLORIC GAS ABSORPTION

JET SCRUBBER

COMPACT GAS SCRUBBERS

NO_x REMOVAL (DENOX)

SUBMERGED SCRUBBER

ABSORPTION C

LIQUID CONTACTORS

CERAMIC CANDLE

HEAVY METALS RE

HOT GAS FILTRATION
SATURATION

HEAVY M

DESULPHURIZATION (DES)

SPRAY DRYER ABSORBER

REDUCTION OF NI

LINEAR FLOW SCRUBBER

EVAPORATION

LABORATORY GAS SCRUBBERS

COOLING & CONDITIONING

DUST SEPARATION

RADIA

BLEACH PRODU

Filter:
Bagfilters, ECOpuls &
Ceramic Candle



Catalytic Gas Cleaning:
SCR, BisCat, OxyCat



EP Absorber



PARTICULATE MATTER REMOVAL

ER ORC MODULES WASTE HEAT RECOVERY COOLING COLUMNS
ON ABSORPTION OF OTHER TOXIC COMPONENTS
ABSORPTION RS TYPE SCRUBBER AEROSOL SEPARATION
AGHOUSEFILTER SPRAY TOWER ENERGY RECOVERY UNIT

OF ACIDS **VOC & ODOR REMOVAL**
REMOVAL ECOPULS SCR PLANTS POWER PRODUCTION
METAL REMOVAL ABSORPTION COLUMNS

VENTURI SCRUBBER **DIOXIN/FURAN ABATEMENT**
(SO_x) QUENCH BISCAT EMERGENCY GAS SCRUBBERS
NITROGEN OXIDES LT PROCESS EP CATALYTIC OXIDATION
ON COOLER **SPECIFIC PROCESSES**

DRY PROCESS EP AEROSOL SEPARATOR SYSTEMS
NING L FLOW SCRUBBER GAS CONTACTORS
ABSORPTION OF HALOGENS
DUCTION **ENERGY RECOVERY**
PROCESS GAS CLEANING

**Waste Heat Recovery Units
(WHRU)
with e.g. ORC systems**



**Spray Drying
Absorber & Evaporator
(SDA/SDE)**



Gas/Liquid Contactors:
Packed Bed, Spray, Bubble Type



OUTSTANDING TECHNOLOGIES AND REFERENCES

To the latest developments contact us
or visit our homepage at gea.com.



Non-Ferrous

GEA is a reliable partner for gas cleaning solutions in nearly all areas of non-ferrous metals production. To ensure air pollution control and process gas treatment, gas cleaning systems are essential components in the process chain.

Metallurgical off-gases

GEA-design gas cleaning solutions ensure that the impurities from the SO₂-laden metallurgical process gases are efficiently removed and a high-quality sulfuric acid is produced downstream. The focus is the cleaning of SO₂-based gases from pyrometallurgical processes such as roasters, smelting furnaces and converters for the production of: copper, zinc, lead, nickel, molybdenum, platinum and gold.

A typical process chain of gas cleaning consists of the following sections:

- dust removal from hot gases using cyclones and dry electrostatic precipitators,
- washing and cooling plants (quench towers, venturi, linear flow or radial flow scrubbers, packed gas cooling towers) including chloride and fluoride removal,
- separation of particles, fumes, heavy metals and sulfuric acid mist with wet electrostatic precipitators,
- separation of mercury in mercury removal towers.

Copper anode refining and slag cleaning furnaces

In the copper refining and recovery processes, exhaust gases must be purified before being released into the atmosphere. Therefore:

- fine dust removal and separation of fumes using wet electrostatic precipitators with integrated quench section,
- separation of sulfur dioxide using wet and dry processes based on limestone and caustic soda.

Mercury removal

The mercury removal process is based on the oxidation of mercury vapor by mercuric chloride to form mercurous chloride (calomel) which can be separated by scrubbing.

Debottlenecking

Beside the activities in green and brown field projects, we are experts in debottlenecking.

In the course of the life cycle of a production plant, the raw materials often change and the production capacities increase.

To avoid degradation of the performance of the plant, GEA offers solutions for debottlenecking:

- revamping and upgrading of existing installations,
- conversion of plate type wet electrostatic precipitators into tube bundle wet electrostatic precipitators,
- adjustment of circulation flows/scrubbing liquids,
- extension of packed columns increases cooling and/or cleaning efficiencies.

GEA technology is the standard in gas cleaning plants of the global players.

Together with the world market leaders, we continue to develop our technology to always stay competitive.



Chemical, Petrochemical & Pharmaceutical

GEA offers tailor-made solutions – from laboratory to full process scale, from thermoplastic or fiber reinforced plastic (FRP) materials to high-alloy stainless steels – in order to provide, both technically and economically, optimal solutions for our customers.

Compact gas scrubbers

GEA-design compact gas scrubbers are made for the treatment of emissions in laboratories, pilot and production plants in the chemical and pharmaceutical industry. They are in use for cooling gases, condensating vapors, absorbing pollutants, separating dust and aerosols and conducting in-situ chemical reactions. The compact gas scrubbers series can treat gas volumes from 1 m³/h up to 1,500 m³/h without pressure loss.

Mobile or stationary emergency gas scrubbers

Mobile or stationary jet-type gas scrubbers are used as safety installations for storage compartments, in dosing or filling stations for transporting halogen, halogen hydrogen, ammonia and other harmful gases.

Chloric gas absorption / bleach production units

These scrubber systems serve to absorb chlorine and are used in the manufacture of bleaching agents. They are made of PVC or ECTFE-lined FRP material and offer high corrosion resistance.

Multi-stage flue gas cleaning processes with recovery of valuable components

Flue gases from combustion, chemical production or recycling processes are treated in multi-stage gas cleaning processes. By using quenching and/or absorption and concentration stages, pollutants such as halogens and their hydrogenated derivatives, sulfur compounds, ammonia, low molecular weight alcohols, carbonic acids or amines can be removed from the gas and recycled into the production process.

Dedusting applications in the chemical industry

This includes the treatment of particulate emissions with particle sizes in sub-micron scale e.g. stemming from chemical milling, screening or drying processes in combination with abatement of gaseous pollutants.

Titanium dioxide calcining

Titanium dioxide is produced through two processes: The chloride process and the sulfate process. For both processes the removal of dust and sulfuric acid mist can be achieved by using venturi scrubbers and wet electrostatic precipitators.

Sulfuric acid recovery plants

Spent acid with high proportion of organic contaminants is processed thermally in a regeneration furnace. This requires gas cleaning plants, such as washing and cooling systems (quench/packed cooling towers) and the removal of sulfuric acid mist using either high performance venturi scrubbers or wet electrostatic precipitators.

Vent gas treatment systems in the petrochemical industry (e.g. UOP Oleflex PDH)

GEA's standardized FRP-built scrubber systems can be used to treat Cl₂, HCl and SO₂ emissions from catalyst regeneration and come with a modular skid-mounted design, covering international codes and standards in all relevant engineering disciplines.

CANSOLV® pretreatment

The CANSOLV® pretreatment is a combined quench and SO₃ aerosol removal system applied prior to Shell's CANSOLV® SO₂ recycle process. The pretreatment uses either a high efficiency wet venturi scrubber or a wet electrostatic precipitator for SO₃ abatement.

Fluid catalytic cracking (FCC) units

For the FCC regenerator off-gases different solutions can be provided: removal of dust by using hot electrostatic precipitator, removal of dust, SO₂ and SO₃ by using an integrated wet scrubber/wet electrostatic precipitator system and the removal of NO_x by using selective catalytic reduction. A ceramic candle filter can be used for dust and NO_x removal, if required.



Iron & Steel

GEA is serving Emission Control and energy recovery solutions for iron making and steel making processes. Long-term solutions are provided for the traditional blast furnace route as well as for alternative routes of direct reduced iron.

GEA is the inventor of global standard solutions like the "BISCHOFF-scrubber" for blast furnaces or the Lurgi-Thyssen (LT) dry dedusting process for converter off-gas. With GEA's long lasting experience and wide portfolio, future requirements for carbon neutral production processes can be met as well. GEA offers clean air solutions while keeping the CAPEX/OPEX low.

Besides the long-term trend towards carbon-free steel production there is also demand for ultra-low emissions (ULE) in the iron and steel industry. It is expected that the environmental legislation in many countries will soon require lower emission levels mainly for dust, SO_x and NO_x. GEA's currently available gas cleaning technologies are designed to comply already today with the ULE-requirements.

In an integrated iron and steel works are multiple opportunities to reduce emissions.

Sintering and pelletizing plants

The main technologies used are:

- Dedusting by dry type horizontal ESP.
- Mitigation of SO_x, HF, PCDD/F and heavy metals in downstream arranged reactor or low-pressure bag filter working on dry/semi-dry basis.
- Special spray dryer absorber (SDA technology to reach very low SO₂ emissions).
- Waste heat recovery on cooler venting air.
- NO_x reduction on sinter/pelletizing strand by tail end compact SCR.

Coking plants

The following technologies are often applied:

- Detarring by wet type vertical ESP.
- Lower temp NO_x reduction by SCR downstream DeSO_x/dedusting.

Blast furnace (BF) / direct reduced iron (DRI)

For off-gas processing and avoidance of diffuse emissions are put in operation:

- Top gas dedusting and pressure control by "BISCHOFF-scrubber" working with an adjustable annular gap.
- Secondary dedusting of casthouse/stockhouse by low pressure bag filters.

GEA offers the following solutions for the individual units in the steel plant:

Basic oxygen furnace (BOF)-shop

- Primary dedusting with CO-gas recovery of converter off-gas by dry type ESP (Lurgi Thyssen Process), "BISCHOFF-scrubber" for wet dedusting, or secondary dedusting by low-pressure bag filters.
- Upgrade of dry and wet gas cleaning plants by wet type vertical ESP in order to comply with ultra-low emission (ULE) requirements.

GEA is also active in the areas of degassing and scarfing. ESP, scrubbers and ejectors may be used here.

Electric arc furnace (EAF) / submerged arc furnace (SAF)-shop

- Dedusting of EAF/SAF off-gas by using low-pressure bag filter along with dry sorbent injection.
- Waste heat recovery/power production with ORC.

A special exhaust gas treatment is required in the area of:

CO-generation plant

- Recovered CO-gas fine cleaning by horizontal/vertical wet type ESP upstream turbines.
- Use of gases from BF, BOF, coke oven for power generation.

The GEA technologies impress with their low energy consumption and minimal maintenance requirements.



Cement

GEA Emission Control provides solutions for process gas cleaning and contributes to reducing the carbon footprint of cement production. With our customers we develop applications to meet the latest standards.

GEA technologies are used for long wet kilns and modern suspension preheater/calcliner kilns. Current and future requirements on NO_x and VOC control are met with GEA's advanced catalytic reduction/oxidation technology.

GEA offers various applications for dedusting:

Process dedusting with low-pressure bag filters for large gas flows

The reduced amount of individual parts, the high gas cleaning efficiency and the small plant footprint allow for minimum investment and maintenance costs. This design is preferably used for conversion ESP into baghouse:

- Kiln/rawmill
- Alkali bypass
- Finishing mills
- Clinker cooler vent air in connection with air-air cooler

The injection of lime-based reagents allows for control of inorganic gaseous emissions like HF, HCl, SO_x.

Particulate matter/NO_x removal with candle filters

Dedusting with candle filters, GEA high temperature filters with ceramic elements, removes particulates and are now available as BisCat ceramic filters with an embedded catalyst matrix allowing removal of NO_x, dioxins, mercury and VOC. The GEA BisCat filter system thus combines the three process stages of dust removal, separation of SO_x, acidic components and reduction of total hydrocarbons (THC) and nitrogen oxides (NO_x) in one unit. The filter elements are chemically inert and corrosion resistant. Ceramic filter elements show very low dust emissions and are thermally stable up to high operating temperatures. No cooling of flue gases is required and no thermal heat energy is wasted.

Wet flue gas desulphurization (FGD)

This is used for high levels of desulphurization.

The GEA wet scrubbing process sets the best standards in cement industry by:

- Using rawmeal as reagent
- Providing dry gypsum for finishing cement
- Working with zero liquid discharge

Waste heat recovery (WHR) units

They are used for heat usage from kiln off-gas, clinker cooler vent air or bypass extraction.

Significant amounts of energy are lost via the stack. The implementation of energy recovery units in your industrial process will increase its economic efficiency.

GEA heat exchangers are used for heat transfer for:

- drying purpose of sewage sludge,
- power production by ORC,
- district heating,
- reheating of catalytic process.

Gas cooling, conditioning and pretreatment downstream CCS

Our portfolio includes a series of quench and scrubber solutions (in tower/in-duct design), which can also be combined depending on the application. The GEA applications can be used for any cooling of gases – such as preheater exhaust, cooler excess air and kiln bypass systems – before they are conveyed.



Glass

GEA is the right partner for the glass industry, providing customers around the world with complete support for all aspects of emission control to comply with the newest air emission levels.

The various sectors of glass production, such as container, float and special glass (fibers/wool) are using different kinds of melting furnaces, raw materials and energy. GEA has competence throughout the whole off-gas-treatment chain.

The proven conventional process concept consists of the following process steps for gas cleaning, which are integrated into the process chain as separate process steps as required:

DeSOx control

GEA has several process options available for the secure removal of SOx and other acidic compounds:

- dry desulfurization by in-duct reagent injection in combination with a DeSOx-reactor,
- dry desulfurization by use of a lime reagent in combination with a candle filter,
- semi-dry desulfurization by injection of lime slurry in a spray drying absorber,
- wet desulfurization by means of a caustic counter flow scrubber.

Particulate matter control by ESP

GEA has utilized electrostatic precipitators (ESPs) over many decades using the latest high-voltage technology, while keeping energy consumption low.

NOx control by SCR

GEA is well known for its long-term proven application of selective catalytic reactors (SCR) for NOx control.

Aqueous ammonia solution or urea is injected into the ductwork upstream of the SCR and evaporates immediately. Two-fluid nozzles are used for the injection of the ammonia solution. A system of static mixers provides an adequate mixing of ammonia. A gas distribution system ensures the gas distribution over the entire cross-section of the unit. The reaction between ammonia and NOx is enhanced by the presence of the catalyst bed.

Dust, SOx and NOx control by candle filter

Ceramic filter elements show very low dust emissions and are thermally stable up to high operating temperatures. No cooling of flue gases is required and no thermal heat energy is wasted.

While standard candle filters only offer dedusting, GEA's innovative technology, BisCat, can combine dedusting with catalytic NOx control, without an added SCR. The BisCat filter system thus combines the three process stages of dust removal, separation of acidic components and reduction of total hydrocarbons (THC) and nitrogen oxides (NOx) in one unit. The filter elements are chemically inert and corrosion resistant.

One advantage of the BisCat is the low pressure loss which ensure low energy consumption.

Energy recovery

We apply intelligent engineering to offer gas cleaning plants that save energy by recovering waste heat from flue gas, as in:

- heat exchanger arranged up- or downstream air pollution control,
- heat transfer medium in an ORC circuit to which a turbine for generating electricity or a compressor for generating compressed air can be connected. The heat can also be used to provide district heating.





Power & Incineration

GEA provides cost-effective emission reduction solutions for the existing fleet of both coal-fired power plants and waste-incineration plants.

More than just waste!

Household waste is not just waste anymore, piled up in stinking dump-yards. Waste is recycled, and more and more regarded as a resource, which can provide clean energy with a low CO₂-footprint. Flue gas cleaning of acid pollutants, dust, heavy metals, dioxins etc. is inevitable, though.

The GEA Spray Drying Absorption (SDA) process is ideal for this challenge. The process is efficient, versatile, mature, simple. We deliver this technology for power and incineration plants almost all over the world through licensees and trusted partners.

Our goal is to reduce the emissions of:

- sulfur oxides (SO₂ and SO₃),
- particulate matter,
- mercury,
- acid gases (HCl and HF),
- and other hazardous air pollutants (HAPs).

Power generation

The SDA process is a versatile way of cleaning flue gases by the removal of acid gases and particulates generated by fossil-fuel burning, mainly coal. Because of the presence of large volumes of flue gasses, power plant installations frequently have more than one spray dryer absorber module.

The end product from spray drying absorption consists of the reaction products, excess absorbent and fly ash. SDA systems can be effectively retrofitted into sites with limited space and are typically brought on-line during a brief tie-in outage, thus minimizing disruption to the power generation.

Waste incineration

Waste incinerator applications are generally characterized by relatively low amounts of gas. The smaller plant size and the composition of acid content typically favor single-pass designs. The drying properties of the absorber, high chloride content in the inlet gas, single pass mode, etc., call for a design with higher retention time in the absorber chamber, and therefore the plants are operated at high outlet temperatures.

A single, centrally located rotary atomizer minimizes the potential for wall wetting and deposition, which provides optimum reagent utilization. Its abrasion-resistant construction and flexible shaft design can tolerate imbalances and provides reliable, continuous operation between scheduled maintenance.

Chemical waste incineration

Chemical and hazardous waste incinerators are thermal processes which generate off-gases, for which cooling and quench systems, acidic and caustic scrubbers and wet electrostatic precipitators and SCR units, are applicable. We supply the full range of gas cleaning technologies for these applications.



CO₂-Saving Technologies

GEA solutions for CO₂ reduction are successfully in use. In view of climate change and the UN agenda, “Engineering for a better world” embodies GEA’s core value proposition.

The saving of energy and the reduction of CO₂ emission make an energy recovery plant an investment, not only providing competitive advantages on final product cost, but also helping to preserve our environment for our future generations.

GEA has focused on providing waste heat recovery equipment for energy-consuming applications, advanced gas purification equipment for pretreatment prior to CO₂ separation and catalyst technologies to reduce greenhouse gases.

Heat Recovery from flue gases by WHR units

In most industrial plants, there is further potential to use the available off-heat for power generation, but also for compressed air production, district heating, drying processes, etc. GEA offers gas cleaning and energy recovery systems that are based on the Organic Rankine Cycle (ORC) technology.

ORC offers the following advantages:

- Works at low pressures and temperatures, which is beneficial for maintenance and service perspectives.
- High efficiency of the entire production system – even at partial load operation.
- Higher flexibility in comparison to steam boilers,
- High service ability of the various modules, ideal for retrofitting.
- Sustainable reduction of energy costs.

Heat transfer by thermal oil can be additionally used for a wide range of applications like production of hot water and electrical energy or co-generation of compressed air.

Advanced gas cleaning for CO₂ removal

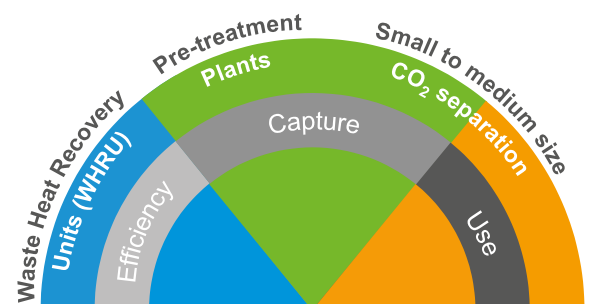
CO₂ separation systems require very low SO_x and NO_x values in the flue gas to ensure the long-term performance of the amine scrubbing. GEA can provide the required gas treatment steps for advanced SO_x removal or selective catalytic reduction (SCR) systems to achieve very low SO_x and NO_x values.

CO₂ separation plants

Chemical absorption in amine solutions is the current industrial process for capturing CO₂. GEA offers its own CO₂ separation process that enables CO₂ to be liquefied for further transport or its utilization e.g. for the production of chemicals.

In addition to CO₂, other greenhouse gases such as methane or volatile organic compounds (VOC) can be eliminated, e.g. with oxidation catalysts in GEA processes as well.

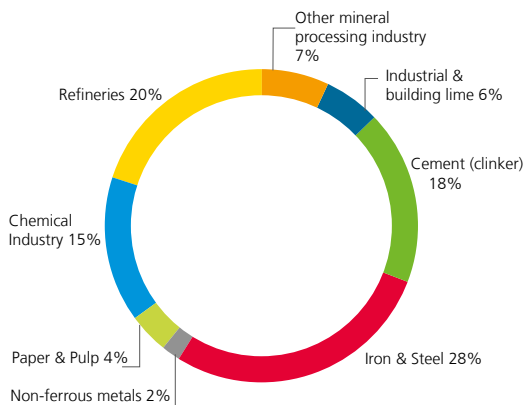
GEA delivers tailor-made solutions for small and medium-sized gas flows.



Sustainability

Getting tough on industrial emissions

Fossil fuel power plants, along with the waste-to-energy, steel, aluminum, glass, fertilizer and cement industries all have one unfortunate commonality: they are all classified as high carbon dioxide (CO₂) emitting industries.



Distribution of emissions among individual industrial sectors in 2020 from a total of 113,8 Mt CO₂-eq.

Source: 2020 VET report, German Emissions Trading Authority (DEHSt) at the German Environment Agency

CO₂, one of several greenhouse gases, absorbs infrared radiation (net heat energy) emitted from the Earth's surface and reradiates it back, contributing to the greenhouse effect. While CO₂, methane, and water vapor are the most common greenhouse gases, surface-level ozone, nitrous oxides and fluorinated gases also trap infrared radiation. Once released, GHGs may remain in the atmosphere for hundreds – even thousands – of years.

To meet the targets set by the Paris Agreement, the rise in the global temperature must be kept to 1.5 degrees Celsius above pre-industrial levels to mitigate further catastrophic erosion of the world's natural ecosystem.

GEA commits to achieve net-zero GHG emissions

To meet global warming targets, industry must further reduce its greenhouse gas emissions. In high CO₂-emitting sectors, GEA solutions are having a significant impact, helping plant owners reduce harmful emissions, improve their energy efficiency and facilitating their journey towards carbon-neutral production.

“GEA is taking bold action to support the global transition to a net-zero economy,” said Stefan Klebert, CEO GEA Group AG, at the GEA Climate Strategy 2021 presentation. “We are taking clear action in line with GEA's purpose: ‘engineering for a better world.’”

GEA has submitted its net-zero commitment and 2030 interim targets to the Science Based Targets initiative (SBTi), the globally recognized and independent body for reviewing climate targets.

GEA's targets are aligned with the latest climate science and are effectively contributing to the 1.5 degrees Celsius target of the Paris Agreement.



GEA's solutions contribute to a circular carbon economy

Emission's treatment is the main challenges of industrial pollution control, besides energy efficient and resource saving production methods.

Our customers come from industries with large emission volumes and there is enormous potential for reducing GHG and other air pollution emissions.

To meet the urgent demand for emissions reduction globally, GEA's solutions contribute to a multi-pronged CO₂ abatement approach:

- We enable the energy supply from renewable sources, the feeding of energy into heating or cooling cycles so that it doesn't go to waste and offer process expertise and efficient systems that cut emissions from production plants.
- We provide an optimized carbon capture (CC) technology for selected industrial applications.
- We offer long-term, cost-effective and ecologically viable solutions that help our customers to comply with regulations, while increasing output and still maintaining a competitive edge.

Better for your bottom line

A unique combination of technology leadership, process knowledge and global presence enables us to provide first-class systems with sustainable processes together with quality, reliability and financing options. This means that our customers receive a bespoke, integrated solution that offers optimal performance at the right capital cost.

Holistic view on emission control

The treatment of emissions and effluents into air, water or soil are the main challenges of industrial pollution control, besides energy efficient and resource saving production methods.

GEA designs tailored process solutions for air pollution control in close dialogue with the customer and keeps a holistic view at all kind of emissions. One example of this is the integration of heat recovery and CO₂ capture.

Effluent treatment

Water is the basic requirement of all life on Earth.

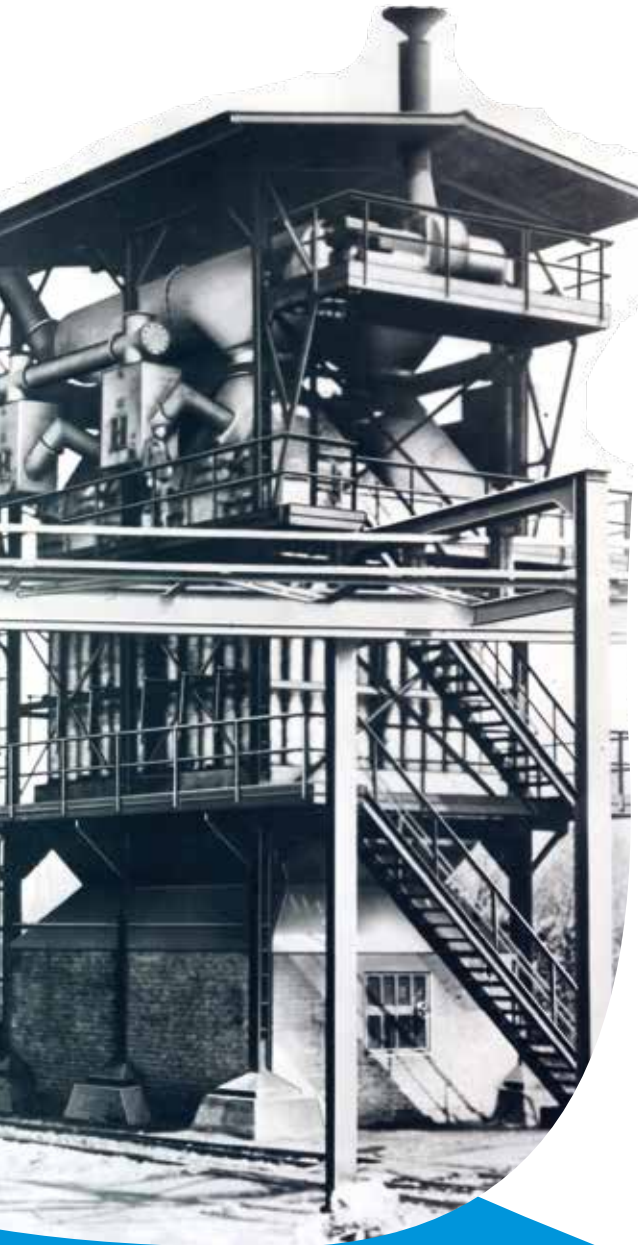
Therefore, the recycling and upgrading of industrial fluids and effluents; including the recovery of valuable substances and by-products, constitute the basic requirements for sustainable action and business.

GEA's technologies lead to low emissions and are characterized by their low energy consumption and the use of process water instead of drinking water. We help manufacturers and producers to make better use of their valuable wastewater resources, even to achieve a zero-liquid discharge (ZLD) solution.

Noise cancellation

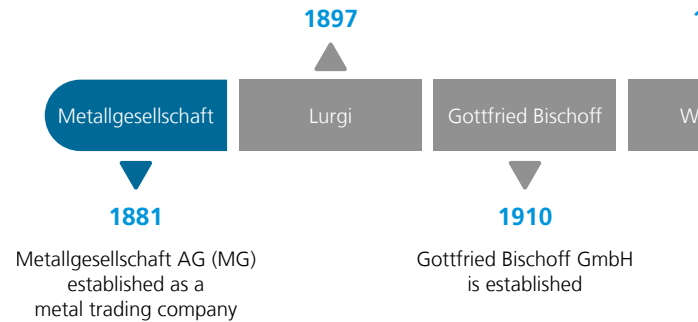
Noise can cause lasting health problems, affecting the well-being and quality of life not only in a subjective way creating disturbance and annoyance, but damaging physical health. When forecasting sound immissions, the sound pressure level of the sound immission at a specified distance from the sound source is determined according to specified models. GEA offers noise control systems which take into account all technical and economic aspects and thus meet both the customer's expectations and the official requirements in full.

Roots and shoots



Lurgi/Metallurgische Gesellschaft gathered expertise in the upgrading of solid fuels and the processing of the resulting gaseous and liquid products

Wiegand Ap
is f



Formation and progressing

We are looking back on more than 100 years of experience.

The forefather of our current company is Metallgesellschaft, which was founded in 1881.

As a subsidiary of Metallgesellschaft, Lurgi was founded in 1887.

Lurgi built the first electrostatic precipitator in 1912.

The “Gesellschaft für Entstaubungsanlagen” (GEA) was founded in Bochum in 1920. The purpose of the company was the construction of air filtration plants. Very quickly, the successful business was expanded and in the early 1990s, Metallgesellschaft took over the Gottfried Bischoff GmbH. Lurgi Bischoff GmbH was then taking care of the industrial gas cleaning.

In 1999, the Metallgesellschaft took over the “Gesellschaft für Entstaubungsanlagen” (GEA). Thus, GEA Wiegand and GEA Niro became members of the GEA family, just like Bischoff.

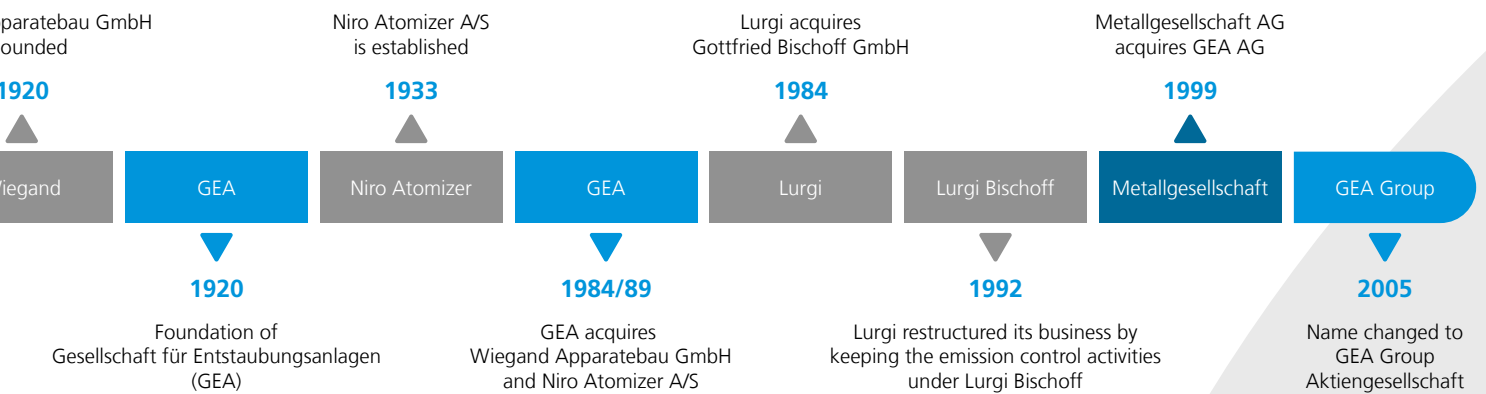
With the complete restructuring of the Metallgesellschaft, GEA Group AG was created in 2005. Over the course of the following years, the individual specialist competences were further bundled.

Nowadays, the centers of competence for Emission Control are hosted at the legal entities GEA Bischoff and GEA Wiegand, both in Germany, and GEA Process Engineering in Denmark.

Our systems are supplied via GEA's global network and cooperation partners.

FIRST OF ITS KIND

The very first electrostatic precipitator built by Lurgi in 1912.

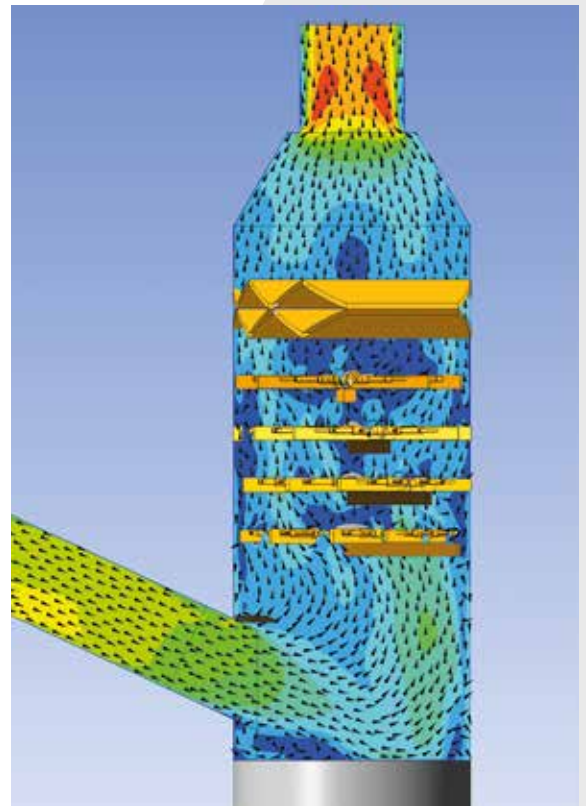


Meeting requirements innovatively with R&D

Research and development of innovative technologies and applications make a decisive contribution to environmental protection. This is a GEA maxim and has been pursued continuously for years.

Innovation promotes further development and plant performance, as GEA shows with its emission control, energy recovery and CO₂ technologies. The first low-dust SCR in cement with GEA technology was successfully put into operation. The further development of candle filters to the BisCat version shows the continuity of the work. The application of FEM and CFD analyses serves to reduce the materials to be used and the pressure loss and thus to reduce the ecological footprint. Latest developments are our new linear flow gas scrubber (LFS) and the advanced mercury removal system.

GEA fosters the exchange of ideas, knowledge and technologies, helping to avoid the often-risky journey from insight to exploitation quickly and successfully by facts.



Your project is in safe hands

GEA's long-standing technical and project management experience leads to over 10,000 installations across virtually every industry and hundreds of new projects in progress every year.

We offer unparalleled experience in managing your project from start to finish and accompany our customers throughout the entire life cycle of the installation and offer tailor-made packages, including:

- technology consultancy,
- feasibility studies,
- conceptual, basic and detail engineering,
- plant condition audits,
- plant and components supply,
- project management,
- turnkey projects,
- assistance in assembly and commissioning,
- customer support services,
- original spare parts.

The right people and skills

Over decades, we have fine-tuned our approach to maintaining the highest standards of quality and efficiency at every stage. As a key part of this, we allocate a dedicated project manager as your single point of contact to keep everything transparent and tightly organized, fronting a larger team of specialists hand-picked for your specific project. Although technical expertise is important, so are the human qualities and managerial skills needed to develop in a multinational, multicultural environment.

We have invested heavily in training all our project managers to have the right skill set, application expertise and experience to guide you seamlessly through the process.

Health and safety

The health and safety principles are an integral part of our work processes and tools (certification of our health and safety management system in accordance with ISO 45001 and SCC ** 2011, in addition to certification to DIN EN ISO 9001:2015).

Our social responsibility towards the company's employees, its suppliers and its customers, includes our effective management in regard to health, safety and well-being at the workplace.

This is increasingly becoming an asset to us as our customers evaluate and rate us.

Innovation and superior research and development

GEA's teams of engineers are constantly looking for new technological solutions that will best attend to our customers' needs, focusing on optimizing existing solutions and developing new class-leading technologies, processes and systems.

Test facilities help to achieve greater confidence in the safe and repeatable emission control.

We work in cooperation with many of the world's best research institutes, universities and government bodies and regularly implement research programs sponsored by the public sector.

We are committed to achieving common goals through active membership in alliances and associations.



Optimized performance, emerging technologies

With unmatched competence in every aspect of the emission control process, GEA provides reliable, flexible and user-friendly software systems that drive performance and efficiency across your plant's operations.

For new equipment as well as existing equipment, we utilize the latest in computational fluid dynamics-based (CFD) predictive modelling software to estimate the actual levels that will be achieved once the plant is operating at full capacity. Our CFD simulation technology is very accurate thanks to our more than 15 years validating modelling with real field results.

For existing air pollution equipment, we measure emissions and make recommendations on how to improve our current solution.

The global trend towards digitalization offers GEA great opportunities to create added value for our customers. Based on in-depth process and mechanical know-how, we develop attractive, tailored new products and service solutions like:

- advanced process optimization,
- real-time assistance, anywhere in the world,
- be on-site when you are off-site with GEA Remote Eye Wear.



Service, plant performance and process automation

GEA Services are made for your continued success. The major goal of any production plant is to achieve the desired product at constant quality with continuous productivity.

For us, service and partnership go hand in hand. We will provide the proactive support you need over your plant's lifecycle to keep you updated, upgraded and able to upscale as opportunities arise.

Working with GEA Service means partnering with a dedicated team of service experts. Our focus is to build, maintain, and improve customer performance throughout the entire life cycle of the plant and its equipment.

Our range of services includes consultancy, engineering, supply, assembly and commissioning of partial and complete plants, including noise protection, process automation and after sales service.

Our goal is to build, maintain, and improve customer performance throughout the entire life cycle of the plant and its equipment.

We consequently follow the health and safety instructions of our customers to protect life and the environment.

Beginning of life services

Getting you started with seamless support for instant productivity and performance.

Installation, commissioning and staff training are carried out by our assembly supervisors, project engineers and process control experts.

On request we create an enhanced Digital Twin (3D model plus dynamic process simulations) of your plant with variable automation levels. This has significant benefits:

- The process control can be programmed and tested before commissioning of the plant with the Advanced Factory Acceptance Test using the dynamic process model.
- Virtual commissioning shortens the commissioning time and identifies errors in advance.
- Operator training at the virtual plant makes the operators familiar with the plant before it is running.



Lifetime services

Keeping your plant running with the cost-efficient way of ensuring safety and reliability.

- Preventive maintenance including periodic inspections and audits, maintenance contracts, calibration services and spare parts planning for scheduled maintenance.
- Corrective maintenance – real-time assistance anywhere in the world through our service engineers and technicians.
- On request video remote support via GEA Remote Eye Wear or other mobile devices to solve on-site problems more quickly.
- Fast delivery of the appropriate spare parts to ensure minimal downtime. Original spare parts maintain the performance of your GEA equipment and plant, ensuring safety and reliability, minimizing down time and maximizing productivity.

Extended life services

Constantly improving by sharing our knowledge to safeguard your investment.

- Predictive maintenance from GEA monitors the operation and performance of defined equipment in your plant. Combining this information with the experience of the GEA technicians allows you to optimize your maintenance activities and related costs.

- Upgrades and optimization – we work with you to make sure your equipment and plant keep up with the demand and improved technology: improving safety and efficiency, reducing costs, providing longer lifetime and ensuring the flexibility you need.

We have developed software solutions that enable you to review and optimize the performance of your plant, a.o.:

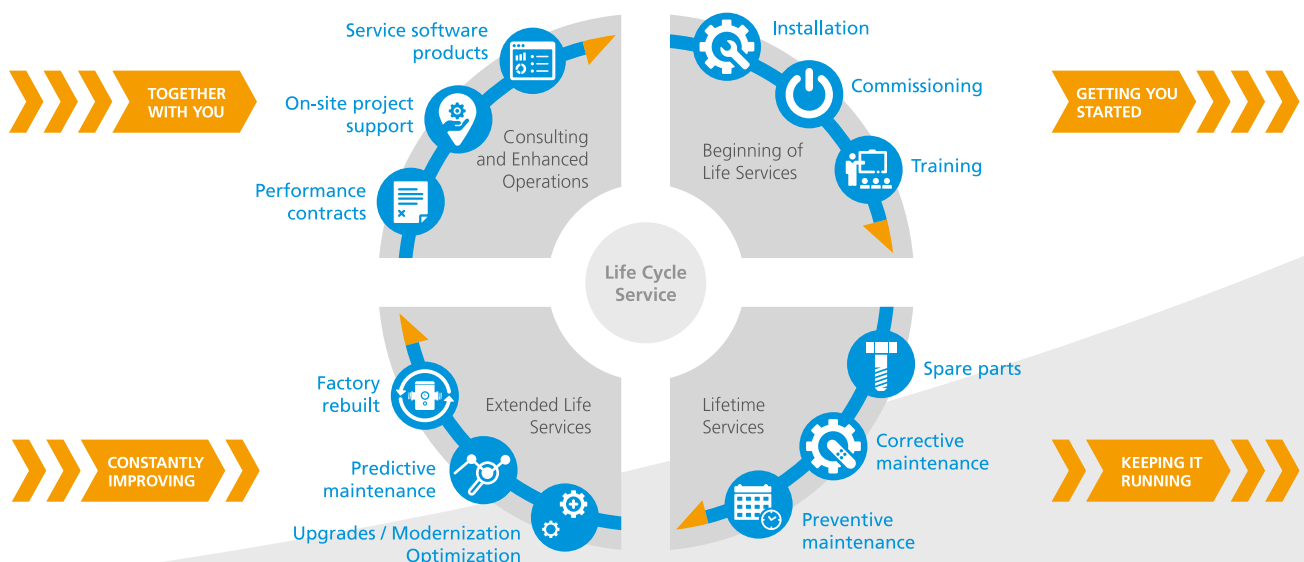
GEA Dashboard – enables the display and monitoring of all necessary KPIs (key performance indicators) on a dashboard. Using digital technologies, such as advanced machine learning algorithms, GEA increases the efficiency and productivity with full visibility of the process.

Consulting and enhanced operations

Together with you by lasting commitment to you and your business.

Service contracts from GEA avoid cost traps and offer service packages focused on availability and cost control.

Our sophisticated software solutions provide the tools you need to manage your plant effectively, including project information, service history reports, plant asset register and spare parts.



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

"Engineering for a better world" is the driving and energizing principle connecting GEA's workforce. As one of the largest systems suppliers, GEA makes an important contribution to a sustainable future with its solutions and services, particularly in the food, beverage and pharmaceutical sectors. Across the globe, GEA's plants, processes and components contribute significantly to the reduction of CO₂ emissions, plastic use as well as food waste in production.

GEA is listed on the German MDAX and the STOXX® Europe 600 Index and also included in the DAX 50 ESG and MSCI Global Sustainability indexes.

GEA Bischoff GmbH

Emission Control
Ruhrallee 311
45136 Essen, Germany
Tel +49 201 8948 0
gea.com/contact

GEA Process Engineering A/S

Spray Drying Absorption
Gladsaxevej 305
2860 Søborg, Denmark
Tel +45 3954 5454
gea.com/contact

GEA Wiegand GmbH

Gas Scrubber
Am Hardtwald 1
76275 Ettlingen, Germany
Tel +49 7243 705 0
gea.com/contact