INDUSTRY SOLUTIONS

sera

SYSTEM SOLUTIONS AND DOSING TECHNOLOGY FOR WASTE INCINERATION PLANTS

INSPIRED. SOLUTIONS. FOR CUSTOMERS.

sera

Precision for Liquids and Gases

Since 1945, **sera** has developed technologies for precise, reliable processes involving liquids and gases. Our solutions dose and transfer chemicals, additives and processing aids in defined quantities, and compress hydrogen as well as industrial and noble gases – oil-free and contamination-free – into high pressure ranges.

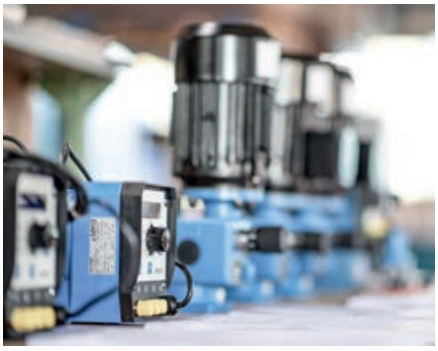
As an independent family-owned company headquartered in Immenhausen, we combine decades of experience with specialised technology expertise. **sera Technology GmbH** brings together our capabilities in dosing technology for liquids and in hydrogen and compressor technology for gases.

With subsidiaries and sales partners in more than 80 countries, we stay close to our customers – from technical consulting through to on-site service.

LEADING IN FLUID TECHNOLOGY

sera offers a broad product range with solutions for a wide variety of applications worldwide. **sera** products are used wherever chemicals and liquids need to be dosed and transferred with precision, for example in water and wastewater treatment and disinfection.

Customised solutions complement our portfolio. In addition, our customers worldwide benefit from a comprehensive range of services – from support with system planning and commissioning to fast and straightforward equipment replacement worldwide and the development of innovative technologies.



Comprehensive product portfolio

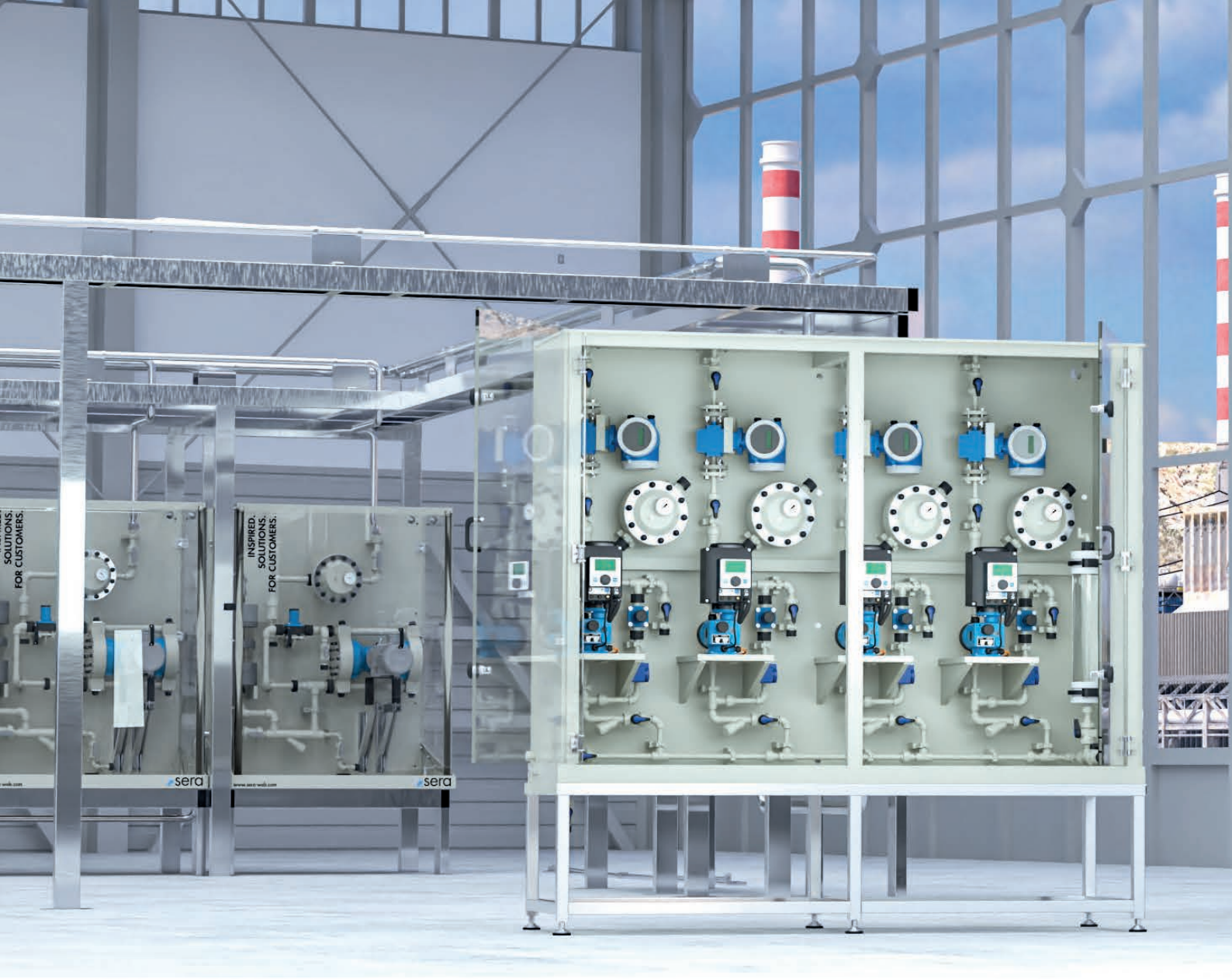
We develop customised solutions for your application. You can choose not only from a wide range of standard products and material options, but also have customised systems configured to meet your specific requirements.

The customer is our top priority

Dedicated and experienced contacts throughout the entire quotation, order and project implementation process ensure professional support and advice. We respond flexibly to your requirements and handle your requests quickly and reliably. From engineering and production to after-sales service, we provide high-quality products and services.

Long-lasting products and high quality

Since 1945, the **sera** name has stood for exceptional quality and expertise. We develop dosing pumps and systems for demanding operating conditions and long service lives. The quality and reliability of our products are therefore our highest priority. Rely on the expertise and experience of our team.



PRECISE DOSING TECHNOLOGY IN WASTE-TO-ENERGY PLANTS

Our expertise for your success

In waste-to-energy plants and waste incineration plants, dosing technology plays a key role in the precise addition of operating and treatment chemicals. It helps to maintain defined process conditions, for example in flue gas cleaning, water treatment and other process engineering stages. Chemicals and operating materials are fed into various processes in precisely measured quantities:

- **Conditioning of boiler and feed water:**
  To prevent corrosion and deposits in steam boilers, pipes, and turbines, chemicals such as defoamers, acids, alkalis, or corrosion inhibitors are precisely dosed. This is the only way to maintain the water quality at the required level.
- **Cooling water treatment:**
  Cooling water is also used in waste-to-energy plants, often in recirculation systems or cooling towers. To prevent corrosion, limescale deposits, or microbiological growth, disinfectants and corrosion inhibitors are used in precisely measured doses.
- **Flue gas cleaning:**
  A particularly important area of application for dosing technology is exhaust gas treatment. Here, for example, sodium bicarbonate or lime is dosed to neutralize sulfur dioxide (SO2) and hydrogen chloride (HCl), and activated carbon is dosed to bind heavy metals and dioxins. To reduce nitrogen oxides (NOx), ammonia or urea is precisely injected into the flue gas stream.

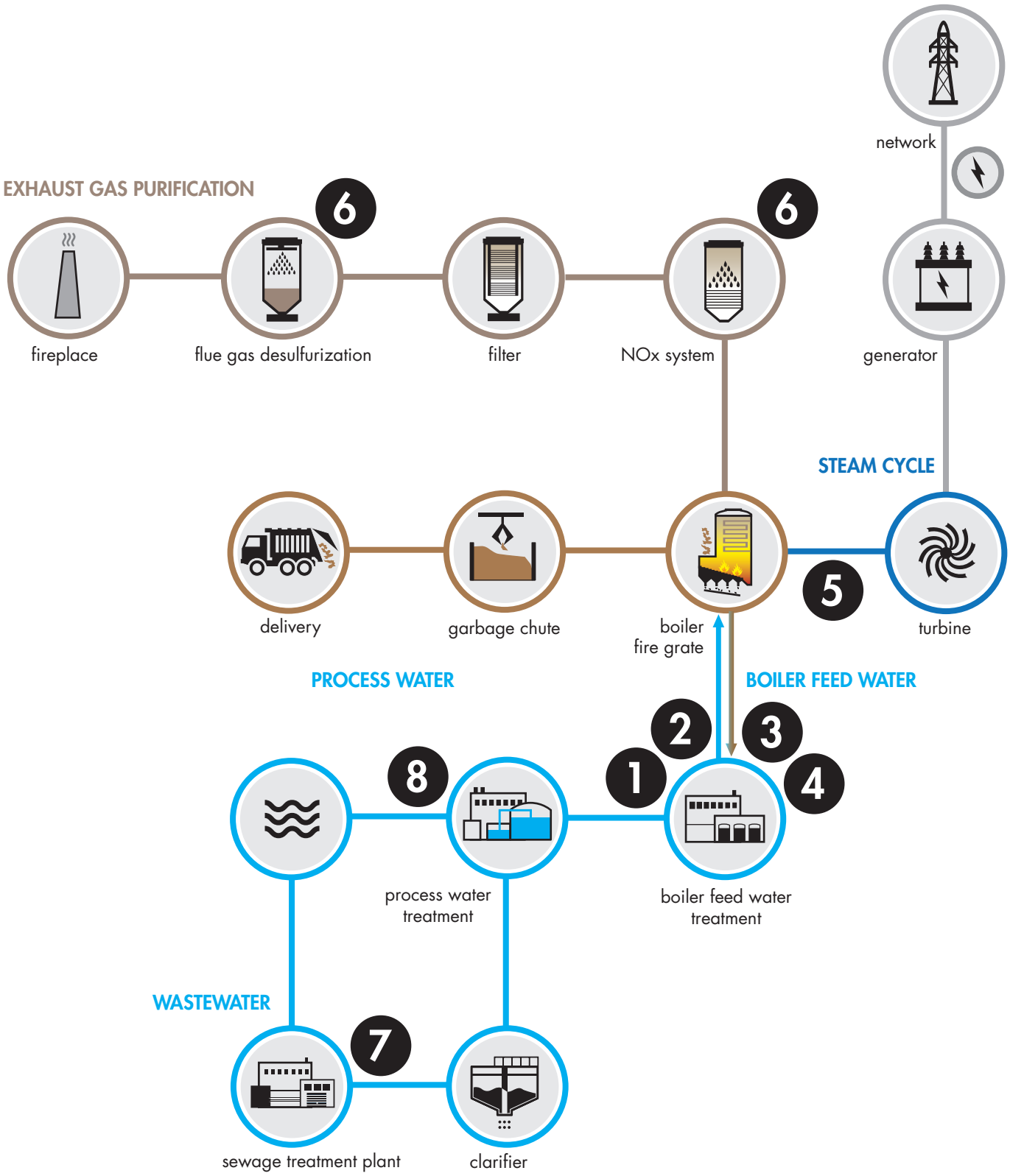
Dosing technology ensures that these substances are fed in evenly and reliably-controlled by automated systems such as dosing pumps and measuring sensors. The aim is to achieve precise dosing to ensure stable process conditions and the reliable fulfilment of defined process engineering and regulatory requirements.

For decades, **sera** pumps and dosing systems have been an important and reliable component of critical processes in energy and waste management worldwide. The product portfolio includes:

- Dosing and feed pumps
- Standardized dosing plants and systems
- Individual, customer-specific solutions

Using tried-and-tested dosing technology, **sera** supports specific process steps in waste incineration, for example in flue gas cleaning and the treatment of process media.

APPLICATIONS IN WASTE-TO-ENERGY PLANTS



THE RIGHT SOLUTION FOR EVERY PROCESS STEP

We offer a comprehensive range of products to find the optimal solution for every process step.
Using a typical process flow, we present some examples of solutions from our comprehensive range:

1. **DOSAGE OF BOILER SCALE INHIBITORS AND/OR PHOSPHATES INTO THE BOILER FEED WATER FOR SOFTENING**
2. **DOSAGE OF OXYGEN SCAVENGERS AND ALKALINE CHEMICALS TO PREVENT CORROSION IN THE BOILER**
3. **PH VALUE CONDITIONING VIA ACID AND LYE**
4. **BIOCIDE DOSING OF BOILER FEED WATER**
5. **TREATMENT OF WATER VAPOR AT PRESSURES > 140 BAR**
6. **EXHAUST GAS PURIFICATION, FLUE GAS DESULFURIZATION WITH LIME MILK, SO2 SEPARATION WITH ADIPIC ACID, NITROGEN OXIDE REDUCTION WITH AMMONIA WATER OR UREA SOLUTION**
7. **WASTEWATER TREATMENT**
8. **PROCESS WATER TREATMENT WITH POLYMER SOLUTION AND NEUTRALIZATION**

1 Boiler feed water must be treated in a specific way to prevent deposits and corrosion in the boiler.

2 Untreated water can contain problematic substances that impair efficiency and shorten the service life of the boiler.

3 Therefore, boiler feed water is typically treated by desalination, degassing, and chemical treatment to prevent deposits and corrosion.

sera supports you in optimally treating boiler feed water and ensures that your boiler operates efficiently and reliably. Untreated water can lead to higher operating costs, as frequent maintenance and repairs are required.

TREATMENT OF BOILER FEED WATER

AREAS OF APPLICATION

- Prevention of corrosion using oxygen scavengers and corrosion inhibitors
- pH conditioning by dosing acidic or alkaline chemicals
- Prevention of deposits using scale inhibitors or phosphates
- Reduction of foam and impurities using defoamers

STRUCTURE

- Modular design with standardized components for flexible adaptation
- Suitable for IBCs, drums, small containers, and storage tanks
- Matching suction lances and connections complete the system
- Compact design with space-saving wall mounting
- Versions with one or two pumps and compact solutions available
- Suction and pressure side connection possible
- Pumps controllable with Profibus/Profinet on request

CHARACTERISTICS

- High operational and process reliability
- Flexible modular system for different requirements
- Easy integration into existing processes
- Compact solutions for different space requirements

4 In waste-to-energy plants, the quality of the boiler feed water plays a decisive role in the operational safety and efficiency of the plant.
Targeted water treatment serves to control corrosion, deposits and microbiological contamination in the water cycle. Where treatment is required, the precise dosing of biocides enables a defined concentration of active ingredients to be achieved, thereby limiting microbiological growth.

BIOCIDE DOSAGE FOR BOILER FEED WATER

AREAS OF APPLICATION

- Treatment of boiler feed water to prevent damage caused by microorganisms
- Protection of cooling circuits against algae, bacteria, and biofilms
- Ensuring economical and trouble-free plant operation

STRUCTURE

- Dosing pumps with integrated control
- Suction lances for different container sizes
- Volume flow measurement for precise dosing
- Optional collection trays for additional protection
- Independent tax solutions without central connection

CHARACTERISTICS

- High dosing accuracy and linear control characteristics
- Durable materials and low-maintenance operation
- Dry-run protection and easy to operate
- Consistent and reliable biocide dosing throughout the entire process

5

In waste-to-energy plants, steam is used as an essential component for energy generation. Targeted treatment helps to maintain stable operating conditions and can help to reduce corrosion and the adverse effects on plant components.

sera offers tailor-made dosing technology for steam applications with pressures of up to 140 bar. Our solutions ensure precise dosing of chemicals to optimise the operational safety and efficiency of your plant.

TREATMENT OF WATER VAPOR

AREAS OF APPLICATION

- Dosage of corrosion inhibitors
- Prevention of deposits such as lime and dirt
- Addition of oxygen scavengers such as ammonia, hydrazine, or ascorbic acid

STRCUTURE

- Available as a single pump with fittings or as a complete dosing system
- Suitable for indoor or outdoor installation
- Can also be installed in EX-protected areas
- Hydraulic transmission of the stroke movement of the mechanically articulated piston to the multi-layer diaphragm
- Integrated compensation valve for high dosing accuracy and optimum overload protection
- Conveying capacity adjustable via adjustment eccentric (stroke length adjustment)
- Option for speed control via an external frequency converter

CHARACTERISTICS

- High dosing accuracy for precise applications
- Counterpressure up to 140 bar for demanding operating conditions
- Overload protection thanks to integrated hydraulic valve
- High process reliability thanks to multi-layer diaphragm

6

Exhaust gas purification in conventional waste incineration plants plays a crucial role in complying with statutory emission limits and protecting the environment and health. The operation of waste incineration plants – such as coal, gas or waste incineration plants – produces exhaust gases that contain pollutants such as sulphur dioxide (SO2), nitrogen oxides (NOX), particulate matter and, in smaller quantities, heavy metals and organic compounds.

In exhaust gas treatment, the precise dosing of chemicals is a key process step for specifically binding or reducing certain pollutants. **sera** combines suitable dosing technology with application-specific expertise for integration into the relevant treatment process.

REDUCTION OF NITROGEN OXIDES IN THE FLUE GAS DESULFURIZATION PLANT

AREA OF APLLICATION

- Reduction of nitrogen oxides through the use of adipic acid
- Transfer of granules or flakes to the preparation tank using a dry material dosing unit
- Manual addition from bags or automatic dosing via an emptying station
- Dissolution of the dry chemical in water to produce a defined concentration
- Precise introduction of the solution into the cleaning process

STRUCTURE

- Manual or automatic approach possible
- Automatic or manual water addition
- PP container with conical bottom for complete emptying
- Electric stirrer for even mixing
- Capacitive, adjustable level indicator
- Components suitable for suspension and heat-resistant

CHARACTERISTICS

- Flexibility through manual or fully automatic handling
- Reliable processing and dosing of chemicals
- Robust and temperature-resistant design
- Easy adaptation to different requirements

7 WASTEWATER TREATMENT

sera offers proven solutions for wastewater treatment in waste incineration plants

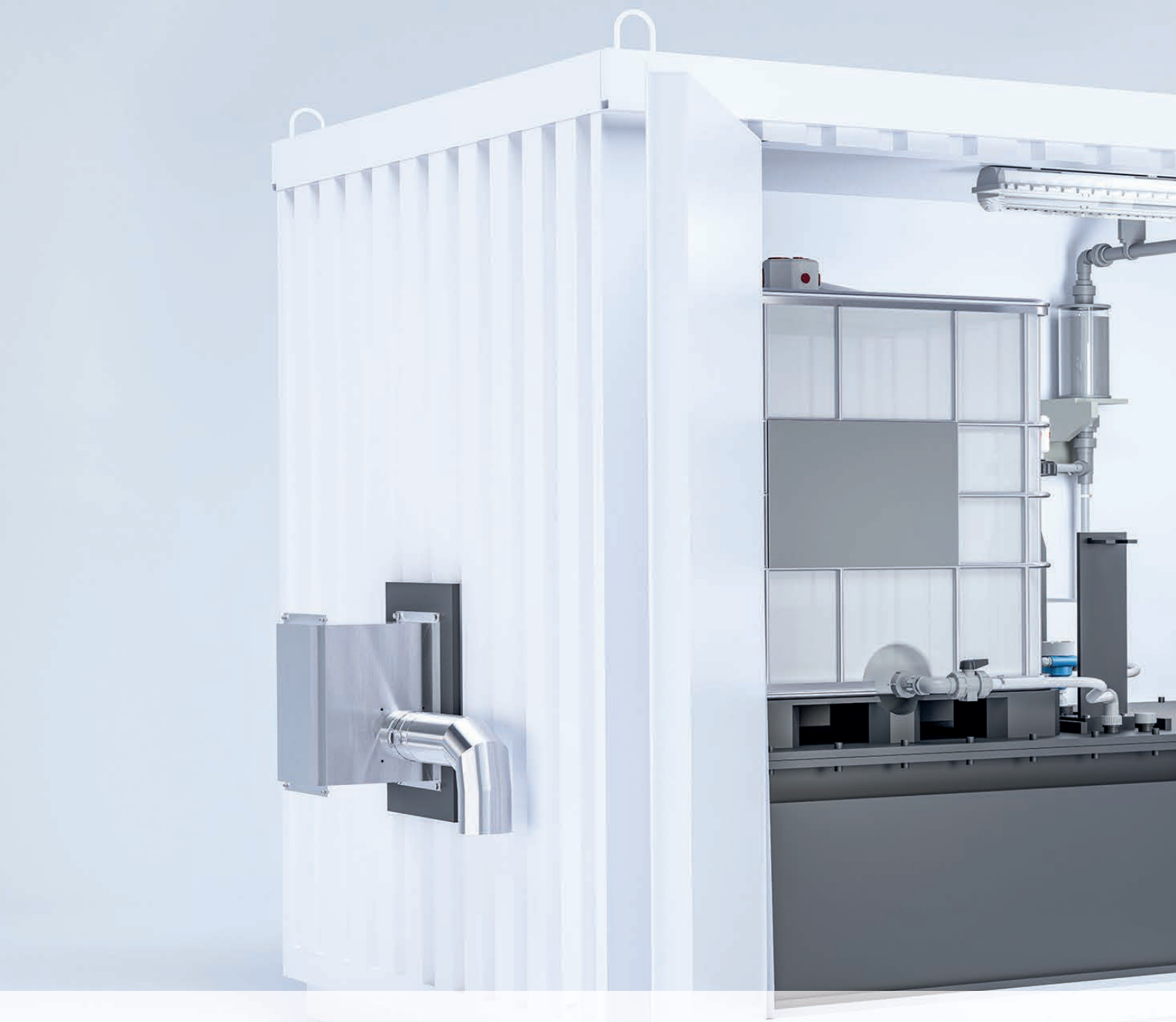
Despite efficient processes, waste-to-energy plants produce various types of wastewater that must be treated properly before being discharged into the sewer system or waterways. Reliable wastewater treatment is crucial for complying with specified discharge and effluent standards and for treating pollutants in a targeted manner before discharge.

Typical wastewater is produced, for example, during flue gas cleaning, condensate treatment, or the dewatering of residues. These often contain substances that must be neutralized, precipitated, or flocculated before they can be further treated or discharged.

With **sera**'s precise dosing solutions, chemicals such as precipitation, neutralization, or flocculants can be added accurately and as needed. The dosing technology enables the precise addition of treatment chemicals in accordance with the relevant process requirements and specified operating and discharge parameters.

The **sera** product range for wastewater treatment includes:

- Complete dosing plants and systems **(A)**
- Preparation and dosing plants for polymer solutions from the PolyLine series **(B)**
- IBC emptying station **(C)**
- Plant accessories **(D)**



8 PROCESS WATER TREATMENT

Clean water protects equipment, meets environmental requirements, and increases efficiency.

In the waste-to-energy industry, river water is often used as a source of raw water—especially for cooling processes, steam generation, or other technical applications. However, before it can be used in the plants, thorough process water treatment is required. This upstream step ensures that the water quality meets the requirements of sensitive processes.

Why is it necessary to process river water?
River water is heavily polluted by natural and human influences. It typically contains:

- Suspended solids (e.g., sand, sludge, algae)
- Organic contaminants (e.g., leaves, microorganisms)
- Chemical residues (e.g., fertilizers, industrial wastewater)
- Fluctuating water quality depending on the season and weather

These substances can cause blockages, corrosion, fouling and efficiency losses in the systems..

Protection of plant technology
Targeted water treatment helps to ensure defined water qualities, stable operating conditions and compliance with relevant requirements during plant operation.

Compliance with legal requirements
Waste incineration plants are regulated by strict environmental requirements. The treatment helps to ensure compliance with defined limit values and creates the conditions necessary for water to be recycled or reused in accordance with process requirements.

Optimization of operating costs
Targeted water treatment helps to ensure stable operating conditions and helps to limit the adverse effects on plant components.

sera container system for process water treatment in waste incineration plants includes:

- Integrated dosing plants and systems
- Compact, air-conditioned, and ready-to-operate design
- IBC emptying stations for chemical feed
- Dosing pumps
- Plant accessories

SETUP AND COMMISSIONING – COMPLETELY FROM A SINGLE SOURCE

From installation to safe operation

Technical systems can only deliver long-term performance if installation, piping, and commissioning are precisely coordinated. The **sera** service team takes care of every step-clearly coordinated, professionally executed, and consistently tailored to your processes.

Installation and tank integration designed as a complete system

- Installation of plants and systems
- Positioning of storage tanks
- Professional connection of the tanks to the plant technology
- Ensuring that the entire structure is ready for operation

Commissioning that anchors knowledge in the company

- Functional testing of all components
- Parameterization and fine-tuning of the plant
- Practical training of operating personnel
- Imparting knowledge for safe operation and fault detection

The goal is not only to start up the plant, but also to permanently anchor the necessary process understanding in the company.

Pipe installation as an integral part of the system

sera implements all pipingh variants:

- Plastic pipes: single-walled, double-walled, or with inliner
- Piping with trace heating
- Stainless steel pipes with clamp ring fittings
- Media-compatible design from the plant to the dosing point
- Hosing for flexible requirements

In doing so, **sera** not only takes current operating conditions into account, but also maintenance accessibility, expandability, and long-term operational safety. Each piping system is planned and implemented as an integral part of the overall system.

The result: stable, safe, and efficient dosing processes – from day one.

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THE WASTE RECYCLING PLANT IN BONN

Energy generation with the latest technology

In Germany, waste may no longer be deposited in landfills without treatment. However, in order to manage more than 400 million tons of waste per year, other methods of waste recycling are required.

The legally prescribed waste hierarchy identifies avoidance, reuse, and recycling as the most sensible approaches to dealing with our waste. Energy recovery from waste, i.e., incineration, ranks fourth in the hierarchy. Thermal waste treatment plays a key role in waste management: certain organic pollutants are destroyed by heat, whilst other pollutants are separated out in downstream purification stages and removed from the process. The Bonn waste incineration plant is an outstanding example for this.
The recycling of residual waste from Bonn and the surrounding region is handled by Müllverwertungsanlage Bonn GmbH (MVA), a subsidiary of Stadtwerke Bonn.

Around 1,000 tonnes of waste are delivered every day for thermal treatment. In a complex thermal process, the waste is first incinerated and then further processed. Stadtwerke Bonn uses modern technology to generate energy from waste. The Bonn waste incineration plant produces steam during the incineration of waste, which is supplied to the neighboring SWB cogeneration plant. Here, steam is used to generate electricity and district heating.

The incineration of waste produces flue gases. Energy is recovered with the aid of a boiler or steam generator downstream of the incinerator. As the hot flue gases flow through the boiler, they are cooled, while the boiler feed water is heated and evaporated. The steam produced is then used to generate electricity and heat. In the downstream condenser, the steam is liquefied again and returned to the feed water.

Feed water and boiler water must meet certain requirements in order to operate a boiler safely and without damage. **sera** designed and supplied a special dosing system for the boiler systems at the Bonn waste incineration plant. This system comprises two independent dosing systems for caustic soda and ammonia water, which condition the boiler water to meet the requirements of the VGB guidelines for power plant operation. Both systems have dosing pumps, fittings, 500-liter mixing tanks, level sensors, drip pans, and space for the delivery containers. Since ammonia water is a volatile chemical, this part of the system is gas-tight. A shared control cabinet monitors both dosing systems and transmits the information to the control room at the Bonn waste incineration plant. This enables decentralized monitoring and control of the systems.

The operational solutions are produced fully automatically from a mixture of concentrate and water, with level control. The ready-made solutions are dosed using controllable **sera** diaphragm or piston pumps. The pump delivery rates are requested and adjusted depending on the operating mode of the higher-level system components. The **sera** dosing pumps ensure that the pH value remains constant by adding caustic soda to the boiler feed water and that the condensate has a pH value of approx. 9.5 to protect the feed water and condensate pipes. This provides optimal and permanent protection against corrosion for the boilers and pipes in the thermal part of the waste incineration plant.

sera dosing technology is also used in key stages of thermal waste treatment, such as flue gas cleaning and water treatment.

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