

Breaking New Ground in Environmental Protection Technology

Wastewater and waste gas treatment, incineration, waste disposal – safe, efficient, and tailored to meet operational demands



INNOVATION

ENGINEERING

OPTIMIZATION



Bayer Technology Services

Powering Your Performance

INNOVATION

ENGINEERING



OPTIMIZATION

SUSTAINABLE ENVIRONMENTAL PROTECTION USING INTEGRATED KNOW-HOW.

The chemical and pharmaceutical industries need experienced and high-performance partners to achieve one of their most important goals – cost-effective and reliable processes. These partners should have precise knowledge of conditions in the sector and factor these in at every stage of their planning.

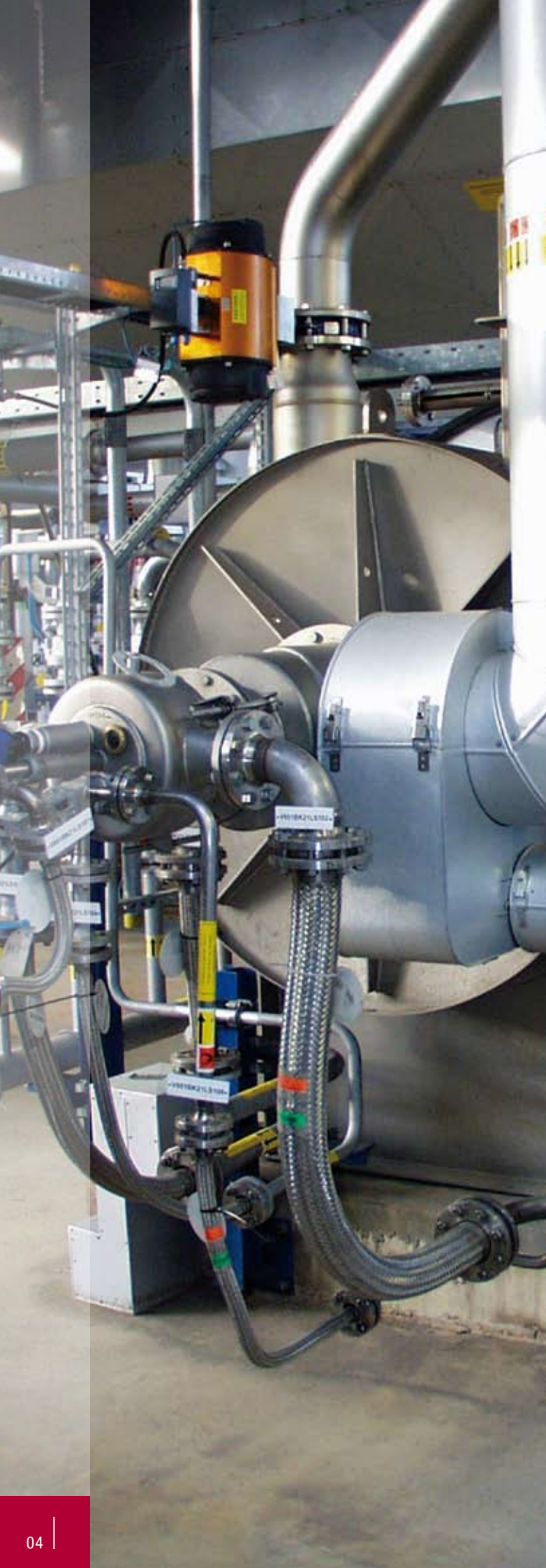
Bayer Technology Services is a major global technology provider with wide-ranging, recognized expertise in environmental protection technology. Our decades of working closely with operators as part of the Bayer Group enable you to benefit from our extensive knowledge of technology and cost-effective procedures. Our interdisciplinary experts, with many years of know-how in process and environmental protection technologies, are one of the key factors of our success.

Bayer Technology Services offers you a whole range of quality technical services, from partial solutions to complex, integrated concepts covering the entire lifecycle of

environmental systems, processes, and products. Our extensive expertise and innovative power are reflected in a wide array of customized solutions, which we have developed quickly and cost-effectively for an extremely broad range of industrial sectors and sizes of company.

We can offer independent advice on the optimal environmental technology for your application and use our own piloting to underpin the process technology. In each project phase, we provide reliable support in planning and implementing all your measures. Trust and absolute integrity are two of our fundamental values. Dependability in using customer know-how and confidentiality in working on customer projects have top priority for us. Mutual trust is key to success.





EXPERIENCE THAT KNOWS NO BOUNDS.

Global expertise for a far-reaching issue

Bayer Technology Services is represented at numerous locations throughout the world. Whether in Mexico, Germany or China, we have proven expertise in constructing environmental protection systems. We are familiar with country-specific environmental regulations and have extensive experience in working with the relevant authorities when implementing projects. Each of our solutions is devised with careful consideration of local conditions. The fact that we are not tied to one manufacturer means we can respond quickly and flexibly at all times. Therefore, you get the components that you really need to solve your problems – giving you genuine, customized environmental protection.



Global partner for environmental protection

But it is not just Bayer subgroups that benefit from our know-how. International industrial customers both large and small have been coming back to us time and again for many years. And there's good reason for this. We work closely with them to achieve optimal solutions and thus a decisive competitive edge. These solutions are rooted in many years of operational experience and extend far beyond out-of-the-box solutions.



Bayer Technology Services employs 2,600 people worldwide and posted sales in 2009 of 380 million euros.





THE OPTIMAL MIX FOR EVERY TYPE OF WASTEWATER.

Perfectly combined processes tailor-made to individual requirements

Modern wastewater treatment involves a combination of chemical, physical, and biological purification processes. Bayer Technology Services has a depth of expertise in all of the common processes used for wastewater treatment. In addition, we have developed numerous technologies in-house to solve the different technical problems encountered with wastewater. Comprehensive analyses enable us to select the optimal mix of processes for our customers. That alone, however, is insufficient. Each chosen technology is then optimized and customized to meet the specific site and process conditions. No two wastewater streams are the same and purification performance must satisfy all quality requirements. We aim to achieve treatment that is cost-effective, even for the most complex chemical/industrial wastewater streams.

Perfect network of process designers

Bayer Technology Services has an almost unique level of expertise to draw on. We regard each wastewater solution as part of a whole. Our engineering specialists take the entire infrastructure into consideration at the planning stage – from the energy resources and level of automation to logistics. We integrate every process and method for wastewater treatment into the specific production process. You too can benefit from our wide-ranging expertise and our structured approach. We always take your entire value chain into consideration.

WHAT GOES AROUND COMES AROUND.

Protecting resources – recycling materials

Biological processes and technologies:

- **Tower Biology (developed by Bayer)**

An aerobic technology optimized, in terms of energy usage, for industrial wastewater treatment. A self-contained construction with a low space requirement.

- **Bayer slot injector**

A highly efficient aerobic aeration system, for both basin and tank constructions.

- **Anaerobic technology**

Organic compounds are transformed anaerobically. Bacteria are used to digest carbon, with methane as the main product. Its advantages are a low level of sludge generation and very low energy consumption.

- **Denitrification**

- **Nitrification**

- **Immobilized carrier biology**

Oxidative processes and technologies:

- **LOPROX® (developed by Bayer)**

Decentralized wastewater treatment, especially for wastewater with a high waste load. LOPROX® is used primarily for the pretreatment of wastewater upstream of biological treatment. The poorly degradable organic components of the water are partially oxidized and rendered more biodegradable.

- **Wet oxidation using ozone and hydrogen peroxide**

Mechanical processes and technologies:

- **Bayflotech® (developed by Bayer)**

High-performance flotation with excess pressure valves – a clarification method that is optimized in terms of energy and operating parameters. This results in high purification of the water, with approximately 99% of solid matter removed.

- **Sedimentation/centrifugation**

- **Filtration**

- **Membrane processes**

Wastewater is forced through special membranes using excess pressure. The membranes hold back even very small particles, bacteria and also chemical substances dissolved in the water.

Physical and thermochemical processes and technologies:

- **Precipitation and flocculation reaction**

- **Adsorption onto activated carbon**

- **Ion exchange**

- **Hydrolysis methods**

- **Extraction**

- **Distillation**

- **Steam and air stripping**



References for wastewater treatment

- Communal wastewater treatment plant, Bayer AG, Leverkusen, Germany
- Industrial sewage treatment plants for Degussa-Hüls AG, Probis GmbH, and Shell/Dea AG at various German sites
- Sewage treatment plants of the Königsbacher and Bitburger breweries in Germany
- Biwater industrial sewage treatment plant, in the U.K. and the Middle East
- LOPROX® plants for Bayer AG, in Germany, Spain, Indonesia, and the Middle East
- More than 10 flotation plants with flow rate capacities of up to 3,000 m³/h
- Fenton oxidation at the Bayer site in Wuxi, P.R. China
- Ozone oxidation for the Bayer site in Dormagen, Germany
- Precipitation of heavy metals and flocculation for 4 hazardous waste incinerators of Bayer AG, Germany
- Precipitation and adsorption plants for Bayer Garbagnate, Italy
- Wastewater evaporation plant for CISA, South Africa
- More than 10 decentralized wastewater stripping plants and extraction plants within the Bayer Group



CUSTOMIZED MEASURES FOR WASTE GAS TREATMENT.

Made-to-measure waste gas treatment

Virtually every production plant in the chemical and pharmaceutical industry produces waste gases containing harmful substances. The permitted concentration of emissions is governed by laws and regulations that become ever stricter over time. Every company, therefore, needs an economical and highly effective waste gas system. Bayer Technology Services offers services that are tailored to your particular purposes in the waste gas, flow, and incineration technology sectors. We have developed technology in-house for key plant components and have continued to optimize these over the years. Thanks to interdisciplinary collaboration with the other Bayer Technology Services departments, even the most complex tasks can be solved.

Wind of change for existing plants

As well as planning new plants, we also provide you with our operator know-how accumulated over many years to analyze and optimize existing plants. We offer effective support in areas such as de-bottlenecking and energy efficiency analyses (CO₂ checks), along with efficient solutions for analyzing existing plants in order to prevent or cut emissions (BAT gap analyses).

CLEAN SOLUTIONS EVEN FOR CRITICAL SUBSTANCES.

Engineering services that you can rely on:

Cornerstones of incineration technologies

• TAREX® (developed by Bayer)

The TAREX® process allows highly explosive waste gases to be treated safely and at low cost. TAREX® systems require less space since the waste gases can be fed and incinerated without dilution.

• Advanced nozzle technology:

SNCR and liquid residue incineration

We use nozzle technology developed in-house and optimized over the years through a variety of internal and external applications to set new standards for tried-and-tested processes. For “selective non-catalytic reduction” of NO_x using ammonia water, we achieve proven reduction rates of over 90% without ammonia slip. Our nozzle technology is also ideal for incinerating liquid residue in thermal waste gas treatment systems.

• Thermal reactor

Particularly suitable for large volumes of waste gases with small solvent loads. This system can be used to save energy costs on a large scale and significantly cut CO₂ emissions. The usability and cost-effectiveness of this process can be expanded by using appropriate systems upstream.

• Bayer-Reither scrubber

The highly efficient Bayer-Reither scrubber for separating dust and aerosols features particularly low pressure loss on the waste gas and flue gas sides, and thus helps make efficient energy savings.



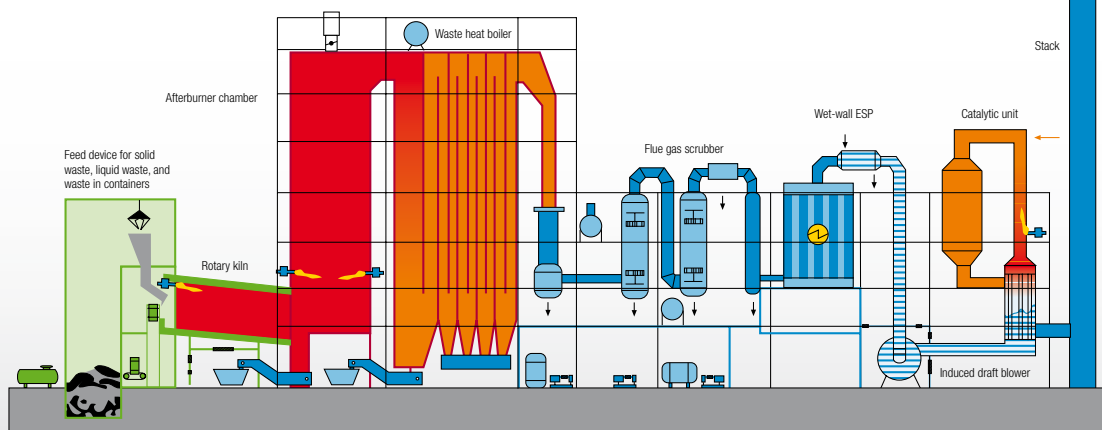
References for waste gas and incineration technology

- TAREX® plant for the TAD facility, Bayer Material Science AG, Dormagen, Germany; two-stage system for safe incineration of waste gases with high NO_x content, offering high availability through installation of cost-effective backup systems (muffle furnaces and NSCR)
- TAREX® plant for the U block, Bayer Material Science AG, Leverkusen, Germany with additional incineration of up to 1,000 kg/h of liquid waste and production of steam in two pressure stages
- TAREX® plant for multipurpose facility, Saltigo GmbH, Leverkusen, Germany, for incinerating several explosive waste gases from ex-zone 0
- TAREX® plant for HNBR facility (Therban), Lanxess AG, Leverkusen, Germany, for incinerating MCB and hydrogenous waste gases using H₂ surge tank upstream to minimize plant size
- Thermal reactor for the PSA facility, Lanxess AG, Krefeld-Uerdingen, Germany, for incinerating a very high waste air volume of 160,000 Nm³/h
- Central Thermal Oxidizer for a multipurpose facility in Israel, incl. planning of the waste gas collection system, incl. waste heat usage, SCR, and flue gas cleaning
- Central Thermal Oxidizer (CTO) for Bayer Corporation in Baytown, TX, U.S.A. for the incineration of 15 waste gas streams, incl. streams with a very high NO_x load
- Central Thermal Oxidizer for the incineration of approx. 20 flue gas streams for the Bayer Integrated Site Shanghai, P.R. China with the option of incorporating further waste gas streams and retrofitting a flue gas scrubber

PLAYING IT SAFE IN RESIDUE DISPOSAL.

Strike while the iron is hot

Waste incineration is now an indispensable part of the chemical and pharmaceutical industries. Bayer Technology Services offers all the standard processes, as well as a number of technologies developed in-house. With incineration processes, the focus is on the use of effective downstream technologies to completely neutralize dangerous substances. We have substantial experience with critical industrial wastes that are difficult to treat, including those with high concentrations of sulfur, phosphorus, iodine, bromine, or chlorine. The combustion technology used by us enables organic reaction products to be implemented completely. Through many years of experience with plants operated by our subgroup partners, we know how the formation and recombination of critical materials such as dioxins and furans can be effectively prevented.



Stop sign for NO_x

The reduction in the emissions of nitrogen oxides is a very sensitive topic of environmental protection. We have the necessary expertise in precisely this area, on many years of tackling the most difficult problems. Our effective DeNO_x technology measures are in demand globally.

Our multistage incineration systems and optimized SNCR processes have become the methods of choice for waste gases with a high NO_x load.

Remediation of contaminated soil

We have the necessary expertise in all of the methods in common use for the remediation of contaminated soil. As a Bayer Group company, we have comprehensive experience of cleaning up soil contaminated through industrial usage, and, in particular, with waste requiring monitoring. We draw up a basic remediation plan based on an in-depth evaluation of the contaminated area. Once remediation is complete, we can also prepare the area for subsequent usage (such as conversion into an industrial park or park area).

Waste management and landfills

Our core areas of expertise:

- New construction, expansion, and sealing of landfills
- Sealing, drainage, and degassing systems
- Securing contaminated industrial sites
- Soil conditioning, in-situ methods
- Expert assessment of existing sites

The knowledge base of a major player, with the flexibility of a smaller one

We are part of a global company, but we still have the flexibility of a small engineering consultancy. Therefore, our customers can rest assured that their investment is secure and can be certain of rapid implementation. Our industrial experience and in-depth subject knowledge are in demand around the world. Our process and construction engineers provide advisory services to numerous companies on all continents in the construction of landfills and remediation of soil.



References for incineration technologies

- Bayer AG, RVA (haz. waste incinerator) Brunsbüttel, Germany, capacity 27,000 t/a
- Rotary kiln, Bayer AG, RVA2 (haz. waste incinerator) Krefeld-Uerdingen, Germany, capacity 20,000 t/a
- Multiplestage furnace, Bayer AG, VA3 Leverkusen, Germany, capacity 80,000 t/a
- Rotary kiln, Bayer AG, RVAD (haz. waste incinerator) Dormagen, Germany, capacity 45,000 t/a
- Rotary kiln, Bayer India Ltd., Thane, capacity 1,800 t/a



References for landfills

- Landfill sites for industrial wastes
- Landfills for mono waste and construction waste
- Sealing of large areas of contaminated soil (Dhünnaue, Leverkusen, Germany)
- Soil contamination and clean-up
- Sludge disposal sites, South Africa
- Sealing of landfills, groundwater barriers



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