



GMVA

**WE BURN FOR
A SUSTAINABLE
FUTURE.**





ENVIRONMENTALLY FRIENDLY. EFFICIENT. SAFE.

The Gemeinschafts-Müll-Verbrennungsanlage Niederrhein (GMVA) is a public private partnership (PPP) between the cities of Oberhausen and Duisburg and the waste management service provider, REMONDIS. It is used to treat waste from the cities of Oberhausen and Duisburg, as well as additional waste from the districts of Kleve, Steinfurt and Coesfeld, in a harmless and environmentally friendly way. Furthermore, we utilise pre-treated commercial waste at our state-of-the-art facility to generate energy.

Well below the required limits

Thermal waste treatment plants such as GMVA are among the safest and cleanest industrial plants in Germany. Like all waste incineration plants, the GMVA is subject to the 17th ordinance of the Federal Immission Control Act, which prescribes extremely low limit values for flue gases to protect the environment.

For us, practising responsibility means more than just complying with legal requirements. This is why GMVA's plant operation is consistently focussed on environmental compatibility, efficiency and safety. As a result, our plant is permanently well below all prescribed limits.

Certified specialised waste management company

Qualitäts- und Umweltgutachter GmbH has certified GMVA as a specialised waste management company, thus certifying that all requirements for the treatment, recycling and disposal of waste are met. This is particularly important to us and demonstrates our sense of responsibility and our commitment to our customers, the people of the region, and the environment in which we all live.

Technical data

Number of combustion lines	4
Energy input	270 MW
Annual capacity	670,000 – 720,000 t
Firing technology	Roller grate with co-current firing
Firing temperature	850 – 1,100 °C
Flue gas cleaning capacity	4 x 133,000 m ³ /h; i. N; f
Flue gas cleaning	SNCR denitrification, electrostatic precipitator, HCl scrubber, SO ₂ scrubber, entrained-flow reactor with downstream fabric filter
Electrical grid feed-in	335,000 – 355,000 MWh
District heating feed-in	60,000 – 150,000 MWh



MILESTONES IN DEVELOPMENT

GMVA can now look back on over fifty years of history. In 1968, Concordia Bergbau Aktiengesellschaft's colliery power plant was converted into an incineration plant, which began operating in 1972 with three boiler lines. Just three years later, the first extraction condensation turbine for waste heat utilisation produced electricity. In the years that followed, we invested in modern flue gas cleaning systems, new boilers and a further turbine.

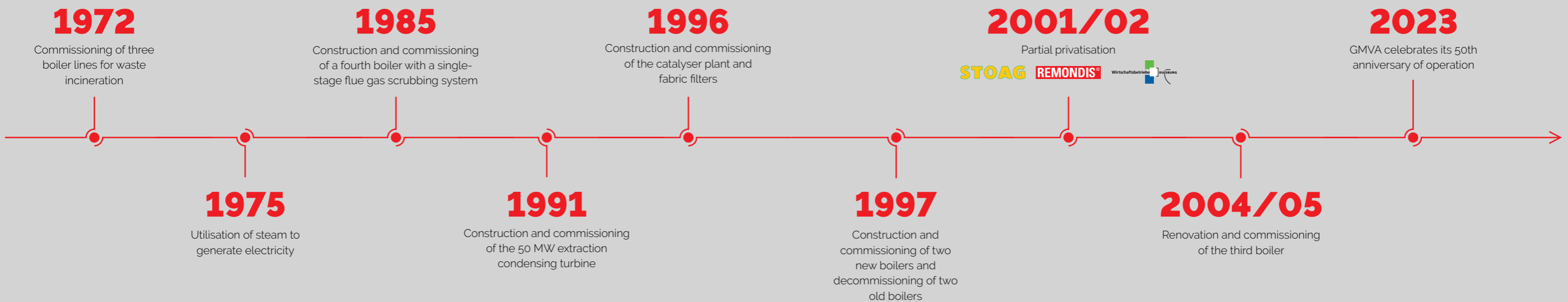
In 2001, REMONDIS took over 49 per cent of GMVA from the cities of Duisburg and Oberhausen, which had previously owned 100 per cent of the plant. Using the capital invested by REMONDIS, the denitrification plant was converted from SCR (selective catalytic reduction) to the more economical and reliable SNCR (selective non-catalytic reduction) technology. Between

2003 and 2006, we also replaced a boiler and a turbine and installed an auxiliary condenser. As part of this modernisation, all boilers were also converted to lower steam parameters from 60 bar and 480 degrees Celsius to 40 bar and 400 degrees Celsius. This measure reduced corrosion in the boilers, lowered repair costs and increased availability.

A digital future

Digitalisation also plays a major role in our waste incineration plants. It helps us to improve, visualise correlations, analyse an enormous volume of data and ensure that our plant is operated in the best possible way. Digitised work processes support employees in their workflows. For example, implausible values due to incorrect measurements or similar can be

quickly recognised via a system balance. This considerably limits troubleshooting and makes it possible to intervene at an early stage.



SOPHISTICATED PLANT CONCEPT

The technical design of the GMVA is consistently focussed on efficiency, safety and environmental compatibility. The plant has four incineration lines, each of which consists of a material feed, a grate with a firing system, a steam generator and a complex flue gas cleaning system. Each line incinerates between 20 and 25 tonnes of material per hour. This corresponds to a total capacity of up to 2,400 tonnes per day or 700,000 tonnes per year, delivered by around 80,000 collection vehicles.

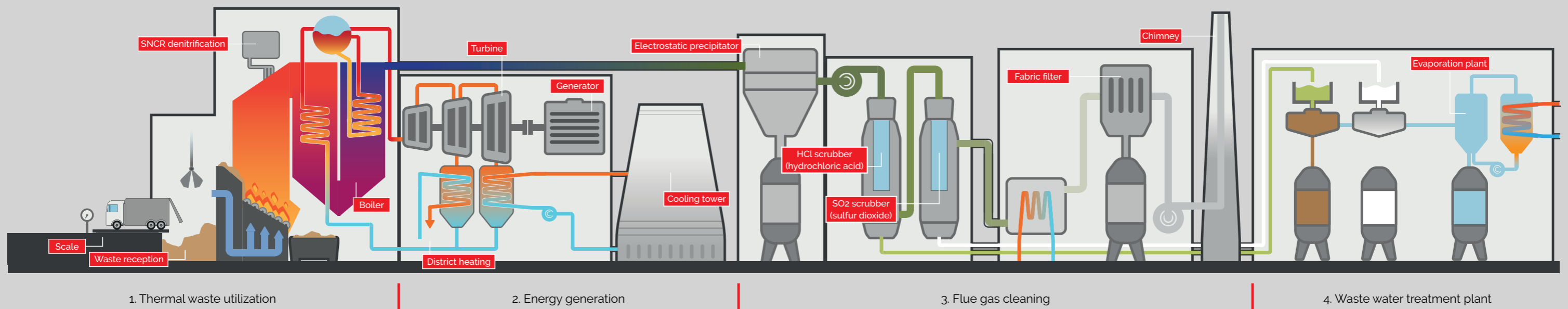
Units and components of the GMVA

1 Thermal waste utilisation
The bunker has ten tipping points with hydraulic sliding beds, two shears and three crane systems. It has a capacity of 26,000 cubic metres. Incineration takes place on roller grates in four co-combustion units with a total firing capacity of 270 megawatts. The associated four steam generators produce a total of 305 tonnes of steam per hour.

2 Power generation
Two turbo generators with an output of 25 megawatts and 44 megawatts produce electricity for the company's own use and for feeding into the public grid. District heating and process steam for industry are also extracted. In order to close the power plant's steam cycle, the steam that is not completely condensed in the turbines must be condensed as water in the condensers. Two cooling towers with 8,000 and 4,000 cubic metres of water circulation per hour respectively ensure the recooling of the condensation heat released.

3 Flue gas cleaning
The pollutants are carefully filtered out in our modern multi-stage flue gas cleaning system. The low measured values for the individual parameters demonstrate the high efficiency of the system. The flue gas cleaning system of each combustion line consists of an SNCR denitrification system and an electrostatic precipitator, whereby each filter is equipped with three filter chambers connected in series. The dust is temporarily stored in silos and utilised. This is followed by the HCl and SO₂ scrubbers, and the entrained flow reactor with downstream fabric filter.

4 Waste water treatment plant
The waste water from the scrubbers is treated and evaporated in the waste water treatment plant so that the system operates without waste water. Hydroxide sludge from the precipitation stages, gypsum and brine remain as residues.





ENERGY FROM WASTE

At the heart of the GMVA are four boilers, which are fed from a common bunker via three crane grabs. The material is fed into the incineration grate via the waste hopper. The roller grate transports the mixture through the various incineration zones in a controlled manner. Specifically, these are the drying, degassing, ignition, main combustion and burn-out zones. By the way: temperatures of up to 1,200 degrees Celsius persist in the main combustion zone!

The design of the GMVA plant guarantees that pollutants produced during incineration are reliably filtered before the exhaust air is released into the environment. And even if the waste we thermally treat cannot be utilised in a meaningful way, it often contains large amounts of energy that we release and use.

Electricity and heat for the region

Around 50 per cent of GMVA's total waste mix is biogenic. We receive guarantees of origin for this proportion in accordance with the German Renewable Energy Sources

Act (EEG). In other words, around half of the electricity we supply is generated from renewable fuels. Compared to modern wind turbines on the coast with an output of 1 MW and 2,000 full-load hours, GMVA replaces around 82.5 wind turbines – even when the wind isn't blowing.

Energy utilisation with a microturbine

In future, we will utilise unused waste heat or process steam with a microturbine. Up to 1,000 megawatt hours of additional electricity can be generated per year with such a small turbine. This can supply around 400 households – energy that was previously unutilised and therefore makes a further contribution to conserving resources.

Conserving natural resources

Incineration also allows us to conserve natural resources in three ways. Firstly, utilising energy from waste saves primary energy sources such as coal, oil and natural gas. Secondly, the slag produced during incineration is processed so that it can be used as a building material, e.g. in

road construction. And thirdly, other residual materials such as fly ash, brine and gypsum, which are produced during flue gas cleaning, can often be recycled.

Reduction of CO₂ emissions

By utilising waste to generate energy, we are helping to improve the climate by reducing CO₂ emissions. While fossil fuels are 100 per cent climate-relevant, waste contains up to 70 per cent renewable raw materials such as wood or paper, which have stored corresponding amounts of carbon dioxide during their natural formation or growth phase and therefore have no additional impact on the climate. In addition, the methane gas produced during landfill pollutes the atmosphere twenty-five times more than the carbon dioxide released during incineration.

CLEAN AIR THANKS TO FLUE GAS CLEANING

Even the best combustion technology cannot simply dissolve waste into thin air. We carefully treat and filter the waste gases produced during incineration in the flue gas cleaning system so that virtually clean air is released into the environment via the chimney.

Overall, flue gas cleaning accounts for around 65 per cent of the enclosed space in our plant. All measured values are collated in the modern control room, where they are continuously analysed and automatically fed into the plant control system. The measured emission values are also transmitted online to the State Office for Environmental Protection.

Denitrification and dust removal

The so-called denitrification of the flue gases already takes place in the boiler. For this purpose, ammonia water is injected as a reducing agent – at the temperature level at which NOx reduction is most effective. The reaction takes place optimally in a temperature window of 880 to 1,000 degrees Celsius. The current status of the temperature window is determined by computer and the appropriate level for injection is automatically selected.

Each GMVA incineration boiler has its own flue gas cleaning system with a capacity of 133,000 standard cubic metres per hour. After leaving the boiler, the flue gases are fed directly to the electrostatic precipitator, where the dust is separated from the precipitation surfaces by means of an ionised electrical field.

Two-stage flue gas scrubbing

This is followed by two-stage flue gas scrubbing. In the first scrubbing stage with the HCl scrubber, the hydrogen chloride, residual dust, heavy metals and dioxins are removed. In the second scrubbing stage, the SO₂ scrubber with the other acidic pollutant components, mainly sulphur dioxide, are removed from the flue gases.

After exiting the SO₂ scrubber, a steam-heated tubular heat exchanger raises the temperature of the water vapour-saturated flue gases to 115 degrees Celsius. In the downstream fabric deduster, fine dust and residual heavy metals, residual dioxins and furans are removed and the acidic components of the flue gases are further reduced.



SUSTAINABLE – FOR THE BENEFIT OF OUR ENVIRONMENT

For us, combining economy and ecology was a matter of principle from the very beginning. That is why we faced up to the economic, environmental and social requirements early on and ensured that our plant is always kept at the highest standards. As a result, GMVA has often served as a role model for other waste incineration plants.

Sustainable premises

Our responsible, environmentally friendly and sustainable actions are not only reflected in the technical aspects of GMVA described above. In 2020, we greened around 3,000 square metres of roof area and the facade of our plant's cooling tower as part of the "Sustainable Premises Initiative" in order to help improve the microclimate. With this measure, we gave the go-ahead for the Ruhr Conference project "Climate-resilient region with international appeal". Green roofs not only reduce rainwater runoff into the sewage system through retention and evaporation, but also contribute to increased evaporation overall and thus to a cooling of the surrounding area. Another positive effect is that the newly gained flora – in addition

to our wildflower meadows – provides a rich food supply for many insect species, such as bee colonies. We have also put up nesting boxes for pipistrelle bats.

A deep commitment to species protection

Since 2003, peregrine falcons have chosen our chimney as their home. Since then, 48 young have seen the light of day there and taken flight for the first time over our facility. This is all the more pleasing as the peregrine falcon was almost considered extinct in Germany in the 1990s and is still subject to strict nature conservation regulations.

We would like to take this opportunity to thank NABU for its outstanding support with this and other projects!





IGNITING YOUR CAREER - WITH PASSION AND ENTHUSIASM

The career opportunities we offer are as varied and extensive as GMVA's range of services and measures. Jobs in administration, laboratories, electrical workshops, I&C workshops (measurement, control and regulation technology), metal-working shops, materials issue, as well as various activities in the context of thermal waste treatment are just some of the numerous options in our company that are future-orientated and open up exciting career opportunities for committed employees.

Apprentice- and internships

GMVA offers apprenticeships in various professions. These include

- Industrial clerk
- Electronics technician specialising in automation technology
- Electronics technician specialising in operating technology
- Construction mechanic

Apprenticeships at GMVA usually start on 1 September each year. Applications by e-mail, including the required application documents in PDF format, can be sent to bewerbung@gmva.de.

Students in engineering or business management degree programmes have the opportunity to complete work placements with us and, if applicable, to write their dissertations in our company. Unfortunately, we do not offer eight-week basic internships for students.

School pupils are welcome to apply for an internship with us and gain an initial insight into the working world. They can familiarise themselves with the electrical workshop, I&C workshop, laboratory, administration, metalworking shop and materials distribution. Exciting work experience days are guaranteed!

Our current job and training opportunities can be found at www.gmva.de/en/careers. Our HR department will be happy to answer questions about advertised positions by telephone on 0208 8594-117 and about advertised apprenticeships or internships on 0208 8594-372.



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