



SAFE WASTE DISPOSAL –
SENSIBLE RECOVERY

2026

with the data from 2022 to 2025

Economically efficient – ecologically consistent

Our corporate objective can be summed up in one sentence: we want to provide low-cost thermal treatment of the maximum available waste that we receive, using the MVR facilities to generate electricity and district heating, produce reusable materials and largely avoid creating waste in the process, while maintaining high standards of plant safety, occupational health and safety for our employees, and environmental compatibility.

Economic sense and environmental sense are not mutually exclusive! This is illustrated in our brochure. MVR has been registered since 1999 in accordance with Regulation (EC) No 1221/2009 (EMAS III) and has been releasing annual environmental statements 2000. Starting in 2026, this will take place annually under the auspices of Stadtreinigung Hamburg (Hamburg's municipal refuse collection service). Our environmental management system applies for internal and external employees on the grounds of MVR and includes all processes on the site.

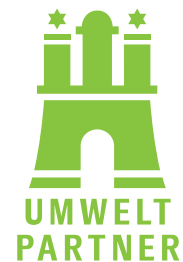


Economically efficient procedures: The high utilisation rate for the energy and materials in the waste we treated is once again clearly documented by the 2025 operating results.

MVR has been a partner of UmweltPartnerschaft Hamburg (Hamburg Eco-Partnership) since 2003 through its voluntary services to environmental protection.

- EMAS environment management system

This also includes the Partnership for Air Quality and Low-Pollution Mobility. In this context, we would like to make an active contribution to reducing traffic-related air pollutants.



Another aspect of our effective utilisation of waste as a “raw material” has been the additional extraction of district heating water since October 2004. This can reach a capacity of up to 20 MW of heat which could serve about 2,500 homes. A further heat extraction is currently being planned.

For a further increase of the cost-effectiveness we work in close co-operation with Anlage Zentrum für Ressourcen und Energie - Standort Borsigstraße. We can work more effectively, pool our knowledge and save costs by working more closely together, exchanging information and opinions, and by sharing staff in some areas. Closer co-operation will also help us in reaching our environmental goals.

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Our environmental policy:

MVR Müllverwertung Rugenberger Damm GmbH operates a thermal waste treatment plant at the Rugenberger Damm site and Tangstedt biogas and composting plant at the Wulksfelder Damm site. The plants contribute to the recycling economy, to the sustainable use of resources and to protecting the environment, cementing the SRH Group's environmental policy for thermal and biological waste treatment. The thermal treatment of residual waste and composting of biological waste are efficient uses of the energy contained in the waste to generate energy, heat and biogas. This replaces fossil fuels and mineral fertilisers and returns materials and nutrients to the economic cycle. In addition to providing energy, it is MVR's goal to create high-quality recycled materials and continuously improve resource efficiency while taking into account the impact of these activities along the value chain. MVR deals systematically with the environmental and climate impact of its activities and takes meas-

ures to improve energy efficiency and limit emissions. Fundamental environmental aspects such as energy efficiency, emissions, material flows and water and resource management are taken into account in the process. The aim is to minimise our own energy consumption while taking into account technical and economic constraints and to maximise utilisation outside the plants of the energy that is generated.

The plants are run with particular regard to environmental protection, health and safety and plant safety. As a critical infrastructure operator, MVR also takes into consideration the information security requirements, particularly with respect to the availability, integrity and confidentiality of its systems and processes.

Compliance with the statutory and official requirements is ensured by means of operational monitoring, internal controls and ongoing self-monitoring. The environmental performance of the facilities is regularly monitored and assessed and continuously enhanced via technical and organisational measures. MVR is transparent in its information to employees, the authorities and the public regarding its activities and their environmental impact.

Clear organisational and accountability structures, qualified staff and regular training guarantee that the plants are run in a secure, environmentally-sound and efficient manner. By acting in a safety-conscious and environmentally responsible manner, our employees make an important contribution to achieving MVR's environmental and climate goals.

Releasing energy – recovering



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Our plant is situated in the south-west of Hamburg, in the port area of Hamburg-Altenwerder. In the north, it is bordered by the Köhlbrand Bridge, in the east by the Köhlbrand basin, in the south by the site of port operator Hansaport Hafenbetriebsgesellschaft and in the west by the Rugenberger Damm embankment.

A fold-out flow chart of the plant's processes can be found on page 24.

MVR is designed to handle a throughput of approx. 320,000 Mg of municipal waste. Waste recovery is performed in two process lines, each with grate firing and a steam generator with a waste throughput of 21.5 Mg per hour.

The waste incineration process releases energy in the form of heat in the flue gases. This heat is used to convert the boiler feed water (demineralised water) in the steam generator into steam which is then used in a steam turbine that is coupled with a generator to produce electrical energy (power).

Any electricity produced which is surplus to own requirements is fed into the Hamburg grid.

Steam is tapped from the steam turbine for the plant's own use (e.g. for heating or hydrochloric acid treatment) and, in particular, for the supply of district heating (steam and heating water).

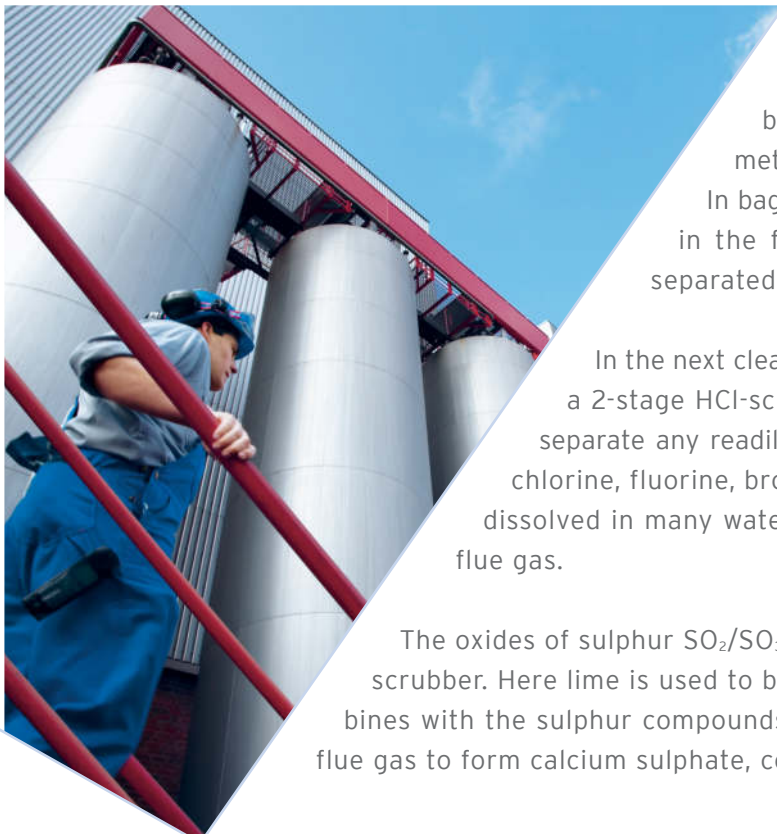
To ensure a constant supply of steam to our industrial clients and, as of October 2004, the supply of district heating, the plant operates two additional auxiliary steam generators which are fired with natural gas.

raw materials

In parallel with waste incineration and recovery of energy, flue gas cleaning begins in the boiler by ensuring an optimum incineration process. The nitrogen oxides are reduced by spraying ammonia water into the combustion chamber (SNCR method).

Each incineration/steam-generating process line has its own flue gas cleaning unit. Adsorbent that has already been used in bag house filter 2, but with a low uptake, is added to the flue gas leaving the boiler.

Flow chart (see p. 24)



The adsorbent consists of a mixture of 70 % trass and 30 % Activated carbon. This mixture ensures that any heavy metals and organic pollutants are separated. In bag house filter 1, any residual dust particles in the flue gas from the steam generator are separated together with the adsorbent.

In the next cleaning process, the flue gas passes through a 2-stage HCl-scrubber where process water is added to separate any readily soluble halogen compounds containing chlorine, fluorine, bromine and iodine. Any harmful gases are dissolved in many water droplets and thus separated from the flue gas.

The oxides of sulphur SO_2/SO_3 are separated by a neutral single-stage scrubber. Here lime is used to bind the oxides of sulphur. The lime combines with the sulphur compounds and part of the residual oxygen in the flue gas to form calcium sulphate, commonly known as gypsum.

For central heating – for domes

The energy released by thermal recovery is used twofold: to generate heat and power. The quantity and “quality” of the waste received play an important role here.

To a large extent, residual waste consists of combustible material and therefore has a calorific value (energy content) comparable to that of lignite (brown coal). The steam generators in the MVR plant are designed for waste with calorific values ranging from 6.5 to 14 MJ/kg. For comparison: lignite has a calorific value of around 10 MJ/kg.

The heat created by the incineration is used to produce steam from demineralised water. The MVR steam generators have a very high level of efficiency in comparison with other systems because of the great extent to which the energy in the waste gas is utilised.

In 2025 the MVR plant achieved an R1 energy efficiency factor of 0.81 (cf. Annex II of Directive 2008/98/EC, without climate-correction factor).



Steam supplies: The steam is supplied to industrial clients and households in the form of process steam and heating steam. Uninterrupted supply is contractually guaranteed. To meet this obligation, the plant has two auxiliary steam generators on standby, each with a production capacity of approx. 20 MW (giving about 25 Mg/h of steam).

The quantity of heat supplied to our steam clients largely depends on the customers’ production requirements and the weather.

The only way to improve the efficiency of the heat supplies is to reduce the input of primary energy (using less gas and more waste) and to level out demand by acquiring additional customers.



Overview of steam supplies*

Year	Steam supplied MWh	Heating water supplied MWh	Heat utilisation (usable heat as a percentage of total energy input) %
2022	540,635	32,949	55.0
2023	547,202	27,032	55.6
2024	537,480	24,952	55.4
2025	515,597	26,830	54.7

* Values from invoicing

tic power



Since autumn 2004, MVR has also been supplying district heating in the form of hot water (heating water) to an HanseWerk Natur supply area in Harburg-Neuwiedenthal/Neugraben.

Approx. 26,830 MWh were produced in 2025. This brought the heat utilisation rate to 54.7%. Here, too, the customers want these heat supplies to be guaranteed by MVR's auxiliary boilers as far as possible.

Simultaneous production of electricity (power) and heat is known as combined heat-and-power generation (CHP operation). In this mode generation of the two energy types, heat and power, is particularly efficient.

Electricity generation: MVR's extraction condensing turbine can generate a maximum electricity output of 29 MW in straight electricity generation, known as the condensing mode. During heat off-take, electricity generation is reduced to around 6 MW at maximum possible steam output.

Overview of electricity consumption

Year	Total electricity production MWh	Grid infeed / produced by CHP generation MWh	In-house electricity requirements MWh	Electricity purchased MWh
2022	77,600	38,244/29,845 ¹⁾	40,791	1,435/1,435 ²⁾
2023	69,012	30,403/26,233 ¹⁾	40,878	2,269/2,269 ²⁾
2024	69,118	29,595/24,587 ¹⁾	41,412	1,889/1,889 ²⁾
2025	66,806	28,125/24,013¹⁾	41,088	2,408/2,408²⁾

1) in accordance with the CHP Act of 1 April 2002 2) proportion from renewable energies

For the construction sector —

In addition to energy products in the form of power and heat, substances of commercially available quality are produced in the course of waste incineration and flue gas cleaning at MVR, namely slag, scrap metal, acid and gypsum.

Slag: After combustion, what is left on the grate are the non-combustible components of the waste plus the inert (no longer capable of reacting) materials produced during combustion, which are known as slag or bottom ash.



The bottom ash is washed with additional water in the slag extraction unit to reduce the content of readily soluble salts. It is sifted, broken up and freed from unburned components in order to produce a tested and approved building material comparable to a mineral mixture made from processed building rubble. The unburned components of the bottom ash are returned to the waste bunker to pass through the incineration process once more.

The slag is of high quality as a result of the washing process in the extraction unit and its extensive mechanical treatment. The proportion of soluble minerals is comparatively low and the residual separable metal content is close to 0%.

The slag complies with the relevant technical guidelines and delivery conditions currently in force. It was also marketed in the previous year over the company Hanseatisches Schlackenkonto GmbH (www.schlackenkonto.de) and is involved mainly in road and path construction.

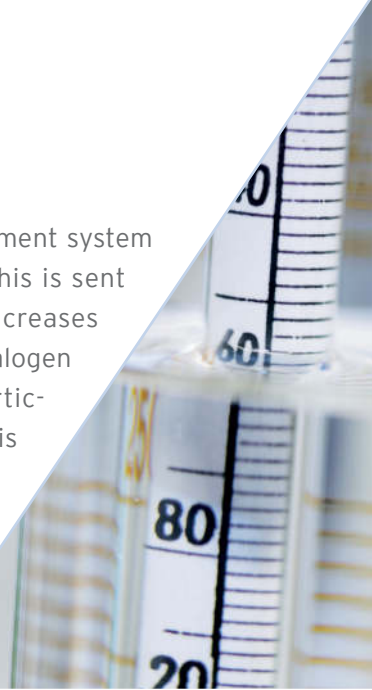
The slag treatment separates the scrap iron and non-ferrous metals which can then be reused as raw materials in smelteries. In the external slag storage facility, non-ferrous metals are again separated in a downstream non-ferrous metal separation of the already processed slag.

Scrap iron: The scrap iron, separated from the bottom ash using magnets, only contains very small amounts of bottom ash residues. The scrap metal produced by MVR thus easily meets the scrap metal industry's purity requirements, which stipulate an iron content of more than 92% for scrap from waste incineration plants.

Non-ferrous metals: An eddy-current process is used to separate, and thus recover, more than 90% of the non-ferrous metals (not separable with magnets) from the slag. These metals are mostly aluminium, copper and brass, but pieces of chromium steel are also included. The mixed scrap goes to an external company.

for industry

Hydrochloric acid: The acid scrubbing process used in the flue gas treatment system produces raw hydrochloric acid (HCl) with a strength of 10 % to 12 %. This is sent to a rectifying unit (operated separately), where its concentration increases to 30%. Various treatment stages remove chlorine as well as other halogen compounds such as bromine, iodine and fluorine, and also ammonia, particulates, and other inorganic and organic impurities, after which HCl gas is produced from the pre-treated crude acid in a distillation process. Demineralised water is used to prepare hydrochloric acid with a concentration of 30% from this HCl gas. Diligent operation of the rectifying unit and intensive checks mean that conformity of the hydrochloric acid to EN 939 can be guaranteed.



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By-products (see p. 24)

Gypsum: A gypsum suspension is removed from the SO₂ scrubber and the gypsum is separated from the suspension. The gypsum is then washed in a centrifuge to remove any readily soluble salts and then dried to a moisture content of less than 10 %.

The quality of this gypsum is very high. Since our operations started, the parameters to be monitored have always been well within the values laid down in the Beckert Study for FGD gypsum (gypsum from the desulphurisation units of power plants) and natural gypsum. The gypsum which is generated corresponds to the EUROGYPSUM quality criteria. The gypsum is supplied to the building industry for manufacturing gypsum plaster.

Waste incineration – the cleanest solution

On 1 June 2005 a new law was introduced prohibiting the landfill of untreated waste. In our opinion, thermal recovery is an economically and ecologically superior process offering the best alternative. Compared with mechanical-biological treatment or landfill, we find incineration in a plant such as MVR provides by far the most environmentally friendly method for the treatment and recovery of waste, and the cost is roughly the same.

In 2025, MVR received some 330,475 Mg of non-hazardous waste which was subjected to thermal treatment, a figure well in excess of the 320,000 Mg per year contractually agreed with Stadtreinigung Hamburg (Hamburg's municipal refuse collection service).

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The quantity of waste received has progressed as follows:

Waste received	
Year	Waste received Mg
2022	344,691
2023	338,873
2024	338,390
2025	330,475



Residual waste – reduction through concentration

Thermal waste recovery cannot make every substance that is contained in the waste simply disappear. However, the pollutants can be concentrated into a small fraction of residual material that amounts to just below 2% of the original quantity of waste. The vast majority of the pollutants can be taken out of circulation in this way. We take great care in the professional and safe storage of these residual materials in underground areas.

Particulates: At 28kg/Mg of waste, the amount of dust separated in the flue gas cleaning system is at the same level as the previous year (28kg/Mg). All of the particulates were used as backfill material in salt mines, and thus recovered.

Mixed salts: The hydrochloric acid rectification unit produced mixed salts in aqueous solution (brine with a concentration of 20%). These composite minerals remove halogens such as bromine, iodine, fluorine and also ammonium compounds from the materials cycle and they are then safely deposited in scoured-out salt caverns.

Raw acid: The availability of the HCl rectification plant in 2025 was once again significantly below the previous year's level. As a result of further repair work, around 1,087 Mg of raw acid nevertheless had to be disposed of.

Pollutants: The organic pollutant dioxin is initially destroyed by incineration, but dioxins are later partly reformed in the boiler. These are removed in the flue gas cleaning process.



Residual waste (see p. 24)

Raw acid disposed of	
Year	Raw acid disposed of Mg
2022	8,493
2023	4,801
2024	3,326
2025	1,087

Emissions – we're doing fine

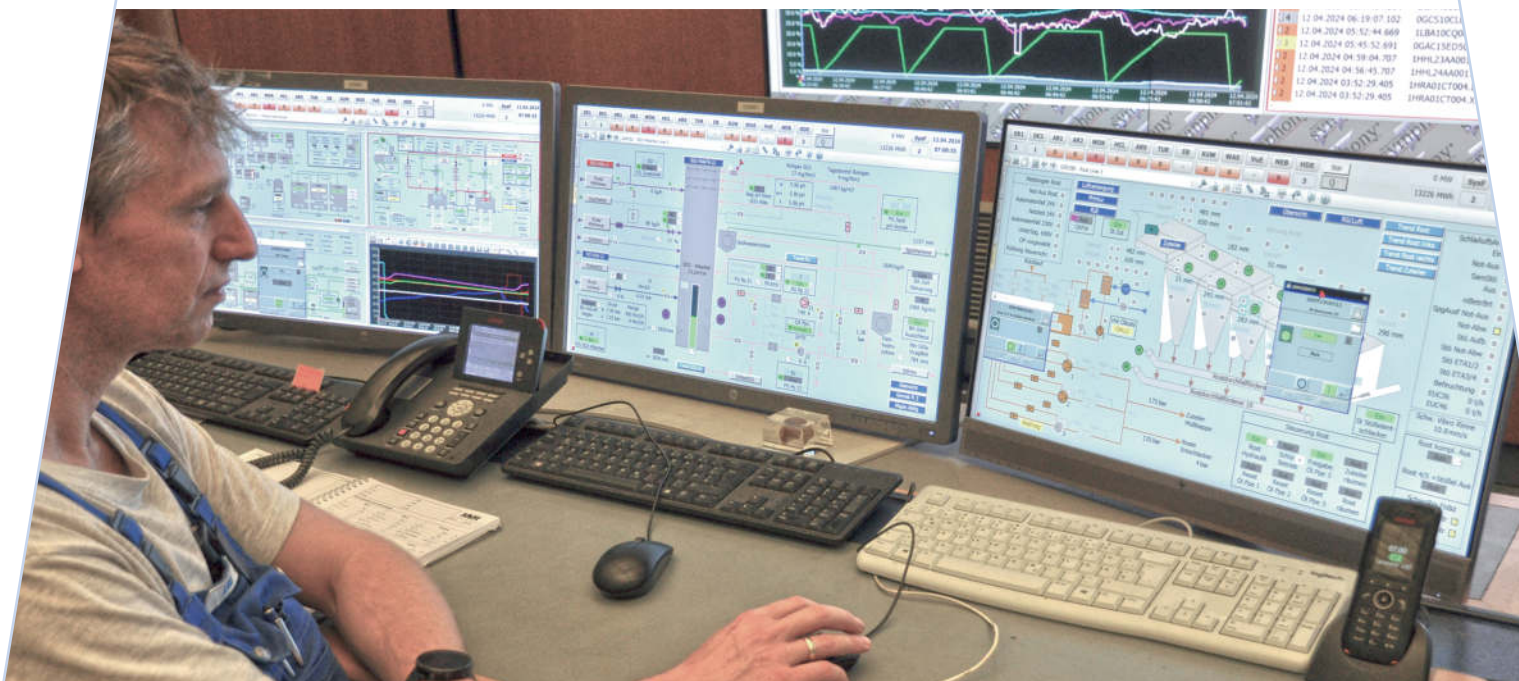
The emissions are still very low. A large part of the measured values are below the relevant detection limit. In 2025, both the emitted loads and the specific (volume-related) values were again well below the permitted values (see table). The utilisation rate of the permitted loads was between 0.1 % (dioxine) and 87.5 % (nitrogen oxide).

It is to be considered that the limit values of the MVR are in-part significantly below the values of 17. BImSchV prescribed by law.

The somewhat higher SO₂ values from 2015 can be attributed to experiments in power saving. In the meantime both lines have each been equipped with an SO₂ washer pump with frequency converter. First a control value of 8 mg/Nm³ was adjusted in the cleaned gas in order to determine under which conditions this conversion brings about the required success. In discussion with the monitoring authority, the control value was then lowered to 5 mg/Nm³ for a longer experiment. With this mode of operation, around 500 MWh of electricity can be saved per line compared with the previous unregulated mode of operation, while always reliably complying with the limit values. Meanwhile this operating mode has been authorised by government authorities for continuous operation.

Although the statistics are good, it is inevitable that limits will sometimes be exceeded for short periods. This can be due to various reasons, such as poor-quality waste, breakdown of components or (in rare cases) operating errors.

The number of such incidents has dropped significantly in recent years as a result of continuous process improvement and training sessions for the crew with specific goals in mind. In 2023 99.999 % of the half-hour average values were adhered to; in 2024 it was 99.995 % and in 2025 it was 99.995 %.

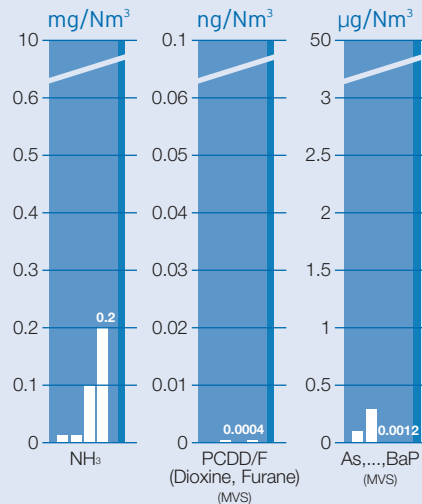
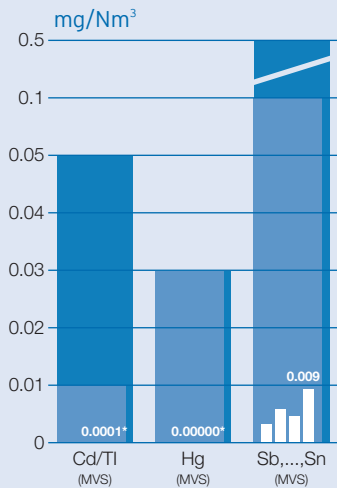
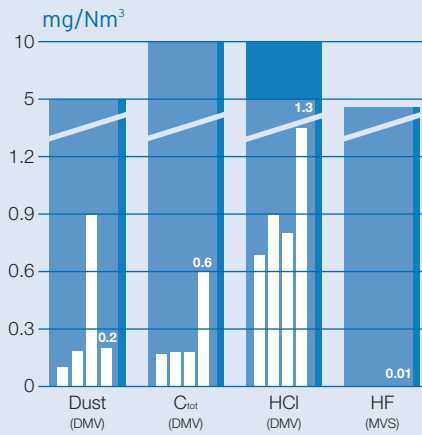
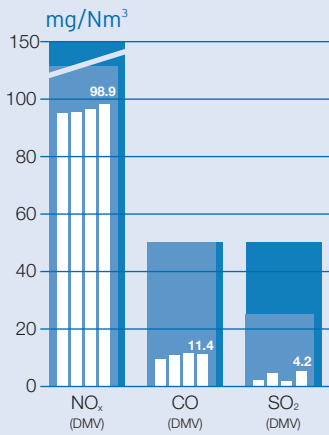


Emission loads

	Year	NO _x ¹⁾ kg	CO kg	SO ₂ kg	Dust kg	C _{tot} kg	HCl kg	HF kg	NH ₃ kg	Cd/Tl g	Hg g	Sb,...,Sn kg	PCDD/F mg	As,...,BaP kg
Annual load ²⁾	2025	137,891	20,984	5,550	674	1,001	1,895	13.5*	405	146*	15*	12.2	0.07	1.65
Limit value (annual load)		157,542	78,771	23,631	4,726	12,603	4,726	158	15,754	3,150	31,510	79	79	79 ³⁾
Utilisation of the load	2021	86.6%	20.3%	32.5%	13.5%	2.9%	26.1%	0.0*	0.6%	0.0*	0.0*	6.2%	0.0*	0.6%
limit value	2022	85.5%	24.0%	20.2%	14.0%	3.0%	22.7%	0.0*	0.2%	0.0*	0.0*	5.9%	0.0*	0.2%
	2023	83.6%	27.2%	31.7%	17.3%	3.1%	29.0%	0.0*	0.1%	0.0*	0.0*	10.5%	2.3*	0.6%
	2024	85.2%	27.5%	12.8%	32.6%	2.9%	23.5%	0.0*	0.7%	0.0*	0.0*	7.6%	0.2*	0.0%
	2025	87.5%	26.6%	23.5%	14.3%	7.9%	40.1%	8.6%	2.6%	4.6%	0.0*	15.4%	0.1*	2.1%

1) including auxiliary steam generators 2) limit value according to the 17th Emission Control Ordinance 3) From 2012: determination of mass flows with nonvalidated values

Emission concentration



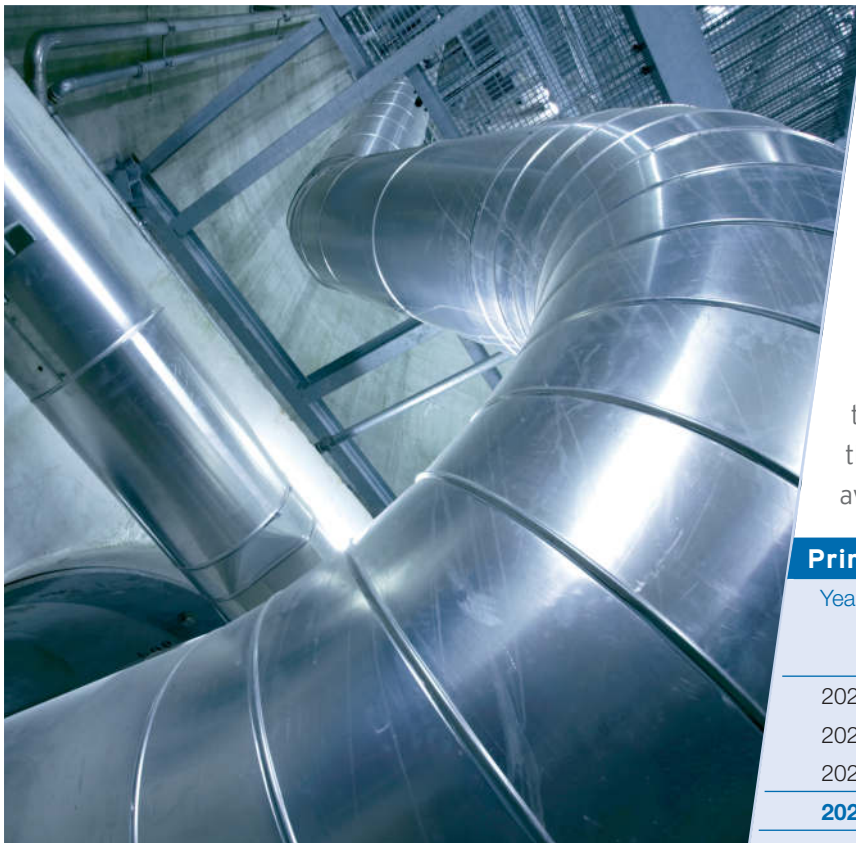
Permissible limit value according to the 17th Emission Control Ordinance

Limit-value permission: daily mean values (DMV) or mean value of samples (MVS)

Values measured in 2022–2025 (2025 also stated in figures).

* From 2019, a new calculation basis for analysis values below the limit of quantification (LC): instead of using half the LC as before, the values will be set to zero, as is standard practice throughout Germany.

Overview of energy consumption – utilisation instead of wastage



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For various reasons, MVR has to use primary energy – fuel oil/natural gas – in addition to waste. Primary energy is used intermittently in the waste-fired boilers in order to ensure the minimum combustion temperature even in unfavourable conditions. And natural gas is also used in the auxiliary steam generators if the energy acquired from the waste does not suffice in order to supply the district-heating customers of the MVR on cold days.

In 2025, MVR used some 23,800 MWh of heating oil/natural gas in the waste boilers and about 48,100 MWh of natural gas in the auxiliary steam generators to provide process steam and hot water for their customers.

The requirement on primary energy is basically influenced by the take-up of the customers, by the weather and by the time availability and performance availability of the garbage vessels.*

Primary energy

Year	Waste boilers MWh	Auxiliary steam generators MWh	Total MWh
2022	8,260	28,000	36,260
2023	13,950	42,180*	56,130
2024	16,993	46,880*	63,873
2025	23,781	48,068	71,849

The high time and capacity availability of the waste-fired boilers has made a significant contribution to the saving of primary energy.

In-house steam consumption

Year	In-house steam consumption MWh
2022	95,954
2023	90,150
2024	87,770
2025	94,764

* Notably, customer demand was higher while system availability was slightly lower in 2023 and 2024. This is why the use of natural gas was greater than usual. In 2025, auxiliary firing became increasingly necessary to secure the combustion process.

Use of operational resources – less is more

The use of vital operational resources, i.e. materials that are necessary to operate the plant and to improve the production yield, is similar to that in previous years. The fluctuations are mainly due to the different compositions of waste and the quality of the water from the River Elbe.

Other operational resources*

Year	Activated charcoal Mg	Aluminium chloride Mg	Calcium chloride Mg	Iron chloride Mg	Sodium hydroxide Mg	Hydrochloric acid ¹⁾ Mg
2023	0	128	0	32	619	993
2024	1	110	38	30	630	733
2025	1	166	0	29	717	860

* annual amounts received

1) from MVR's own HCl production

CO₂ – saving where we can



Approximately 50% of municipal solid waste is derived from biogenic sources (National Inventory Report published by the Federal Environment Agency (UBA)). Since MVR makes optimum use of the energy released by waste incineration, the consumption of primary energy is correspondingly reduced.

MVR's auxiliary steam generators must comply with the Greenhouse Gas Emissions Trading Act. For the fourth period of operation from 2021 to 2025, MVR receives 20,715 certificates (1 certificate corresponds to 1 Mg CO₂) in total. In 2025 9,502 certificates were required.

Water – every drop counts

Drinking water: In 2025, MVR purchased 3,410 m³ of drinking water, mainly for sanitary purposes, most of which was released into the sewage network of Hamburg’s municipal sewage system.

Rainwater: In 2025, approx. 11,000 m³ of rainwater were collected from roofs and traffic areas for use as process water, e.g. for slag washing or flue gas cleaning.

Water from the River Elbe: There are strict regulations regarding the amount of water MVR can extract from the Elbe for use as cooling water in its turbine condensers. The specified amount of water may only be heated by max. 6.0 °C in the summer* and by max. 7.5 °C in the winter* and must not exceed the temperature of 28 °C when discharged back into the river. The MVR complied with regulations: in 2025, the cooling water throughput amounted to approx. 23.7 million m³ of river water, only about 59.3% of the quantity* permitted. The max. heating in summer operation was 5.8 K¹⁾ and in winter operation was 7.2 K. The oxygen content of the water is increased close to saturation limit by way of cascades in the outlet structure. Boiler feed water for steam generation has to be fully cleaned and demineralised. The water for this is taken from the cooling-water flow and treated. After using the heat from the steam supplied, our customers return about 60 % as condensate which is then treated and reused. In 2025, around 482,000 m³ of water from the Elbe had to be cleaned and demineralised to compensate for the loss. The process of neutralising the minerals and pollutants produces neutralisation waste water in the water and condensate-treatment plant. The plant was enlarged in 2004 to reduce the concentration of pollutants in the water (in particular, filterable substances). In 2025, around 48,880 m³ of treated waste water from the neutralisation process was channelled into the Elbe.

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* Amended water law permit
 Summer operation: 01.04 – 30.11
 Winter operation: 01.12 – 31.03
 Quantity again reduced by a third
 Monitoring values as sliding 6-hour average values

Water collection

Year	Rain water m ³	Water from the Elbe			Public water supply Drinking water m ³	Waste water ¹⁾	
		Cooling water m ³	of which boiler feed water m ³	Fire extinguishing water/ process water m ³		Cooling water m ³	Neutralisation waste water m ³
2023	18,801	26,329,000	475,100	127,880	3,450	25,854,000	43,226
2024	16,826	31,366,000	473,000	78,600	4,913	30,893,000	42,234
2025	10,956	23,722,000	482,000	97,700	3,410	23,240,000	48,882

1) directly channelled into the Köhlbrand

Noise pollution and operational disruptions – all under control



MVR is located in the heart of Hamburg's port area.

The noise level in the vicinity of this industrial area, where there is a large amount of traffic, is relatively high. MVR complies with all the relevant noise level limits along its site boundaries. The Workplace Ordinance relating to areas within the site is also strictly adhered to. In the few parts of the plant where soundproofing is restricted by technical limitations, either soundproof casing has been fitted or else hearing protection is mandatory for employees.

Operational disruptions can have adverse effects on the environment. In 2025 there were 14 operational interruptions in all, 2 of which were scheduled stoppages (overhaul) and 12 unplanned stoppages for various reasons. None of the operational disruptions were malfunctions as defined in the Statutory Ordinance on Hazardous Incidents. Dealing with the effects of the disruptions caused no problems. There were no serious work-related accidents.

Flora and fauna – protecting biotopes



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Obviously the construction of MVR's plant had an adverse effect on the flora and fauna on the site during the building phase. Approx. 44,400 m² were sealed through buildings and traffic areas.

MVR has created green spaces on the undeveloped areas of the site to compensate for this and has planted vegetation on approx. 7,000 m² of roof space. As an additional measure, MVR has purchased a 13-hectare site (Höfnermoor) about 4 km south of the plant and restored it to its original marsh-like condition.

A major finding of the expert appraisal of the compensatory measures, which was carried out in recent years and completed in 2005, was that the substitute area had developed favourably. The measures for improvement stipulated in the final report will be carried out on an ongoing basis.

An additional space in Vierlande was placed under maintenance in 2025 for the construction of the district heating station. It is being environmentally enhanced by the Free and Hanseatic City of Hamburg on behalf of MVR.

Area consumption

MVR grounds m ²	of which sealed m ²	of which near-natural m ²	Near-natural areas away from MVR m ²
61,600	44,420	17,180	139,305

Establishing connections – having an influence

In addition to the environmental effects described above that are directly attributable to MVR, its operations also have indirect environmental effects. An overall examination of the environment was therefore carried out as part of MVR's approval application. On this basis, MVR continually pursues all the environmental aspects of its operations in accordance with the EU directive.

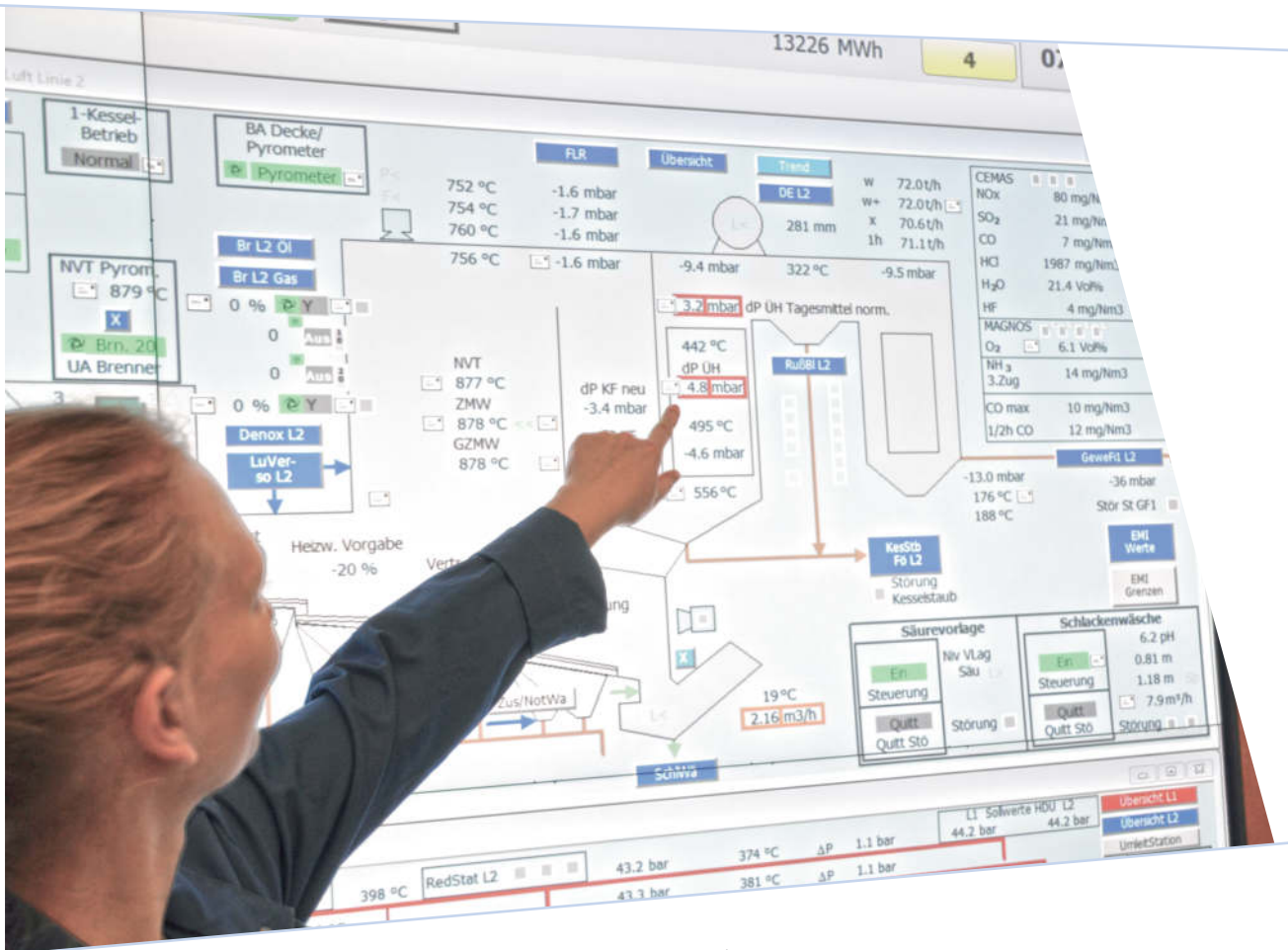
a) Directly attributable environmental aspects are assessed on an annual basis and their development is continuously monitored.

b) The indirect environmental aspects include the quality of the products and of the waste which can for the most part be marketed. Only if the materials delivered by MVR meet the required quality criteria can natural resources be spared. The recycling should not entail a concentration of harmful substances in the recovered substance cycle. High quality standards are demanded of our materials in the light of this aspect. They are subject to ongoing quality control. The marketing and handling of the proper disposal of the residual materials are organised by an externally accredited company, enabling the benefit of experience and the exploitation of synergies.

The philosophy adopted for the procurement of operating resources is similar. Any by-products from other production processes or treated substances which are available are used if they are of the requisite quality (e.g. ammonia water, heating oil). We are constantly searching for alternatives to hazardous substances. In this respect we also try to encourage environmentally responsible behaviour and production processes in the companies with which we work.

Another aspect of indirect environmental relevance is the noise nuisance caused by delivery vehicles coming onto the site. The main delivery service provider, the Stadtreinigung Hamburg municipal refuse collection authority, claimed that all its vehicles are low in noise and pollutant emissions and also equipped with blind spot monitors.

Management system – organisati



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At MVR, under the motto “Action, not reaction” we take an active part in environmental protection, making a significant contribution to preserving the natural basis of life and to making our company a safe place. To reach this goal, MVR has a unified management system that is under constant development and takes into consideration the requirements concerning environmental protection, health and safety at work, and risk management as it performs its duties. All our employees are actively involved in our environmental protection and health and safety activities. There are two levels at which the company ensures that the statutory, regulatory and corporate requirements are adhered to.

Level 1

Principles; integrated management; environmental protection policy, objectives, and programme; regulated structures and processes; assignment of responsibility and authorisation.

Level 2

Operating and shift-related instructions; instructions on action in the event of malfunctions; detailed regulations concerning work routines and action.

We regularly conduct environmental company audits during which we assess the application and effectiveness of our system, our compliance with legal requirements and the achieved environmental performance.

ng success

The Technical Director bears overall responsibility for environmental protection at MVR. He is responsible for developing, implementing and complying with the applicable legal and regulatory requirements in the areas of environmental protection and occupational safety. Various tools have been introduced to support this at MVR, such as an environmental committee, an occupational safety committee and regular training and instructions.

The committees that have been set up advise and monitor the fulfilment of tasks and ensure the involvement of the workforce and the works council.

The improvement suggestion scheme and involvement of the works council both continue to play an important role in the overall success.

The Technical Director delegates essential environmental management tasks to the Head of Operational Control. He is designated together with the Management Representative as Environment Management Representative in accordance with the EMAS III Regulation and is responsible for maintaining and developing the Environmental and Safety Management System. He also performs the legally-mandated functions of company representatives for waste, emissions and water protection and coordinates the activities of external officers.

The company representative functions are allocated externally and internally as shown by the following organisational chart:



Environmental objectives – doing our homework

Energy efficiency, e-mobility and resource conservation

Increasing energy efficiency for greater heat extraction:

The Free and Hanseatic City of Hamburg is planning to develop further heat sources south of the Elbe to supply Hamburg's district heating grid. MVR can play an important role here. In 2020, preliminary planning was carried out by means of a feasibility study and the development of additional heat utilisation potential was analysed by replacing the steam turbines and integrating a flue gas heat exchanger (ECO 2) in front of the HCl scrubber. For process-related technical reasons, the integration of ECO 2 was not pursued further. This means that the increase in energy efficiency and heat extraction is largely being generated via the replacement of turbines.

Implementation of the project would allow approximately 23 MW in additional district heat output without increasing fuel use. Realisation of the project would therefore mean a total reduction in CO₂ of approximately 43,700t CO₂/a. In future, MVR heat supply will increase from 30,000 MWh to 139,500 MWh. At the same time, the new back-pressure turbine will increase power input from 40,000 MWh to 68,000 MWh. The district heating station and pipeline are currently under construction.

(2021-2027, production, €39.5 million)

E-mobility funding:

MVR has set up ten parking spaces for electric vehicles and ten spaces for e-bikes, including charging columns, within the scope of the eco-partnership. The parking spaces were originally planned for mid-2022, but implementation was deferred due to the organisational process. The car charging columns and e-bike spaces were constructed in 2024. The car charging columns are not yet operational as the final details still have to be clarified with the energy provider. (2021-2023, maintenance)

Improved NF separation in the slag treatment process:

By optimising the separation of non-ferrous (NF) metal in the slag treatment process at MVR, the aim is to retrieve yet more NF metals for the highest possible quality of recovery and to reduce the residual metal content of the slag. It is expected that approximately 450 Mg of additional NF metals (NE fine) will be separated per year. The concept was revised once again in 2024 and implemented in 2025.

(Original planning: 2021-2023, now implemented in 2025, production) Improvements are currently being made

Increase in energy efficiency of induced draughts on both lines:

The integrated induced draught fans are currently equipped with one vane control system each. This regulates the respective load case and the necessary negative pressure in the combustion chamber. From an energy standpoint, however, vane control systems are loss-prone throttle regulators, especially in partial load operation. To increase the electrical energy efficiency of the entire plant, the existing induced draught fans are being replaced by new induced draught fans run on frequency converters. Using these frequency converters, the speed of the new fans can be precisely adapted to every load case and therefore to every flue gas volume flow. This means that the electrical power consumption of the induced draughts is set to the economic and technical optimum in the load case. (2025-2027, production, €3.8 million)

Protecting the Environment

Pilot plant for capture of CO₂ from flue gas and subsequent utilisation (CCU):

The Free and Hanseatic City of Hamburg is aiming to be climate-neutral by 2040. At the moment, a pilot project is examining how CO₂ can be removed from the flue gas and used in the synthesis of organic matter. The permits are currently being obtained. (2026-2029, €3.4 million)

Our environmental performance at a glance

The following table contains the most important key indicators for the last five years in accordance with EMAS III.

Energy efficiency		2021	2022	2023	2024	2025
Steam and hot water supplied	(MWh/Mg _{waste})	1.6	1.7	1.7	1.7	1.6
In-house steam consumption	(MWh/Mg _{waste})	0.29	0.28	0.26	0.26	0.29
Primary energy input (fuel oil/natural gas)	(MWh/Mg _{waste})	0.12	0.11	0.17	0.19	0.22
Electricity production	(MWh/Mg _{waste})	0.22	0.23	0.20	0.20	0.20
In-house electricity consumption	(MWh/Mg _{waste})	0.12	0.12	0.11	0.12	0.12
Proportion of electricity consumption from renewable energies	(%)	100.0	100.0	100.0	100.0	100.0

Material efficiency		2021	2022	2023	2024	2025
Ammonia water	(kg/Mg _{waste})	2.6	2.5	2.3	2.4	2.4
Adsorbent	(kg/Mg _{waste})	1.8	1.5	1.5	1.5	1.4
Quicklime	(kg/Mg _{waste})	1.6	1.3	1.5	1.2	1.3
Sodium hydroxide	(kg/Mg _{waste})	1.6	1.7	1.8	1.9	2.2
Hydrochloric acid (Internal requirements)	(kg/Mg _{waste})	3.1	3.5	3.0	1.9	2.6

Water		2021	2022	2023	2024	2025
Consumption of cooling water	(m ³ /Mg _{waste})	82	75	78	93	72
Consumption of water from the Elbe	(m ³ /Mg _{waste})	1.4	1.4	1.7	1.6	1.8

By-products/waste		2021	2022	2023	2024	2025
Slag	(kg/Mg _{waste})	202	205	197	241 ¹⁾	196¹⁾
Boiler particulates (Filter dust recycling)	(kg/Mg _{waste})	13	13	13	14	14
Filter particulates (190113*)	(kg/Mg _{waste})	13	13	13	14	14
Raw acid disposed of (190106*)	(kg/Mg _{waste})	7	25	14	10	3

Biological diversity		2021	2022	2023	2024	2025
Area used (developed)	(m ² /Mg _{waste})	0.13	0.13	0.13	0.13	0.13

Emissions		2021	2022	2023	2024	2025
CO ₂ emissions *	Mg	334,975	332,019	320,624	310,824	307,090
	(kg/Mg _{waste})	974	962	946	919	929
SO ₂ emissions	(kg/Mg _{waste})	0.022	0.014	0.022	0.009	0.017
NO _x emissions	(kg/Mg _{waste})	0.393	0.390	0.389	0.397	0.412
Particulate emissions	(kg/Mg _{waste})	0.0018	0.0019	0.0024	0.0046	0.0020

* 50% of which has no impact on climate change, in relation to the waste (NIR UBA (National Inventory Report published by the Federal Environment Agency))

CO₂ calculation for municipal waste, natural gas and heating oil with reference to emission factors, cf. <https://wiki.prtr.bund.de/wiki/Emissionsfaktoren>.

Other substances identified as greenhouse gases, such as CH₄, N₂O, hydrofluorocarbons, perfluorocarbons and SF₆, are not relevant.

1) One-off effect due to extensive mining of waste heap at MVR.

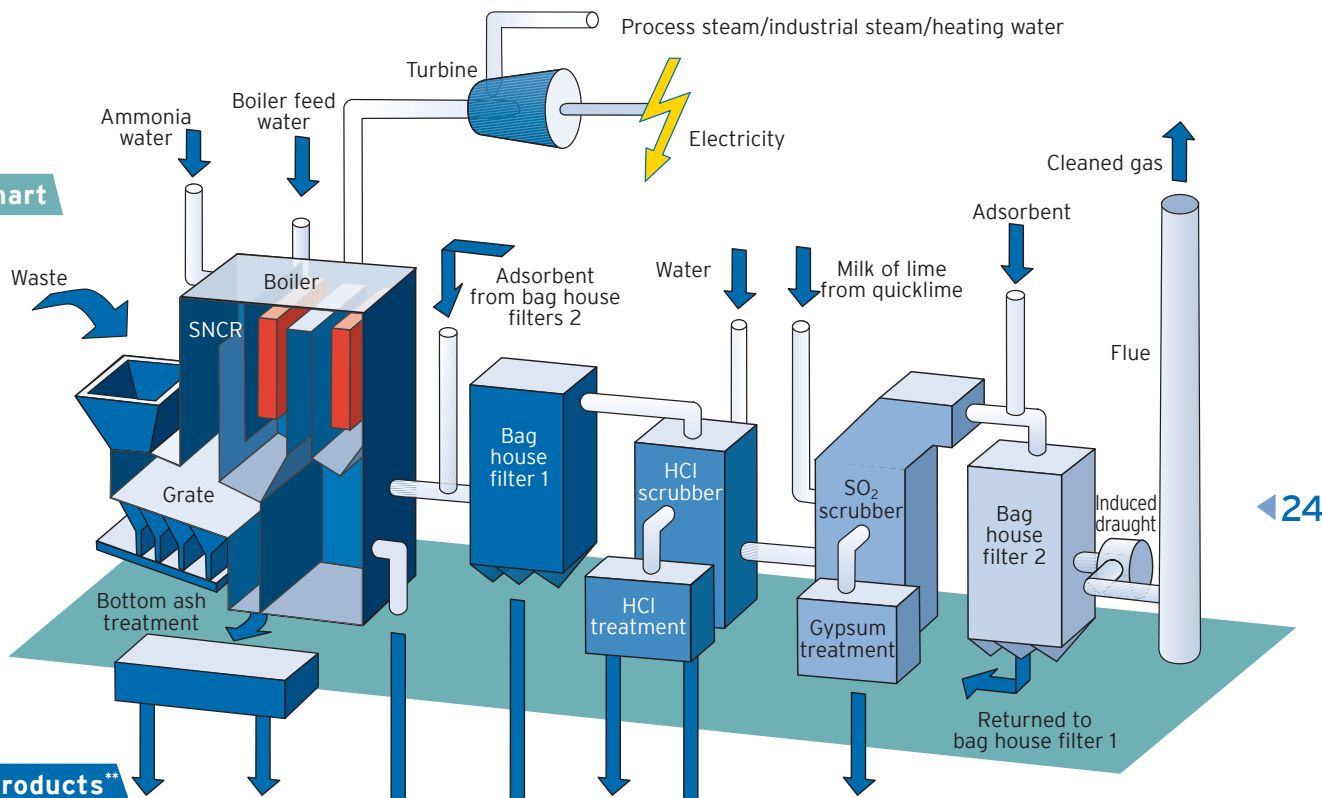
p. 15 Operational resources*

Year	Ammonia water Mg	Boiler feed water Mg	Granulated asphalt** Mg	Quicklime Mg	Adsorbent Mg
2022	878	450,070	0	438	503
2023	775	475,100	0	509	499
2024	827	473,000	0	413	500
2025	780	482,000	3,315	428	478

* annual amounts received
** In use since 2025

In addition, we purchased 288 Mg of hydrochloric acid 30% in 2022, as our own production was not always available.

p. 5 Flow chart



p. 8/9 By-products**

Year	Slag Mg	Scrap metal Mg	Hydrochloric acid Mg	Gypsum Mg
2022	70,822	9,943	1,356	624
2023	66,886	8,970	2,381	626
2024	81,557	9,465	2,979	478
2025	64,608	10,501	3,048	462

** annual amounts delivered Non-ferrous from reworking: 2015 303 Mg

p. 11 Residual waste**

Year	Boiler particulates Mg	Filter particulates Mg	Raw acid disposed of Mg	Mixed salts Mg
2022	4,630	4,630	8,493	2,021
2023	4,573	4,573	4,801	2,383
2024	4,797	4,797	3,326	2,244
2025	4,688	4,688	1,087	2,567

** annual amounts delivered

Basic data

Quantity of waste received	norm. Mg/h	2 x 21.5
	max. Mg/h	2 x 23.0
Calorific value range	kJ/kg	6,500–14,000
Auxiliary fuel: natural gas/fuel oil		
Waste delivery weekdays		0–24 h
Number of trucks per day		approx. 150

Supplies to the plant

Tipping hall

Length	m	approx. 51
Width	m	approx. 33
Height (roadway height)	m NN	approx. 20
Number of tipping bays		12

Waste bunker

Length	m	approx. 50
Width	m	approx. 20
Storage height (max.)	m	approx. 30
Floor thickness	m NN	0
Storage volume	m ³	approx. 20,000

Waste bunker - mechanical equipment

Cranes	Number	2
Type/working load	–/Mg	Polyp/4.5
Bulky-waste shredders	Number	1
Throughput	Mg/h	15

Storage of process materials

Fuel oil	m ³	300
Ammonia water in reserve	m ³	3 x 80
	m ³	1 x 80
Lime silo	m ³	60
Adsorbent	m ³	70
Aluminium chloride	m ³	20
Sodium hydroxide	m ³	20
Chemicals (total)	m ³	approx. 55

Incineration

(data for each incineration line, normal values)

Grate firing

Stepped feeder grate		2
Width	m	6.25
Length	m	10.2
Rated thermal input	MW	60.0

Steam generator

Flues		4
Steam	Mg/h	72
Steam pressure	bar	44
Temperature	°C	400
Flue gas exhaust temperature	°C	170

Combustion air system

Primary air (max.)	Nm ³ /h	67,186
Secondary air (max.)	Nm ³ /h	48,761

Turbine

District heat offtake max.:		
District heat	MW	70
Electricity (gross)	MW	6
Electricity offtake:		
District heat	MW	0
Electricity (gross)	MW	approx. 29
Plant use	MW	approx. 5

Flue gas data at flue

related to normalised dry conditions and to oxygen content of operation

◀25

Volume flow (design)	m ³ /h	80,000
Oxygen content (design)	% bV	8.5
Process O ₂	% bV	< 7
Temperature	norm. °C	125
	max. °C	150
Permitted annual average values:		
Particulate	mg/m ³	3
HCl (hydrogen chloride)	mg/m ³	3
SO ₂ (oxides of sulphur)	mg/m ³	15
HF (hydrogen fluoride)	mg/m ³	0.1
NO _x (oxides of nitrogen)	mg/m ³	100
C _{tot} (total carbon)	mg/m ³	8
CO (carbon monoxide)	mg/m ³	50
Cd, Tl (cadmium, thallium)	mg/m ³	0.002
Hg (mercury)	mg/m ³	0.02
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V+Sn	mg/m ³	0.05
As+BaP+Cd+Co+Cr *)	mg/m ³	0.05
PCDD/PCDF, I-TE (dioxins, furans)	ng/m ³	0.05

*) in accordance with the amendment of the 17th Emission Control Ordinance in 2003

Personnel

Total employed trainees	140
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A company of



STADTREINIGUNG.HAMBURG

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