

Environmental Statement 2019



IKW Rüdersdorf waste to energy plant

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Our company

Thermal recovery: conservation of resources, efficient use of energy

When it comes to waste, one thing is certain: it arises wherever consumption takes place. Our waste contains a large number of substances that can be reused through recycling. However, because of its composition and nature, not all municipal waste is suitable for recycling. But the energy contained in this waste can still be used, as a large part of it is of organic origin, meaning it can be used in the IKW Rüdersdorf waste to energy plant to contribute to resource-saving energy generation.

The plant belongs to STEAG Waste to Energy GmbH, a subsidiary of the Essen-based energy group STEAG, and is located just outside Berlin in the district of Märkisch-Oderland (state of Brandenburg) in the large municipality of Rüdersdorf between the districts of Hennickendorf and Herzfelde. The waste incineration plant is fuelled mainly with municipal and commercial waste from the Berlin-Brandenburg area. Its modern technical equipment enables a particularly high electrical efficiency. This means it yields significantly more electricity than conventional waste incineration plants, achieving three goals simultaneously in the process:

- optimisation/reduction of CO emissions during normal plant operation,
- highly efficient production of energy,
- reduction in the use of fossil fuels for electricity production.

DIKW Rüdersdorf generates electricity primarily for the neighbouring cement plant of CEMEX Zement GmbH, where most of it is used directly. The electricity produced in excess of CEMEX's requirements flows into the grid of the transmission grid operator E.ON edis and serves general power supply. The main objectives of waste utilisation are to conserve natural resources and minimise environmental impact. To guarantee this, IKW Rüdersdorf GmbH has

implemented an environmental management system. Active environmental protection is anchored in the operations of the wholly-owned subsidiary of STEAG Waste to Energy GmbH. This environmental management system is developed further and adapted on an ongoing basis when general conditions change.

IKW Rüdersdorf GmbH has published an environmental statement annually since 2007. The current environmental statement is based on the 2018 environmental statement and covers the period from January to December 2018.

For over 80 years, STEAG has stood nationally and internationally for efficient and reliable power generation. STEAG is one of Germany's leading energy producers and operates its own coal-fired power plants in the Ruhr region, Saarland and at foreign locations in Colombia, the Philippines and Turkey. The company's second sphere of business comprises decentralised plants and renewable energies. STEAG operates more than 200 plants in Germany, France, Poland, Spain, Romania and Turkey for the production of energy from renewable and thermal sources.

As an experienced partner, STEAG supports its customers comprehensively in all phases of energy supply. STEAG plans, develops, builds, operates and markets highly efficient power plants and their by-products. In addition to tailor-made solutions in the field of electricity and heat supply, STEAG also offers a wide range of energy services.

Good governance and sustainable management



The company's goal is to burn waste at the waste to energy plant in Rüdersdorf to generate electricity and heat in compliance with all relevant laws and licensing requirements and under high standards in occupational safety, health and environmental protection. In doing so, we strive for high plant availability and cost-effectiveness.

The company's operating objectives for the following year and a further four years are formulated annually as part of the planning process by the Board of Management in consultation with the plant management. These objectives form the basis for operational control of the waste incineration plant.

In order to achieve the corporate goals, we have defined the following principles for IKW Rüdersdorf's corporate policy:

The protection of life and health enjoys the highest priority. We abide by the law and comply with all regulations under public law that apply to us.

We meet our responsibility for the future with innovative solutions and effective use of resources.

The purpose of our environmental protection and occupational health and safety management is to promote the sustainable development of our economic, social and ecological environment and serve the healthy growth of the company. We take precautions and, if necessary, follow-up measures to reduce the environmental impact of our activities and examine the possible environmental impact in advance of new activities.

When selecting our suppliers, contractors and business partners, we also take their environmental and occupational health and safety practices into consideration.

We conduct an open dialogue with the public and other interested parties about the environmental aspects of our business activities.

We are committed to protecting the environment, complying with environmental and occupational health and safety regulations, continual improvement of environmental performance as well as internal company/staff agreements and enable participation in voluntary occupational health and safety programmes. The latest reliable findings in the fields of occupational medicine, hygiene and occupational health and safety are taken into account in the preparation of risk assessments. Employees, external representatives and specialist companies are involved in this continuous process. We strive to ensure and continuously improve the safety and health of our employees and all other registered personnel on our premises.

To prevent accidents, to avoid hazards and to organise work in a humane manner, we provide a suitable organisation and the necessary resources.

Occupational safety, health and environmental protection are a firm component of our corporate culture and are integrated into all work processes from the outset.

We wish to strengthen job satisfaction and identification as well as maintain and promote employability.

Our employees are actively involved in the process of continuously improving our integrated management system in order to improve environmental protection, occupational health and safety.



Our plant

Waste incineration as an economical source of energy

Economical production conditions are of decisive importance today when it comes to having an advantage over competitors. Energy prices play a particular role here.

In the cement plant of CEMEX Zement GmbH, electricity costs make up a considerable part of the total production costs. In order to secure the CEMEX site over the long term, the company implemented a concept for an alternative and secure power supply by using the energy released from a waste incineration plant in the immediate vicinity of the site.

Through thermal recycling of waste, we guarantee a reliable supply of energy, especially for the cement plant of CEMEX Zement GmbH – one of the oldest and largest employers in the area – and also contribute to reliable waste disposal in the region.

Over and above this, the operation of the waste to energy plant also provides economic impulses for the region, preserves direct jobs, and safeguards indirect jobs through orders to companies located in the region.

How it works

Stockpiling:

The waste is stored on delivery in a 14,000 m³ fuel bunker. There it is mixed by crane, stacked in preparation for use and then fed for incineration as required. To avoid odour emissions, the air in the fuel bunker is extracted continuously and fed to the furnace of the boiler plant as combustion air. During plant downtimes, an alternative exhaust air cleaning system on the bunker roof, the so-called bunker standstill ventilation system, prevents emissions.

Incineration:

In the single-line plant, energy in the form of hot flue gases is released during incineration of the waste in the grate firing system. The combustion chamber is designed in such a way that the flue gas is kept at 850°C for at least two seconds. A special combustion control system ensures proper incineration even when the composition of the fuel changes. The parameters required for combustion control are measured and monitored continuously. The residues from the incineration process are discharged as bottom ash into a deslagger at the end of the grate and transported from there by vibrating conveyors to the slag bunker, where they are stored intermediately until they are removed by a disposal contractor. At the end of the boiler, the flue gases are passed on via a flue gas duct to the flue gas cleaning system.

Energy conversion:

The thermal energy released during the incineration of the waste is converted into electrical energy in a highly efficient process. The steam generator heats the feed water (fully demineralised water) to form steam in that the hot flue gases flow past the water-bearing boiler heating surfaces in the direction of flue gas cleaning. As the boiler heating surfaces are cleaned to ensure optimum heat transfer, boiler ash is produced for disposal. The thermal energy contained in the steam is converted into electricity in the turbine with downstream generator. Thanks to intermediate superheating of the steam, the IKW Rüdersdorf has a particularly high electrical efficiency compared to other waste incineration plants, thus making optimum use of the energy contained in the fuel. The exhaust steam from the turbine then condenses in an air condenser. The condensate is returned to the steam generator, where it is evaporated again.

Flue gas cleaning:

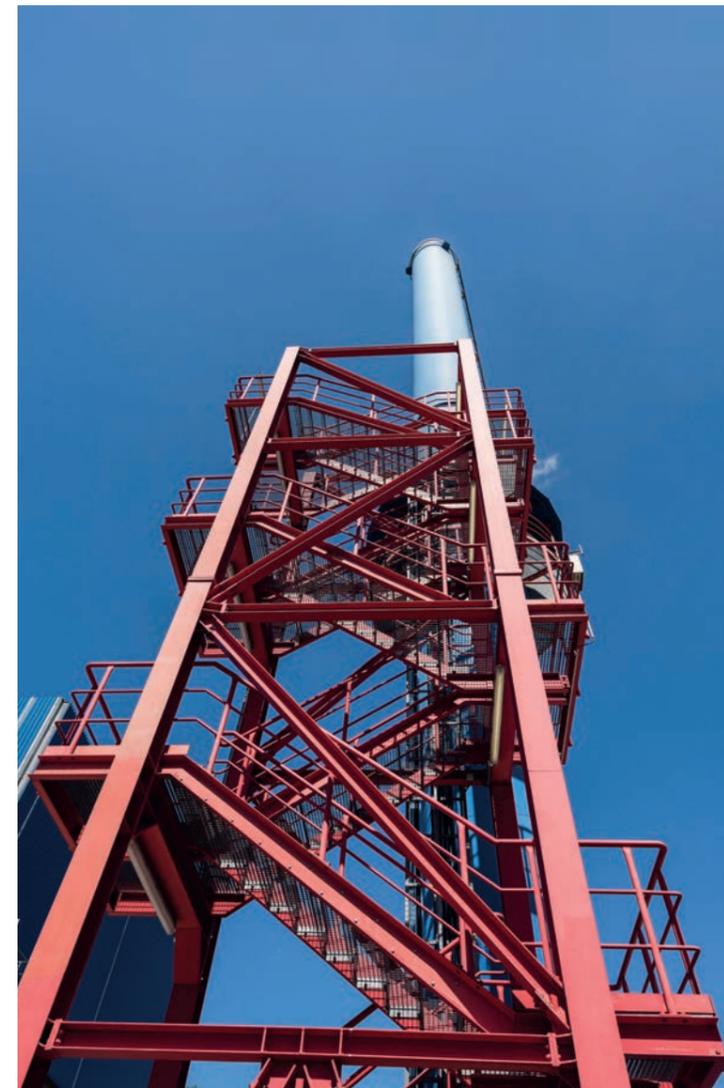
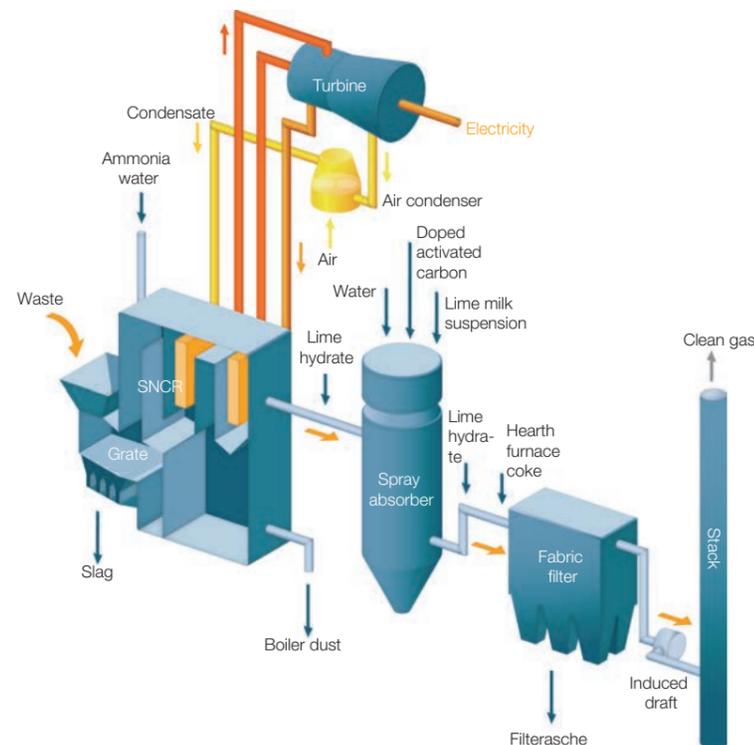
Cleaning of the flue gas already starts in the boiler thanks to an optimal combustion process. The flue gas is also denitrified there (NO reduction) through injection of ammonia water. A temperature field measurement and a combustion chamber camera were installed in the boiler to further control the reduction of the daily average NO value. In 2017, this plant technology was expanded elaborately and the control system further optimised and automated via the control technology.

The flue gas cooled in the steam generator is cleaned of pollutants in a multi-stage flue gas cleaning system. This process ensures that the strict legal and license limits are safely adhered to during plant operation. A quasi-dry process in which no wastewater is produced is used.

Behind the boiler outlet, lime hydrate is added to the flue gas before the spray absorber, lime milk in the spray absorber and lime hydrate and hearth furnace coke downstream of the spray absorber, all in dependence on the pollutant load, in order to bind the various pollutants in the flue gas. In 2015, additional technology was installed, such as mercury measurement in the raw gas, dosing of doped activated carbon in the case of unusual mercury peaks in the raw gas and the introduction of continuous long-term sampling of dioxins, furans and heavy metals.

The pollutants are separated together with the reactants and dusts by a fabric filter and disposed of as filter dust. The clean gas is discharged into the atmosphere through a 50 m high stack.

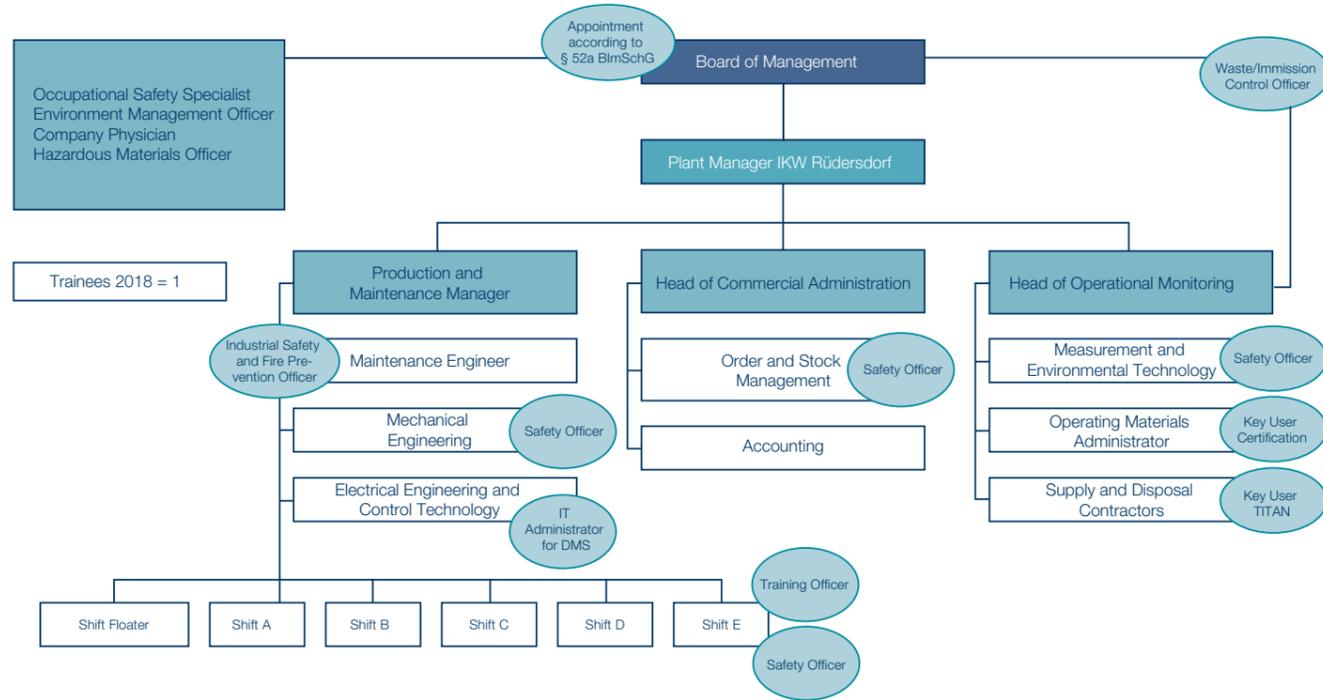
Compliance with the prescribed emission limits according to the German 17th Federal Immission Control Ordinance (BImSchV) and the approval notices is monitored by continuous and discontinuous emission measurements. The emission measuring points are regularly checked by an inspection body authorised in accordance with §§ 26, 28 of the German Federal Immission Control Act (BImSchG).



Key plant data

Fuel throughput	270,000 t/a
Furnace thermal capacity	
- Rated	110 MW
- Maximum	121 MW
Live steam mass flow rate	120.3 t/h
Live steam parameters	90 bar/400 °C
Electrical power output	
Power plant, net	approx. 30 MW _{el}
Clean gas volume flow rate	192,000 m ³ /h in norm, dry

They keep the plant running



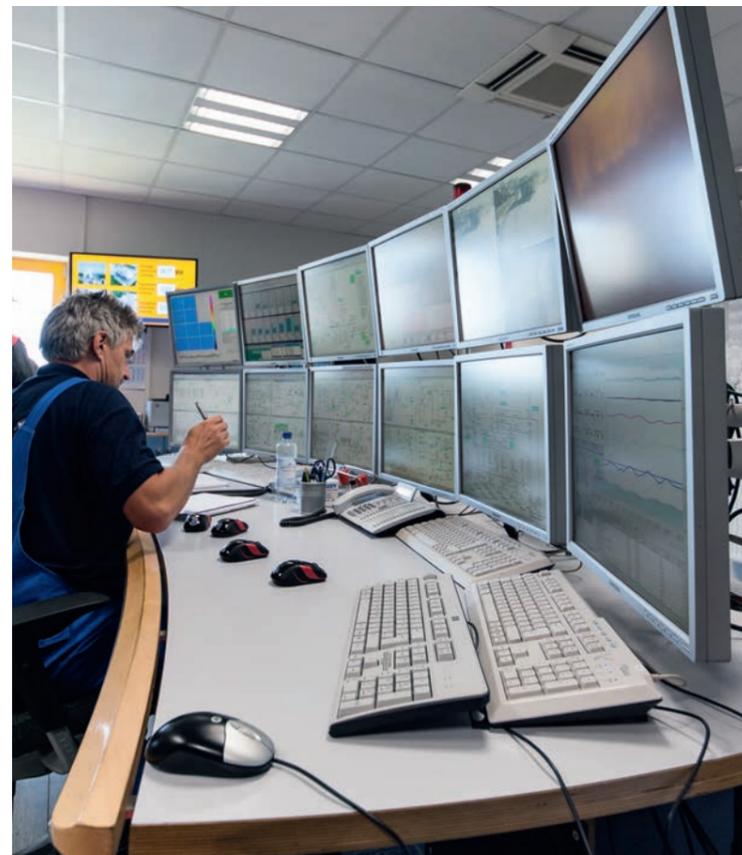
Our 45 qualified employees play a key role in the success of IKW Rüdersdorf GmbH. Most of them are long-term employees of the company and have the necessary expertise, skills and experience for their work. Our employees are properly and verifiably trained and instructed in accordance with operational requirements and statutory provisions. Extensive training and continuing education measures ensure their knowledge is always up to date. New employees are trained according to a fixed plan.

As a modern company, we operate a family-supporting personnel policy that enables our young employees to achieve a work-life balance.

The employees in our power plant are supported by internal and external specialists.

Various internal communication tools have been implemented at IKW Rüdersdorf. These include regular consultations, such as daily morning briefings, regular meetings in the individual departments, management meetings as well as committee and works council meetings.

The majority of our employees come from the immediate vicinity or from the Berlin-Brandenburg region. This also applies to our trainees.



Waste disposal and power generation

Our plant uses the energy contained in the waste to generate electricity. The quantity and quality of the waste delivered are of great importance in this.

The IKW Rüdersdorf currently uses waste with a calorific value of 6 to 18 MJ/kg. Lignite, by comparison, has a calorific value of around 8 to 10 MJ/kg, and hard coal around 20 MJ/kg. The average net electrical output of the power plant is around 30 MW, meaning that the plant achieves an unusually high electrical efficiency for waste to energy plants of approx. 30%.

The boiler efficiency of the IKW Rüdersdorf amounted to approx. 90% in the period under review. The resultant heat was used to generate electricity. An expert appraisal confirmed that, in accordance with § 3 of the German Closed Substance Cycle and Waste Management Act (KrWG) in conjunction with Annex 2, waste incineration at IKW Rüdersdorf is energy-efficient, complies with the R1 criterion and can be classified as recovery (2016: 0.83, 2017: 0.82, 2018: 0.74). An R1 factor of 0.65 is prescribed by law for classification as a recovery plant.

In the period under review, our boiler plant was in operation for a total of 7,750 hours by firing with waste. Plant operation was interrupted as planned for 38 days (plant overhaul) and unplanned for four days (plant cleaning, repairs, replacement of plant components).

The total quantity of electricity generated and the quantity of electricity fed into the grid fell by 2%, which, compared with the previous year, may be attributed to lower output due to maintenance work at CEMEX and the major turbine overhaul. Some 89% of the electricity required to operate the plant was generated by the company itself, of which around half was generated from renewable sources. Our own electricity requirement is comparable to 2016. Specific electricity consumption, based on the amount of waste incinerated, is at a comparable level (2016: 0.076 MWh/Mg, 2017: 0.072 MWh/Mg, 2018: 0.068 MWh/Mg).

It is necessary to draw electricity from the public grid during turbine or plant downtimes, e.g. inspections.



Electricity balance	Unit	2016	2017	2018
Electricity generation (gross), volume	MWh	251,188	241,521	236,639**
Electricity generation (gross), output	MW	32.40	32.46	33.1
Grid supply (net), volume	MWh	232,307	223,564	219,744**
Grid supply (net), output	MW	29.96	30.04	30.84
Own electricity requirements, volume (plant in operation)	MWh	18,881	17,957	16,895
of which electricity from renewables*	MWh	9,441	8,727	8,211
Own electricity requirement, output (plant in operation)	MW	2.44	2.41	2.37
Electricity from grid, volume (plant out of operation)	MWh	840	1,149	2,156**
of which electricity from renewables	MWh	3	3	6

* The biodegradable fraction in the waste is approx. 50% (calculated according to the ITAD specifications for registers of guarantees of origin).

** Major turbine overhaul in reporting year 2018

Ensuring an awareness for the environment and safety

Running a waste to energy plant has an impact on the environment, which should be minimised.

An environmental audit has been carried out annually since 2006 to determine the environmental impact of IKW Rüdersdorf's operations. Every audit has shown that the effects on the environment are low due to the technical concept of the IKW Rüdersdorf, in particular its use of state-of-the-art technology and ecological operation of the plant.

In addition to compliance with all relevant environmental regulations, the environmental management system also strives for continuous improvement of environmental performance and continuous optimisation of operational processes.

Occupational health and safety for all persons working at IKW Rüdersdorf are also of great importance. The management of IKW Rüdersdorf GmbH provides the necessary resources for this.

The suitability and effectiveness of the corporate policy are monitored through regular review and evaluation. The corporate policy and corporate goals and programs derived from it reflect the company's internal endeavour for continuous improvement of environmental performance and constant optimisation of standards, thereby encouraging environmentally conscious activity at all times.

In order to evaluate our environmental performance even better and make it comparable, we have introduced environmental indicators and supplemented them with the core indicators specified in EMAS III (see pages 28/29).

The pursuit of environmental awareness further necessitates the inclusion of suppliers and subcontractors, making it a cross-company challenge. Information and the sharing of experience play a key role in this.

The environmental impacts and environmental performance of plant operation for the reporting period January to December 2018 are examined below and compared with previous reporting periods. It is possible to compare plant operation in these periods.



Energy from waste: our input

In the reporting period, a total of 248,925 Mg of waste was accepted at the plant and 248,093 Mg of waste incinerated. Most of the waste delivered (87.9%) originates from the Berlin-Brandenburg region and small quantities from other federal states (11.8%) and abroad (0.3%).

The volume of waste accepted corresponds to 92% of the approved annual volume (270,000 Mg/a). Most of the waste was classified as "Other wastes (including material mixtures)", "Combustible wastes", "Mixed municipal wastes - commercial wastes" from households. Household waste accounts for 16.7% of total input and non-hazardous hospital waste for 1.5%.

When the waste is delivered, employees of IKW Rüdersdorf first carry out visual checks to ensure that the acceptance criteria are met and then regularly take samples from the waste in accordance with the stipulations in the permits for examination in an approved laboratory. A total of 610 samples were analysed in the period under review. In three cases, IKW Rüdersdorf had to reject deliveries after a visual inspection due to non-compliance with acceptance criteria. The respective waste producer and competent authority were informed accordingly.

In order to ensure that no radioactive materials in the waste enter the IKW Rüdersdorf, a radioactivity measurement system has been installed in the entrance area. Radioactive contamination can occur in waste if the deliveries contain undetected wrong binning of waste, e.g. from the medical sector. During the reporting period, the State Office for Occupational Safety, Consumer Protection and Health was informed 11 times about activation of the radioactivity measurement system. In all cases, the further procedure was coordinated and implemented in consultation with the expert for radiation protection and the competent authority.



Waste	Unit	2016	2017	2018
Total input	Mg	248,219	251,600	248,925
Incinerated waste	Mg	249,814	250,995	248,093

Operating materials: used with care

In order to keep the plant running, it is necessary to use various resources in addition to the waste as fuel.

Heating oil is used at times to ensure the necessary minimum combustion temperature during combustion in the boiler, e.g. during start-up processes. The law stipulates that the feeding of waste to the firing system of the boiler plant may only begin when a minimum temperature of 850°C has been reached. Similar regulations apply to the shutdown of the plant or other situations which could result in the temperature falling below 850°C. The pilot and auxiliary burners installed to this end with a total capacity of 72 MW are fired with heating oil. The plant is further equipped with a heating oil-fired hot water boiler for building heating, which, however, only runs when waste incineration is down.

Heating oil consumption for start-up and shut-down processes/auxiliary firing has fallen by 35%, which can be attributed to the low number of start-up and shutdown processes required, in particular to the lower number of unplanned plant shutdowns compared to 2017.

The consumption of heating oil for operation of the hot water boiler system during plant shutdowns and the use of fan heaters for heating during overhauls fell by 62%. This can be explained by postponement of the overhaul to the warmer period of the year (see also page 32).

Diesel consumption dropped by 6% over 2017, due to lower bale volumes and reduced use of wheel loaders as a result.

Operational losses of boiler water due to sludge removal and desalination of the boiler necessitate regular production of demineralised water (deionised water) from drinking water. A smaller part of the drinking water requirement is accounted for by office use and sanitary facilities. The consumption of drinking water for the production of demineralised water rose by 16% from 07/2017 due to the increased number of filling processes of the boiler during the overhaul and the use of demineralised water as a carrier medium for NH water injection. The consumption for the sanitary facilities is at a comparable level.

Groundwater was used for the production of lime milk for flue gas cleaning, the cleaning of outdoor facilities and silo vehicles as well as for the irrigation of green areas. The consumption of groundwater for the production of lime milk remained almost the same.

Various resources are used for flue gas cleaning. A defined quantity of lime milk (from quicklime), lime hydrate, hearth furnace coke and ammonia water is injected into the flue gas, controlled by the process control technology, in order to bind the pollutants of the flue gas.

Hydrochloric acid and caustic soda are required for conditioning of the feed water needed for the boiler plant. With these additives, the drinking water is treated in such a way that it meets the physical and chemical requirements for feed water for steam boiler operation.

The consumption of operating materials, in particular for flue gas cleaning, must be seen in direct relationship with the amount of waste incinerated, the pollutant contents in the waste and the applicable limit values for air pollutants. The level of consumption of operating resources for flue gas cleaning achieved in 2017 could essentially be maintained in 2018, taking into account the operating hours, with fluctuations in the individual operating resources being attributable to the composition of the waste and the different throughput quantities. For detailed explanations, see page 29.

Consumption of operating materials	Unit	2016	2017	2018
Quicklime	Mg	4,193	3,798	3,717
Lime hydrate	Mg	406	225	311
Hearth furnace coke	Mg	100	144	165
Ammonia water	Mg	634	750	705
Hydrochloric acid	Mg	15	27	47
Caustic soda	Mg	7	12	26

Consumption of fossil fuels	Unit	2016	2017	2018
Heating oil EL total	m ³	239	530	344
Heating oil EL for start-up and shutdown processes, auxiliary firing	m ³	215	509	336
Heating oil EL for building heating and fans	m ³	23	21	8
Diesel	l	4,505	5,273	4,963

Water consumption	Unit	2016	2017	2018
Drinking water	m ³	11,686	20,146	23,314
Service water	m ³	18,554	0	0
Groundwater	m ³	35,799	44,582	45,106
Total	m ³	66,039	64,728	68,420



Waste: reduction through concentration

Incineration of the waste produces typical residues of waste incineration such as bottom ash, boiler ash and filter dust from flue gas cleaning. During cleaning of the boiler and the residue silos, so-called abrasive waste and solid waste from flue gas treatment are produced.

Further operational waste is generated through operation of our workshop, during scheduled inspections and in the office area. All waste generated was disposed of properly.

Typical residues of waste incineration	Unit	2016	2017	2018	Disposal 2017
190111* Bottom ash	Mg	27,914	57,864	20,250	100% disposal
190112 Bottom ash	Mg	27,544	0	35,874	100% recovery
190113* Filter dust	Mg	11,062	10,353	10,634	100% recovery
120106* Waste blasting material	Mg	146	32	182	100% disposal
190115* Filter ash	Mg	2,475	2,726	2,873	100% recovery
190107* Solid waste from flue gas treatment	Mg	15	246	244	100% disposal
TOTAL	Mg	69,155	71,221	70,057	70% recovery 30% disposal

In addition, the following total quantities of operational waste were generated:

Operational waste	Unit	2016	2017	2018
Waste that is not hazardous waste according to AVV*	Mg	114	156	147
Waste that is hazardous waste according to AVV*	Mg	10	11	1

* Ordinance on the European List of Waste (Abfallverzeichnisverordnung – AVV)

In general, the amount of waste typical of incineration depends on the waste throughput, the composition of the waste, the amount of pollutants in the waste and the consumption of operating materials for flue gas cleaning. Overall, the amount of waste typical of incineration fell by 2% due to the lower throughput.

The amount of bottom ash rose by 4%. The total amount of hazardous and non-hazardous bottom ash remained constant compared to 2017.

However, it should be noted that in 2017 only hazardous slag was produced and in 2018 64% non-hazardous and 36% hazardous slag as waste.

The reason for this is that, on acceptance of the household waste, the resultant bottom ash was initially classified as hazardous waste and, following the decision of the State Office for the Environment of 25 April 2018, then as non-hazardous waste.

The amount of filter dust produced increased by 3% and the amount of boiler ash by 5%, which is mainly due to the higher raw gas loads and the higher output.

In particular, the production of scrap and aqueous liquid waste (tank cleaning) led to an 11% reduction in operational waste.

Wastewater: wastewater-free operation

Wastewater is produced in the office and sanitary areas. No further wastewater was produced in the reporting period, as the process water is recirculated.

The amount of sanitary wastewater was reduced by 7%.

Wastewater volume	Unit	2016	2017	2018
Sanitary wastewater	m ³	485	483	451

Flora and fauna: preserving habitats

Flora and fauna were inevitably influenced by the construction of the plant on the premises of the IKW Rüdersdorf. The buildings and traffic areas constructed sealed an area of approx. 15,500 m². It should be noted that the site had already been used commercially before the construction of the facility and had already been partially sealed. An environmental impact study carried out as part of the approval procedure came to the conclusion that the impact of land usage can be considered minor.

To compensate for the sealing, all undeveloped land areas were greened and planted with trees and shrubs in consultation with the competent authorities.



Emissions of air pollutants: as low as possible

Waste incineration will only find acceptance if it can be shown that the approved emission limit values for air pollutants are safely complied with. In the Federal Republic of Germany, the 17th Federal Immission Control Ordinance (17th BImSchV) imposes the strictest requirements by global standards. The mode of operation of our flue gas cleaning system is described on pages 6 and 7. Compliance with the emission limits for air pollutants specified in the licence is monitored by continuous and discontinuous measurements.

In a settlement and location agreement with the municipality of Rüdersdorf dated 24.08.2006, IKW Rüdersdorf GmbH undertook to reduce the annual mass flows of air pollutants, which are compared in the following table with the actual annual mass flows emitted.

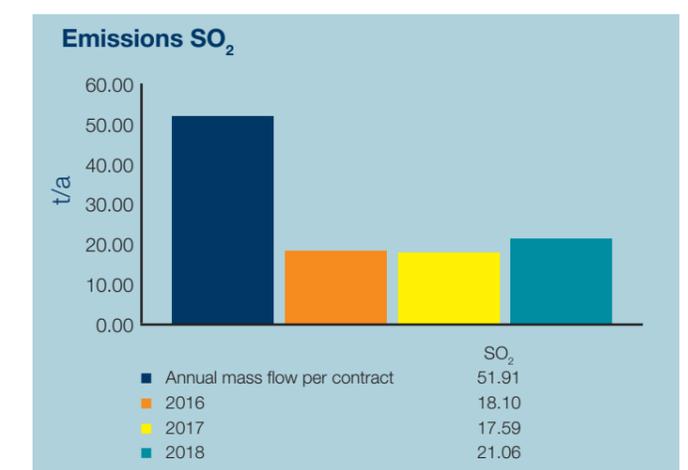
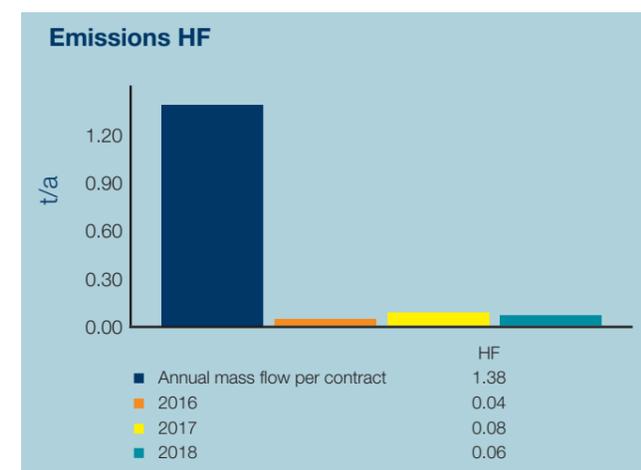
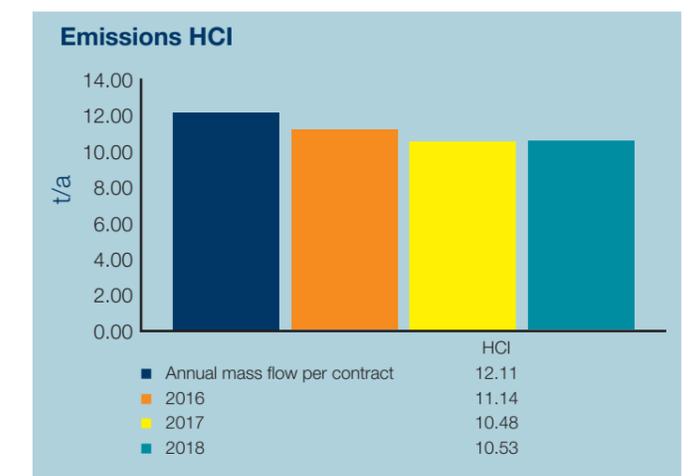
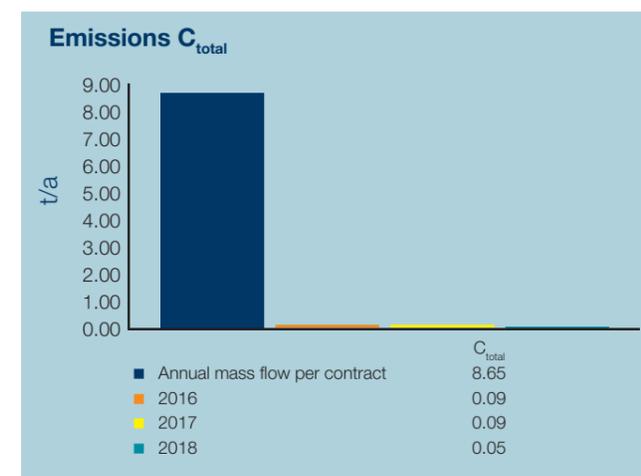
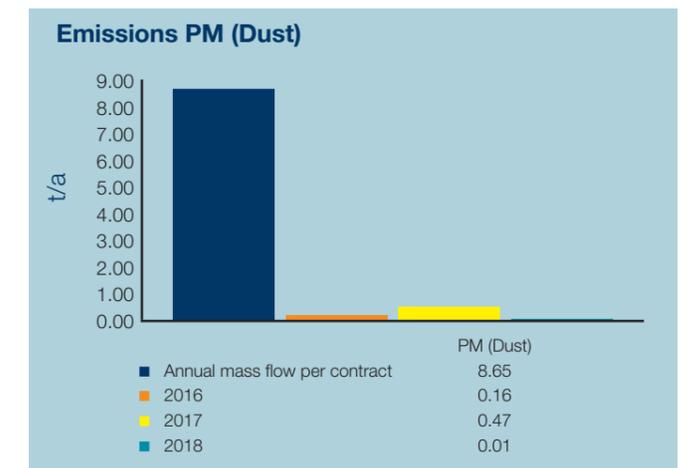
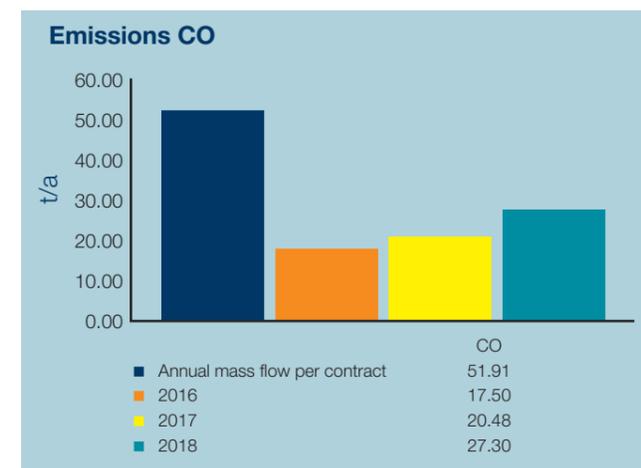
The fluctuations in the total emissions of the air pollutants listed must be seen in direct connection with the composition of the waste and are explained by same.

Air pollutant	Unit	Annual mass flow per contract*	2016	2017	2018
CO	t/a	51.91	17.50	20.49	27.30
PM (dust)	t/a	8.65	0.16	0.47	0.013
C _{total}	t/a	8.65	0.09	0.09	0.050
HCl	t/a	12.11	11.14	10.48	10.53
HF	t/a	1.38	0.04	0.08	0.058
SO ₂	t/a	51.91	18.10	17.59	21.06
NO _x	t/a	259.53	169.35	151.29	135.17
Hg	kg/a	15.60	1.54	0.49	1.018
Sum Cd, Tl	kg/a	26.00	3.01	2.53	2.58
Sum Sb...Sn	kg/a	260.00	89.83	68.10	70.84
Sum As, Co, Cr, Cd, BaP	kg/a	69.00	14.56	12.65	7.42
PCDD/F	g/a	0.052	0.0064	0.0052	0.00147

* Taking the adaptation clause into account

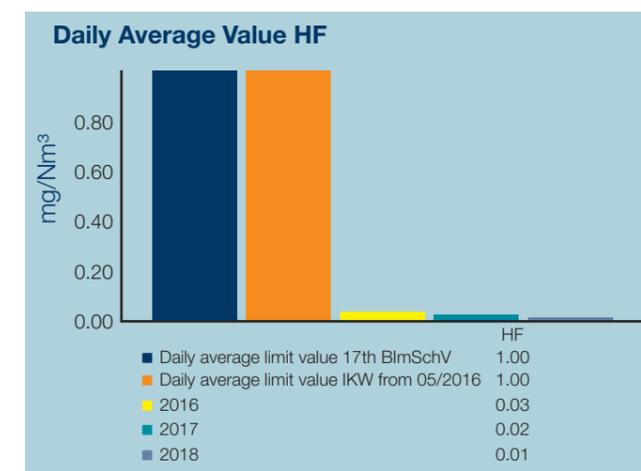
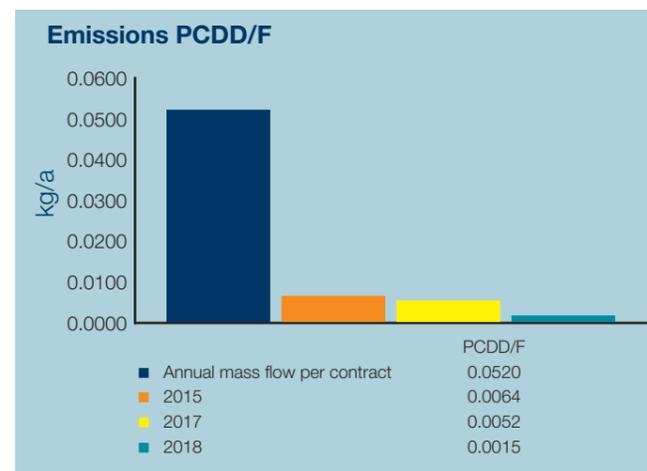
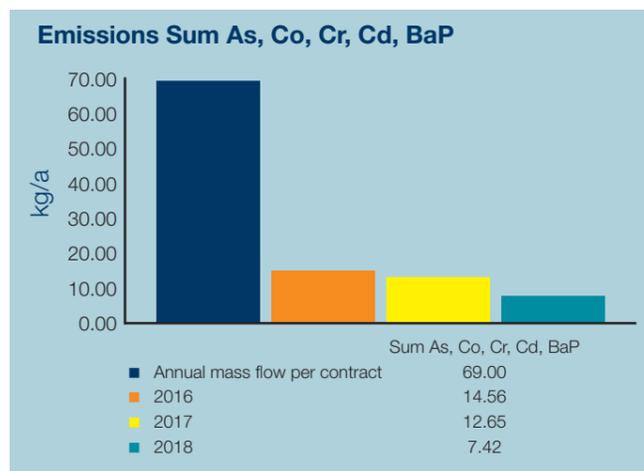
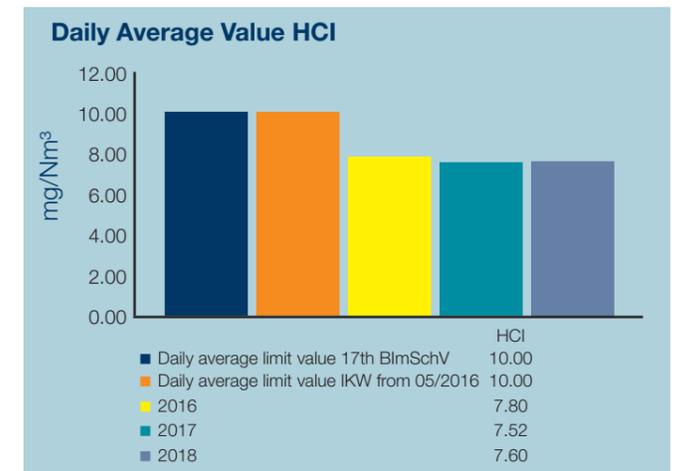
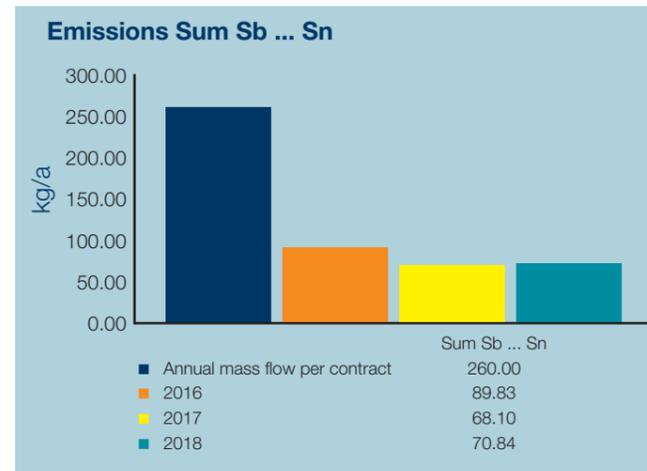
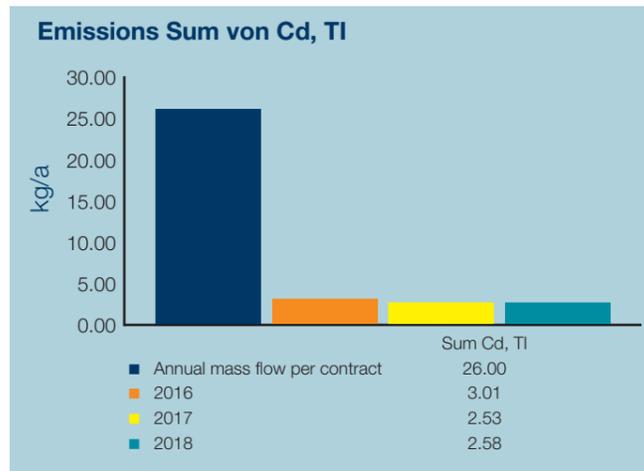
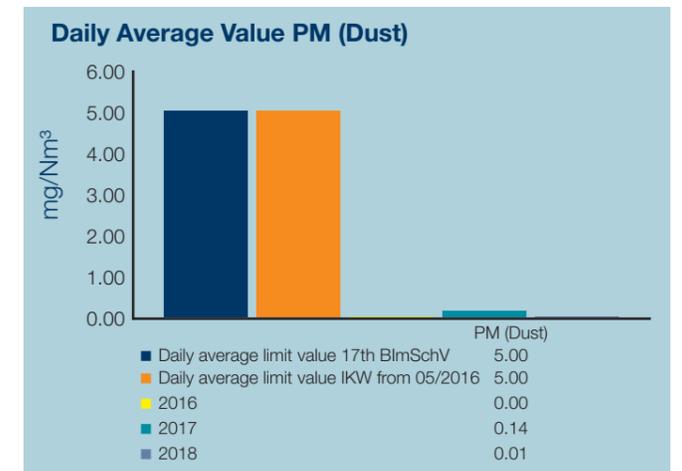
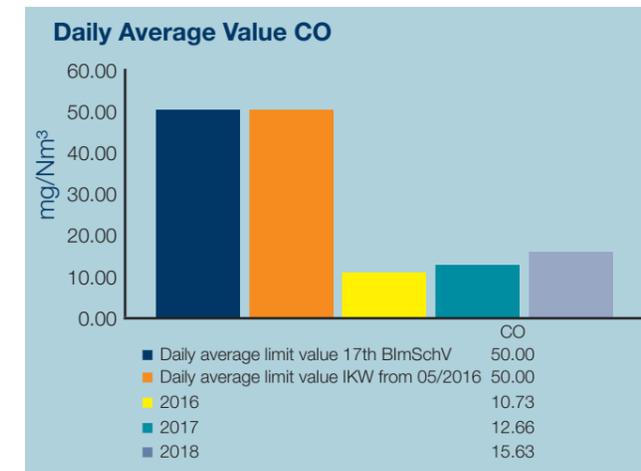
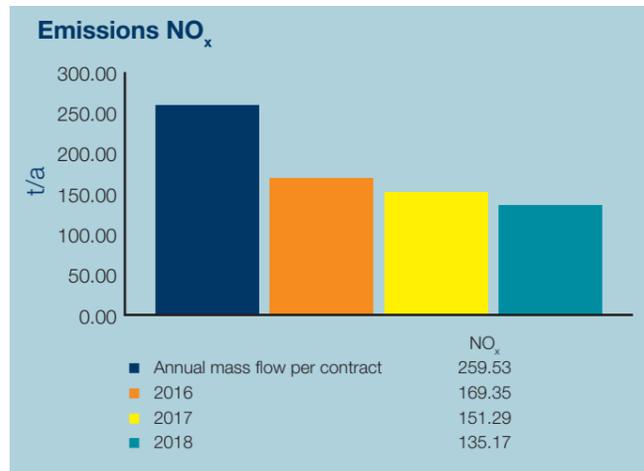
A comparison of the actual annual air pollutant loads emitted with the contractually agreed ones shows that the annual loads in the reporting periods are significantly lower than the annual loads agreed with the municipality of Rüdersdorf. Detailed explanations are given on the following pages.

We have a keen interest in transparency and publish the half-hourly and daily average values of airborne emissions continuously on our homepage www.ikw-ruedersdorf.de. Due to a system migration from Vattenfall to STEAG, the data link had to be rebuilt at the beginning of 2018. As a result, the publication of the emission values was interrupted for several weeks.



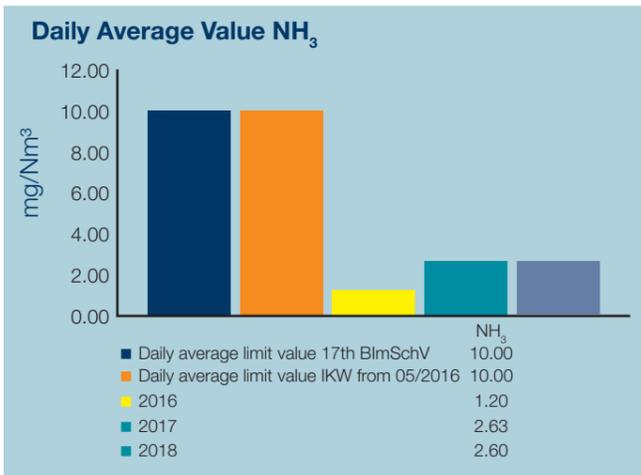
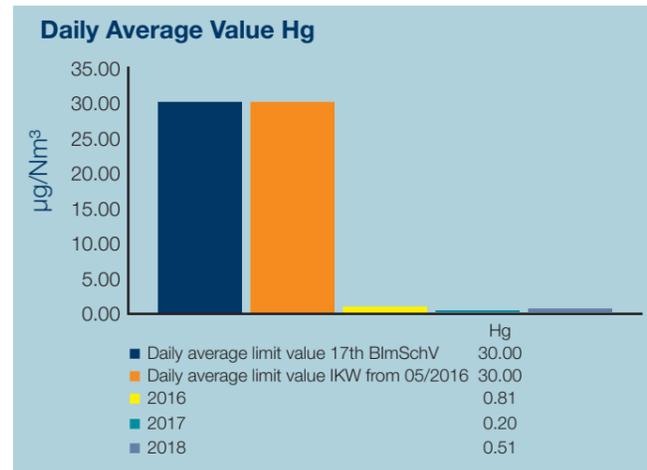
The continuous measurement of the air pollutants in the cleaned flue gas is used for permanent monitoring of CO,

PM (dust), C_{total} , HCl, HF, SO_2 , NO_x , Hg, NH_3 . The results are as follows:



The pollutant loads of dioxins, furans and heavy metals are calculated from the average values of the discontinuous

measurements multiplied by the mean volume flow and operating hours.



The pollutant load and concentration of mercury increased slightly in 2018 over 2017. However, the pollutant load was lower than in 2016.

The annual average value of NH₃ is at a comparable level.

The annual loads and concentrations for heavy metals are comparable to the previous year. By contrast, dioxins/furans fell sharply and are at a very low level.

The functional test and calibration of the emission measurement technology for the continuous measurement of air pollutants to be carried out in accordance with the applicable permits is carried out regularly by an inspection body authorised in accordance with §§ 26, 28 of the German Federal Immission Control Act (BImSchG). The competent authority is to be informed immediately of any failure of measuring equipment for the continuous measurement of air pollutants and of any infringements of limit values. In the reporting period, the IKW Rüdersdorf informed the State Office for the Environment of three infringements (1x HCL, 1x CO, 1x NH₃) of the daily average values and 23 infringements of the half-hour average values (1 x dust, 6 x CO, 8 x NH₃, 3 x C_{total}, 5 x SO₂).

The limit values were exceeded as a result of plant malfunctions, boiler shutdowns/start-ups, excessive pollutant loads in the waste and deposits in the sample gas line after maintenance work.

The plant personnel do their utmost to avoid violations of the limit values.

The results of the measurements show that the values are below the specified limits.

The annual mass flow and average value for CO are above the previous year's values. The CO value cannot be controlled by control technology. The plant operators are instructed to adapt plant operation (grate speed, air flow) to the fluctuations in the calorific value of the waste in order to ensure compliance with the limit value.

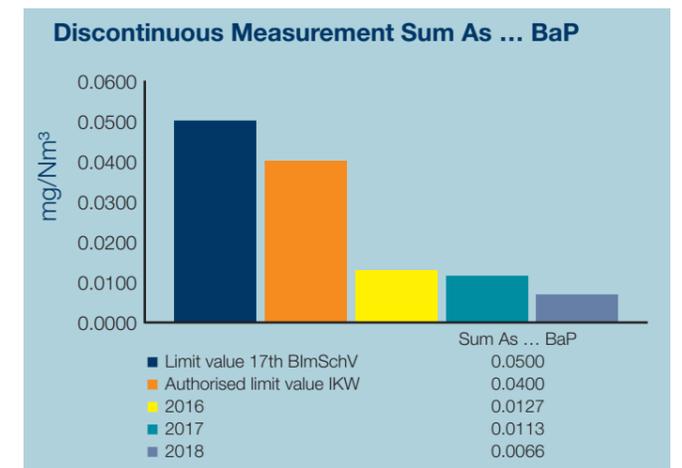
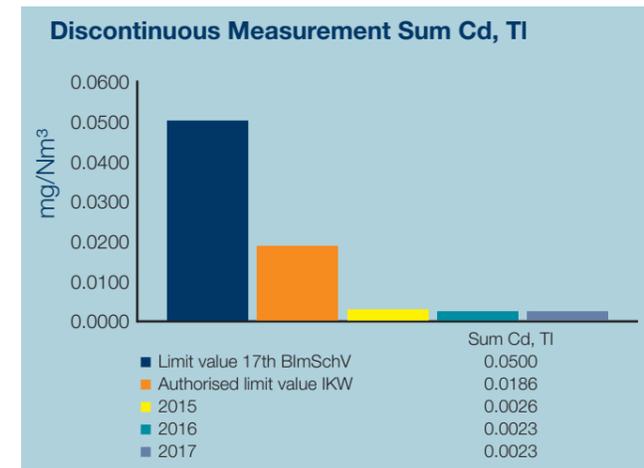
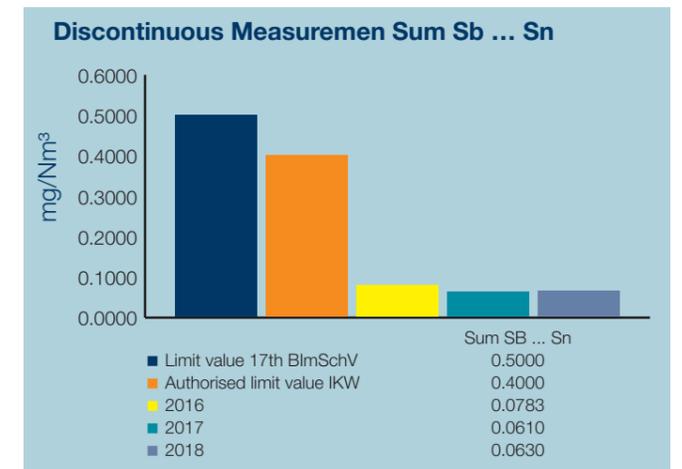
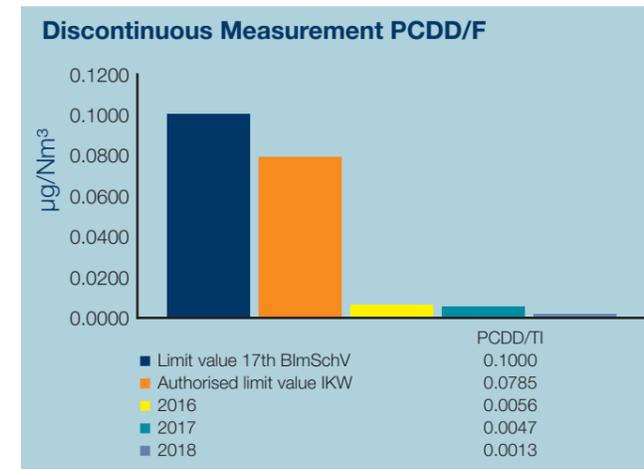
The dust values are at a very low level.

The annual mass flows and average values for C_{total}, HCl, HF, SO₂ are within a comparable range.

In 2018, the annual mass flow and average value for NO were again significantly reduced by the voluntary reduction in the daily average value for NO to 120 mg/Nm³ following the modernisation of the SNCR plant in July 2017.

Dioxins, furans and heavy metals are measured discontinuously and additionally continuously.

Air pollutants	Unit	Limit value 17th BImSchV	Authorised limit value IKW Rüdersdorf	Average discontinuous measurement			Average long-term sampling		
				2016	2017	2018	2016	2017	2018
PCDD/F	ng/Nm ³	0.1	0.0785	0.0056	0.0047	0.0013	0.00291	0.002018	0.00105
Sum Sb...Sn	mg/Nm ³	0.5	0.4	0.0738	0.061	0.0630	0.0007428	0.0008217	0.00231
Sum Cd, Tl	mg/Nm ³	0.05	0.0186	0.0026	0.023	0.0023	0.0000096	0.0000134	0.00001
Sum As...BaP	mg/Nm ³	0.05	0.04	0.0127	0.0113	0.0066	-	-	-



The results of the discontinuous measurements show that the limit values are clearly undercut.

In order to corroborate the results of the discontinuous measurements, a continuous long-term sampling programme was implemented. The values from the long-term sampling programme are well below the authorised limit values.

The results of the discontinuous measurements were displayed publicly in October/November 2018 for four weeks in the town hall of the municipality of Rüdersdorf.

Greenhouse gas emissions

According to the classification under § 2 of the German Greenhouse Gas Emissions Trading Act (TEHG), the IKW Rüdersdorf is not subject to greenhouse gas emissions trading. Similarly, the hot water boiler system fired with heating oil, which is used for hot water supply and building heating when the incineration plant is shut down, also does not fall within the scope of the TEHG. Thus, according to § 1 TEHG,

the IKW Rüdersdorf does not carry out any activities that emit greenhouse gases to a particular extent.

Irrespective of the TEHG, CO₂ emissions must be registered in other registers, resulting in the following CO₂ emissions for the last three reporting periods:

Greenhouse gas	Unit	2016	2017	2018
CO ₂	Mg CO ₂ -equivalent	302,255.22	283,636.80	279,815.7
of which CO ₂ (climate-relevant)*	Mg CO ₂ -equivalent	153,888.90	145,779.00	145,028.5
of which CO ₂ (climate-neutral)	Mg CO ₂ -equivalent	148,336.32	137,857.80	134,787.2

* Calculated according to ITAD specifications for registers of guarantees of origin

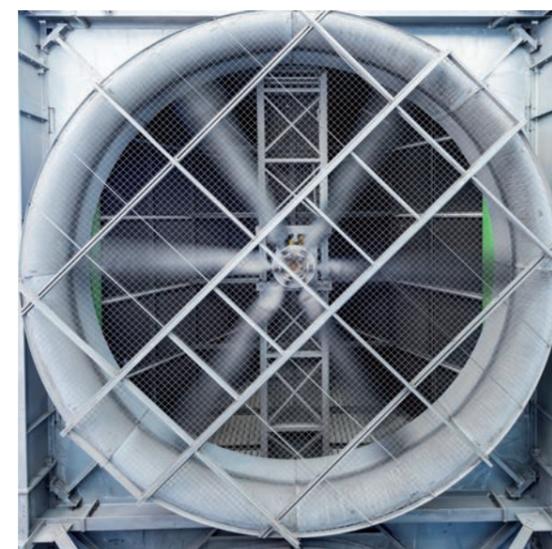
The slightly lower figures for 2018 result from the slightly lower throughput.

Further greenhouse gases such as CH₄, N₂O, hydrofluorocarbonate, perfluorocarbonate and SF₆ do not arise in the incineration of waste.

Emissions from heat and exhaust steam

The thermal energy contained in the steam is converted into electricity in the turbine with downstream generator. The exhaust steam leaving the turbine no longer contains any usable energy and is cooled down to condensation in the air condenser using air. The resultant condensate is returned to the steam generator, where it is evaporated again. The heat released during the condensation of the steam in the air condenser is released into the atmosphere.

avoidance of emissions by heat. However, we are working on solutions for use of the waste heat (supply of district heating to Rüdersdorf) in order to contribute to a reduction in emissions by heat.



Heat is also released into the environment by the purified exhaust gas, since the outlet temperature at the stack is approx. 135°C.

Further heat is released into the atmosphere through the entire operation of the plant, including the heating of all work and social rooms.

For physical reasons, the technology of waste incineration plants and power plants does not permit the complete

Noise emissions

According to the modification permit of 12.05.2016, measurements of noise immissions must be carried out at the earliest 3 and at the latest 12 months after commissioning of the modified plant and every three years thereafter. The noise measurements carried out on 21.09.2017 and 20.09.2018 showed that the permissible total noise immissions at the officially specified substitute measuring points for the night period are undercut. Due to the continuous operation of the plant, the night period at full load with its much stricter requirements was chosen for consideration.





Traffic volume: high demands on logistics

In order to run the plant as intended, it is necessary to receive deliveries of the necessary waste and operating materials as well as to remove the operational waste (filter dust, slag, etc.). This work is performed by contracted suppliers and transport companies.

the direct delivery of waste from the district of Märkisch-Oderland from an average of 55 trucks per day in 2017 to 60 trucks per day in 2018, as the capacity of the collection vehicles is lower than that of other delivery vehicles.

The volume of traffic for delivery of operating materials and removal of operational waste has remained constant. The delivery of waste, on the other hand, has increased due to

The results of the weighing of the waste deliveries show that the permissible loading capacities of the trucks are well utilised at an average of 20 Mg.

Truck traffic	Unit	2015	2016	2017
Delivery of waste	Trucks/d	Avg. 44 *	Avg. 53 *	Avg. 55 *
Delivery of operating materials	Trucks/d	Avg. 1 *	Avg. 1 *	Avg. 1 *
Removal of operational waste	Trucks/d	Avg. 8 *	Avg. 11 *	Avg. 11 *

*based on working days per month without Saturday

Influence of hazardous substances on soil and water

Some of the operating materials used in the operation of the IKW Rüdersdorf as well as the boiler ash and filter dust produced during the incineration of the waste are classified as hazardous substances within the meaning of the German Hazardous Substances Ordinance and/or as substances hazardous to water in accordance with the German Water Resources Act because of their hazardous properties. Special safety regulations must be observed when handling these substances. In order to protect soil and water from being influenced by these substances, storage facilities and ground sealing must meet special requirements.

In accordance with the modification permit notice of 12.05.2016, a concept for monitoring the measures to protect soil and groundwater was drawn up, and approved by the competent authorities. The hydrogeological report prepared for the monitoring concept comes to the conclusion that groundwater investigations at the plant site can be dispensed with. In order to obtain an idea of the current state of the soil and to determine whether there are indications of soil contamination with relevant hazardous substances on the plant site, the monitoring concept provides for soil sampling at a reference point. The soil was sampled on 24.11.2017. The analysis results showed no abnormalities.

The IKW Rüdersdorf has taken all necessary structural measures to prevent the penetration of hazardous substances into the soil or water.

The employees who work on these systems are regularly trained in the handling of hazardous substances and in the handling of the systems.

The functional safety of the facilities is monitored continuously via our process control system. In addition, our employees regularly check the functional safety of these systems and their safety equipment on site.

In order to ensure that the plant parts containing hazardous substances are always in good condition, we have contracted specialist companies to maintain and inspect these plant parts at the prescribed intervals.



Incidents, accidents: quick and effective response

Comprehensive measures for safety, health and environmental protection have been defined and implemented at IKW Rüdersdorf. These are reviewed regularly. In order to manage the issues of occupational health and safety even better, we have introduced an occupational health and safety management system. There were no reportable accidents in the reporting period. We have therefore been working accident-free since April 2011 (date of the last reportable work accident).

Contracts for regular monitoring of plant components subject to mandatory inspection have been concluded with authorised consultants/experts and technical inspection organisations.

We have defined maintenance and servicing plans for the ongoing monitoring activities by IKW Rüdersdorf employees, which are implemented in day-to-day operations.

Operational disruptions can trigger unwanted impacts on the environment. To keep these as low as possible, we have analysed potential operating states that could lead to serious operational disruptions and defined a course of action.

During the reporting period, there were unplanned plant shutdowns totalling 4 days due to necessary plant cleaning, repairs and replacement of plant components.

In general, every incident is analysed in order to avoid it in the future or to quickly and safely take the right action and prevent its impact on the environment.



Practices of service providers and contractors: environmental protection does not stop at the plant gates

In accordance with our corporate policy, we take the environmental practices of our suppliers, contractors and business partners into account when selecting them. Only in this way can we ensure that all aspects of the environmental impact associated with the operation of our plant are included in the pursuit of continuous improvement.

For services at IKW Rüdersdorf that cannot be performed by our own employees, we give preference to local companies. It is stipulated contractually that a material flow management company in the Vattenfall Group will continue to select suppliers of waste and operating materials as well as transporters and disposal facility operators for the disposal of operational waste.

The material flow management company checks the reliability of the contracted disposal facilities and waste transporters in accordance with its own regulations for the selection and monitoring of disposal facilities and waste transporters. The waste disposal facilities used and the transporters contracted to dispose of the operational waste generated at IKW Rüdersdorf have set up operational systems to comply with legal requirements and operate in accordance with certified management systems.

Our energy partner CEMEX Zement GmbH has been active in the field of environmental protection for many years. As early as 2000, the Rüdersdorf cement plant was the first cement plant in Germany to be certified in accordance with the Eco-Management and Audit Scheme Regulation. In them we thus have a strong partner by our side.

Our environmental performance at a glance

Our environmental performance is summarised below:

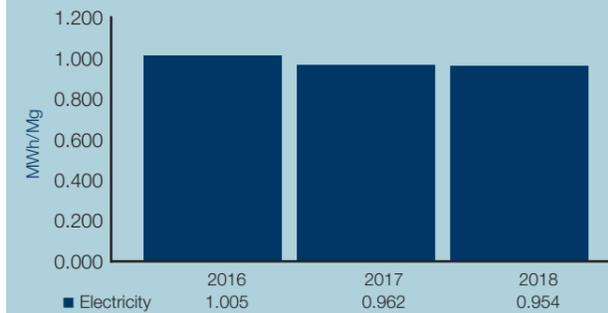
Indikator	Unit	2016	2017	2018
Average electrical energy recovered (MWh) related to incinerated waste (Mg)				
Electricity (based on total gross electricity volume)	MWh/Mg waste	1.005	0.962	0.954
Average consumption of operating materials (kg) related to incinerated waste (Mg)				
Quicklime (CaO)	kg/Mg waste	16.79	15.13	14.98
Lime hydrate (Ca(OH) ₂)	kg/Mg waste	1.62	0.90	1.25
Hearth furnace coke (HFC)	kg/Mg waste	0.40	0.57	0.67
Ammonia water (NH ₄ OH)	kg/Mg waste	0.86	2.03	1.35
Heating oil (total)	l/Mg waste	0.86	2.03	1.35
Average proportion of residues (kg) related to incinerated waste (Mg)				
Bottom ash	kg/Mg waste	222.00	230.54	226.22
Total filter dust	kg/Mg waste	44.86	41.38	43.79
Total boiler ash	kg/Mg waste	9.97	11.84	11.56
Energy				
Total direct energy consumption ¹	%	8.489	8.546	8.670
Total consumption of renewable energies ¹	%	4.065	3.905	3.706
Materials				
Consumption of waste ¹	Mg/MWh	1.068	1.125	1.145
Consumption of quicklime ¹	Mg/MWh	0.018	0.017	0.017
Consumption of lime hydrate ¹	Mg/MWh	0.002	0.001	0.001
Consumption of hearth furnace coke ¹	Mg/MWh	0.0004	0.0006	0.0008
Consumption of ammonia water ¹	Mg/MWh	0.003	0.003	0.003
Consumption of heating oil ¹ (total)	m ³ /MWh	0.001	0.002	0.001
Consumption of diesel ¹	l/MWh	0.019	0.024	0.023
Water				
Total water consumption ¹	m ³ /MWh	0.284	0.290	0.311
Waste				
Total generation of waste ¹	Mg/MWh	0.298	0.319	0.319
Total generation of hazardous waste ^{1,2}	Mg/MWh	0.179	0.319	0.155
Land use related to biodiversity				
Land use ¹	m ² /MWh	0.065	0.068	0.069
Emissions				
Total emissions of CO ₂ ¹	Mg CO ₂ -equivalent/MWh	1.301	1.269	1.273
Total emissions of SO ₂ ¹	kg/MWh	0.0779	0.0787	0.0958
Total emissions of NO _x ¹	kg/MWh	0.7290	0.6767	0.6884
Total emissions of dust ¹	kg/MWh	0.0007	0.0021	0.0021

¹ Related to quantity of electricity fed into the grid

² According to the Ordinance on the European List of Waste (Abfallverzeichnisverordnung - AVV)

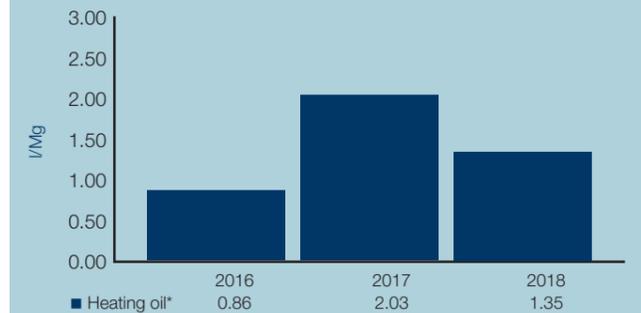
The environmental indicators defined for the IKW Rüdersdorf for evaluation of environmental performance developed as follows:

Average Electrical Energy Generated



Thanks to stable turbine operation, the amount of electricity generated per tonne of incinerated waste could be kept at an almost constant level. As an internal benchmark, approximately 1 MWh of electricity is generated from 1 Mg of incinerated waste. The slight reduction is due to restrictions resulting from work on the transformer plant of CEMEX Zement GmbH.

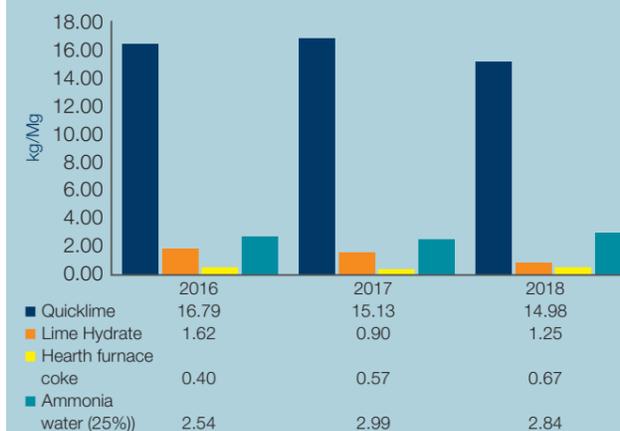
Specific Heating Oil Consumption



*Start-up and shutdown processes

Compared to the previous year, specific heating oil consumption per tonne of incinerated waste was reduced by 33%. This can be attributed to the higher unplanned downtimes in 2017 and the postponement of the overhaul to the Sumr.

Specific Operating Materials Consumption



In general, the quality and composition of the pollutants in the waste determines the consumption of operating materials for flue gas cleaning. Due to lower pollutant loads as a result of a higher household waste fraction, the specific consumption of quicklime and lime hydrate dropped. The rise in the specific consumption of hearth furnace coke resulted from the increase in the basic dosage from 5% to 8% in order to reduce the pollutant loads from mercury further. The reduction in the NO_x target from 150 mg/Nm³ to 120 mg/Nm³ in the year 2017 led to an increased specific consumption of ammonia water.

Specific Incidence of Typical Incineration Waste



The specific incidence of typical incineration waste depends on the proportion of non-combustible components in the waste as well as on the quality and pollutant composition of the waste and the associated use of operating materials for flue gas cleaning. The specific incidence of typical incineration waste is comparable with previous years.

Management system: organising success

WWe permanently adhere to the high standards of occupational safety, health protection and environmental compatibility. For this purpose, we have introduced a management system that is practiced and developed further continuously, taking into account the requirements of environmental protection, occupational health and safety.

In order to ensure that legal, official and internal company requirements are met, we have clearly defined personnel responsibilities and organisational processes. The Board of Management bears overall responsibility for IKW Rüdersdorf GmbH. It has delegated key management tasks to the plant management and, especially in the area of environmental protection, to the Head of Operational Monitoring. An Environment Management Officer has also been appointed. This officer supports the Board of Management and plant management in the implementation, ongoing development and documentation of the environmental management system. The environmental protection, industrial safety and safety officers required by law have been appointed.

All our employees are actively involved in the environmental protection activities of IKW Rüdersdorf GmbH. The company organisation, the company-specific process organisation of operational processes and their interaction as well as the responsibilities with the aim of proper management are defined as binding in our organisation manual. It also contains definitions of measures to ensure compliance with legal requirements and to avoid liability risks resulting from organisational deficiencies. We have introduced and implemented legal monitoring and approval management to ensure compliance with applicable legal obligations and their regular evaluation. Through internal audits and examination of our operations, we ensure that the management system is regularly reviewed

and evaluated with regard to its effectiveness, the achievement of and compliance with objectives, compliance with the structural and procedural organisation and the implementation of corrective measures in the event of variances.

IKW Rüdersdorf GmbH (Rüdersdorf site) was awarded further certifications. These certifications confirm that

- the legal, official and other requirements according to the Ordinance on Specialised Waste Management Companies are met (Efb certification) and
- the requirements for systematic and effective occupational health and safety have been verified (AMS certification).



In dialogue with the public

Our company is committed to an open dialogue on the environmental impact of its business activities, operations and products. The annual publication of the environmental statement is only one part of this external dialogue.

We constantly strive to create an understanding through direct contact with authorities, residents and interested third parties. On 14.04.2018, we held our 3rd Open Day in conjunction with our celebration of the 10th anniversary of IKW Rüdersdorf. The number of visitors has developed as follows:

Year	2016	2017	2018
Visitors, pupils, associations, companies, etc.	395	303	653

We regularly hold discussions with representatives of the municipality of Rüdersdorf. Further, we maintain intensive contacts with the competent authorities. The representatives of the authorities have the possibility to visit our plant and to enter into technical discussions with us at any time. The same openness is also available to residents and interested third parties. In recent months, we have welcomed a large number of representatives of the authorities, schoolchildren, students and specialist personnel from other areas of waste management. Written and telephone enquiries were also received from citizens, which we were able to answer personally or in writing.

It is our goal to continue this dialogue intensively in the future. IKW Rüdersdorf GmbH is also a participant in the Brandenburg Environmental Partnership and a member of the Environmental Committee and the Regional Committee of the East Brandenburg Chamber of Industry and Commerce. Interested parties can find out about current emission levels on our homepage at www.ikw-ruedersdorf.de.

Written or oral inquiries, requests for information or complaints from interested members of the public are accepted at any time. They can reach us at the address stated on the last page. The current environmental statement can be downloaded from the internet at www.ikw-ruedersdorf.de.

Internal communication at the site is an essential factor that is indispensable for the success of our facility and our company. Active communication in the form of an exchange of information, opinions and experience encourages teamwork and forms the basis for trusting, successful cooperation and a continuous improvement process.

In addition to the regulation of the structural and procedural organisation in the organisation manual, regular internal meetings and training of employees in various specialist areas take place. A committee has been set up to receive and review suggestions for improvement from staff.



Environmental goals: permanently in the spotlight

Compliance with the highest standards in environmental protection is a matter of course for us. But there is nothing that cannot be improved. We therefore constantly strive to further increase environmental compatibility and to identify and eliminate weak points. To this end, we have set ourselves goals

as yardstick for the future. This also applies to the updating of objectives.

The environmental goals set out in the Environmental Statement 2018 reached the following levels as of 31.12.2018:

Goal	State of achievement
10% reduction in ammonia water consumption compared to 2017	Since the daily average value remained at 120 mg/Nm ³ in 2018, it was possible to reduce the pollutant loads again. The NO _x target value was reduced by 20% (from 150 to 120 mg/Nm ³) with a simultaneous reduction in ammonia consumption of 4%. The planned technical change would have made it possible to achieve the target for the reduction in ammonia water, but we replaced it with a reduction in nitrogen oxide, which we consider to be more relevant from an environmental point of view.
Verification that slag is a 100% non-hazardous waste	Goal achieved. The appraisal by the Brandenburg State Office for Environmental Protection that classifies slag as non-hazardous has been received.
Coordination and implementation of the concept for water and soil monitoring	Goal achieved. The authorities have approved the monitoring concept. Soil sampling was carried out and the results are available.
Utilisation of the CHP potential to increase plant efficiency	The talks between STEAG and the municipality of Rüdersdorf are continuing. The goal will be carried over into 2019.
Determination of the potential of rail instead of truck transports	The topic was published at several universities as a proposal for a Bachelor's or Master's thesis. The goal will be carried over into 2019..
Further sensitisation of employees to efficient use of energy	Employees were made aware of the issue at morning briefings and staff meetings. The goal will be carried over into 2019.

We have set ourselves the following priorities for 2019:

Goal	Measure	Period
Optimisation/Reduction of CO emissions in normal plant operation (load reduction)	Optimisation of the mode of operation of the boiler plant	2019
Verification that slag is a 100% non-hazardous waste	Continuation of the discussion with the competent authorities on the appraisal submitted	2019
Utilisation of the CHP potential to increase plant efficiency	Continuation of the talks between STEAG and the municipality of Rüdersdorf	2019 ff.
Determination of the potential of rail instead of truck transports	Commissioning of a scientific study to determine the potential under ecological and economic aspects of rail instead of truck transport for the delivery and collection of waste	2019 ff.
Further sensitisation of employees to efficient use of energy	Implementation of an information event on the use of electromobility	2019
Identification of further potentials to reduce emissions	Renewal of raw gas measurement and extension by the components NH ₃ and NO _x	2019
Increased reliability	Planning, erection and construction of an own electricity feed into the public grid	2019 ff.

Tested, and validated



2017/1505 of 28 August 2017 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), as set forth in the updated Environmental Statement 2019 of IKW Rüdersdorf GmbH, Siedlerweg 11, 15562 Rüdersdorf, near Berlin/OT Herzfelde with the registration number D-148-00028.

By signing this declaration, it is confirmed that

- the verification and validation were carried out in full compliance with the requirements of Regulation (EC) No. 1221/2009 and Regulation (EC) 2017/1505 of 28 August 2017,
- the result of the verification and validation confirms that there is no evidence of non-compliance with applicable environmental legislation,
- the data and information in the updated Environmental Statement 2019 of IKW Rüdersdorf GmbH give a reliable, credible and truthful picture of all the activities of the organisation within the area stated in the Environmental Statement.

EDeclaration by the environmental verifier on verification and validation activities (in accordance with Regulation (EC) No. 1221/2009): The undersigned Stefan Krings, EMAS environmental verifier with the registration number DE-V-0168, accredited or approved for scope 38.2 (NACE Code) (waste treatment and disposal), confirms that he has verified whether the organisation meets all the requirements of Regulation (EC) No. 1221/2009 of the European Parliament and Council of 25 November 2009, taking into account Regulation (EC)

It's your turn now

Do you have any suggestions or questions about our work, our environmental statement or the environmental impact of our plant?

Then please contact us:

IKW Rüdersdorf GmbH
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Thank you.

13.06.2019

Ratingen, signed on

Stefan Krings · Licensed Environmental Verifier (DE-V-0168)

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We hereby confirm that we have all necessary rights of use for the material contained in the Environmental Statement 2019, such as texts, photographs, illustrations and map extracts.

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May 2019

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WASTE TO ENERGY