HF MIXING GROUP

Environmental Report 2015 - 2020

Location Freudenberg

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Foreword

Given the increasingly visible climate change and the growing scarcity of resources, it is becoming increasingly important to assess and question the impact of one‘s own and to find ways to reduce the ecological footprint.
Harburg - Freudenberger Maschinenbau GmbH has long been concerned with the subject of environmental and resources protection for a long time and introduced an environmental and energy management system in 2015, and has since continued to improve and further develop. Among other things, an environmental policy has been drawn up, environmental and energy targets were set, and measures to achieve the targets were implemented.
With the help of all employees, and especially the environmental and energy team, many different environmental and energy projects were planned and implemented of which the most important and sustainable are described in this environmental report.

The following report is intended to serve both, a „high-level“ overview and to provide detailed information for all employees in the various departments to communicate the successes and to promote further activities.

Ian Wilson / Dr. Holger Rudzio
30.11.2021

Project overview:

		Energy reduction in kWh	CO_2 reduction in kg	Number of spruces [1]	Watersaving	Local / accidential pollution	Material/ Chemical/ Waste	Employee/ Customer Health Safet env.	Product Use
Area: Production	Optimization of the compressed air system	19.500	11.505	1.046					
	Heating of the production halls by dark radiators	■	■	■				■	
	Reduction of heat loss through door openings	■	■	■				■	
	Implementation of ABH busbar	35.651	21.034	1.912					
	MEWAtex - Reusable principle	■			■	■	■	■	
Area: Mechanical manufacturing / Purchasing	Cooling lubricant recycling					■	■		
	Recycling of solid hard metals						200 kg		
Area: Welding / Purchasing	Welding wire barrel recycling						■		
	Reduction of the energy consumption of the frequency inverter	12.360	7.292	663					
	further possible future saving	*13.440*	*7.920*	*721*					
Area: Transport & Logistics	Implementation of lightweight transport pallets					■	110 tons	■	
	Foam packaging line for small parts						25 % material		
Area: Production, technical center, administration	Conversion of lighting to LED	74.828	44.150	4.014				■	
Area: Technical center, Product development, Automation	ADVISE® CS iXseal						■	■	■
Area: Product Development, Service & Safety	The Maintenance Box (MBox)							■	■
	The Cantilever Arm							■	■
Area: Administration	CO_2 compensation through Kyocera toner		1.500						
	Paper reduction through electronic data storage (ELO)	24.478	2.429	■	119 m³		6.838 kg wood		
	Savings through use of recycled paper	*18.730*	*500*	■	*90 m³*		*5.383 kg wood*		
Area: New administration building	*Environmentally friendly print management*	■	■	■	■		■		
	Heat and power generation by a combined heat and power plant	■	■	■					
	Electro-mobility	■	■	■		■		■	

Figure 1: Project overview

Key:

■ applies *italics: Future projects* [1]) Number of spruces that would have to be planted to achieve a temporary CO_2 fix, according to the IWR CO_2 Calculator (International Economic Forum for Renewable Energies).

Production area

Optimization of the compressed air system

Fig. 2: New compressor Comp Air L30RS Source: compair.com

Compressed air is an expensive but indispensable medium. Therefore we must operate the compressed air system efficiently.

With the introduction of energy management, the area of compressed air generation was first closely examined. It was determined that the compressor from 1986 was no longer state of the art. A compressed air study and 2 bachelor theses were carried out on this subject. As a result, in March 2017, a new, energy-efficient, variable-speed compressor (Comp Air L 30 RS) was installed. Models with speed control save energy by matching the delivery rates to the respective demand.

In addition, it is also important to inspect the entire compressed air network for leaks. This was carried out very intensively in 2017, 2018 and 2019. On the one hand, it was done via the exclusion method, on the other hand, it was done with the aid of an ultrasonic detector (Sonophone). In this way, some leakages were discovered and eliminated.

Now, during ongoing operation, smaller leaks are recognized by our employees and they are eliminated by the maintenance department. Many thanks for this!

Another aspect of energy management is the consistent shutdown of machines when they are not needed. This also applies to the compressor. Whenever possible, especially at weekends, the compressor is switched off. In 2020, the compressor shutdown rate was 70 %. The target here is 100 %. A technical solution is currently being worked on to ensure production, but also to shut down the plant as often as possible. In addition, the exhaust air from the compressor is used to heat the new assembly hall in spring and fall. All that is required is to manually adjust the lever on the exhaust air duct.

Savings per year (electricity for compressed air generation)

- **19.500 kWh**
- **11.505 CO_2**
- **1.046 spruces***

**) Number of spruces that would have to be planted, and to achieve a temporary CO2 fix, according to IWR CO2 Calculator (International Economic Forum Renewable Energies)*

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Production halls heating using dark radiators

The heating technology and the opening of the hall doors for logistics operations have a major influence on heating gas consumption in the three production halls. Thereby two different types of heating technology are used in the company. Large parts of the mechanical production are equipped with circulating air heating. The other parts of the halls and rented auxiliary halls are heated with dark radiators.

The advantage of dark radiators is the heating of the objects and people in the room in contrast to the heating of the air with circulating air heating. Thus, the use of radiant heating systems drastically reduces the impact of heat loss through open gates, as the heat energy is not carried away through the air to the outside (when the gates are open). By using dark radiators, it is possible to save about 15% of energy in comparison with recirculation heaters just by reducing the power. In addition, the heat is perceived as very pleasant by the employees.

Reduction of heat loss through door openings

To keep track of the gate opening times in the company, data loggers have been installed at the gates which are analyzed regularly. In this way, it is possible to learn how long they have been open at any given time. This data was analyzed to make a theoretical calculation of how much energy is wasted/lost through the open doors.

The following measures were taken to reduce heat losses:

- Employee training and signs on all gates
- Installation of air curtains at a highly frequented gate at the gateway
- Special high-speed doors have been installed in the halls to reduce drafts
- Extensive replacement of heating technology to dark radiators (e.g. welding shop in 2020)

These measures significantly reduce heat losses through open gates.

Implementation of the ABH busbar

In the case of individual power supply of the production machines, losses occur per supply line due to line resistance. To counteract this, the in-house electricians (Industrie Elektrik Homuth GmbH) bundled the lines in a so-called busbar. The power supply is provided by a central axis and line losses are limited. In the years 2018 and 2019, the conductor rails of the company ABH Stromschienen GmbH were implemented in various areas.

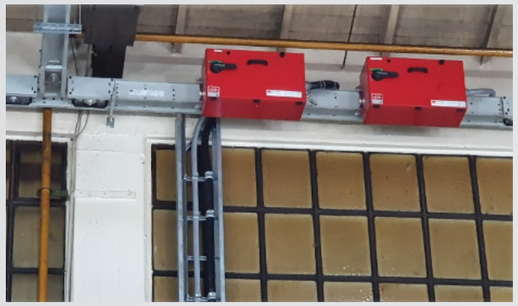

Figure 3: Conductor rails installed in the production hall

The annual savings since 2020 are as follows:

Element integrated into conductor rail	Annual savings (kWh)
Distribution control and Pama boring mill	13,500
Supply line Geding & Lewis Boring Mill	6,732
Supply line Union Boring Mill	4,379
Heat furnace at bead breaking station	6,720
Bead breaking station	4,320
Total	**35,651**

Further advantages:

- Space-saving due to compact design
- High short-circuit resistance
- Safety in case of fire
- Flexible energy supply
- Optimized heat conduction
- IP55+ protected

Savings per year

- 35.651 kWh
- 21.034 kg CO_2
- 1912 spruces*

*) Number of spruces that would have to be planted, and to achieve a temporary CO2 fix, according to IWR CO2 Calculator (International Economic Forum Renewable Energies)

MEWAtex - Reusable principle

Numerous oils, greases and other lubricants are used in machine and plant construction. For many years, the HF Mixing Group has been using MEWA cleaning cloths to remove dirt from machines and tools. In the reusable principle, the cloths go through the following life cycle:

Figure 4: MEWAtex reusable principle, source: mewa.de

These steps guarantee easy deployment, clean storage and efficient reuse:

- Delivery in MEWA Safety Containers in a previously determined cycle (according to consumption)
- Use by the HF employees (withdrawal from the containers and after soiling storage takes place in differently coloured Safety Containers); currently in circulation
- in circulation: a total of 11,000 wipes and 80 oil mats
- Collection, removal and replacement of defective defective cleaning cloths by Mewa
- Washing and drying
- Redelivery to us

The MEWA reusable system avoids a great deal of waste and valuable resources are conserved. Safe containers are also used for transport and storage.

Water-saving through multiple uses of process water.

Biodegradable detergents.

Pollutants (oils) are treated in an environmentally friendly manner processed.

Energy-efficient washing systems and dryers (incl. heat recovery).

Area: Mechanical Manufacturing / Purchasing

Cooling lubricant recycling

In 2015, during an improvement process and through close cooperation with the contracted disposal company, it became clear that the number of cooling lubricants (KSS) in the chip collection containers was significant. Up to this point, coolant lubricants were still being disposed of together with the metal scrap generated. However, we realized that the separation of the metal swarf and the KSS are necessary for material-appropriate disposal and possible further processing.

All chip buckets were then equipped with a drain, which ensured that the KSS could flow off and then be disposed of separately with a bucket. The necessary internal transport processes, as well as the external disposal processes, were not yet satisfactory and a solution was still being searched for.

Cooling lubricants are disposed of in an environmentally friendly manner.

Last year (2020), an employee from mechanical production had a brilliant idea. Not only to ensure that the waste is disposed of appropriately to the material but also to reduce the amount of coolant disposed of, excess coolant was collected and reused. In cooperation with Facility Management (FM), the colleagues then worked on a way to reuse the coolant. The colleagues‘ solution: Remaining KSS back into the KSS tank via pipelines at the back into the coolant tank. Due to the recirculation of 75%, less coolant has to be replenished in the production process.

Figure 5: Recirculation of cooling lubricants

The solution was implemented without any problems so that the FM colleagues were able to install the piping directly on the majority of all machines. We were able to implement this ingenious idea, to save on costly disposal logistics and also significantly reduce the amount of KSS to a considerable extent.

Saving of cooling lubricants through direct reuse

In the future, it is planned to equip the recirculation systems with an additional filter to avoid contamination, impurities and the associated cost-intensive treatment processes or the purchase of a new complete tank filling.

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Recycling of solid hard metals

In addition to the metal chips, which are known to be recyclable scrap, the inserts and cutting tools worn out in the production process and drills made of solid carbide can also be returned to the material cycle. This is because solid carbide can also be recycled and is therefore considered an important secondary raw material for the metalworking sector. The fact that the scrap metal is not worthless has always been known at the Freudenberg site. However, the valuable raw materials were not always systematically collected and recycled. For many years now, every time the inserts or drills are changed, the user inserts have been collected in the tool shop in a container specially provided for this purpose. Once or twice a year, depending on the quantity, these cutting inserts are then sold to the highest bidder via our purchasing department. In total, sometimes we collect up to 200kg of the material. In this way, we contribute to a sustainable metal cycle.

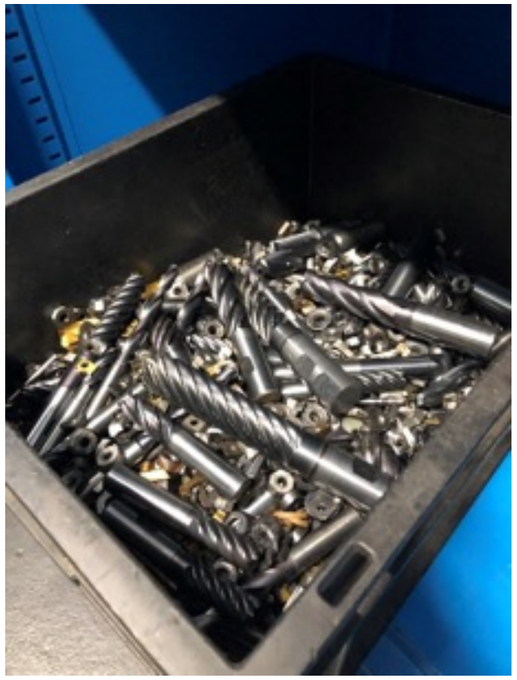

Figure 6: Collected carbides

Solid carbides are processed in an environmentally friendly process

Area: Welding / Purchasing

Welding wire barrel recycling

In the case of a new delivery of welding rods, the supplier shall provide us with the barrels used for transport and storage, as well as the reel on which the welding wires are wound. In the past, they were disposed of with the residual waste after a single-use.
During an internal audit, this was noticed, discussed and a better solution was searched. After consultation with the supplier, an agreement was reached that the wire cans would be returned to the supplier after usage. This means that the welding rod tons can always be reused. Recent discussions with the supplier have shown that there is also interest in reusing the welding rod drums. We are still working on the most suitable recycling process for this case.

Figure 7: Welding rod barrel

Welding wire barrels are reused by the supplier

Reduction of the energy consumption of the frequency inverter

For the use of the grinding equipment in the welding shop a conversion of the low frequency to high frequency is necessary. The current central frequency converter with 18.5 KW was permanently in operation, even when the grinding shop was not in operation and consumed a lot of power. To prevent permanent power consumption a temporary shutdown by a time relay was installed on 30.05.2020.
Since then the inverter is only active when work is being carried out in the grinding shop. The automatic disconnection via the time relay results in an average power saving of more than 50%, i.e. approx. 1,030 kWh of electricity per month.

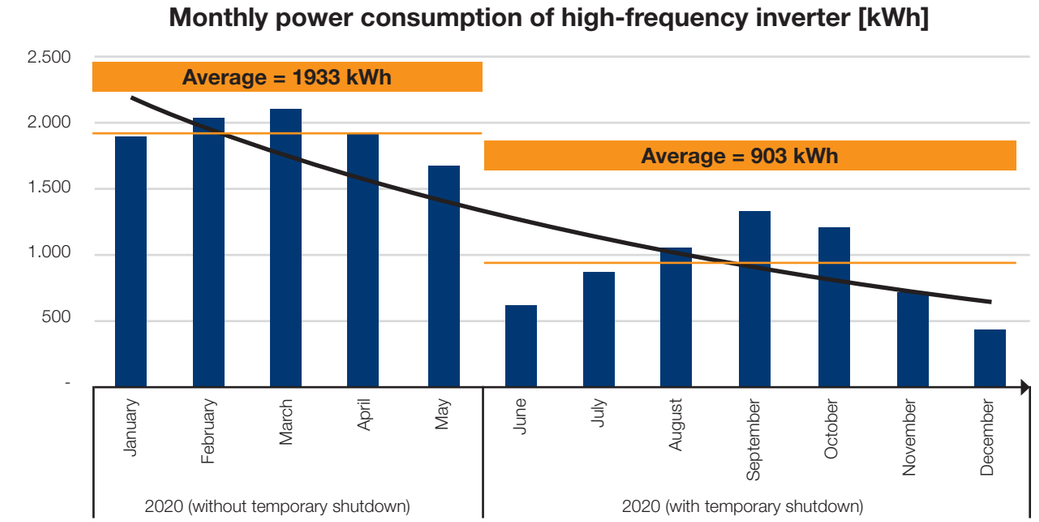

Figure 8: Monthly power consumption of the high-frequency converter in 2020

Temporary shutdown and baseload reduction are important ways to reduce energy consumption. The energy evaluation of the electricity consumption has also shown that, particularly in the welding shop, there is very high energy demand.
Thus, the next step is to consider whether the old high-frequency system (with 18.5 KW) should be replaced by 2 electronic frequency converters with a maximum of 7.5 KW, thus reducing the annual power consumption by another electricity consumption to reduced further 13440 kWh.

Savings per year (through time relay):

- 12.360 kWh
- 7.292 kg CO_2
- 663 spruces*

Possible savings per year (through 2 new frequency converters):

- 13.440 kWh
- 7.920 kg CO_2
- 721 spruces*

*) Number of spruces that would have to be planted, and to achieve a temporary CO2 fix, according to IWR CO2 Calculator (International Economic Forum Renewable Energies)

Area: Transport & Logistics

Implementation of lightweight transport pallets

In the field of transport and logistics, the weight of the goods plays a major role, especially in the case of air freight, but also for land and sea transport. On the one hand for ergonomic reasons, but also cost reasons. Visiting various trade fairs gave us the idea of replacing the normal Euro pallets with stacking frames with lighter alternatives. Together with the supplier Sibo Verpackungen
the SIBOXX was developed, which has many advantages:

- Reduction of logistics costs due to perfect adaptation to the transported goods
- Simplified handling due to weight reduction of up to 60%.
- Reduction of transport costs
- IPPC treatment is no longer necessary
- Stackability with a load of up to 2,000 kg
- low risk of injury
- simple, environmentally friendly disposal

This system has been in use since the beginning of 2013. A total of 110 tons of transport weight have been saved to date, which corresponds to approx. 60% (Theoretically with Euro pallets: 190 tons, actually with SIBOXX: 80 tons).

Figure 9: Euro pallet with collars

Figure 10: SIBOXX in different versions

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Foam packaging line for small parts

Another successful environmental project in the area of logistics division was the replacement of the existing foam packaging system with a more environmentally-friendly system - FOAMplus from the company Storopack. Through the new system, foam consumption is reduced by 25% and indirectly reduces packaging waste by 25%. The new system has been in use since summer 2019 and brings the following advantages:

- Sufficient product protection with little minimum effort
- Cost reduction
- Secure shipment to the customer
- Increased environmental friendliness

In addition, the standard foil adhesive tape has been replaced by environmentally friendly paper which is 100% recyclable. In addition to the easy processing, the quiet unrolling of the tape also brings advantages for the employee.

Figure 12: Eco-friendly paper adhesive tape

Figure 11: New FOAMplus foam packaging line Source: storopack.de

Area:
Production, technical centre, administration

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Conversion of lighting to LED

It is indisputable that LED lamps are the most efficient way to produce good lighting. In the company, the administrative building, the technical centre and the production halls, the old halogen lamps were replaced with LEDs.

By replacing 292 traditional lamps with LED lamps with lower energy consumption, 74828 kWh of electricity can be saved per year. This energy measure aimed to illuminate the hall sections by TRGS standards, thereby saving energy consumption and energy costs.
Energy consumption due to lighting has been significantly reduced since the start of the measure in 2016. The ongoing process continues this year so that further savings can be expected next year. In addition, increasing the light colour to 5000 Kelvin improves the effect of light on employees: employees are more productive, employee health is improved and the workplace directive is fulfilled in an exemplary manner.

Savings per year:

- **74.828 kWh**
- **44.150 kg CO_2**
- **4014 spruces***

*) Number of spruces that would have to be planted, and to achieve a temporary CO2 fix, according to IWR CO2 Calculator (International Economic Forum Renewable Energies)

Area: Technical centre, Product development, Automation

ADVISE® CS iXseal

The iXseal is an intelligent HFMG mixer dust seal controller that adjusts the hydraulic sealing pressure of the mixer dust seals according to the dynamic load. As is well known there are different load phases during the mixing process, such as polymer mastication with a low fill factor and carbon black mixing with the correct filling factor and very high load on the machine. Without the iXseal, it is not possible for the mixer to differentiate between these different loading phases and therefore always takes the highest possible as a reference for dust sealing pressure and lubricating oil quantity. Analyses have shown that, on average, the mixer is only 60% of the time of a customer recipe in a high load phase. With the iXseal, during low-load mixing phases, the mixer dust seal pressure
is automatically lowered and the amount of lubricating oil required is also reduced. In high-load phases, the dust seal is closed with higher pressure to avoid to prevent leakage, and the system is supplied with the higher oil volume required in this phase. The iXseal regulates the pressure of the hydraulic mixer dust seal within the process and thus reducing the amount of lubricating oil and recycling costs. This means that the iXseal has a positive impact on the operating costs of mixers and reduces the environmental pollution caused by the machines. In addition, the service life of the
dust seal is increased. The iXseal dust seal controller also results in less contamination of the customer's mixtures, since normally some of the process oil flows into the mixing chamber and thus into the product, which in most cases is not part of the customer recipe.
The following overview shows how much savings the iXseal has shown for our customers and the environment:

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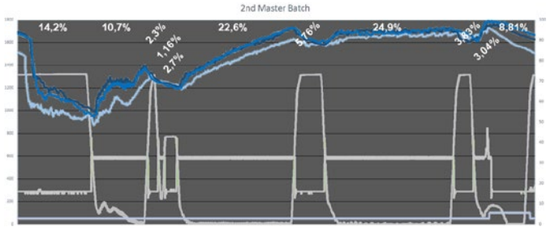
iXseal - intelligent dust seal controller
Example process IM320E



Cycle time 261 sec. → 330 batches per day

Low pressure 37,6%	with iXseal → 100,10 ml/batch
High pressure 62,4%	with iXseal → 312,96 ml/batch
High pressure 100%	without iXseal → 501,00 ml/batch
	-88,06 ml/batch saved

This calculation is only valid if the mixer operates 365 days a year, 24 hours a day, all year round with this product and the same lubrication settings. Your savings may differ!

-29 liters oil/day

-872 liters oil/month

-10.464 liters of oil/year

ADVISE® CS sleep timer function for mixer main drive

The „sleep timer function" can be activated or deactivated in the **HFMG ADVISE® CS** mixer control system and offers the possibility that the main drive switches off automatically after a defined time. This function is used when the operator does not refill the mixer with the material after the last batch has been produced and the mixer is not switched off. As the main drive is automatically switched off by this function, the lubrication of the mixer is also stopped. This function, on the one hand, reduces the energy consumption of the mixer when the mixer is idle, and also oil can be saved, which is needed for the lubrication of the dust seals.

Accordingly, the „sleep timer function" saves energy and oil consumption in HFMG mixer lines.

Relief function for flexible Lubrication hoses

Flexible lubrication hoses for dust seal lubrication expand under pressure and therefore store a certain amount of oil. After the lubrication pumps are switched off, the stored oil flows into the mixing chamber and is consumed unnecessarily. Due to the relief function of the flexible lubrication hoses, this stored lubricating oil does not flow into the mixing chamber but is instead back into the lubricating oil tank. Therefore less oil enters the mixing chamber with this special function, which results in oil being saved. Thus the relief function of the flexible lubrication hoses also helps to protect the environment.

Area: Product Development, Service & Safety

To further optimize the safety standards of the HF Mixing Group, an internal working group consisting of product development and service has developed a large number of safety solutions were. The following 2 of these solutions are described in more detail. Firstly, the Maintenance Box (mBox) is described which will be offered for new installations. And secondly, the Cantilever Arm, which can be used in existing and also for new systems.

The Maintenance Box (mBox):

The mBox is intended to secure HFMG or customer technicians in the internal mixer against falling and to provide the possibility to rescue an injured person. The mBox also significantly improves the ergonomic working method, so that an employee can stay in the internal mixer for several hours at a time.

Figure 13: Maintenance Box (mBox)

Further benefits:

- Supports any security concept
- User-friendly and easy access for up to two persons
- Easier cleaning of the mixing chamber
- Easier access for a maintenance inspection and cleaning
- Hydraulic movement
- Significant cost reduction
- Fast ROI
- Reduced maintenance downtime
- Working materials on site
- A stable platform and excellent working conditions
- HF patented

The Cantilever Arm:

The cantilever arm is designed to secure HFMG or customer technicians in the internal mixer against falling and to provide the possibility of rescuing a person who has had an accident. By securing and rescuing at the same time decisive time is saved in the event of an accident and the rescue is considerably simplified. The cantilever arm is to be fitted to all HFMG internal mixers (from mixer size 190 litres). The Cantilever Arm is therefore the new HFMG standard and can be fitted to new machines and retrofitted to existing machines. Without this cantilever arm or a similar device, a rescue from the internal mixer is impossible.

Further benefits:

- Rescue option from the internal mixer
- Can be retrofitted
- Optimal protection against falling
- Easy handling

Area: Administration

In the administrative area, the relevant environmental aspects are quickly obvious: paper is needed, printed, copied and filed. In addition, energy is needed to use PCs, laptops and printers.
How can we protect the environment here?
With our partner, Bürowelt Hees, an analysis of our printer landscape was already carried out in 2015, and as a result, in 2016, approx. 2/3 of all printers and copiers were reduced, and the existing devices were replaced by multifunction devices from Kyocera. In this way, the acquisition and maintenance costs for the devices could be reduced, and by using CO2-neutral Kyocera toner and durable devices, a contribution to environmental protection.

ACTUAL / TARGET energy consumption / CO2 emission

ACTUAL-Situation	TARGET-Situation	Saving
Power consumption per year		
9.368 kWh	5.843 kWh	3.526 kWh
Energy costs per year		
1.873,66 €	1.168,55 €	705,12 € !
Carbon dioxide emission*		
5.527 kg	3.447 kg	2.080 kg !

Reduction of CO2 emission by

60,34% !

10.4 tons less CO_2 in 5 years

Figure 14: Savings through optimization of the printer landscape

CO_2 compensation through Kyocera toner

The purchase of Kyocera original toners has saved an average of 1.5 metric tons of CO_2 annually since 2016. Equivalent has been offset by Kyocera in the myclimate Gold Standard carbon offset project „Efficient Cookers for Kenya“.

Figure 15: Certificates of savings through the use of Kyocera original toner

Paper reduction through electronic data storage (ELO)

Due to the advancing digitalization in many areas of the company, Harburg- Freudenberger Maschinenbau GmbH has been able to reduce paper consumption over the last 2 years, thus saving resources, energy and CO_2.

Environmental impact	Purchased quantities of virgin fiber paper					
	2018: 1.115.000 sheets		2019: 1.032.500 sheets		2020: 575.000 sheets	
	recycled paper	Fresh fiber paper	recycled paper	Fresh fiber paper	recycled paper	Fresh fiber paper
Waste paper/ wood in kg	6.231	16.667	5.769	15.434	3.213	8.596
Water requirement in m^3	114	290	105	268	58	149
Energy demand in kWh	23.337	59.656	21.610	55.242	12.034	30.764
CO_2 in kg	4.929	5.897	4.564	5.460	2.541	3.041

Figure 16: Environmental impact of reducing/restructuring paper demand

Area:
New administration building

Environmentally friendly print management

With the move into the new office building, additionally to new, energy-efficient multi-functional devices and new printing software (papercut) will be used. This is DSGVO compliant and brings some „environmental features“ with it. Less paper waste is created through established guidelines and responsible printing. The print management solution demands to think before you print - for the sake of the environment.

Heat and power generation by a combined heat and power plant

A very efficient and environmentally friendly heating system was planned for the new administration building and is being currently being implemented:

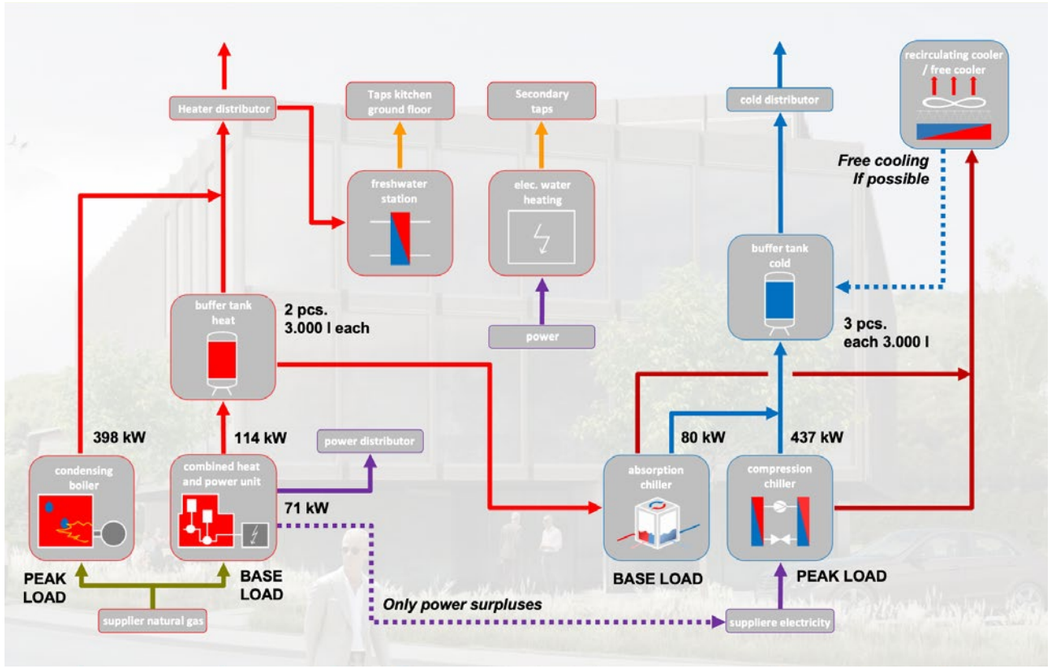


Figure 17: Planned heating system in the new administration building (diagram according to G-TEC Ingenieure)

Heat is generated via a bivalent heating system. A combined heat and power plant (CHP) is installed as a baseload heat generator and a condensing boiler is installed to cover the peak load. Both systems are powered by natural gas. The CHP also produces electricity, most of it will be used by ourselves. In this way, we can make a significant contribution to achieving the company‘s goals: the reduction of CO_2 emissions. According to initial projections, the CHP saves about 100,000 kg of CO_2 per year. Further details and energy savings achieved will be reported in the next environmental report.

Electro-mobility

With the completion of the parking garage in 2020 two e-charging stations for electric and hybrid cars were installed which have been in operation since the spring of 2021 for our first electrically powered company vehicle, the Renault ZOE. This laid the foundation for the electric mobility of the HF-Mixing Group. Currently, we are working on an e-mobility strategy to equip more parking spaces with charging stations and to implement more e-vehicles in the future. Already further hybrid vehicles and a Renault Clio with electric drive are planned for the current year.

Figure 18: First electric car at HFF

Another important component in the area of mobility / vehicles is our forklift fleet. This already consists to a large extent of electric vehicles, but there are still a few diesel-powered forklifts. These need to be replaced, not only for environmental reasons but also to protect the health of our employees.

E-bikes had already been offered to employees since 2013. From 2013 to 2016, this offer was taken up by 257 employees*. Since 2018, the contract was changed to BikeLeasing. Even now many employees take advantage of the offer. Further 193 contracts have been concluded since 2018. Some
colleagues also use the company bike regularly, and cycle to work, thereby doing something good for their health and the environment. That pleases us very much!
Illustration: THE SERVICE BIKE WITH FUN AND A GOOD FEELING ON THE ROAD

To encourage even more colleagues to use alternative means of transport, such as the bicycle, HF is taking part this year in the „City Cycling“ initiative. „City Cycling“ is a competition in which the aim is to cycle 21 days as many everyday journeys as possible in a climate-friendly way by bicycle.
Every kilometer counts - even more so if you would otherwise use the car.

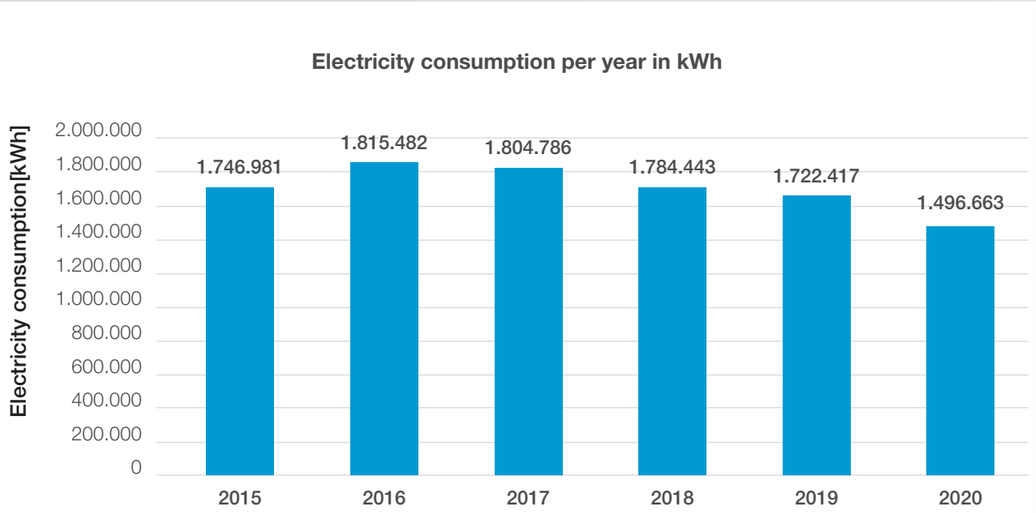
Speaking of cars: If you have to get to work by car, a new HF-internal portal offers you the opportunity to offer and/or find a ride. This not only saves your wallet, but you can also reduce your carbon footprint. Just give it a try! Register on the Q/U/E SharePoint.

If you have any questions, please contact the QHSE team.

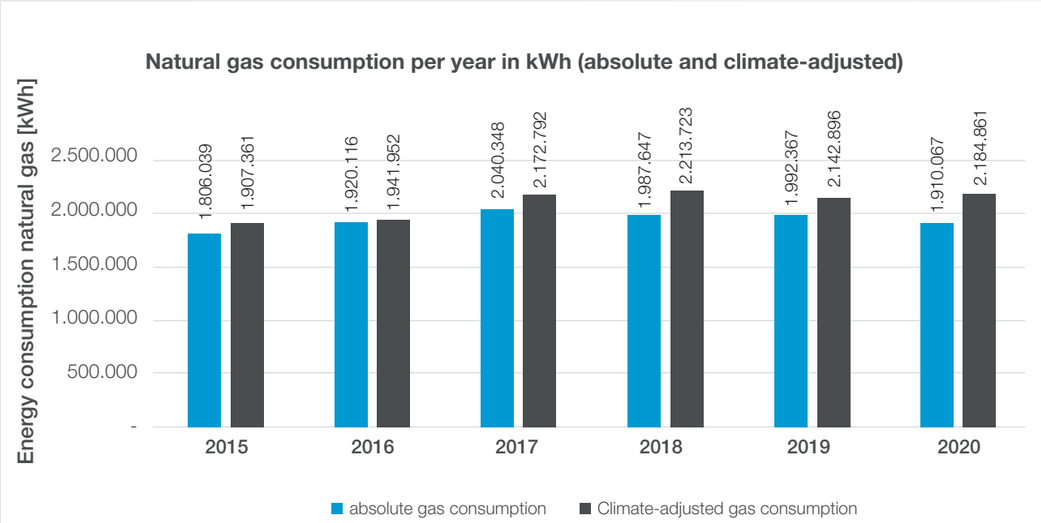
Thank you for participating!

Appendix: Key figures

Development of electricity consumption 2015 – 2020



Development of gas consumption 2015 – 2020

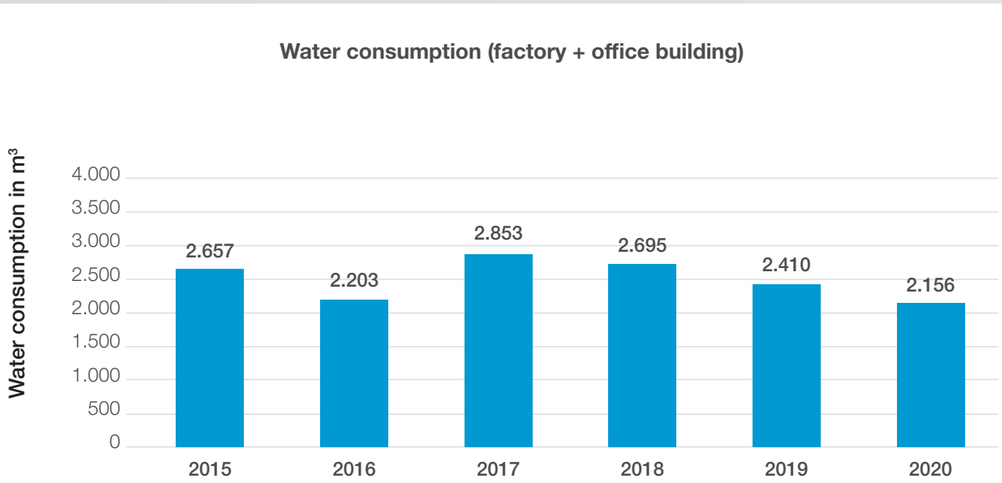


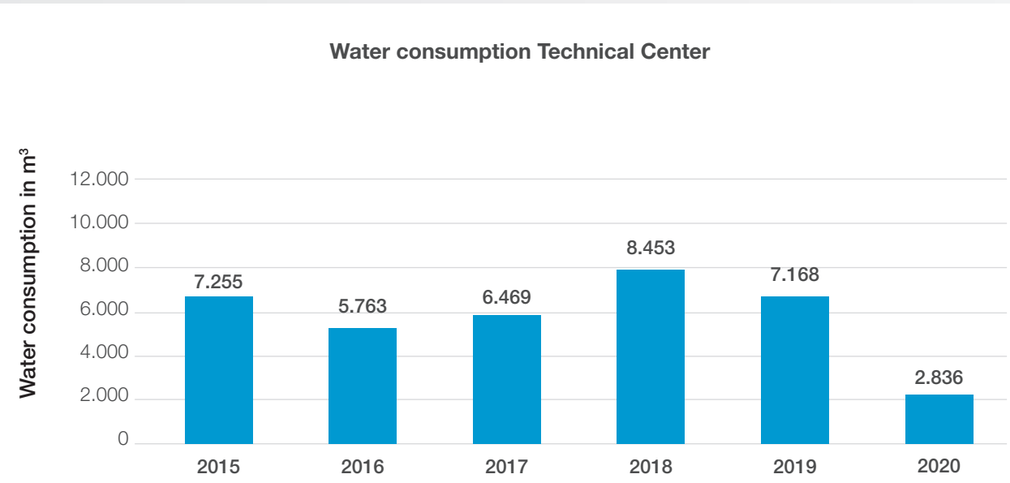
The total gas consumption is composed of:

- To a large extent: gas consumption for heating = weather-dependent
- Consumption is converted -> climate adjusted
- Gas consumption for heating domestic water (e.g. showers) = weather-independent
- Gas consumption by production facilities = weather-independent

Appendix: Key figures

Development of water consumption 2015 – 2020





Water consumption in the pilot plant is very much dependent on the number of customer trials carried out.

The data collected is verified annually by the external certifier (TÜV Nord) during the audits of the integrated management system.

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