



Corporate Responsibility Report 2021

MAN Energy Solutions
Future in the making

Building a
sustainable
future

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MAN Energy Solutions in brief

MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon neutral future. Addressing tomorrow's challenges within the marine, energy and industrial sectors, we improve efficiency and performance at a systemic level. Leading the way in advanced engineering for more than

250 years, we provide a unique portfolio of technologies.

Headquartered in Germany, MAN Energy Solutions employs some 14,000 people at over 120 sites globally. Our after-sales brand, MAN PrimeServ, offers a vast network of service centres to our customers all over the world.

	2021	2020	2019
Orders received (in million €)	3 821	2 933	3 804
Turnover (in million €)	3 278	3 267	3 462
Workforce (Quantity on 31.12.)	14 062	14 782	15 198
CO₂ emissions (in t)	52 892	69 917	82 552
Energy consumption from renewable energy sources, external procurement (in MWh)	41 165	37 491	20 601
Total amount of waste (in t)	21 865	23 857	37 128

Moving Big Things to Zero



Dear Readers,

In 2018, our company took a decisive step and committed to a future growth strategy based on decarbonization and digitalization.

We have learned a lot since then. Our ambitions remain as high as ever, but we now have a much better idea of how best to pursue and deliver on our vision. In short, MAN Energy Solutions is “Moving Big Things to Zero”, which means we have identified the key technology pillars that support our growth strategy and successfully established them on the market. All of this provides tremendous leverage to reduce harmful greenhouse gas emissions from the operations of our customers’ products while ensuring the profitability of their business:

1. “Green” engines and retrofits will drive maritime energy solutions. Our dual-fuel marine engines can run on a variety of green, synthetic fuels, putting climate-neutral shipping within reach.

2. “Green” hydrogen is needed to fuel a fossil-free global economy. We will invest 500 million euros in the expansion of our H-TEC-SYSTEMS electrolysis business and, as one of the world’s leading suppliers, will offer electrolyzers and power-to-x systems on an industrial scale.

3. Our Carbon Capture Utilization and Storage (CCU-S) technology helps reduce industrial emissions that would otherwise be difficult to reduce.

4. Large heat pumps have the potential to reduce greenhouse gas emissions from domestic and industrial heat generation.

In addition to these levers, we have committed ourselves to further reducing emissions from our own production facilities on the product side. Our goal is a reduction by 50% by 2030. The full details of our commitment to decarbonization can be found in this report.

Another focus last year was on our internal and external supply chains with the introduction of an improved energy management system, a new compliance management system – Health, Safety & Environment (CMS – HSE) and a sustainability rating for evaluating suppliers and partners. Additionally, together with our parent company Volkswagen, we are committed to fighting and eradicating corruption at every step of our supply chain. Finally, we work closely with our business partners to pursue and intensify circular economy approaches wherever possible.


Note that this is just a selection of the initiatives we are currently working on. Believe me when I say that MAN Energy Solutions is 100% committed to “Moving Big Things to Zero”.

A handwritten signature in black ink that reads "U. Lauber". The signature is fluid and cursive, written in a professional style.

Dr. Uwe Lauber
CEO
MAN Energy Solutions SE

The four focus areas of our sustainability strategy

As a company and as part of society, MAN Energy Solutions faces global challenges that have a significant impact on our future viability. Our main goal is the commitment to a sustainable corporate policy with a strong focus on secure jobs, healthy employees – both internally and in our supply chain – and resource- and environmentally conscious manufacturing processes as well as safe products. With our products and services, we act exactly where the major drivers of economic and ecological progress are located. We are aware of this responsibility and therefore already offer system technologies that help our customers increase the efficiency of their systems and applications and reduce emissions.




»Sustainable production and development are activities aimed at meeting the needs of the present without compromising the ability of future generations to meet their own needs.«

MAN Energy Solutions is guided, among other things, by the world's largest and most important CR initiative, the UN Global Compact, with its ten generally recognized principles on human rights, labor standards, environmental protection and anti-corruption and the 17 goals based on them – the so-called Sustainable Development Goals. Operational implementation is part of the Volkswagen Group's CR and climate strategy. They are firmly anchored in our corporate strategy.

In 2021 we restructured our activities and defined four focus areas for our activities, which are primarily based on five Sustainable Development Goals (SDGs).

Below, we will present these four focus areas in more detail and explain our strategic orientation and objectives in these areas. In addition, we give you an overview of the activities carried out in 2021.



Decarbonization

- We are going to decarbonize our maritime business by 2030.
- We are providing new technologies and solutions for a carbon-neutral economy.
- We are continuously expanding our retrofit business for ongoing decarbonization of the existing fleet.
- We are implementing measures to reduce CO2 emissions by half at our own production sites by 2030.




Circular economy

Focus “Product”:

- We make a significant contribution through long-life products, first-class service, high repair and maintenance capability, and the potential to retrofit.

Focus “Manufacturing”:

- We make a further contribution to the circular economy in particular through our measures for energy and resource efficiency and waste reduction as part of our HSE management system.




Responsibility in the supply chain

- We have a mandatory code of conduct for all business partners.
- We comply with, monitor and improve all legal and voluntary requirements on due diligence obligations in supply chain.
- We continuously improve our own HSE system and implement an HSE culture index.




People empowerment

- All employees are aware of the importance and aspects of our sustainability strategy.
- We push our Driving Change Initiative to support innovation, motivation and empowerment of our employees.
- We are consistently implementing our qualification initiative to implement our corporate strategy so that we can retain core competencies and establish future know-how.





Decar- bonization

Alignment and strategy

Climate change and the need for decarbonization is probably the greatest challenge of our generation. It opens up two major fields of action for MAN Energy Solutions: On the one hand, we are pursuing the goal of reducing the CO₂ emissions that we produce ourselves. On the other hand, it is our goal to offer products and solutions that in turn drive decarbonization forward. It is essential that we succeed in linking ecological and economic goals: This is the only way to create innovations that make us successful.

Decarbonization through our products and solutions

Our goal is to play a leading role in our business areas as a pioneer and enabler of global decarbonization and to pave the way to a climate-neutral future with our products – in the maritime sector, in the energy industry, and in industrial applications. We provide new technologies and solutions for a CO₂-neutral economy in order to avoid and reduce CO₂ wherever possible and to compensate for unavoidable emissions.

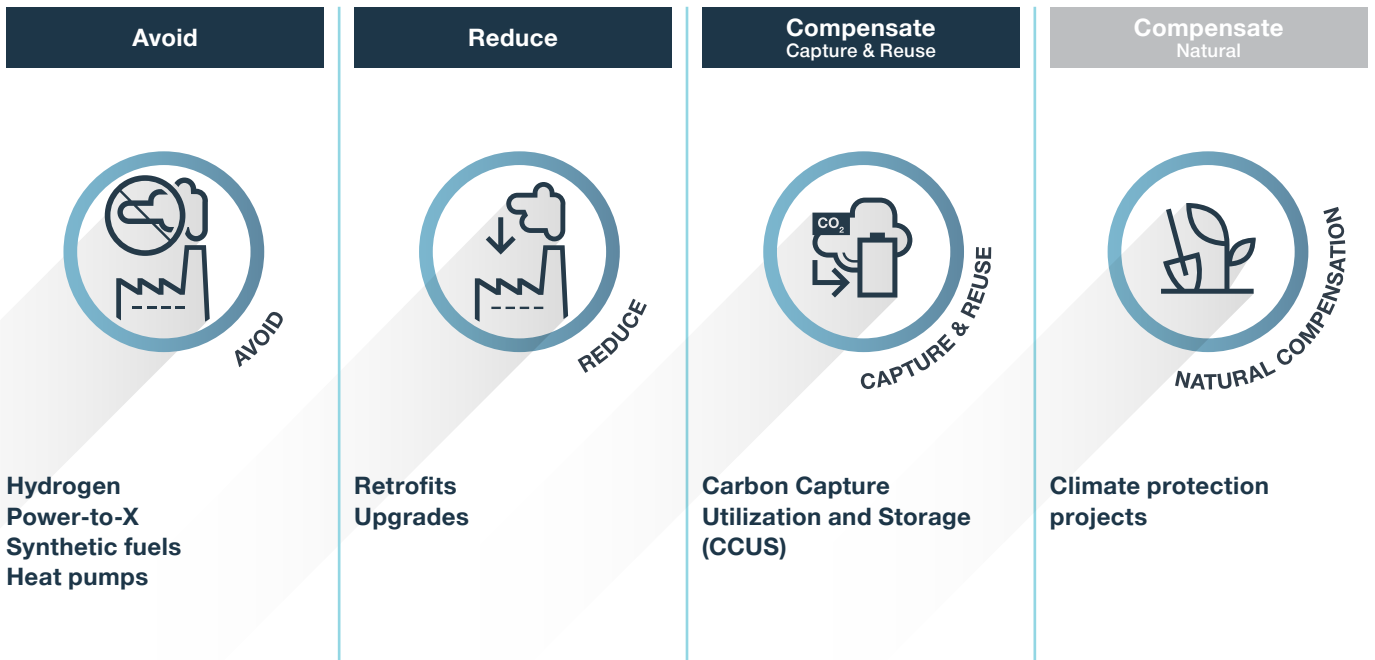
In concrete terms, this means: By 2030, sustainable technologies and solutions will make up the majority of our business and our portfolio for our main

applications will each include at least one technological solution for CO₂-neutral product operation. By 2030, we want to offer products for the maritime industry that enable complete decarbonization.

We are working to enable our customers to use a variety of synthetically produced, climate-neutral fuels. MAN gas and dual-fuel engines can already be operated with climate-neutral fuels, e.g. synthetic natural gas (SNG). In the future, other so-called “future fuels” such as ammonia or green methanol will play an important role. At the moment, they are not yet available on

the market in sufficient quantities. For this reason, we are also preparing appropriate solutions for the production of these fuels in order to enable operation of our engines with these fuels.

Hydrogen, as an indispensable raw material for “deep decarbonization”, has a prominent position in the energy transition. Where direct electrification does not make sense or is technically impossible, green fuels made from hydrogen point the way to a climate-neutral future. Over the next few years, MAN Energy Solutions will invest up to 500 million euros in its subsidiary



H-TEC SYSTEMS to transform the hydrogen specialist into a mass-producer of PEM electrolyzers as quickly as possible. H-TEC SYSTEMS is already successful on the market with solutions for the electrolysis of hydrogen and offers its customers integrated container solutions in the megawatt range.

Not all emissions can be effectively reduced or even avoided altogether. Around a third of the greenhouse gases emitted worldwide are emitted in these so-called “hard to abate” sectors. Against this background, technologies for capturing, recycling, or storing CO₂ offer powerful leverage and are also becoming increasingly strategic for MAN Energy Solutions. Our Carbon Capture Utilization and Storage solutions, CCU-S for short, offer

energy-intensive industries the opportunity to minimize their greenhouse gas emissions and thus contribute to decarbonization. We will continue to expand our commitment in this area.

Our retrofitting business, i.e. the business of technological retrofitting of existing products and systems, makes another important contribution to the maritime energy transition and to the decarbonization of the global power plant park: Upgrade and conversion is an essential part of the range of services from MAN PrimeServ, our aftersales Brand. Retrofitting not only extends the service life of engines and systems, but can also significantly reduce their CO₂ emissions, for example by converting them to run on alternative fuels.

We are continuously expanding our retrofit solutions in order to promote the decarbonization of existing systems and are pursuing the goal of quadrupling sales in this area by 2025 compared to 2019 (see also the “Circular Economy” chapter).

In addition to our product-related decarbonization efforts, we are also committed to implementing the regulatory and market-related framework conditions, for example by adapting the regulations and expanding the infrastructure or through our membership in the National Hydrogen Advisory Board of the Federal Ministry for Economic Affairs and Energy. This way, we support the goal of making the necessary fuels available to the market at competitive prices in the future.



Decarbonization in our production and at our sites:

Even if the majority of the CO₂ footprint still comes from the operation of our products in the field, we have also been focusing on internal decarbonization for years.

We commit to reducing absolute CO₂ emissions at our own production sites by 50 percent by 2030 (compared to 2018). This also includes emissions outside of production, such as administrative areas, and those for example caused by engine test runs, which are required by regulation in the marine sector.

To achieve this goal, we have established a central action management system for energy reduction and increased energy efficiency many years ago. In construction measures that we undertake, we pay attention to energy efficiency, for example through ceiling insulation. In the years 2023 and

2024, our energy management system is to be implemented at the two main sites in Oberhausen and Augsburg in accordance with ISO 50001 (see also the section on responsibility in the supply chain).

In addition to reducing overall electricity consumption, we are also working on increasing the proportion of electricity from renewable sources. We have already reached an important milestone in this area: Since January 1st, 2022, all of the electricity we have purchased for all of our European production sites has come from renewable sources. We are also planning further investments in the millions in our own generation of renewable energies.



Activities and actions in 2021

Our contribution to the maritime energy transition: Hydrogen and Future Fuels

The International Maritime Organization (IMO) puts the annual emissions from shipping at around 1 billion tons of carbon dioxide – this corresponds to almost 3 percent of all greenhouse gas emissions worldwide. The IMO calls for these emissions to be reduced by 50 percent by 2050 and 40 percent by 2030, compared with their level in 2008, and indicates the need for action.

MAN Energy Solutions has been committed to a maritime energy transition towards climate-neutral shipping for many years. It is clear to us: developing engines and the associated infrastructure that enable the industry to make large-scale use of carbon-neutral and zero-carbon fuels is key to establishing a greener shipping industry. However, the construction and conversion of the infrastructure and global fuel supply chains required for this can only be successfully managed if the shipping industry and political regulation work together. That is why we are not only committed to our products and solutions, but are also collaborating on the relevant research, innovations and regulations that govern this field – and pushing wherever possible that the emissions caused by shipping be reduced.

One of these important projects for CO₂-neutral engines is the development of the ammonia engine, which began in 2019 and is currently still ongoing, in which we see a key

technology for the maritime energy transition. For this initiative we were able to win the Trafigura Group Pte. Ltd. as a co-sponsor. By 2024, the two-stroke ammonia engine is to be commercially available for large ocean-going vessels. A retrofit package follows that will allow ships to be converted to run on ammonia by 2025.

We underlined the importance of this development project by signing a Memorandum of Understanding with Mitsui E&S Machinery Co. Ltd. (MES-M) und Mitsui O.S.K. Lines (MOL) in October 2021: In it, we set out a shared commitment to low-speed dual-fuel ammonia engines to decarbonize shipping. The first engine is expected to be delivered in 2024. The engines are also compatible with other fuels such as LNG and methanol. The merger of the three companies establishes a shared commitment to reducing the environmental footprint of shipping and reveals one of the pathways to decarbonize the entire shipping industry.

Another milestone in the maritime energy revolution took place in September 2021 in the Elbe port of Brunsbüttel: The “ElbBLUE” was the first container ship in the world to be refueled with climate-neutral synthetic natural gas (Synthetic Natural Gas – SNG), which was obtained from 100 percent renewable energies. This was the first time green SNG was used in commercial shipping. More information about this project can be found in the chapter “Circular Economy / Lighthouse”.

Hydrogen is of particular importance in the production of alternative, climate-friendly fuels. Therefore, in June 2021 we increased our shares in our subsidiary H-TEC SYSTEMS to the majority stake. MAN Energy Solutions is now the sole owner of this company. By investing in H-TEC SYSTEMS, we are completing our range in the hydrogen value chain. Our goal is to advance the industrialization of electrolysis with H-TEC SYSTEMS and bring green hydrogen to the mass market.

Our commitment in the field of hydrogen also means that our gas-powered four-stroke engines in power plants are already “H2-ready”: This means they can be operated with a hydrogen content in the gas mixture of up to 25 percent by volume. The adaptive combustion control (ACC) required for the hydrogen admixture in MAN engines reacts fully automatically to varying hydrogen percentages in the natural gas and compensates for possible efficiency losses when operating with fluctuating H2 percentages. This way, we enable the use of hydrogen, e.g. in power plants and thus a significant reduction in CO₂ emissions. Gas engines already in operation can be upgraded for so-called hydrogen blend operation by upgrading the automation and retrofitting additional ACC sensors. By 2025, the units should also be updated so as to operate with up to 100 percent hydrogen.

In 2021, we took another important step in the eFuels area as well: we agreed with Porsche AG to supply a methanol reactor for their eFuels pilot plant in Chile. This is the world’s first integrated and commercial large-scale plant for the production of synthetic, climate-neutral fuels using wind energy. Green hydrogen is produced here using wind power, which is then combined with CO₂ filtered from the air in the methanol reactor, which is developed and manufactured at our Deggendorf site. This is how green methanol is generated. In the pilot phase, the large-scale plant is expected to produce around 130,000 liters of eFuels as early as 2022. By 2026, the capacity is to be increased to around 550 million liters of eFuels per year.

Energy efficient energy solutions

Our cooperation with thyssenkrupp, which started in 2021, shows how important digitization is for decarbonization: together, MAN Energy Solutions and the thyssenkrupp Uhde division want to develop, test and market the autonomous operation of turbo-machinery systems – based on artificial intelligence – for the industrial sector of nitric acid production. The merging of human expertise with artificial intelligence is a milestone for the process industry. The AI algorithms ensure that machines and systems run reliably and at the optimum operating point at all times. This has a positive effect on operating costs, leads to fewer failures, increases efficiency, conserves resources and reduces emissions.

100%
from renewable energies
obtained container ship

550
million liters of eFuels
per year by 2026

The decarbonization of our production sites

In 2021, we have further increased the proportion of purchased electricity from renewable sources at our production sites to 52 percent. This enabled us to save more than 30,000 tons of CO₂ in the reporting year (on average for 2018-2021), which corresponds to the annual emissions of almost 20,000 mid-range cars.

52%

electricity from renewable sources

more than

30 Tsd.

tons of CO₂ savings

In addition, we worked at our locations in 2021 to further increase the generation of our own energy from renewable sources in addition to the existing operation of our own photovoltaic system. In the reporting year, for example, we began planning another photovoltaic system at our site in Augsburg. At our Changzhou site in China, we are already one step further: In December 2021, we signed a contract with a local solar panel supplier. Solar panels with 1,540 individual units are installed on around 10,000 m² of roof area. These can generate around 915,000 kWh per year. For the plant in Changzhou, this means around 1,000 tons less CO₂ emissions per year.

Further examples of measures carried out in 2021 are modernization of lighting technology, e.g. through additional conversions to LED technology, as well as the optimization of our compressed air systems. We have also made some improvements in the energy-intensive area of the test benches. Through various process optimizations, we have reduced the engine operating times on the test benches by around 20% and further increased the energy efficiency of the test runs.

The electrification of our vehicle fleet also took an important step forward in 2021: In our plant transportation (material distribution) in Augsburg, we already use forklifts with electric drives without exception. Since the electricity we have purchased has come exclusively from renewable sources since January 1st, 2022, these forklifts are already extremely environmentally friendly. Wherever possible, we also reduce CO₂ emissions by consistently using rail for heavy-duty transport and shipping of the engines produced in Augsburg. We also have a positive trend in the company car fleet with the gradual conversion to electric drive. At

the Augsburg location, 30% of the fleet of company cars are already hybrid or electric vehicles.

The high degree of digitization and remote work also had a positive effect in 2021. The majority of the conferences and meetings – internally as well as with our customers – took place remotely, which significantly reduced the number of business trips and trips to the workplace and the resulting CO₂ emissions. We will continue to use these positive experiences of remote approaches in the long term and have expanded the tools for digitalization in accordance with our specifications for mobile working (see also the chapter on People Empowerment).

Due to the essential importance of decarbonization for our company, the annual Management Conference 2021 was all about sustainability. In line with the topic, the conference was also carried out in full using new, innovative remote approaches. In addition, the #Project1Hour took place on April 22, 2021 on the occasion of Earth Day, an initiative from our Volkswagen Group with the aim of collecting ideas and measures for decarbonization with the involvement of all employees of the company. All 14,000 MAN ES employees worldwide – as well as all VW employees – were invited to spend an hour dealing with the topic and to contribute their own ideas on how climate protection can be lived in the workplace, but also in the private environment. This shows that sustainability is anchored at all levels in the company and is a process in which all employees are involved.



Lighthouse projects 2021

Double premiere in the container segment: MAN Energy Solutions builds the world's first and largest methanol ship engine

Renewable methanol is a clean, efficient and safe fuel – and a promising option in the large container ship segment, where conventional fuel and LNG have traditionally dominated. We will soon be able to show how this works in two respects: In 2021 we received two groundbreaking orders for methanol engines.

It all started in July 2021 with the order for the delivery of the world's first slow-running dual-fuel engine for operation with methanol in the container segment. The MAN B&W 6G50ME-LGIM (Liquid Gas Injection Methanol) engine is being developed by MAN Energy Solutions in Copenhagen and Hyundai Engine & Machinery Division, HHI-EMD will produce it. Hyundai (HMD) is building the 2,100 TEU vessel in which the engine will be used for A.P. Moller-Maersk in Korea. The ship is scheduled to enter service in 2023 and will sail the Baltic Sea route between Northern Europe and the Gulf of Bothnia.

Shortly afterwards, in August 2021, a second major order from Møller-Maersk followed – this time for the world's largest dual-fuel methanol engine MAN B&W 8G95ME-LGIM. Eight engines were ordered by Hyundai's shipbuilding division, HHI-SBD, for the construction of eight 16,000-tonne container ships, again for A.P. Møller-Mærsk. The engines can burn both biomethanol and eMethanol. The first of the commissioned ships is scheduled to enter service in the first quarter of 2024.

Compared to a conventional heavy fuel oil engine, the G95 methanol engine reduces CO₂ emissions by approximately 89% when running on green methanol. Specifically, the engine will emit 8,000 tons of CO₂ per year, compared to 73,000 tons of CO₂ emissions from a diesel engine. These figures cover the main engine fuel consumption for propulsion including pilot oil.

We already have orders for 60 methanol engines, which will save 3.9 million tons of CO₂ annually once they are in operation.

With the introduction of renewable methanol as a decarbonization strategy, we are taking a leading role with our customers – well ahead of the original target for 2030. Together with these milestone projects we will pave the way for the use of methanol as a marine fuel in the large container ship segment and stimulate market interest in methanol as a fuel in other ship segments, such as bulk carriers.

Heating for Esbjerg: MAN Energy Solutions supplies a large Danish city with climate-neutral district heating

Esbjerg is the seventh largest city in Denmark and is located in southwest Jutland on the North Sea coast. A coal-fired power plant is currently supplying the 72,000 residents of the port city with heat, but this is scheduled to be shut down in 2023 and replaced by climate-neutral heat generation technology.

To this end, MAN Energy Solutions is supplying two of the world's largest CO₂ high-temperature heat pumps, which generate hot water at temperatures of up to 120°C using seawater heat and the supply of electrical energy from renewable sources. The main innovative feature is the use of CO₂ as a non-toxic and non-flammable refrigerant within the heat pump process cycle.

The customer and operator of the system is the Danish drinking water and district heating supply company DIN Forsyning, a subsidiary of the municipalities of Esbjerg and Varde. In February 2021, DIN Forsyning commissioned MAN Energy Solutions to deliver the turnkey plant. The scope of supply includes, among other things, the heat exchanger, the entire piping and steel construction within the heat generation plant, the plant control and all the process fittings required for this, ancillary units such as water pumps and the electrical infrastructure, which is provided by ABB.

The core element of the transcritical heat pump process circuits are two hermetically encapsulated and

therefore emission-free HOFIM® compressor units, which are developed, produced and tested by MAN Energy Solutions in Zurich.

With a total heat output of 50 MW, the future district heating power plant will supply 25,000 households with around 235,000 MWh of heat annually. And the best thing about it is that using MAN heat pump technology saves around 100,000 tons of CO₂ per year compared to the previous coal-fired power plant solution.

The project shows that innovative technologies such as large heat pumps from MAN Energy Solutions are important building blocks on our path to climate neutrality. In this case, too, together with our client, we are playing a pioneering role in the field of decarbonization of the heat supply and are taking a decisive step forward in Denmark's phase-out of coal. We hope that other municipalities will follow the example – also and especially in Germany, where many coal-fired power plants are still in operation.





Carbon Capture and Storage: MAN Energy Solutions reduces emissions in cement works by 50 percent with CO₂ separation system

In certain industrial and combustion processes, large amounts of CO₂ are produced which cannot yet be avoided. Cement production alone currently causes around six to seven percent of all global emissions. Can these sectors contribute at all to climate protection? And if so – how?

One way of rendering these emissions harmless, at least in part, is Carbon Capture and Storage, or CCS for short: the CO₂ is “captured” immediately at the point where it is produced and further processed or stored deep underground – for example in empty gas fields.

It is important to stress that, of course, CCS cannot be the solution to the climate crisis and the urgent need to avoid CO₂ emissions remains. However, CCS is an important transitional technology that many experts and well-known research institutes such as the International Energy Agency believe is indispensable for climate protection.

That is why we also offer CCS solutions with our partners and were able to get an important project off the ground in

2021: MAN Energy Solutions is supplying the compressor system for the carbon capture and storage plant in the Norwegian cement plant HeidelbergCement Norcem in Brevik. This will be the world’s first industrial-scale CO₂ capture plant for cement production and will capture 400,000 tons of CO₂ annually from summer 2024, which corresponds to a total of 50 percent of the cement plant’s emissions. The carbon is then compressed, liquefied and transported by ship to an underground storage location.

Our scope of services for this project includes the delivery of an electrically driven compressor train of the type RG 63-7 with integrated “Carbon Capture Heat Recovery” technology (CCWHR®). We developed this together with Aker Carbon Capture and are using it here for the first time. The heat generated in the compressor system is recovered and used using a new process: Steam generators cool the CO₂ mixture between the compressor stages and generate steam, which in turn covers almost a third of the heat requirement of the CO₂ separation system. Together we

are offering a system solution that uses significantly less energy than previous carbon capture technologies.

All in all, we are not only realizing a groundbreaking project for an industry that plays a key role on our way to a decarbonized global economy – we are also pursuing the goal of doing pioneering work in the field of CCS technology.



Circular economy

Alignment and strategy

By circular economy we mean a regenerative system in which the use of resources and energy on the one hand and the production of waste and emissions on the other are minimized. After all, our natural resources are finite and sustainable growth is therefore only possible if it is decoupled from their consumption. To achieve this, resources and materials must be put into a cycle that ensures they can be used for as long as possible. The circular economy is supported and accompanied by various initiatives, such as the European Green Deal, which, in addition to climate neutrality by 2050, also aims to decouple growth from resource use.

For MAN Energy Solutions, the circular economy is a central element of the sustainability strategy, especially as it is closely linked to other focus areas:

for example, reduced use of resources makes a positive contribution to a responsible supply chain, as it also has less environmental impact. If we increase the service life of the products we already have on the market through product improvements and upgrades, retrofits (conversion of products, e.g. to more environmentally friendly fuels) and optimal service and maintenance, we also cause fewer CO₂ emissions – another important aspect in terms of decarbonization.

In the area of circular economy, we operate in two main fields of action: On the one hand, we gear our own production to energy and resource efficiency and constantly optimize our waste and recycling management. On the other hand, the high quality and technological performance of our products and solutions ensure a long service life – this is also an important aspect in the circular economy. With appropriate design, maintenance and

servicing, our systems can achieve a service life of more than 25 years, sometimes up to 50 years. For this reason, their longevity and a service concept that provides for simple maintenance, servicing and repairability as well as in many cases also retrofitting (in the engine area, e.g. the ability to convert to alternative fuels) are in the foreground right from the development stage. Accordingly, we support our customers in the best possible way.

We combine all of these after-sales services under our independent brand MAN PrimeServ. It includes various areas that are of particular importance here: MAN PrimeServ Assist as a digital service solution for our customers, the preparation of components (reconditioning) and the retrofit area.

The retrofit trend towards decarbonization of the products and systems already in the field is supported by various regulations and changes in the

law: For example, the International Maritime Organization (IMO) introduced the Energy Efficiency Existing Ship Index (EEXI), according to which merchant ships and cruise ships over 400 GT must meet certain efficiency standards. The Carbon Intensity Indicator (CII) will also come into force together with EEXI. The aim is to align the operation of the ships with strict CO₂ emission values. If a ship needs a retrofit to meet EEXI standards, the opportunity should be taken to also invest in an optimal CII rating.

Against this background and other regulatory requirements, such as from “Fit for 55”, we see enormous potential in our retrofit area to make a significant contribution to an effective circular economy and to decarbonization. Our goal is to further strengthen our activities here and to quadruple the associated sales by 2025 compared to 2019.



UTILIZATION IN OTHER SEGMENTS



Activities and actions in 2021

Activities related to the supply chain

With a focus on our supply chain and our own locations, we made a contribution to a sustainable circular economy in 2021 through many different actions. These include actions to improve waste management, to optimize the circulation system for load carriers or the increasing use of paper and cardboard packaging instead of plastic packaging. Also worth mentioning is our own foundry in Augsburg, where we used almost 100% secondary materials (casting or steel waste) for our gray cast iron again in 2021.

The continuous increase in our product quality and the associated reduction in our non-conformity costs over the last few years also supports the circular economy: the fewer rejects we produce, the more environmentally friendly we act, since fewer resources and energy have to be used for repairs or scrapping. This shows: For us,

product quality is not only essential with regard to our customers, but also in terms of the environment.

In the context of the circular economy, component marking and product tracking are also becoming increasingly important. With clearly marked components, we can improve transparency in the supply chain, increase the reliability, durability and safety of our products and track the products better throughout the product life cycle and link them to important information – e.g. for later recycling and hazardous substance management. Numerous activities in this regard are bundled in the TRUST initiative, which was also pushed ahead in 2021 (TRUST = Transparency, Reliability, Unity, Safety, Traceability). With this approach, the components are marked with a serial number or a scannable data matrix code and digitally recorded

and linked to measurement and supply chain data. This allows the part to be traced back over its entire product life cycle. TRUST optimizes our processes, increases traceability and product quality and ultimately also offers protection for our customers against defective plagiarism that can cause serious damage – to name just a few advantages.

TRUST also supports the implementation of the IMO Ship Recycling Convention, which came into force in 2021, the worldwide agreement for the environmentally friendly recycling of ships and the improvement of working conditions in demolition shipyards. It should be emphasized here that we have been applying this set of rules on a voluntary basis in the area of new marine construction since 2012. Last year, this approach was then extended to the spare parts business.

Activities related to product use

MAN PrimeServ takes care of our customers and our products and solutions in the field. This way, too, we have great leverage to improve the circular economy.

For example, as part of MAN PrimeServ Assist, we have been offering additional digital solutions since 2021 that guarantee the highest possible product reliability by detecting irregularities in operation quickly and reliably. The basis is the digital platform CEON, on which the product data is collected and analyzed by algorithms. Our experts, who are organized in a global network and are therefore available to our customers around the clock, proactively evaluate the results and provide the operators with recommendations or an action plan.

With this condition-based maintenance approach (CBM), we can increase the availability and overall efficiency of the systems in the field, optimize maintenance intervals and prevent damage that requires repairs and thus resource-intensive damage. In the end, this also helps to ensure a safe working environment for our customers' employees. In many cases, the problem can be solved via remote maintenance. This form of digital collaboration makes a lot of travel unnecessary – which also makes a significant contribution to reducing CO₂ emissions.

This service is already very well received by our customers. For example, around 1000 systems in the marine and industrial segment are currently already connectivity-enabled. Our goal is to further significantly increase this number in 2022. All future new systems should already be delivered “CEON-ready”.

We also want to expand the PrimeServ Assist portfolio in the course of 2022 with various additional service packages for optimizing efficiency. For example, we give our customers recommendations for increasing their system performance based on their fuel efficiency data and analysis of the influencing factors. This in turn can also reduce CO₂ emissions. The offer for maintenance optimization provides recommendations based on a data-based indication of the state of wear of individual components as to whether they should be replaced or whether they can be used longer. All of these measures prevent damage and further increase efficiency.

We also want to carry out software updates and upgrades more “over the air” in the future and thus further reduce air travel.



We use another important lever for a sustainable circular economy via the retrofit measures: This is what we call the conversion of ship engines in the existing fleet, for example, but also of systems in power plants or industrial applications for more efficient or lower-emission operation. Our retrofit product portfolio includes various solutions, depending on the product in question, which regulations apply or which goals are to be achieved.

One measure is our MAN-oPL solution (overrideable power limitation), for example, which limits the power of the engine via an electronic engine control, but can still provide the full engine power in a justified exceptional case.

Conversions from diesel to LNG or MeOH or, in the future, also to hydrogen are appropriate measures. This not only extends the service life of

an engine by many years, but also saves an enormous amount of CO₂ emissions. In summary, in 2021 we can look back on the installation of over 600 individual efficiency packages, 13 complete engine conversions and 14 turbocharger retrofits in the retrofit area. An impressive highlight for a large retrofit project is the conversion of the ElbBLUE, which we describe in our lighthouse project.

Our reconditioning offers for overhauling, repairing or calibrating old or defective components also support the approach to improving the circular economy. This way we extend the service life of the components and the customer gets his own fully functional component back. Basically, the cost of remanufacturing a component is significantly lower than manufacturing a new part, and the consumption of resources and the carbon footprint are reduced.

The ecological footprint of the new production of a MAN 48/60 cylinder head is around 7600 kg CO₂. Only 700 kg of CO₂ are generated during reconditioning, which corresponds to a CO₂ saving of approx. 90%.

Finally, we would like to point out the positive contribution made by converting face-to-face training courses in the PrimeServ Academy into new digital formats. In 2021 we trained the global MAN Energy Solutions Service Team as well as our customers about the new digital formats. This training included 40 courses with 350 participants. Numerous flights to face-to-face events were avoided this way. Assuming an average of 2.8 tons of CO₂ for an overseas flight and 0.8 tons of CO₂ for a flight within Europe, this results in savings of around 500 tons of CO₂.

600

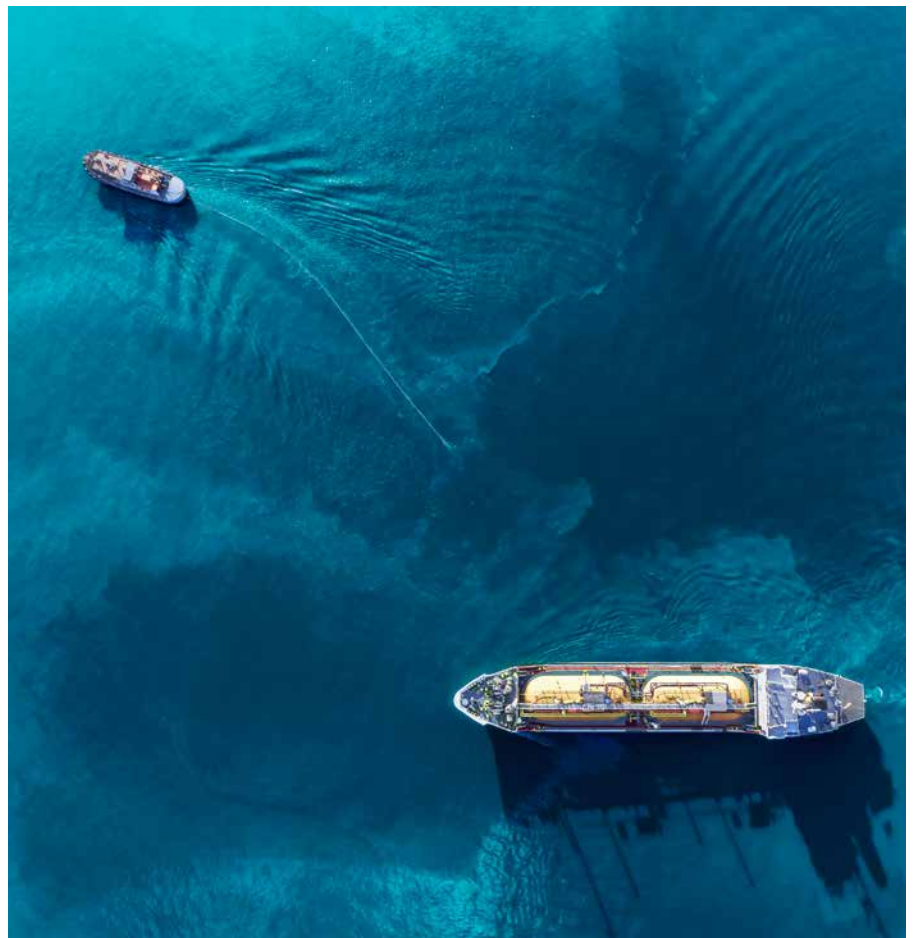
efficiency packages

13

engine conversions

14

turbocharger retrofits





Lighthouse projects 2021

Prime example of a retrofit: the container ship ElbBLUE runs on synthetic natural gas from renewable energies

With so-called retrofits, MAN Energy Solutions is converting the existing maritime fleet and thus enabling ship engines to use CO₂-reduced or climate-neutral fuels. An impressive example of such a project is the 1,036 TEU container ship ElbBLUE, which sails the North and Baltic Seas. As early as 2017, it made headlines as the first ship in the world whose engines were converted to gas propulsion.

For this purpose, the original MAN 8L48/60B main engine, which ran on heavy oil, was converted to the MAN 51/60DF four-stroke unit. As a multi-fuel engine, the unit has since enabled the use of liquid natural gas (LNG) as fuel in addition to heavy fuel oil (HFO). This conversion has already led to a significant reduction in emissions.

The next big step then took place in October 2021: As the world's first container ship, the "ElbBLUE" bunkered around 20 tons of synthetic natural gas from 100% renewable energies in the Elbe port of Brunsbüttel Ports and thus used a mixture of LNG and SNG for the first time. This was the first time that green SNG, obtained from CO₂ and electricity from renewable energies, was used in commercial shipping. The added quantity of 20 tons – which corresponds to around 50 percent of the tank filling – reduced the ship's direct CO₂ emissions by around 56 tons. This reduced CO₂ emissions by 27% compared to running exclusively on LNG.

With this project, we at MAN Energy Solutions have provided evidence that our concept of a maritime energy

transition is technically viable: It shows that ships retrofitted for LNG operation can also be operated with green fuels from Power-to-X without engine modification – a groundbreaking step towards green shipping.

We are now committed to creating the regulatory conditions so that these fuels will be available on the market in future at competitive prices and in sufficient quantities.

Subsidiary of MAN Energy Solutions DWE supplies reactor system for the production of biodegradable plastic to China

A project that started in September 2021 shows how we enable our customers to establish a sustainable circular economy on their part: Our subsidiary DWE® is supplying three salt-powered reactors for a new maleic anhydride plant for Wanhua Chemical Group Co. Ltd.. Wanhua is the leading supplier of chemical products in China. The plant is designed for the production of PBAT (polybutylene adipate terephthalate), a raw material for biodegradable plastics. Buried in the ground, PBAT-based plastic decomposes through the action of natural microorganisms such as fungi, algae and bacteria, leaving no toxic residue.

Since the Chinese industry is currently making increasing efforts to produce environmentally friendly packaging, China expects demand for maleic anhydride to increase in the coming years. Wanhua is preparing for this with the new plant, which will be one of the world's largest production plants for maleic anhydride with a total capacity of 200,000 tons per year. The technology solution supplied by MAN Energy Solutions will cover an annual capacity of 67,000 tons per reactor system. The reactors have a diameter of more than 10 meters and reach an operating temperature of up to 450°C. Our technology solution corresponds to the

current development trend in the maleic anhydride industry towards larger capacity, lower power consumption and safer operation. In addition, we are the only manufacturer in the world that can cover the high capacity of 200,000 tons of maleic anhydride with just three reactor systems.





Responsibility in the supply chain

Alignment and strategy

As a large manufacturing company, we have an enormous human rights and ecological responsibility in our internal and external supply chain. We live up to this responsibility by complying with regulations, standards and voluntary commitments regarding occupational safety, the environment and human rights. They are decisive for our actions and an essential part of our strategic mission statement. Specifically, we implement this through appropriate programs, management systems and initiatives.



Internal supply chain

In general, it can be said that in many respects we understand our obligations much more broadly than the legal requirements stipulate.

Our Integrated Management System (IMS), which comprises the three standards of quality management, environmental management and occupational health and safety, forms the strategic framework for our measures in the internal supply chain. All of our production sites are triple certified according to the above standards. In addition to the HSE management system in accordance with ISO 14001 and 45001, we want to expand our energy management and have it certified in accordance with ISO 50001.

The continuous improvement of our Compliance Management System for Health, Safety and Environment

(CMS-HSE) is also an important aspect for us. To this end, we have integrated the approach of an ECMS (Environmental Compliance Management System) defined by Volkswagen into our existing Integrated Management System and thus also included occupational safety and health protection in addition to environmental aspects. This system is continuously being improved.

External supply chain

For years there have also been comprehensive regulations, processes and audits for responsibility in the external supply chain.

A key role is played by our Code of Conduct for suppliers and business partners, which is binding for everyone. This agreement already sets out a very concrete framework with regard to the observance of human rights and environmental protection.

On January 1st, 2023, the new “Act on Corporate Due Diligence in Supply Chains” (Supply Chain Act, LkSG) will come into force in Germany. For the first time, the law places new, stricter requirements on companies above a certain size with regard to environmental protection and compliance with human rights throughout the supply chain.

With our activities, we already cover a large part of future demands today. Strategically, it is now a matter of reconciling these existing programs and measures with the requirements that will apply in the future. Our activities are already based on the present draft of the EU supply chain law, which will contain further requirements that go beyond the LkSG.

Activities and actions in 2021

Internal supply chain

Our occupational health and safety management system and our environmental management system are core elements of our supply chain responsibility activities. In 2021 we started a project with which we are focusing even more on the important topic of energy within our environmental management. With regard to the planned certification according to ISO 50001, the introduction of an improved energy management system was started and our energy efficiency measures were intensified. The certification of our two main locations in Augsburg and Oberhausen according to ISO 50001 is planned for the years 2023 and 2024.

The second major project in 2021 was the introduction of our new Compliance Management System - Health, Safety & Environment (CMS-HSE). This expands our requirements for environmental protection and occupational safety with additional aspects and establishes a uniform, transparent process with which suspected irregularities can also be reported quickly and effectively. You can find more information on this in our lighthouse project.

External supply chain

The year 2021 was characterized by dealing with the requirements of the new LkSG and comparing the required actions with our existing measures, processes and initiatives. A LkSG risk management process was developed. This consists of four phases, each of which includes various measures and precautionary mechanisms.

We will continue to improve proactive risk management in the supply chain by passing on our own requirements and ambitions more intensively to our upstream supply chain. The implementation of specific requirements of the LkSG will be checked and ensured in the future, for example, via our existing supplier audits. A so-called sustainability rating, provided with various measures, is also intended to ensure a further increase in the level of sustainability at our suppliers. To this end, in 2021 we developed a new process with the four phases Evaluate - Prevent - Detect - React. This includes many existing programs and measures, supplements them with newly required actions and transfers this overall package into a new system.



Some of these tools were already established or were adapted and expanded accordingly for the conception of the process. There were also new tools to fully cover the requirements of the LkSG. The four process phases are:

Evaluate stands for regular risk analysis in the areas of human rights and the environment. This has been firmly established in the company for many years and is now being expanded to include topics relevant to the LkSG.



Prevent includes the transparent information and training of our suppliers about our sustainability requirements, based on their respective risk exposure



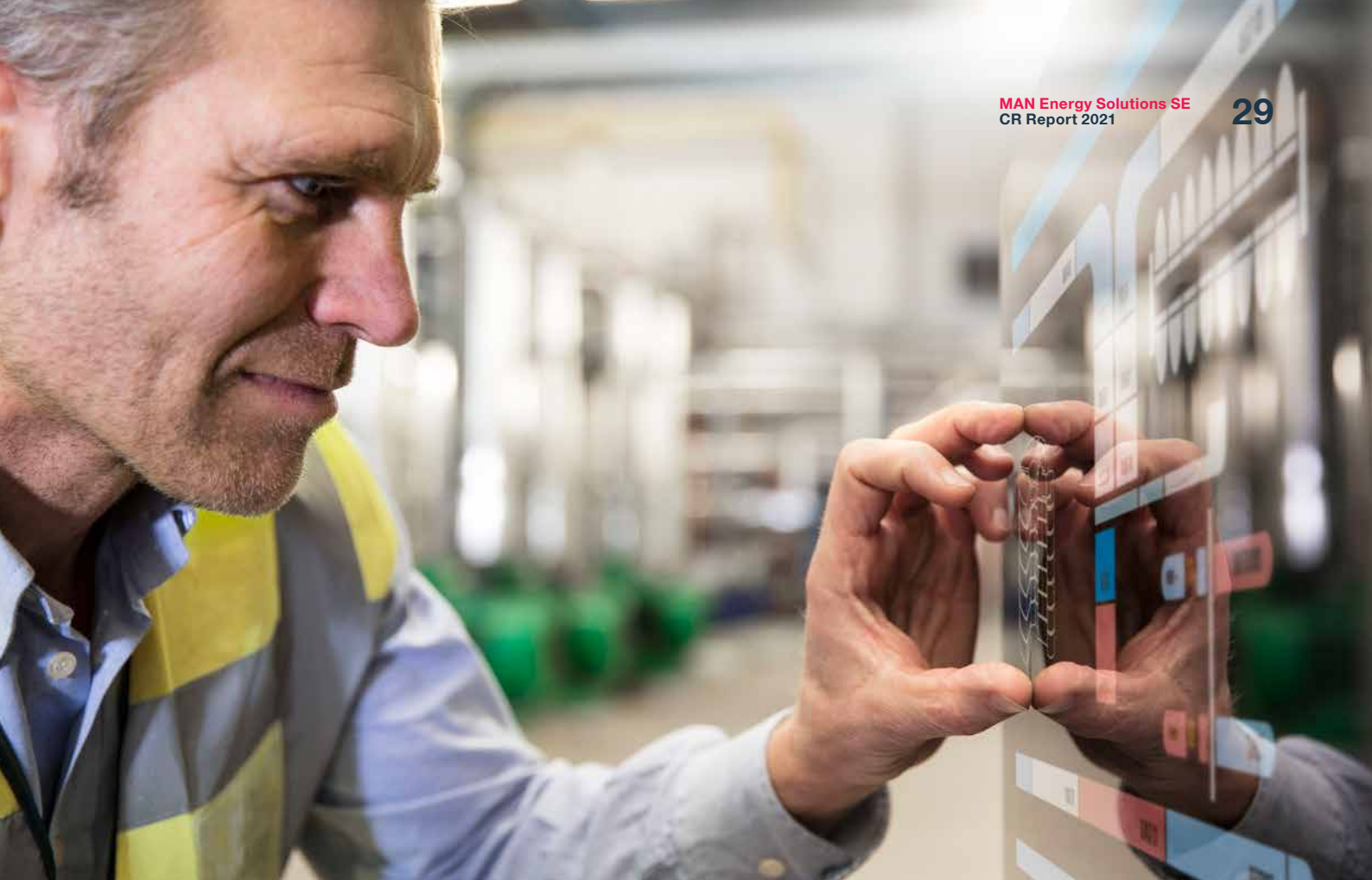
This process step, which was comprehensively implemented in 2021, also includes audits for new suppliers as part of the existing QHSE audits.

Detect means checking the communicated expectations and the continuous screening and monitoring of suppliers by external service providers. This process step also includes a sustainability rating depending on their individual risk exposure. This process step was designed in 2021 and will be implemented in 2022.



React means: goal-oriented approach to identified risks or misconduct. This includes, for example, the creation of action plans for the respective suppliers. Preparations and planning for this took place in 2021, and implementation is currently being prepared.





An essential tool for this process step is the cross-departmental ad hoc meeting, which already existed and has now been repositioned. It is convened in the event of a serious violation of the sustainability requirements in terms of environmental protection, occupational safety, human resources or human rights and initiates remedial measures if necessary.

Another important point that was strongly promoted in 2021 is action against corruption – an initiative that goes back to an approach by our parent company VW. To this end, we have introduced an anti-corruption check “Supplier Due Diligence” (SDD) for certain suppliers.

The decisive factor for the risk assessment is a combination of the risky business model and the supplier’s company headquarters. If the suppliers

are in certain countries with a high risk of corruption (CPI: corruption perception index, transparency international), they must go through a separate process before the order is placed. We implemented this procedure in full for general procurement in 2021. Our plans envisage extending this measure to other procurement areas in the future.

In 2021, we also expanded our PrimeServ Omnicare area with customer training courses on topics related to the operational safety of our engines and systems. We understand PrimeServ Omnicare to be a comprehensive service package for our customers who, in addition to MAN Energy Solutions turbo machines and systems, also use machines from third-party suppliers and want to maintain, repair or modernize them from a single source.

Lighthouse projects 2021

Even better compliance management: Our new CMS-HSE system

CMS-HSE – this stands for Compliance Management System – Health, Safety & Environment. This new system adds additional aspects to our requirements relating to environmental protection and occupational safety and establishes a uniform, transparent process with which suspected irregularities can also be reported quickly and effectively.

The CMS-HSE was developed in 2021 and initially introduced in Germany as part of our Integrated Management System (IMS) in order to better meet our responsibility for the environment and employees. The aim is to continue to promote and support compliance – i.e. adhering to the rules and requirements we have specified – internally and externally with regard to environmental protection.

For this purpose, the system uses the steps already known from the risk management process: Prevent (prevention through training, risk assessment and an open communica-

tion culture), Detect (four-eyes principle, audits, controls) and React (reaction to incidents in order to eliminate them, and to avoid repetition).

The central tool is the Quentic software, which maps and supports the process: It is based on a legal register in which HSE-relevant legal standards are stored. From this, the system extracts tasks and assigns them to the respective manager based on the workplace. The constant adjustment and updating of the legal standards and the obligations derived from them are carried out by a service provider. The system offers managers an

overview of their individual duties and the necessary documentation of their fulfillment at all times and can assign the tasks.

An important component of the CMS-HSE is a new whistleblower system that summarizes the reporting of violations in a clear, binding process and thus makes it simpler and more transparent. Through this new process, we also want to encourage the reporting of suspected or potential violations to further minimize risks.

Actions for more biodiversity and environmental protection

The decline in biological diversity has accelerated at an alarming rate in recent years: more and more animal and plant species are becoming extinct worldwide. That is why every action helps and is important – no matter how small it may seem. In order to also recognize private initiatives for more biodiversity and environmental protection and to present them as examples to other employees, MAN Energy Solutions launched an internal competition on the occasion of Biodiversity Day on May 22, 2021.

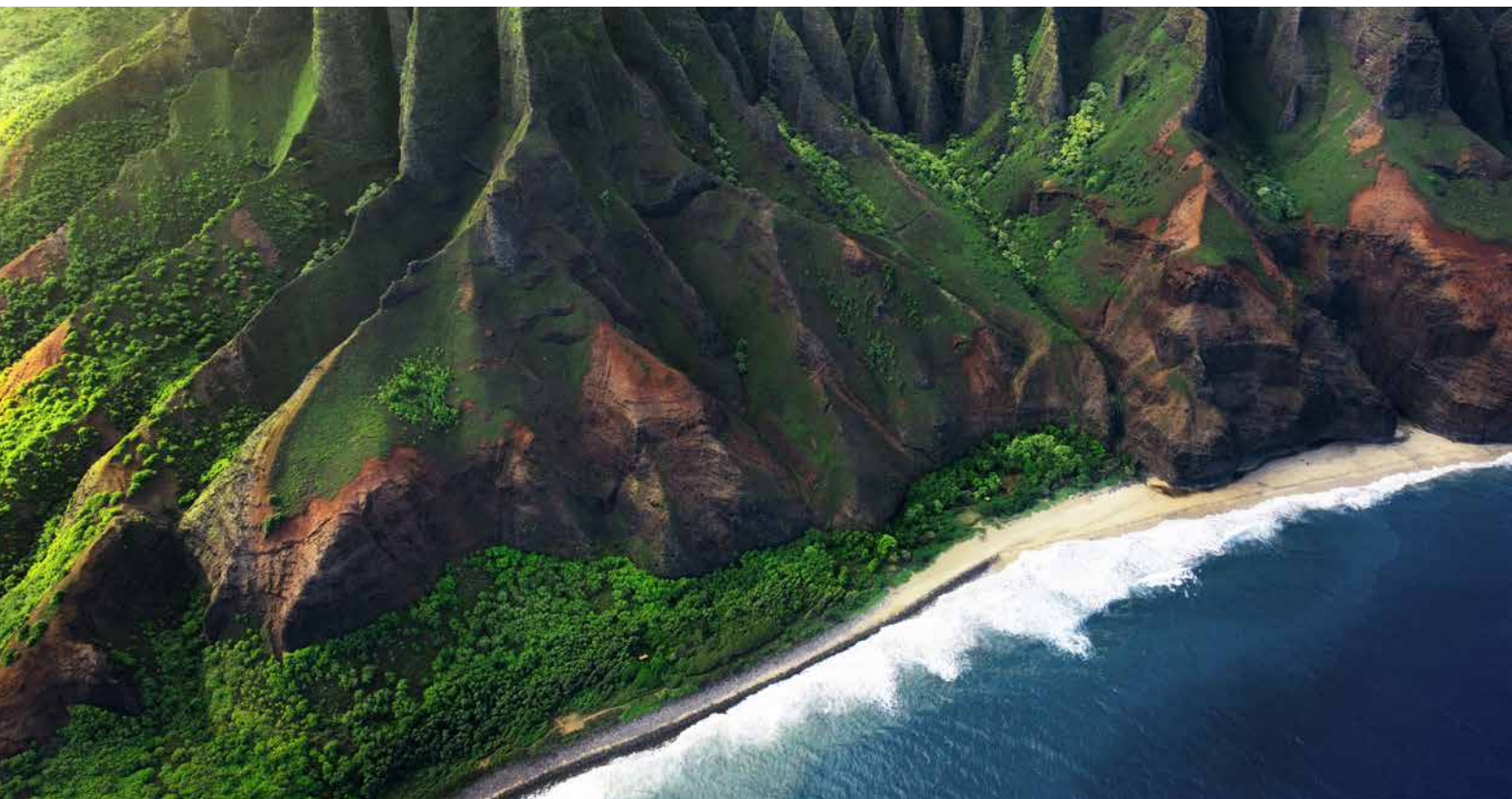
We received numerous letters from nine countries showing that many of our employees around the world are already committed to environmental protection. Two examples: In Augsburg, a private garden and an adjacent over-fertilized usable area were upgraded to a 3,200 square meter ecological landscape. A flowering and species-rich rough pasture with various wet biotopes and natural stone walls,

surrounded by a 140-meter-long wild hedge, offers a home for many different insects, birds and small mammals that use the garden as a territory and for raising their offspring.

In Deggendorf, too, an employee has created a natural garden in which owls and kestrels nest, wild bees live in the insect hotel, dragonflies live in the small wet biotope, grass snakes and lizards find shelter in stone walls and piles of leaves, and dead wood is naturally decomposed by insects and fungi.

Where possible, MAN Energy Solutions also implements its own campaigns to promote biodiversity and protect the environment – for example at the Danish site in Frederikshavn: various projects that had been started earlier were continued here in 2021. For example, our employees in Frederikshavn – supported by residents and local companies from the city – planted more than 100 apple trees and fruit

bushes on our company premises and created a strip of fauna around 180 meters wide for the bees, butterflies and insects. The A.P. Møller Foundation also participated in this project and created paths suitable for the disabled and purchased play equipment. This is a great example of how you can achieve a lot for the environment and people together – companies, business partners, communities and their residents. This area, which is publicly available to all residents of Frederikshavn, is used by schools and other educational institutions, but also by the employees of MAN Energy Solutions, who go for walks, meet here and in the surrounding area and even hold meetings.





People empowerment

Alignment and strategy

MAN Energy Solutions is currently implementing the “Performance 2023” program, which aims to ensure the company’s future viability in the long term and to support and economically secure the transformation into a provider of climate-friendly solutions for the maritime industry, the energy sector and industrial production. Performance 2023 has also strongly shaped the strategy, goals and activities in the area of human resources in 2021. The main thing here is to involve all employees closely in the change process, to support and encourage them during the transformation.



A Germany-wide qualification initiative called “Transformationsqualifizierung” (transformation qualification), which started in 2021 in cooperation with the works council, plays a central role in this transformation process. The aim is, on the one hand, to secure important core competencies in the company and, on the other hand, to build up further future-oriented competencies. Numerous qualification measures had already been successfully implemented at the time this report was published. Further training initiatives and training series as well as a roll-out of the program are planned for 2023. Further details can be found in the corresponding lighthouse project.

In addition, as part of our transformation process with the “Future Makers Initiative” in 2021, we implemented various formats to involve our employees in the transformation: The formats were developed in close cooperation with many committed employees worldwide, who greatly enriches the approaches with their personal perspectives and efforts.

Activities and actions in 2021

Various formats have emerged from this Future Makers initiative, such as “Time2Ask”. The Executive Board and top management of the individual areas answer the employees’ questions about the strategy. 15 Time2Ask digital events, attended by between 50 and 400 employees, have already taken place worldwide in the course of 2021.

In another worldwide, digital format, internal experts present strategic topics and answer questions from the audience, similar to the so-called TEDx Talk ©. Two events took place in December 2021, which were recorded and were available for later viewing as well. With this event alone, we reached around 600 employees.

Both Time2Ask and discussions with internal experts will continue in 2022. The new website “Enabling for Change” also emerged from the initiative. It offers support for the implementation of the change process in everyday work. The users’ question “What is change and what does that mean for MAN ES?” is answered here, and practical methods, tools and tips for the change process are made available. “DrivingChange @ MAN ES” will start in autumn of 2022, a training initiative in change management for all managers worldwide. All transformation initiatives and events can be accessed on our new FutureMakers intranet-page. From 2022, new innovation formats will also be implemented, such as “Hackathon”, a format for finding quick solutions, and “Innoflex” as a kind of “Shark tank” for generating new innovative ideas.

A major innovation was the expansion of “mobile working”: Here, the very good experiences that MAN Energy Solutions had with employees working from home due to the pandemic were transferred to a new concept for mobile working. In this concept there is more room for flexibility to meet the needs of individual areas and teams. The aim of this regulation is also to further increase the compatibility of family and career. In order to ensure the greatest possible occupational safety and ergonomics in the home office, we developed and offered online training courses and a manual for mobile working in 2021.

In 2022, this approach will be expanded to include a shared desk model, in which several employees share a desk in the office. In preparation for this, various pilot projects have already taken place in the company.

15
digital events

400
participants

600
employees reached
with Time2Ask

Our employee survey “Stimmungsbarometer (Mood Barometer)” in 2021 showed that the possibility of working from home has a positive effect on satisfaction: Here, the aspect of “work-life balance” emerged with above-average approval ratings. Incidentally, the regulation for extended work in the home office also has a positive impact on our efforts to decarbonize, since there are fewer trips to the office and thus less CO2 emissions.

Another focus area in 2021 was the promotion of diversity in the company as a success factor for the future. Against the background of an extremely dynamic business world, we want to anchor the topic of diversity in all its facets as part of the corporate culture. This is what the Diversity Wins initiative aims to achieve. With the workshops for managers, we create space for exchange and discussion and provide opportunities and concrete concepts for how diversity can be implemented in everyday working life. By the end of 2022, 1,250 managers worldwide should have completed the Diversity Wins program (you can find more details in the “Diversity Wins” lighthouse).

The topic of training played a very important role again in 2021 in order to cover our need for skilled workers. Here we can report a special success in 2021: A trainee at the Deggendorf site was awarded as the best nationwide out of 2,223 young trainees in his training field construction mechanics welding technology. He completed his training in January 2021 with an overall grade of 1.0 (99 out of 100 possible points). With this result, our trainees continue the list of award-winning degrees at MAN Energy Solutions – a track record of which we are very proud, as it certifies the high quality of our training and the enormous commitment of our trainers.

Finally, one particularly pleasing result from the employee survey for 2021 should be mentioned: The positive development of the results of the last few years continued here with increasing approval ratings. Within this positive trend, the aspects “Compliance and Integrity” continued to receive the best ratings. This shows us that we are on the right track in terms of employee satisfaction and important issues such as compliance, integrity or the connection between work and private life.





Lighthouse projects 2021

We believe in diversity: Our Diversity Wins program

At MAN Energy Solutions, the topic of diversity is already anchored in our internal guidelines as a maxim of our actions. Living this diversity every day is the responsibility of every single employee. In order to anchor the topic of diversity even more deeply in the company, our Diversity Wins program was continued in 2021 with a focus on Germany and Denmark.

At the heart of the program are workshops that provide managers with specific tools to establish and anchor the topic of diversity in their team or department and to live it every day. In

the workshops, the topic of diversity was examined from all sides, making it lively and tangible for the participants. A large number of perspectives and opinions came together and in the end all participants had a common understanding of the enormous importance of this topic.

In the first wave of implementation in 2021, more than 750 managers have already taken part in around 230 workshops in Germany and Denmark, which corresponds to a participation rate of 100 percent. In 2022, a further 250 managers are to be trained in a

second wave for France, Switzerland and India. From July 2022, waves 3 and 4 will follow for all other global company locations. A total of around 1,250 managers will have completed the Diversity Wins program. This is a fundamental basis for the sustainable implementation of this important topic.

Fit for change:

Our major qualification initiative

Maintaining valuable skills for the company and developing skills that are crucial for the future – that is what our large-scale qualification initiative, which was designed and launched in 2021, is all about.

For this purpose, a special budget for the qualification of the employees is available for the years 2022 and 2023 – in addition to the already existing training budget. The money is used to finance training measures that transfer important know-how that is at risk of being lost due to personnel changes as part of Performance 2023 to other employees and develop future-oriented skills.

The qualification initiative was preceded by intensive analyzes in cooperation with the managers. These resulted in focal points for expanding knowledge and developing skills, e.g. in the areas of digitalization, IT, automation, agile project management, new technologies and change management.

The concept covers three main areas: First, there is the qualification of employees who take on new tasks in the context of the Performance2023 program. The department-specific establishment of additional expert knowledge for the implementation of our new strategy and future technologies is also promoted, as is the expansion of cross-departmental future competencies. The corresponding training and courses are possible in both digital and face-to-face formats and are now being successively implemented both internally and in cooperation with external institutes and service providers.

In the future, the process will also be extended to international locations. Here, too, a needs assessment will be the first step in developing tailor-made and sustainable concepts.



Health protection

2021 was also marked by Corona

Protecting the health of our employees is of the utmost importance to us. To this end, we at MAN Energy Solutions have a comprehensive and differentiated HSE management system and promote the health of our employees through numerous programs, offers and campaigns. Against the background of the pandemic in 2021, a special approach was also required with regard to health protection.

We took various measures to minimize the risk of infection for our employees at the locations, on the way there and on business trips to the best of our ability.

The overarching corona crisis management team established in 2020 and the local crisis management teams continued to exist and managed the measures at the various locations. This enabled the measures to be implemented quickly and the country-specific requirements to be taken into account. For close coordination, there was a weekly meeting for those responsible for the crisis management team and representatives of the HSE team in the German-speaking area in order to coordinate the measures and specifications and to exchange best practices. Thanks to the close cooperation with VW, many synergies could be used and activities bundled, e.g. when purchasing and making available protective masks and rapid tests.

We closely involved our employees in the measures. For example, we inspected the workplaces of employees who were

previously ill or were particularly at risk and defined measures to minimize the risk of infection.

A special focus was on the offer of vaccinations, especially at the German locations: Here we carried out a total of around 4,000 vaccinations (first, second and third vaccinations) in 2021. For many high-risk patients, we were even the first employer to offer them vaccination. We informed this group about possible vaccination dates before anyone else.

The topic of business trips presented us with a particular challenge, and these were significantly reduced in general. All business trips abroad were assessed individually over a period of several months. The assessment of the state of health of the respective employee by means of a company medical examination was also included. The health service team took on the filter function here and evaluated all the general conditions, including the employee's state of health. The aim was to protect employees as far as

possible from infection on a business trip and to spare them the burden of any strict quarantine regulations in the destination countries.

Wherever possible, meetings and maintenance work on our engines and systems were carried out "remotely", i.e. digitally, so that there was a significant reduction in business trips worldwide down to ones that were simply unavoidable. This procedure was maintained until 2022 and can be re-established at any time should the Corona situation require it – just like the other proven measures that we implemented in 2021.

Foodversity:

sustainable company catering at MAN Energy Solutions

Company restaurants are not only places to eat, but also places to meet, exchange ideas and feel good. Good company catering increases motivation and employee satisfaction. In addition to these employee-related aspects, company catering – like all other business units – must meet the requirements of sustainability. Against this background, the concept “Foodversity - Go green. Taste life” for sustainable company catering was set up in 2017 and has received several awards since then. This concept is being implemented at the MAN Energy Solutions locations in Augsburg, Hamburg and Oberhausen. The measures are developed in Augsburg, tested as a pilot project and the results

measured. They can then be adapted to the needs and circumstances of the other locations.

Foodversity is a good example of how the four sustainability action areas responsible supply chain, people empowerment, circular economy and decarbonization are related and how they are lived in all areas at MAN Energy Solutions.

Various Foodversity projects and campaigns also took place in 2021 to save energy and minimize food waste: For example, as in previous years and still today, vegetables that do not fully meet the aesthetic requirements of sales in some places were bought so

that these are not disposed of in waste. At the so-called food-saving buffet, guests put their meals together individually according to their personal taste and in the desired quantity. In conjunction with intensive sensitization of employees to the topic of food waste, this resulted in the achievement of the self-imposed goal of reducing waste by more than 50 percent by the end of 2021.

The company catering team pays attention to animal welfare, for example by not using eggs from cage farming and meat comes exclusively from farmers who meet the criteria of the “Initiative Animal Welfare”. We also support the European broiler chicken initiative. This





means that our supplier companies and external caterers are not allowed to use poultry from factory farming.

Own production also plays a role in company catering: herbs such as rosemary, peppermint, lemon balm and thyme are grown in-house and used in the kitchen, and at the Augsburg site the hard-working company bees have been producing honey for a number of years, which is served in the staff restaurant. Bread and pastries are sourced in the region and baked on site. By the way: Due to the conversion of the Augsburg company catering in 2015/16, the kitchen now only uses half the energy, although more appliances are in use.

A measure with a great effect, which fully exploited its environmental protection potential, especially during the Corona crisis, was the deposit menu boxes and cups that were introduced in 2019. During the pandemic, when it was not possible to eat in the company restaurant for a long time, these containers made single-use plastic packaging unnecessary – and thus saved a lot of waste. In 2020 and 2021, the range of reusable containers was further expanded.

In general, Corona presented company catering with immense challenges in 2021. Planning uncertainty, significantly reduced guest numbers, hygiene concepts, etc. demanded a lot from the

team. It is all the more remarkable that we have succeeded in ensuring that our employees are supplied with food on a daily basis while not deviating from the sustainability criteria.

Selected key figures at a glance

Economic development

In 2021 we were able to increase both sales and incoming orders again. This shows us that our strategic direction and our “Performance 2023” efficiency program are having an effect. Performance 2023 helps us to advance and economically secure the transformation of MAN Energy Solutions into a solution provider for climate-friendly ship systems, power plants and energy storage systems.

	2021	2020	2019
Orders received (in million €)	3 821	2 933	3 804
Turnover (in million €)	3 278	3 267	3 462
Investments (in million €)	53	101	118
% of turnover	1,6 %	3,1 %	3,4 %
Research and development (in million €)	174	192	206
% of turnover	5,3 %	5,9 %	5,9 %
EBIT (in million €)	176	42 ¹⁾	96
RoS (in %)	5,4 %	1,3 % ¹⁾	2,8 %

¹ Result before posting a restructuring provision for performance 2023

Employees

Structure of the workforce¹⁾

	2021	2020	2019
Core workforce	13 331	13 978	14 441
thereof female	2 012	2 112	2 158
thereof male	11 319	11 866	12 283
thereof part-time employees	480	505	508
thereof female	304	346	330
thereof male	176	159	178
thereof employed on a temporary basis	377	458	533
thereof female	70	76	86
thereof male	307	382	447
Trainees	519	583	569
thereof female	81	107	94
thereof male	438	472	475
thereof in Germany	369	372	355
Employees in semi-retirement passive phase	212	221	188
Workforce	14 062	14 782	15 198
Temporary workers	137	149	491

¹ At the end of each year

Employees of MAN Energy Solutions

	2021	2020	2019
Workforce (value-adding)	13 468	14 127	14 932
Germany	6 511	7 064	7 526
Abroad	6 957	7 063	7 406
Share abroad in %	51,7 %	50 %	49,6 %

Age structure

	2021	2020	2019
Core workforce	13 331	13 978	14 441
<= 30	1 615	1 483	2 032
31 – 40	4 013	4 156	4 505
41 – 50	3 615	3 806	3 743
51 – 60	3 361	3 586	3 247
> 60	727	947	914

Women in leadership positions

We are glad that after a slight decline in 2020 we were able to increase the proportion of women in the permanent workforce again. A differentiated picture emerges when it comes to the proportion of women in management. In the management group (Managementkreis, MK), the proportion has recently decreased, in the upper management group (Oberer Managementkreis, OMK) we were again able to slightly increase the proportion.

	2021	2020	2019
Percentage of women in core workforce	15,1 %	14,8 %	14,9 %
Percentage of women in management group (MK)	9,3 %	11 %	10,6 %
Percentage of women in upper management group (OMK)	4,8 %	4,7 %	4,6 %
Percentage of women in top management group (TMK)	0	0	0

Vocational training/qualification

In 2021 we were again able to very successfully implement the knowledge gained from the previous year regarding effective training under pandemic conditions and to continue the excellent cooperation of all those involved – from the trainers to the crisis management team all the way to the health service. Once again, a big thank you to all trainees who, despite the protective measures, devoted themselves to their training with great discipline. With great success: A trainee at the Deggendorf site was awarded as the best nationwide out of 2,223 young trainees in his training field construction mechanics welding technology. This shows that despite Corona, we can achieve our common goal: the successful training of young junior staff and skilled workers. We are also proud that we were once again able to take on 100% of the trainees in Augsburg.

	2021	2020	2019
Number of trainees at MAN ES Germany	369	372	346
MAN ES training center, Augsburg			
Number of trainees, new hires	39	57	65
Number of trainee applications	549	734	931
Percentage of women (%)	13	11	11
Takeover rate in %	100	100	98

Qualification measures

As already described in focus area 4 “Employee development”, employee qualification is essential for our transformation into a solution provider. We are therefore glad that we were able to significantly increase the number of measures carried out despite the pandemic situation. The number of training hours has also increased, so that in the end we were able to increase the average number of training hours per employee by more than 30%. The number of online training courses, either as live events via MS Teams or as web-based training courses as part of our eAcademy, was again very high and was well received by the employees.

	2021	2020	2019
Measures taken	3 367	2 586	3 854
Participants	51 115	52 155	31 745
Qualification hours	203 893	159 764	298 492
Thereof E-learning/persons	32 240	34 030	9 304
Thereof E-learning/hours	27 688	24 198	17 083
Ø Qualification hours per employee	2,04	1,55	2,83





Occupational safety and environmental protection

The following key figures for 2021 apply exclusively to our 12 production sites: Augsburg, Oberhausen, Berlin, Deggendorf (Germany), Copenhagen, Frederikshavn (Denmark), Zurich (Switzerland), Saint-Nazaire (France), Velká Bíteš (Czech Republic), Aurangabad, Bangalore (India) and Changzhou (China).

Since the 2020 financial year, the Holeby site (Denmark) and since the 2021 financial year the Hamburg site have by definition no longer been among our production sites. However, the values from previous years still include the data for this location (retrospective changes were not made here).

Accidents at work

The accident frequency index RIF was slightly higher in 2021, and the number of days lost as a measure of the severity of work-related accidents decreased significantly in 2021. This was achieved through the consistent derivation and implementation of corrective and preventive measures. Great importance was attached to the personal aspect of mindfulness. In order to improve this sustainably, employees are sensitized through targeted actions and campaigns.

	2021	2020	2019
Accidents at work with an absence of \geq 1 day	141	136	147
Days of absence due to accident	2 170	2 822	1 877
Fatal accidents at work	0	0	0
Index of accident frequency - RIF (Recordable Injury Frequency) ¹	12,2	11,9	12,4

¹ Number of recordable accidents at work requiring medical care x 1 million / hours worked



Energy consumption in MWh

The share of regenerative sources in electrical energy consumption increased by a further 33 percentage points from 2019 to 2021. In relation to 2021, this corresponds to a share of around 52%.

	2021	2020	2019
Total energy consumption	289 439,74	337 155,01	357 458,49
Electric energy consumption	79 099,46	92 557,36	107 142,92
Elec. energy consumption from ren. energy sources - own generation	18,68	0,00	0,00
Elec. energy consumption from ren. energy sources - external generation	41 164,62	37 490,73	20 600,88
Elec. energy consumption from conv. energy sources - external generation	37 916,17	55 066,63	86 542,04
Thermal energy consumption	49 360,46	48 073,95	48 757,42
Thermal energy consumption from ren. energy sources - own generation	0	0,00	0,00
District heating consumption from ren. energy sources - external generation	0	0,00	412,48
District heating consumption from conv. energy sources - external generation	49.360,46	48 073,95	48 344,94
Fuel use of the sites	159 056,07	193 137,71	198 355,97
Fuel oil	1 018,17	641,32	890,07
Natural gas	132 543,70	138 924,42	131 925,80
Diesel	24 910,99	53 208,67	65 123,30
Gasoline	583,21	363,30	416,80
Fuel gases for manufacturing processes	1 923,75	3 385,98	3 202,18
Acetylene (Ethin, C2H2)	818,79	1 147,92	1 180,60
Propane	1 051,63	2 182,47	1 960,73
Hydrogen	53,33	55,58	60,86

CO₂ emissions in t

Among other things, due to the higher proportion of renewable sources in electrical energy consumption, CO₂ emissions were reduced by more than 17,000 tons in 2021 compared to the previous year. This continues the positive trend from the previous year.

	2021	2020	2019
Total carbon dioxide emitted	52 891,79	69 917,02	82 551,66
Directly emitted carbon dioxide	33 351,54	42 216,37	44 347,58
Indirectly emitted carbon dioxide	19 540,25	27 700,66	38 204,08

Recycling and waste in tons

The amount of waste was also effectively reduced. At the Augsburg location, for example, defective logistics load carriers are reconditioned by a service provider and reused in the logistics chain.

	2021	2020	2019
Total amount of waste	21 865,28	23 856,65	37 128,19
Total amount of waste for recycling	11 537,13	12 141,99	22 214,15
Hazardous waste for recycling	2 060,41	2 298,96	2 707,03
Hazardous construction waste for recycling	166,30	82,94	136,22
Other hazardous waste for recycling	1 894,11	2 216,02	2 570,81
Non-hazardous waste for recycling	9 476,72	9 843,02	19 507,12
Non-hazardous construction waste for recycling	3 480,18	733,46	7 601,33
Other non-hazardous waste for recycling	5 996,54	9 109,56	11 905,79
Total amount of waste for removal	1 785,88	1 648,77	4 517,92
Hazardous waste for removal	903,11	960,19	899,24
Hazardous construction waste for removal	132,92	1,84	11,28
Other hazardous waste for removal	770,19	958,35	887,96
Non-hazardous waste for removal	882,77	688,58	3 618,68
Non-hazardous construction waste for removal	549,08	188,50	3 005,75
Other non-hazardous waste for removal	333,69	500,08	612,93
Metal waste	8 542,27	10 065,89	10 396,12

Water and waste water in m³

The positive trend continues regarding water consumption as well.

	2021	2020	2019
Total fresh water volume	3 435 615,99	3 517 388,95	3 567 371,05
Fresh water volume from external supply including drinking water	102 375,29	147 438,95	143 678,05
Amount of fresh water from own sites (well water)	3 333 240,70	3 369 950,00	3 423 693,00
Surface water from lakes, rivers, seas	3 678 610,00	6 547 262,00	8 178 021,00
Waste water volume	302 836,87	400 353,14	463 926,53

Air pollutant emissions in t

The positive trend of a comprehensive reduction in air pollutant emissions was successfully continued in 2021. Due to the correction of the key figure system in 2021, the test bench consumption is now taken into account for the calculation of the sulfur dioxide, nitrogen oxide and total dust emissions.

	2021	2020	2019
Sulphur dioxide (SO₂)	4,77	0,14	0,25
Nitrogen oxides (NO_x)	123,80	15,35	92,99
Total dust	2,00	0,11	0,30
Emissions of volatile organic compounds (VOC)	37,07	39,24	44,31

Certificates for production sites

All our production sites are triple certified according to the mentioned standards. By definition, the Holeby (Denmark) and Hamburg (Germany) sites are no longer part of our production sites. However, the values from previous years still include the data from these sites; retrospective changes were not made here.

	2021	2020	2019
Site with ISO 14001	12	13	14
Site with ISO 9001	12	13	14
Site with ISO 45001	12	13	1

Final Note

The data listed in the chapter “Key Figures at a Glance” were subject to an independent business audit for the year 2019 as part of sustainability reporting process to obtain limited assurance. The key figures now published for the financial year 2021 are subject to the same selection and application of appropriate sustainability reporting methods.



MAN Energy Solutions

86224 Augsburg, Germany

P +49 821 322-1750

F +49 821 322-49 1750

info@man-es.com

www.man-es.com

Contact Person

Dietmar Pinkernell

Head of HSE Management & Corporate Responsibility

dietmar.pinkernell@man-es.com

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