JADEWESERPORT
WILHELMSHAVEN

2019 PERS Environmental Report

JadeWeserPort Realisierungs GmbH & Co. KG (JWPR)

ESPO
EUROPEAN SEA PORTS ORGANISATION ASBL / VZW
ORGANISATION DES PORTS MARITIMES EUROPEENS ASBL / VZW

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Preface

Dear reader,

Holger Banik, managing director

The current debates regarding climate protection shows that the topics of environmental protection and sustainability have finally reached the policy-makers and society at large and that there is a great need for action. We here at JadeWeserPort Realisierungs GmbH & Co KG therefore see ourselves confirmed in our efforts to run a sustainable business. Based on our agency agreement, we also represent Container Terminal Wilhelmshaven JadeWeserPort-Marketing GmbH & Co. KG. Our goal is not only to avoid environmental pollution, but also to ensure a protection of nature that exceeds the statutory environmental standards.
Ports form the interface in global goods traffic and the transport industry. This is where different forms of traffic and modes of transport meet. Goods from all over the world are handled in our ports. As a port operator, we believe to have a responsibility to create the optimal logistical conditions for our customers. Thanks to our infrastructure, we can positively influence the use of low-emission means of transport and a more efficient flow of existing logistics chains.

As a relatively young port, JadeWeserPort already has numerous modern and energy-efficient facilities that are exclusively run with renewable energies. Our efforts in this and subsequent reporting periods therefore focus on optimising the transport infrastructure. Within the scope of our possibilities, we can contribute to lowering the emissions of transport around the port.

The areas of influence of JadeWeserPort Realisierungs GmbH & Co. KG comprises planning and port management, administrative and real estate matters as well as the (expansion) construction processes of Germany's only deep-water port. First and foremost, these include the invoicing of port fees to ships, renting and leasing of port areas, management and maintenance of the port infrastructure and operation of the port railway. Other private companies that we partner with carry out the operation of the terminal, transloading and warehousing.

Today we are happy to present the third PERS Environmental Report for JadeWeserPort Wilhelmshaven. We are thus carrying forth continuous environmental reporting and are informing you about the current sustainable developments and progress at JadeWeserPort.

We hope you enjoy reading the report.

Holger Banik
Managing director

Silke Lüders
Environmental coordinator

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List of abbreviations

CO_2	Carbon dioxide
DGPS	Differential Global Positioning System
DIN	Deutsches Institut für Normung
DLZ	Service Centre
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V.
EMAS	Eco Management and Audit Scheme
ESI	Environmental Ship Index
ESPO	European Sea Ports Organization
EU	European Union
EUROGATE	EUROGATE Container Terminal GmbH & Co. KGaA, KG
GmbH	limited liability company
GVZ	Freight traffic centre
IAPH	International Association of Ports and Harbours
IMO	International Maritime Organization
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security Code
JWPM	Container Terminal Wilhelmshaven JadeWeserPort-Marketing GmbH & Co. KG
JWPR	JadeWeserPort Realisierungs GmbH & Co. KG
KG	limited partnership
KV	combined traffic
KWh	kilowatt hour
LAT	lowest astronomical tide
LED	light-emitting diode (light source)
LNG	Liquefied Natural Gas
MThw	Mean High Tide
NN	sea level
NOx	Nitrogen oxides
OPS	Onshore Power Supply
PERS	Port Environmental Review System
PO	Port Office
SECA	Sulphur Emission Control Area
Smart-SC	Smart Supply Chain
SOx	Sulphur oxides
tkm	tonne-kilometre
TSC	Truck Service Centre
ULCS	Ultra Large Container Ships
WPCI	World Ports Climate Initiative

1 JadeWeserPort Profile

JadeWeserPort in Wilhelmshaven is one of the biggest infrastructure projects on the North German coast in recent years. It was planned and built to meet the logistical requirements of growing world trade and thus industrial, trade and service companies will find a port location with outstanding advantages and great potential at JadeWeserPort. Germany's only deep-water port offers optimal conditions for the world's largest container ships and a lot of potential for commercial and industrial development.

Under the name JadeWeserPort, a container port and a freight transport centre that is independent of the tide and boasts excellent hinterland connections has been built in Wilhelmshaven, Germany's third largest port.

In recent years, the sizes of container ships have been steadily growing and there is no end in sight to this growth. Due to their dimensions, the new container giants are constantly presenting ports with new challenges. However, it is not only a question of greater handling productivity, larger container gantry cranes, faster loading and improved infrastructure.

Short, safe and flexible transport routes to the port are a very important factor for the maritime business with ever larger ships and rising bunker prices. The nautical accessibility of a port has therefore become a decisive criterion for determining the economic, but also the ecological value of a location.

With its short distances for ships, railways and trucks, JadeWeserPort has an economical, time-saving infrastructure which, on the one hand, meets the existing and future requirements for container ships and, on the other, helps to reduce emissions.

The port's advantages include its great geographical location on the 18-metre deep Jade fairway, a short piloting waterway of 23 nautical miles, a turning range of 700 metres and the excellent hinterland connection, which directly links the terminal and the freight transport centre with the European road and rail network. This means increased traffic load due to the JadeWeserPort and the resulting increase in CO_2 and time losses can be avoided as far as possible.

On the water side, JadeWeserPort's great accessibility means that economic and ecological strains can be minimised. Thanks to the water depth of 18 metres, shipping companies can also use JadeWeserPort as a port of departure or arrival for the largest container ships of the current and future generations, regardless of the tide, which can only call at a few ports when fully offloaded. These fully unloaded container ships are particularly economical and environmentally friendly. The short waterway passage and the width of the Jade fairway also help to avoid bottlenecks and waiting times, thus saving fuel and time.

JadeWeserPort's dual-track connection to the railway grid of Deutsche Bahn is a further component of efficient transport logistics. A 16-track forwarding group where trains can be assembled up to the full train length, and the connected terminal for the combined traffic prevent bottlenecks and make it easy to move containers from the road to rail and vice versa.

The port's freight traffic centre is designed to create a direct rail connection for the logistics areas. This connection option was also integrated into the port's planning not only for economic reasons, but also due to the fact that freight trains emit roughly two thirds less CO_2 per transported tonne per kilometre than lorries. Thanks to its easy execution at JadeWeserPort, freight transport by rail is thus a viable alternative to transport by road.

Located in Germany's third largest port area, JadeWeserPort as a container port is a logical addition to the port landscape of the city of Wilhelmshaven. It also has room to expand and develop. Long-term natural space management is an important factor in the port's management, the neighbouring industrial development and the entire site. It forms a significant component of current and future planning, construction and operation.

1.1 The structure of JadeWeserPort

The port is managed by JadeWeserPort Realisierungs GmbH & Co. KG (hereinafter referred to as JWPR) with its registered office in Wilhelmshaven. Alongside it is the Container Terminal Wilhelmshaven JadeWeserPort-Marketing GmbH & Co. KG (hereinafter referred to as JWPM), a subsidiary completely owned by the State of Lower Saxony. It is in charge of marketing and managing the industrial and logistics sites located in the freight traffic centre. The port railway and the Truck Service Centre (TSC) as important service providers of the freight traffic centre (GVZ) as well as the areas of the freight traffic centre and JWPM's other properties are managed by JWPR within the scope of the agency agreement.

The container terminal is operated by EUROGATE Container Terminal Wilhelmshaven GmbH & Co. KG (hereinafter referred to as EUROGATE).

JWPR is the company responsible for operating the port infrastructure, whose shares are held by the federal states of Lower Saxony (50.1%) and Bremen (49.9%).

As the port operator of JadeWeserPort, JWPR assumes the typical tasks of a port infrastructure company. Among other things, this includes the collection of port fees, management of the port's areas, tendering and awarding of concessions for maritime services, maintenance and monitoring of port facilities, including nautical measurement equipment, and preparation of a management plan for ship-generated waste. Furthermore, the scope of duties includes the establishment and enforcement of rules of use in the form of the port's terms of use, the general terms and conditions of use and an alarm and emergency plan. In the course of the implementation of the planning approval decision, JWPR also drew up a port management plan, which details the official port management and ensures functional and safe port operations.

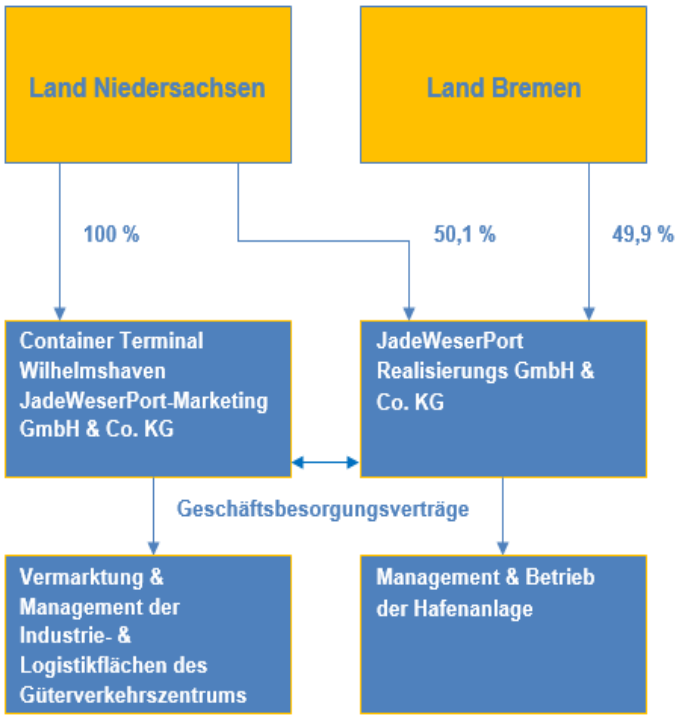

Illustration 1: Ownership structure of the shareholders

1.2 Description of the port areas and facilities

Illustration 2: JadeWeserPort port area

The port facilities are among the world's most cutting edge. Thanks to the excellent connection (without traffic-lights) to Germany's Motorway A 29, the railway infrastructure in the north of the terminal and the fact that JWP is Germany's only deep-water port, there are virtually no limits to the onward transport of containers, whether by land or sea. The various port sections ensure that the operations flow efficiently and seamlessly.

Illustration 2: JadeWeserPort port area shows the entire JadeWeserPort spanning a total area of 360 ha. In area V (see Illustration 3: Overview of the port area with the freight centre), new business partners have established their enterprises, thus increases the capacity utilisation of the freight centre. The available space for further business models was reduced. There are currently 60 ha available in the GVZ.

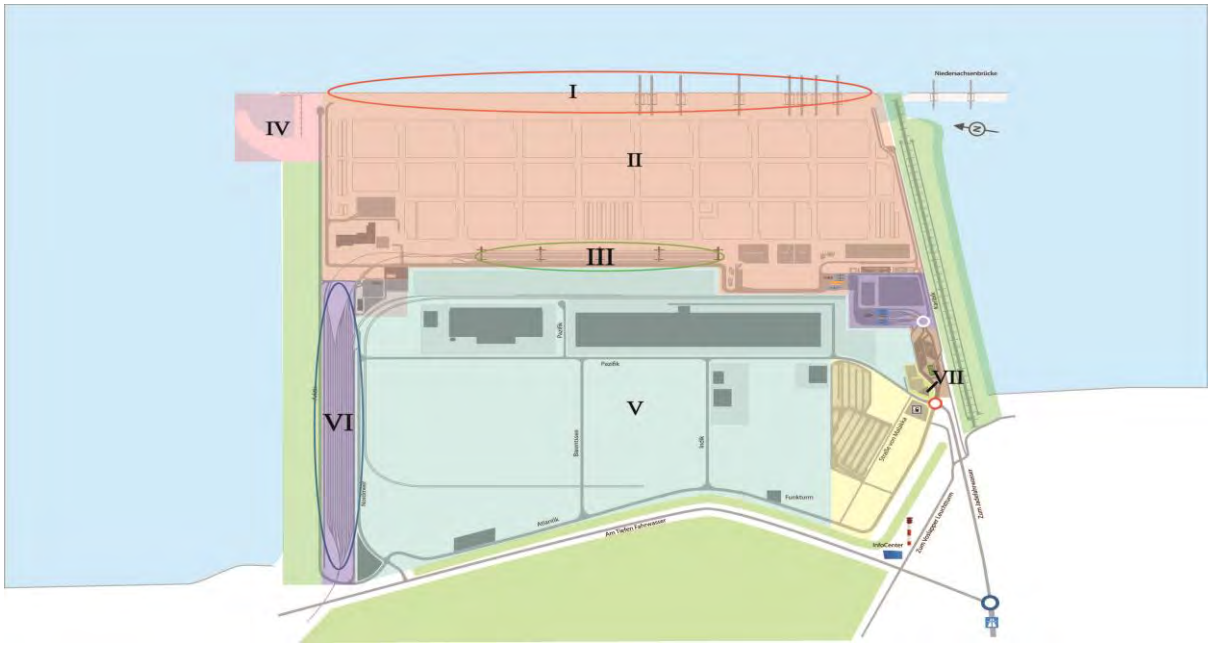

Illustration 3: Overview of the port area with the freight centre

I **Quay:** With a length of 1,725 metres, the quay can simultaneously handle four large container ships or a maximum of twelve feeder ships with currently eight (in the final stage 16) container gantry cranes.

II **Terminal area:** The terminal area is operated by EUROGATE and is located directly adjacent to the quay, where containers are handled and stored.

III **KV combined traffic facility:** For rail-side transhipment, there is also a handling facility with six tracks and five transhipment bridges for combined transport (KV facility) on the terminal's western edge.

IV **Service port and Project Pier:** The service port is located at the northern end of the port. It has several berths for nautical service provider vessels, and the 65-metre long Project Pier, which is designed to handle large and heavy cargo with a maximum transport load of 2,000 tonnes and a loading area of 1,200 m^2 can be found there as well.

V **Freight traffic centre:** JadeWeserport's trimodal freight traffic centre (GVZ) is located in the direct, adjacent vicinity of the container terminal. In addition to a lorry service centre and the service centre, the 16-track forwarding group and the signal box building are also located there. In the northern GVZ area, the track system has been extended by 2.5 km to allows future companies positioned here to receive or send their volumes directly by rail.

VI **Forwarding group:** The 16-track forwarding group assumes a buffer function between the container port and the hinterland. Container trains up to the maximum block train length can be assembled and dispatched here. The entire track and signalling technology is controlled from the signal box.

VII **Service centre:** Among others, JWP management, the port office and the port captain have their headquarters here.

2 The environmental strategy of JadeWeserPort

With its sustainability strategy, the European Union provides a clear direction for environmental policies. Packages of directives and standards, such as those regarding the increase of energy efficiency or reduction of emissions, define a binding framework for action in that context. In order to meet these requirements and to support the global implementation of objectives, JadeWeserPort has derived its own environmental objectives from the four following EU environmental policy priorities:

- **Environmental protection**
- **Nature and biological diversity**
- **Environment and health**
- **Natural resources and waste**

Within their operating areas, all corporate divisions are involved in the environmental targets and the active implementation at JWPR. For JadeWeserPort, sustainability means reconciling ecological, economic and social interests. In the course of the Environmental Report, the company's own environmental objectives are elaborated on in detail. The following declaration of principles is meant to serve as an initial point of reference:

Declaration of Principles of JadeWeserPort Realisierungs GmbH & Co. KG

We, the JadeWeserPort Realisierungs GmbH & Co. KG (JWPR), are committed to avoiding environmental pollution and to acting in accordance with the principle of sustainability in all business areas. Our environmental policy has already been implemented in all areas of the company and by the employees in their areas of responsibility.

As a port operator, the activities of JadeWeserPort Realisierungs GmbH & Co. KG focus primarily on port management and on planning and development management. Within the scope of the agency agreement for Container Terminal Wilhelmshaven JadeWeserPort-Marketing GmbH & Co. KG, we are responsible in particular for the implementation of compensation measures as well as for the tasks for the rail, truck service centre and freight traffic centre (GVZ).

To reduce the environmental strain and improve the quality of the environment, we take the following measures:

1. An efficient utilisation of our location advantages, such as the short port passage ways and the direct, straightforward hinterland connections

2. The launch of an environmental controlling system to obtain information to continuously improve our environmental protection and to increase energy efficiency

3. Taking action for the development of innovative and environmentally friendly solutions in the shipping sector with a focus on saving resources and energy as well as reducing emissions

4. Avoiding and conscientious handling of waste, regulated by our ship waste management plan

5. Providing information on and the compliance with current and relevant environmental legislation and standards, as well as taking the necessary measures to maintain compliance and to emphasise nature conservation as a key indicator for port operations and its development

6. Ensuring a high level of security through a 24/7 port office and an alarm and emergency plan in order to minimise the risk of accidents and possible consequences both for the environment and for safe port operations, and the maintenance of the port facility for the same reasons

7. The publication of an environmental report to document the progress and developments of the port long-term and in a transparent manner. This is done on the basis of specially defined performance indicators and the regular updating of the report and the information contained therein

8. Expansion and consolidation of networks with cooperation partners such as Niedersachsen Ports GmbH & Co. KG and bremenports GmbH & Co. KG

9. Ensure the availability of necessary resources to implement this Declaration of Principles.

In addition, JadeWeserPort is committed to the implementation and further development of the following environmental strategy (with a focus on emissions reductions and natural area management), which was developed in cooperation with Niedersachsen Ports GmbH & Co. KG (NPorts). NPorts manages the state-owned seaports of Lower Saxony.

Unternehmensbereich	Ziel	Umsetzung
Betrieb	Reduzierung von CO_2 - Emissionen	ESI, Reefer Anschlüsse im TSC, Vorbereitung LNG, Landstrom (OPS), Fuhrpark, IT-Lösungen, Energetische Sanierung
Planung und Entwicklung	Planung und Bewirtschaftung neuer und bestehender Infrastrukturanlagen unter Berücksichtigung ökologischer Gesichtspunkte	Vermeidung und Verringerung von Verkehrswegen, effiziente Nutzung der Infrastruktur
Planung und Entwicklung	Naturraummanagement	Langfristige Planung von Kohärenz- und Kompensationsmaßnahmen
Kooperation	Zusammenarbeit mit Akteuren der Hafenwirtschaft im Umweltschutz	Berücksichtigung von ökologischen Gesichtspunkten bei der Zusammenarbeit mit Partnern
Marketing	Umweltschutz innerhalb und außerhalb des Unternehmens	Kommunikation der Umweltschutzmaßnahmen mit internen und externen Anspruchsgruppen in Form von Umweltberichten, Broschüren und Schulungen der Mitarbeiter
Finanzen	Umweltcontrolling	Erstellung von Input-Output-Bilanzen zur Informationsgewinnung für einen besseren Umweltschutz.

Table 1: Environmental goals of JadeWeserPort

Holger Banik
Managing director

Silke Lüders
Environmental coordinator

Furthermore, the continuous certification of the port according to the environmental management system PERS is part of the environmental strategy. Among other things, this involves examining the ecological effects of JadeWeserPort and reducing environmental pollution through environmental management. The goal is to thereby create an assessment basis for the achievement of objectives. The identification of essential aspects is an important step in recognising the effects on the environment and the consequential formulation of goals and solutions. At JadeWeserPort, the following aspects are significant and are thus dealt with in the port's environmental strategy:

- **Air pollutant emission**
- **Water emission and water quality**
- **Waste management**
- **Pollution of the soil**
- **Effects on habitats and biotopes**
- **Noise emission**

3 Environmental protection measures at the port

Aspects of environmental protection and sustainable planning already played a decisive role in the planning, construction and operation of JadeWeserPort. Current measures also contribute to protecting the environment at the port. A few examples are introduced in the following.

3.1 Optimising the logistics processes

The still increasing handling figures at the JadeWeserPort container terminal and the further settlement of companies on site pose new challenges for the logistics processes. In order to promote an uninterrupted logistics flow and vehicle traffic at the JadeWeserPort's site and throughout the port's surrounding infrastructure, additional areas have been and are being prepared and made available for use.

TruckServiceCentre (TSC)

Illustration 4: TruckServiceCentre (TSC)

The planning of JadeWeserPort also included a parking area close to the terminal for truck traffic in order to optimise the terminal processes. The responsibility now lies with Container Terminal Wilhelmshaven JadeWeserPort-Marketing GmbH & Co. KG and is located directly adjacent to the container terminal and the long-distance transport connection. The site currently has sufficient capacity with 311 parking spaces and is witnessing growing user numbers. Use of the fenced and barrier-secured area is free of charge for vehicles and their trailers. The site also offers a free hygiene facility and disposal of household waste by JadeWeserPort. The power supply for the trucks can be ensured for the entire duration of their stay via freely available power connections (retractable supply posts) onsite. By means of these free offers, the parking facilities are thus making a significant contribution to avoiding illegal everyday waste in the vicinity of JadeWeserPort and to reducing exhaust emissions. The lorry traffic can immediately find a safe parking space when needed. This improves the flow of traffic and relieves the traffic system especially during heavy use.

Electrification of the JadeWeserPort siding and forwarding group

JadeWeserPort's connection to the public railway grid is being modernised and expanded. By 2022, the Oldenburg - Wilhelmshaven connection is to be extended to two tracks and electrified in the process. This project will also have an impact on the JadeWeserPort track system. To ensure as free and uncomplicated a transition as possible from the public railway network to the port tracks, the approx 4 km long siding and the entire forwarding group will also be electrified in the course of the track project.

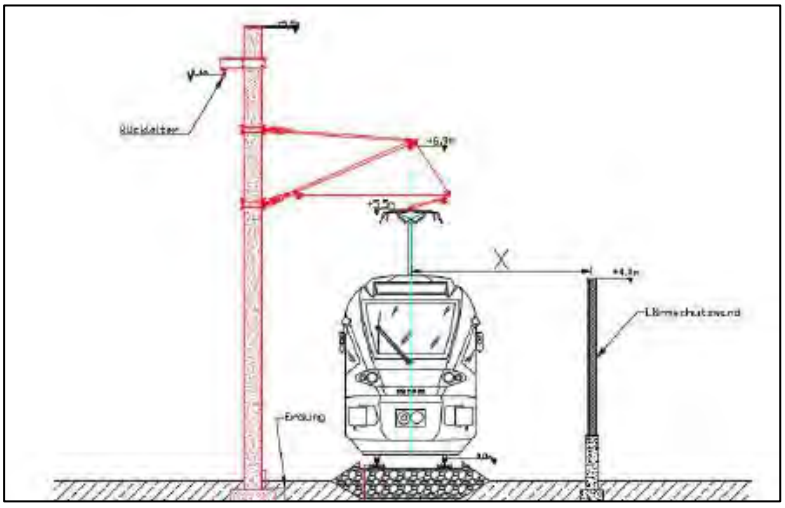

Illustration 5: Cross section of feeder track

The forwarding group spans a length of roughly 1150m and has one entrance, three exits and 16 tracks. To the extent possible, the port thus contributes to the use of a lower-emission technology - using electric vehicles instead of diesel-powered vehicles - and a barrier-free and ultimately more efficient logistics flow. In order to keep the impact on the adjacent 'Voslapper Groden-Süd' nature reserve to a minimum, all work that could potentially impact the reserve is carried out outside the breeding and settling periods. The track system is equipped with noise protection walls and obstacles, such as suspension ropes fitted with special reflectors to protect birds. All insulators are equipped with bird protection clamps.

Energy monitoring system

In order to record the energy consumption in the port and capture the potential to optimise, JadeWeserPort, in cooperation with Niedersachsen Ports, has begun setting up a new database that is tailored to the needs of a port infrastructure company and records the individual consumers in a very detailed manner. It is logically structured and allows a simple and structured recording of energy data. Thanks to the software and its algorithms, the user only has to record and enter the energy data. The software calculated and documents all further information.

The data submitted and calculated by the software are stored in a central database. Storing data on a central SQL database server also allows several users to work with the system simultaneously.

The finely tuned structure makes it possible to capture nearly all consuming units. These include real estate, mobile work equipment, heating systems, vehicles, port infrastructure facilities (railway facilities, pumping stations, locks, etc.), port superstructure (cranes, lighting systems, etc.). The energy database records all energy sources used at JadeWeserPort. These include electricity, natural gas and diesel. The documentation with exact address, photos of the locations, facilities/systems and meters always makes it possible to identify each individual consumer.

By regularly entering the incoming invoices of the respective energy consumers as well as the outgoing invoices, we can regularly monitor the energy consumption, compare it with the normal values and immediately take countermeasures in event of major deviations.

Advantages of data collection:

- errors are discovered more quickly
- all consumptions are displayed clearly and bundled
- data from the previous year make a quick comparison possible
- consumption levels can be managed in a targeted manner
- optimal energy efficiency measures can be deviated

3.2 Climate protection by minimising energy consumption levels

Good energy management is essential to successfully anchor sustainability within the company. Consumption is monitored, energy saving potentials are explored and intelligent solutions are applied wherever possible. Special attention is also paid to sustainability when purchasing and investing in new infrastructure. Examples of energy efficiency measures that have been implemented are presented in this section.

Energy consumption and $C0_2$ emissions

The positive trend regarding energy savings and reduction of CO_2 emissions continued in 2018. The port's total energy consumption was reduced by approximately 2.6% compared to the previous year and CO_2 emissions were reduced by almost 1%. In particular, the use of diesel and natural gas was reduced. It should be noted that the port was called at by fewer ships compared to the previous year, despite increased volumes. As a result, the transhipment processes and thus also their overall energy consumption reduced accordingly. Other processes at the port, such as the operation of the track infrastructure, must be permanently secured independent of ship calls and transhipment processes. In total, this led to a slight increase in energy consumption per ship call and correspondingly to slightly higher emissions per ship call. Detailed data on consumption values and CO_2 emissions between 2015 and 2018 are provided in the table below.

	2015	2016	2017	2018
Number of ship calls	387	491	571	531
Energy consumed in total in kWh	641,267	799,006	630,237	613,248
CO_2 in total (in tonnes)	335.50	420.42	319.28	316.41
Energy kWh / ship call	1,657	1,627	1,104	1,155
CO_2 (in tonnes) per ship call	0.87	0.86	0.56	0.60

Table 2: Total energy consumption (JadeWeserPort Realisierungs GmbH & Co. KG and JadeWeserPort-Marketing GmbH & Co. KG)

The total emissions of JadeWeserPort comprise the total electricity consumption via the port, the natural gas consumption and the energy consumed by the vehicles.

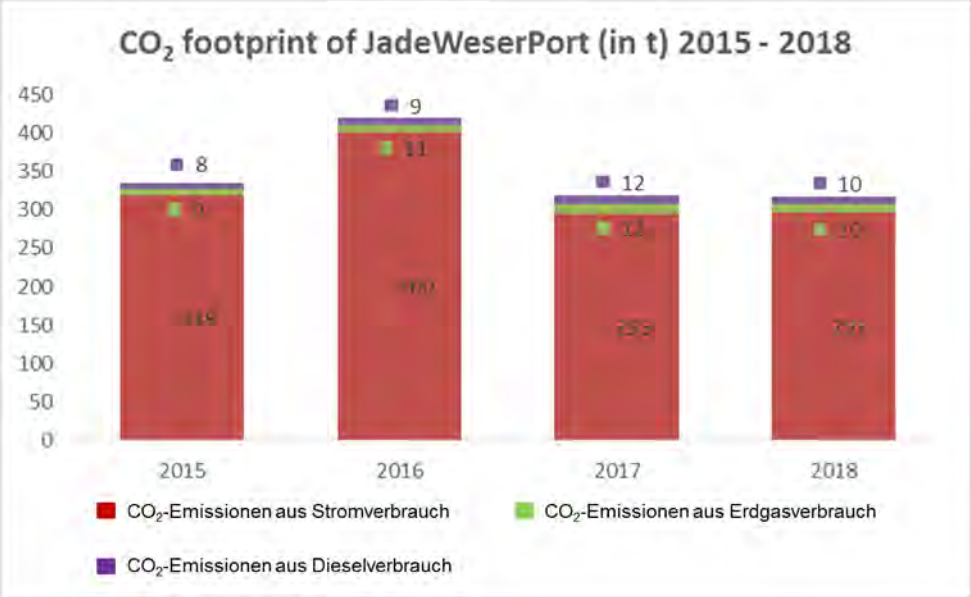

Illustration 6: CO_2 footprint of JadeWeserPort (in t) 2015 - 2018

Thanks to the port's lower energy consumption in 2018, CO_2 emissions also reduced slightly. The share of emissions resulting from the consumption of natural gas and fuel was disproportionately lower compared to total consumption. The port's energy needs were largely covered through electricity, the generation of which has a small CO_2 footprint. More than 50% of the purchased electricity mix was generated from renewable energies and is therefore significantly lower in emissions than the average electricity used in Germany.

Mobility

The JadeWeserPort is committed to car sharing. The pool service cars are available to all employees and can be booked online. Among other things, the vehicles are used to keep appointments with service providers and customers.

While mobility is important for the team, the environmental factor is not neglected. Employees strive to avoid single journeys and to use the company cars as optimally as possible. In addition, the pool company cars were procured according to ecological criteria and have reduced CO_2 emissions and fuel consumption.

Table 3 offers an overview of the use of the vehicle fleet and its CO_2 emissions. Compared to 2016 and 2017, both the number of kilometres and CO_2 emissions decreased, thus breaking the negative trend. In 2018, the number of kilometres travelled with the fleet's vehicles was reduced by more than 10% compared to the previous year.

	2015	2016	2017	2018
km travelled	58,424	65,895	65,258	58,269
CO_2 emission (t CO_2)	9.06	10.57	12.18	9.96
CO_2 (kg CO_2) / km	0.155	0.160	0.186	0.171

Table 3: CO_2 emission (in t) of vehicle fleet

Climate-friendly lighting system

The freight centre is illuminated using particularly economical LED technology, which on the one hand has a much longer service life than standard high-pressure sodium lamps and, on the other, requires less energy. This way the needed electricity can be reduced from the ground up by using the simplest of means. A further reason in support of using LEDs at JadeWeserPort is the high recycling rate of the lamps, which do not contain any harmful substances such as mercury or lead, thus allowing for easy disposal. LED technology is planned for new projects from the start.

3.3 Environmentally sound disposal of ship-generated waste

Ships calling at the port are charged a flat-rate disposal fee under the General Terms of Use of JadeWeserPort. Only if they actually dispose of waste at the port collection facility will they receive a proportional refund of the disposal costs on request. JadeWeserPort thus creates an incentive not to dispose of ship-generated waste on the high seas, but to hand it over to a certified and professional company at the port.

The disposal must be registered in the port and is monitored by the authorities. The disposal/recycling companies located in Wilhelmshaven and the surrounding area have the appropriate tankers, containers and other collection facilities to receive the ship's waste.

Ship-generated waste as per MARPOL Annex I (oil in m^3) is generally received on land by a tanker lorry or on the seaward side by a special ship and taken for proper disposal. A container service generally collected ship-generated waste as per MARPOL Annex V (e.g. household waste in t) from the ship in question.
The Ship Waste Management Plan is strictly monitored and revised every two years by JadeWeserPort. The developments for the years 2015 to 2018 are shown in the following. Ship operators are not subject to any regulations when choosing a point to deliver their waste within the EU, so ports have no influence on the amount of ship-generated waste to be disposed of.

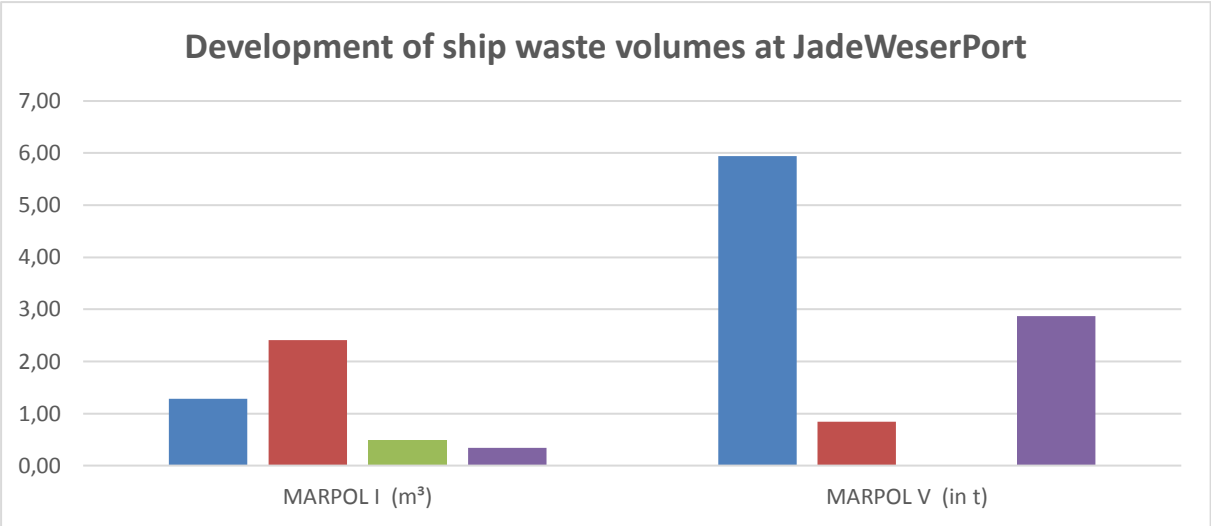

Illustration 7: Development of ship waste volumes at JadeWeserPort (2015 – 2018)

3.4 Incentives to reduce customers' air and marine pollution

At JadeWeserPort, the environmental responsibility in the context of the challenge as a growing container port is assumed by supporting ship owners in their efforts to reduce ship emissions. This is discussed in more detail below.

Port fee discounts for environmentally friendly ships

In order to improve the environmental balance in shipping, new initiatives to protect the climate and keep the oceans clean are needed, as the pollutant emissions from the combustion of heavy fuel oil are still too high.

The JadeWeserPort has been granting an ESI discount (Environmental Ship Index) for particularly low-emission ships since the start of operations in 2012. The index provides information on the environmental performance of ships in terms of air pollutant emissions (NOx and SOx) and CO_2. Ports and other maritime service providers around the world can use the index to remunerate ships and thus foster sustainability in shipping.

The ESI determines which ships have better emission values than the guide values for nitrogen and sulphur oxides set by the IMO (International Maritime Organisation). The classification level (ESI points) is then based on the determined values.
In 2018, 41 ships called at JadeWeserPort that received a 5% ESI discount on port fees. Especially given the lower total number of ship calls compared to 2017, this represents a significant increase and effectiveness of the discount concept.

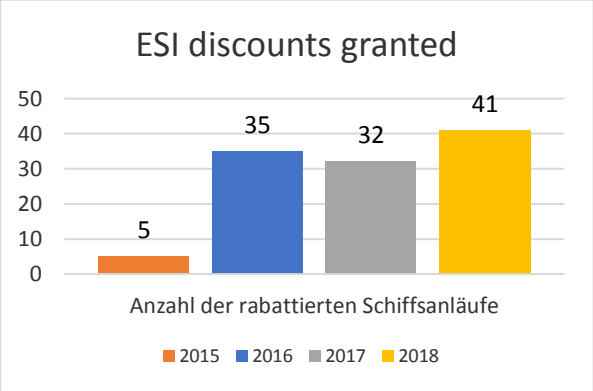

Illustration 8: ESI discounts granted

Discounts for environmentally friendly trains

From the port, it is only a few hours by train to the most heavily populated regions of Germany, such as North Rhine-Westphalia, or to neighbouring European countries. Especially environmentally friendly trains are granted discounts for the use of infrastructure, thereby contributing to sustainability and climate protection. In addition to discounts for diesel locomotives with filters, the fees are also reduced for trains who are fully equipped with composite brakes, so-called 'whisper brakes'.

3.5 Low-impact maintenance of bodies of water

As a port infrastructure company, JadeWeserPort is responsible for the maintenance of the waters within its area of responsibility in order to create reliable conditions. At JadeWeserPort, this area of responsibility extends to the service port and the access and berthing area in front of the quay. The total area to be maintained is around 130 hectares.

The examinations carried out in the context of the planning approval decision essentially revealed that sedimentation is to be expected in front of the quay. However, is less pronounced due to ship-induced turbulences and is largely neutralised by the natural erosion in the area of the new fairway and the access area. Extensive maintenance dredging is not expected here.

In addition, the tide's strong pendulum current at the Jade already carries away a lot of dredged material. During the tidal cycle, almost the entire water volume of the Jade Bay flows in through the Jade Fairway at high tide and out again at low tide, which already washes away some of the sand deposits.

JWPR carries out regular echo-sounder inspections to check for adequate fairway depths. In order to carry out the required work with as low an impact as possible, the so-called water injection method is primarily used at JadeWeserPort. Water is injected into the river bed where it penetrates into the sediment's cavities and dissolves sediment particles. The particles mix with the water and a suspension layer forms on the waterbed, which the natural current then removes. Compared to dredging with hopper dredgers, this method is more economical and at the same time more environmentally friendly, as it limits the intervention to the absolute minimum.

3.6 Compensation measures and areas

Anything taken from the environment due to the construction of port facilities must be returned to it elsewhere. In order to functionally compensate for the encroachments on nature, JWPR, representing JWPM, establishes so-called compensation areas in the course of business management. It thus compensates for changes elsewhere and creates equivalent replacement areas. Unavoidable interventions in the natural balance through construction measures were successfully offset and an ecological enhancement of certain areas could be proven. Some interesting compensation and coherence projects are presented in the following.

Warnsath and Möns

To compensate for the loss of land resulting from the construction of the railway line, 64 hectares of land were purchased in Warnsath and Möns. The goal of the compensation measure is to create replacement habitats for meadow-breeding birds and, second, to develop a wetland that is largely untouched by agriculture and that features a water-bound surface structures that are typical in the region. To this end, arable and grassland previously used for intensive agriculture was extended and wetted with positive consequences for the biodiversity typical of the location.

Compensation area		Particular character of the region	Positive development of the flora and fauna
Mönss		Marshes and swamps	Narrow-leaved cotton grass, water navel, meadow sedge and purple moor grass
			lapwing, blue cup, skylark, field warbler yellowhammer, garden warbler, common Chiffchaff, fitis and chaffinch
Warnsath	nutrient-poor grassland	Common sweet vernal grass, meadow grass, heal-all and greater yellow-rattle	
		skylark, lapwing, quail and meadow pipit	

Table 4: Development of species in Mönss and Warnsath

The Friesland-Wittmund-Wilhelmshaven nature conservation foundation looks after the areas and carries out regular monitoring.

Langwarder Groden

Langwarder Groden is an area spanning about 140 hectares and is bordered on the mainland by the main dike and on the sea by a summer dike. By partially opening the summer dyke, a section of Langwarder Groden was exposed again to the tidal current. The plan is for a valuable salt marsh to develop there. In addition, the construction of a five-kilometre-long circular path with a viewing platform and observation huts provides nature lovers a way to explore the natural discovery park without disturbing the animal and plant world. The IAPH awarded a Silver Port Environment Award to the project in 2015.

Preventive nature conservation

In order to provide long-term space for the development of the port and to meet the growing logistical requirements, JadeWeserPort is already focusing on creating additional compensation areas that may be used as coherent areas should there be demand in the future.

The main aim is a continuation of the Natura 2000 network of protected areas within the EU and an early preparation of the areas that is close to nature. To this end, approx 243 ha of land has been acquired and is gradually being returned to nature. For example, a former clay pit in Elsfleth, where already endangered species such as the common lady's mantle and flowering rush, but also the great bittern have successfully returned.

Illustration 9: Oberhammelwarden clay pit

Illustration 10: Hemmoor measure

In the Hemmoor area, in cooperation with the local dike association, a partial area has been redesigned in an initial step - following the coherence requirements.

All measures are accompanied by regular monitoring to document the development of the areas. The areas are also maintained to ensure compensation for the qualitative connection of the Natura 2000 network.

4 Cooperation and partnerships

To be successful as a container port, you need strong partners and good relations bot locally as well as around the globe. The JadeWeserPort companies are advocating the project of a container port and a freight transport centre in Wilhelmshaven not only regionally but also on a national and international level.

JadeWeserPort is an active member of the International Association of Ports and Harbours (IAPH) and the World Ports Climate Initiative (WPCI) and is a member of the Ecoports Foundation.

Germany's sole deep-water port has taken up the challenge of meeting and transparently demonstrating the continuous improvement of its environmental performance that exceed the legal requirements. With the help of the EcoPorts tools, the port on the Jade is well on it way to introducing sustainable environmental management.

Organisations such as the Chambers of Industry and Commerce or the Weser Economic Association also repeatedly tackle environmental aspects. Here, legal developments and plans that could endanger elementary port interests are analysed and evaluated.

Regional cooperation is also important for JadeWeserPort. In a joint cooperation project with Niedersachsen Ports, bremenports and local lighting companies, future-orientated and sustainable lighting technologies were tested. Among other things, a comparison is made between traditional sodium vapour lamps, LEDs and LEPs (plasma lights). LED lighting managed to outperform other lighting systems in both energy efficiency and lighting quality. These results will be taken into account in future renewal, maintenance or expansion measures.

5 Outlook

It is our aim, through dialogue with shipowners, shippers and forwarders, to present the special advantages that the JadeWeserPort can offer companies and customers for optimising their supply chains in order to strengthen the sustainable use of the port through new traffic. For the future, JWPR plans to further intensify sustainable port management. This means that JadeWeserPort will continue to work extensively on measuring its performance against the standards of environmentally sound and sustainable management and to then align it accordingly.

It is also important to continue the sustainable work already begun in the area of compensation and coherence and to ecologically enhance land at an early stage - before it is legally required.

The electrification of the railway systems will become a focus. The first project steps towards implementation have already been taken. Until 2022, we will continue to work intensively on promoting and realising a hinterland connection that is low in CO_2.

The continuation and further development of the environmental management system will also be focused on in the coming years. In addition, projects already begun are to be continued and accelerated. At the same time, our dialogue with JadeWeserPort's partners and interest groups will be intensified in order to jointly advance issues of environmental protection and the sustainable development of the site.

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