Hamburg Port Authority

THINK GLOBALLY
ACT REGIONALLY

Sustainability report 2015/2016

End poverty in all its forms everywhere.

End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Ensure healthy lives and promote well-being for all people of all ages.

Ensure inclusive, fair and high-quality education for all and promote lifelong learning.

Achieve gender equality and empower women and girls.

Ensure access to, and sustainable use of, water and sanitation for all.

Ensure access to affordable, reliable, sustainable and modern energy for all.

Promote lasting, inclusive and sustainable economic growth, employment and decent work for all.

Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

Reduce inequality within and among countries.

Make cities and residential areas inclusive, safe, resilient and sustainable.

Ensure sustainable consumption and production patterns.

Take urgent action to combat climate change and its impacts.

Conserve and sustainably use the oceans, seas and marine resources in line with sustainable development.

Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.

Build and promote just, peaceful and inclusive societies in line with sustainable development, facilitate access to justice for everyone.

Strengthen means of implementation and revitalize the global partnership for sustainable development.

The strategy: Re-think, evaluate, optimise

Large ports such as the Port of Hamburg are complex ecosystems whose sustainability is of great importance for the people in the region. The development of society is influenced by megatrends such as globalisation, climate change, and the digital transformation of the economy (in particular Industry 4.0). Which markets will be of significance tomorrow, and which market volumes and dynamics will develop? The new normal is characterised by volatility, uncertainty, and variability. The traditional role of the port as a component in a global multi-modal supply chain is changing.

Our job as managers, service providers, and partners of the Port of Hamburg is to ensure the accessibility and availability of the port, to keep the infrastructure resilient and functioning, and to plan with foresight. At the same time, we are in a transitional phase and need to re-think the purpose of our company with regard to services of public interest in order to maintain the value of the port.

The port and the city of Hamburg are closely linked. Its inland location in the Tidal Elbe nature region at the heart of the city poses unique challenges for us. However, it also offers many opportunities for creativity. The Port of Hamburg would be well-advised to capitalise on these very opportunities and to see itself as an innovative port which capitalises on its unique location to develop its dynamic, which calls for new solutions for people, the environment and the economy.

Our task is to develop the infrastructure in the port region so that the port experiences healthy growth in both national and international contexts and is able to compete at a high level. Where new port areas are created, natural habitats are pushed back. And where there are objectives, there also exist conflicts of objectives. Finding a reasonable compromise here is not easy and a consensus cannot always be reached. For this purpose, we are constantly in a dialogue and learning process with our stakeholders.

In this context, we understand sustainability as a competitive factor which can give rise to a substantial advantage in an international context. At the same time, the following holds true: Only a limited number of the transformational solutions of today which create economic and societal value can be encountered entirely within a company; instead, they are very frequently found beyond its boundaries. Networking with other ports as well as the hinterland will strengthen the global value creation system that is the port.

With the initiative chainPORT, which was founded in 2016, we want to go beyond the concept of traditional bilateral port partnerships. The global chain of worldwide smartPORTs has set itself the goal of bringing together port management and stakeholders to share benchmarks and develop strategies on how ports can work together intelligently in a global network at digital and physical levels.

We recognised early on that the future of the port lies not only in its spatial, but also intelligent development; that the various traffic and cargo information flows need to be networked with each other in order to enable more efficient port operations. One of the most important success factors is efficiency — both with regard to energy and infrastructure use as well as traffic and property management. It is exactly this approach which the HPA's smartPORT philosophy[1] stands for. Digitalisation will become a key instrument for innovations which generate business opportunities from ecological and societal challenges. Connectivity and barrier-free access of information make possible process optimisations and the development of new business areas. In addition to trading with goods, the trade of information is increasingly growing in importance.

We introduced our smartPORT projects to the international specialist public at the World Ports Conference (IAPH) in Hamburg in Summer 2015, an event which we organised.

[1] See also: http://www.hamburg-port-authority.de/en/hpa-360/smartport/

We are delighted that this work was recognised with "CIO of the Year 2015", an award which was presented to the Chief Information Officer of the HPA, Dr Sebastian Saxe.

Since 2011, the HPA has been particularly intensively involved in the topic of sustainability. In order to integrate sustainability into decision-making processes and day-to-day business activities, we have developed a common understanding of what sustainability means in general and with regard to HPA's business. This understanding has led to a situation where ensuring that actions contribute to sustainable development is not seen as an inconvenient obligation, but as a rewarding task for the future.

With the UN Sustainable Development Goals (SDGs) that were agreed upon worldwide in 2016 and which aim to preserve the economic performance, social responsibility, and regenerability of the earth, we are now faced with additional challenges, but at the same time opportunities. Actively utilising the SDGs as corporate disruptors in the future in order to align the Port of Hamburg's competitiveness to these goals will become our new normal.

We have aligned our value system according to the SDGs, the guidelines of the OECD, and the Global Reporting Initiative (GRI) and report on our progress. In addition, we have compiled port-specific aspects and indicators for port operators (PO) together with international port experts under the roof of the PIANC[2]. This new guide, which is expected to be published in 2018, defines innovative standards and performance indicators for port operators from a long-term perspective.

Fig. 1: 17 goals and 169 targets[3]

[2] Permanent International Association of Navigation Congresses

[3] The United Nations' 2030 Agenda for Sustainable Development

MISSION

Our corporate responsibility programme is based on these value systems. It forms the framework for the sustainable development of the HPA and the derivation of short- and long-term strategic and operational objectives:

1. Achieve increased economic productivity through diversification, technological modernisation and innovation, including the establishment of value creation and employment-intensive sectors. At the same time, the goal is also to decouple economic growth from environmental destruction.

2. Build and modernise high-quality, functioning, reliable, and resilient infrastructure (properties, waterways, roads, railway tracks) that communicates via sensors for our clients and stakeholders in order to promote economic development and human well-being.

3. Develop optimal traffic management for all modes of transport to ensure the accessibility and availability of the port and to strive towards a reliable, smooth flow of traffic as well as efficient use — also in order to maintain and create future port development potential.

4. Forge global partnerships for the sustainable development of the Port of Hamburg to mobilise and exchange knowledge, expertise, and technologies.

5. Utilize dialogue and participation to establish understanding and trust. Transformation processes for dealing with megatrends require constructive solutions whose decision-making workflows are needs-oriented, inclusive, and participatory.

6. Use sustainable fuels and renewable energy. Via increased energy and material efficiency and with electric drives, contribute to achieving the climate goals and the improvement of the health of our neighbours. The avoidance and/or reduction of noise, light, smells, and air pollutants is to be strived for along the logistics chain.

7. Provide decent work for all, in particular for people with disabilities. At the same time, the following are also to be taken into account: Protection of labour rights; promotion of a safe working environment, same pay for the same work, promotion of mental health and well-being; ensuring inclusive, equal, and high-quality education and support for lifelong learning; ending discrimination and achieving gender equality in leadership positions.

To achieve this, we intend to proceed as systematically as possible. Environmental analyses and benchmarks for dealing with megatrends as well as the early inclusion of stakeholders form the basis for determining opportunities and risks. The resulting recurring adaptation of the corporate and digitalisation strategy and its integration into the corporate process will anchor sustainability in the core business. In the future, the following basic principle will also apply at project level: a project is only considered to be sustainable when it has been synchronised with the strategies of the HPA and the achievement of goals and an analysis of the effects has been performed. Sustainability will become the business model:

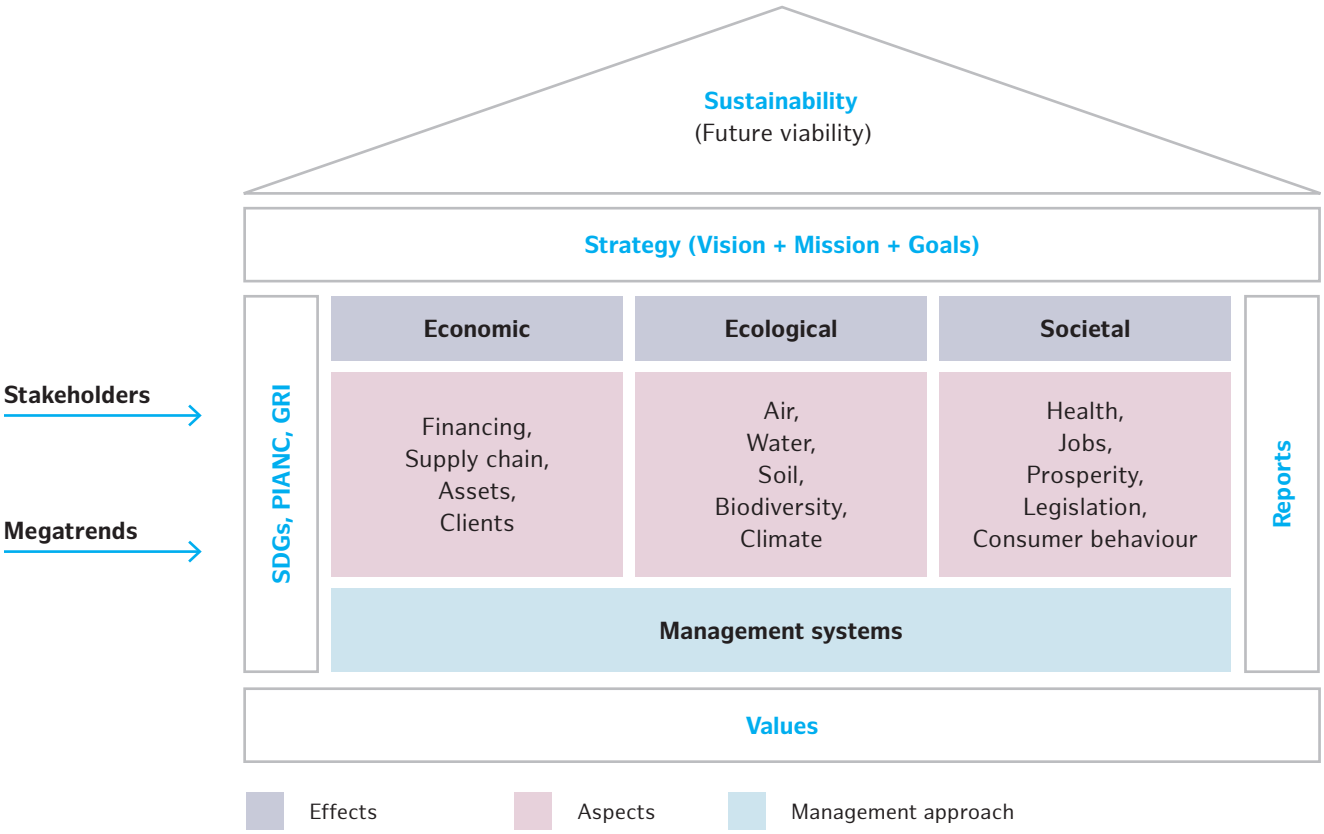


Fig. 2: Sustainability as a business model

Under the title "Sustainability", we will continue along the path we have embarked on, and with the third report, continue to pursue the disclosure of corporate activities and the economic, ecological, and societal effects on its environment. With this disclosure, we are reacting to the requirements of the market and the public, as well as to internal structural requirements.

01

SUSTAINABLE PORT MANAGEMENT AS A COMPETITIVE FACTOR

1.1 The company: flexible structures, defined goals

The Hamburg Port Authority AöR (HPA) is a port manager, service provider, and a partner of the Port of Hamburg. On behalf of the Department of Economics, Transport and Innovation (BWVI), it determines the strategic direction of the port based on client requirements and economic and political framework conditions to ensure its competitiveness, utilising its expertise and new business areas to augment efficiency.

In collaboration with the federal government and neighbouring states, HPA ensures and develops the ground and water routes of the port. At the same time, it consolidates the supra-regional significance of the Port of Hamburg at national and international levels.

In order to ensure efficient, sustainable, and global port management, HPA collaborates with national marine ports on the Lower Elbe, with numerous international port cities, and with associations such as Logistik-Initiative Hamburg (LiHH), the European Sea Port Organisation (ESPO), and the International Association of Ports and Harbors (IAPH).

The HPA is a public agency (Anstalt öffentlichen Rechts) and is subject to the technical and legal oversight of the Free and Hanseatic City of Hamburg (FHH) via the BWVI. The supervisory board of the HPA consists of nine members — of whom three are female.

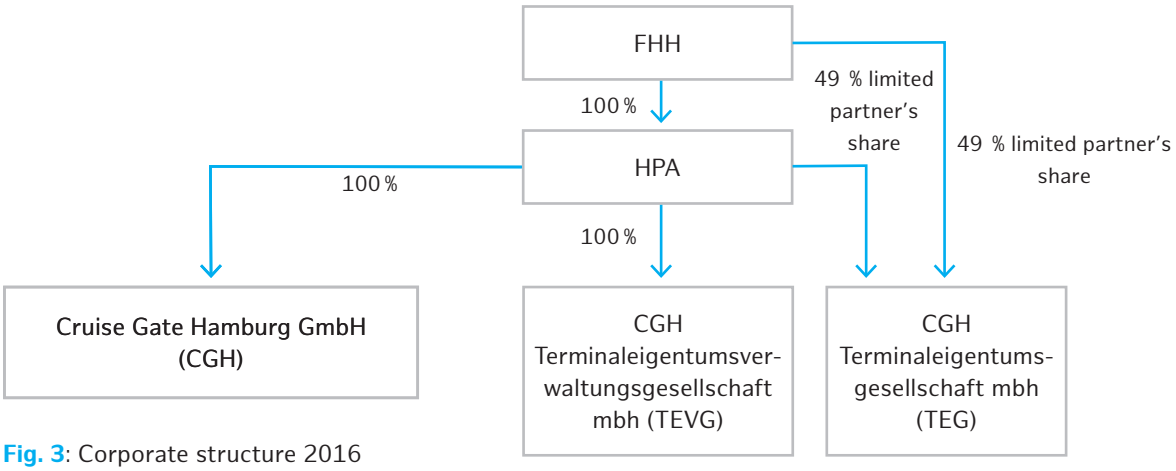


Fig. 3: Corporate structure 2016

Change as a constant: organisational, operational, and geographical changes

The organisational structure of the HPA is geared towards being able to rapidly and flexibly react to market, political, and client requirements. During the reporting period, the HPA was also assigned new tasks which triggered various organisational changes:

- As part of Hamburg's application to host the 2024 Olympic Games, port planning had to be reorganised within a very short period of time. In particular, this affected the potential Olympics location "Kleiner Grasbrook", which at that point in time was still being leased for port activities. In order to be able to adapt the plans as quickly as possible, an Olympics project team was assembled within the HPA ad hoc. Consequently, this team was dissolved again after failing to win the bid.

- With the founding of the subsidiary Cruise Gate Hamburg (CGH), the framework conditions were created in Hamburg for the successful development of cruise activities. Since the beginning of 2015, this 100 % subsidiary of the HPA has been operating all three Hamburg Cruise Centers in Altona, in the HafenCity, and in Steinwerder.

- The port railway (Hafenbahn) has expedited the plans for the expansion of the range of railway-related services in the port over the past few years. The offerings of the carriage workshop which went into operation back in 2014 were expanded and all necessary certifications were acquired, such that a larger clientele can now be catered to. This allows carriages, which regularly come to the Port of Hamburg on round trips, to be serviced and repaired directly on site.

- Since 2013, the European Commission has been reviewing the financing structures of European ports. Due to the European Commission's requirement that grant-relevant and non-grant-relevant areas be separated from each other in a more transparent manner, a new organisational structure with the project name "HPAnext" was agreed upon at the end of 2016. This allowed the foundation to be laid for the future performance and the financial transparency of the HPA. The goal: An organisational separation of public and commercial activities. A divisional structure and divisional accounting would be used to make financial relationships within and outside the HPA more transparent.

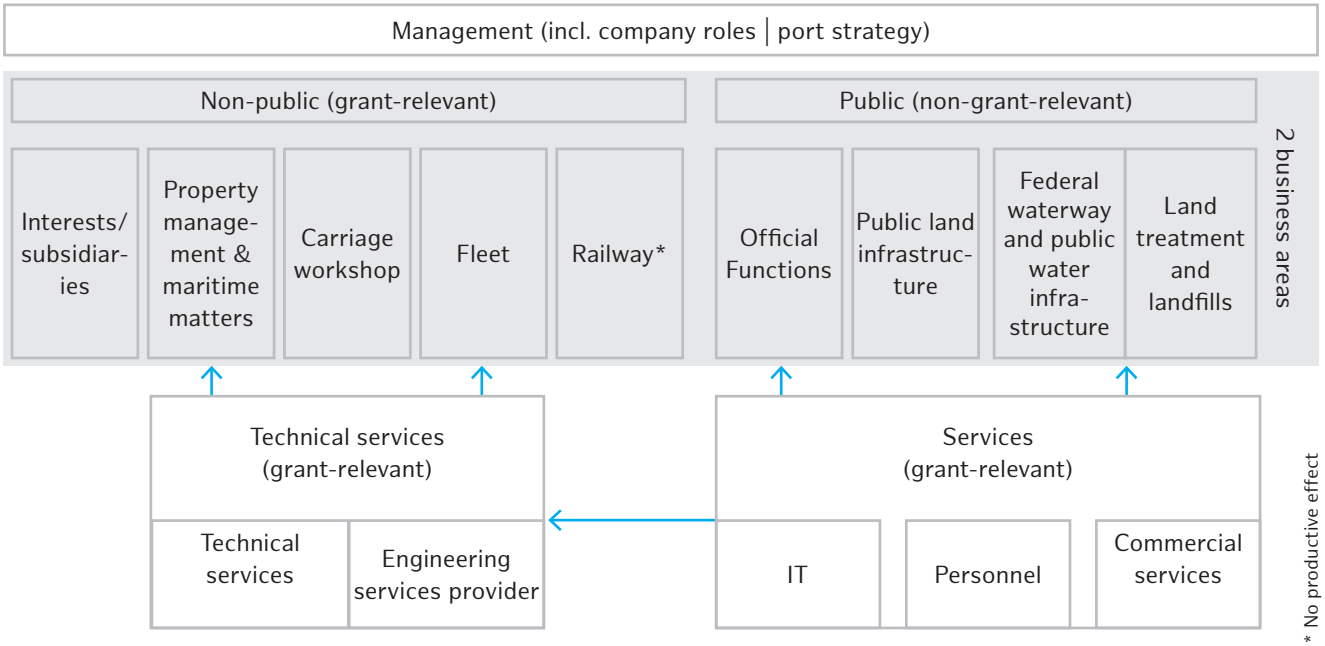


Fig. 4: Corporate structure from 2017

The current and complete organigram of the HPA can be viewed on the website at www.hamburg-port-authority.de.

The following geographical changes took place during the reporting period. The area "Altenwerder West" measuring 44.4 ha was transferred from the port expansion area to the port utilisation area on 03/05/2016 pursuant to a resolution of the FHH Senate. Land areas at Kirchenpauerkai (Baakenhafen) were excluded from the port area.

Port areas in ha	2016	Difference from 2014
Port area (PE + PU)	7,105	-10.0
Port expansion area (PE)	795	-44.4
Port utilisation area (PU)	6,310	+44.4
Water area	2,849	0.0
Land area	4,256	0.0

Fig. 5: Change in port areas

Guidelines for values-compliant corporate governance

The HPA's corporate guidelines and management principles form the basis for efficient corporate governance. One important aspect of this standardisation is the integrated management system which is still in development. It consists of quality management (ISO 9001), environmental and energy management (ISO 14.001 and ISO 50.001), and occupational safety and health management. The decisions and actions of the employees in conjunction with the management systems (various corresponding manuals and guidelines are used for setting objectives and evaluation) therefore contribute to the continuous improvement of corporate governance. With its management approach that is regulated in a central and standardised mannerfor all major aspects and fields of activity, the HPA possesses management principles for decision-making, monitoring, and feedback.

Furthermore, the sustainability principles are also an integral component of the corporate guidelines, which have been continuously adhered to and refined since 2014. They provide orientation for an environmentally friendly, socially fair, and efficient course of action while also taking into account the precautionary principle, and are binding for all employees. The annual acknowledgement by all employees has been a key procedure since 2015.

Our goals in a dynamic market and client environment

HPA's client structure is highly diverse. Direct clients include: local and international shipping companies, cruise companies and port skippers, tenants and users of port properties, public transportation in the Port of Hamburg, tourist companies and sports boat drivers, port skippers and rail transport companies. The over 400 contractual partners of the HPA include small and medium-sized companies, but also major international corporations.

The other participants in the goods and supply chain act as indirect clients: international clients of the shipping and logistics companies located in northeast Asia, in the Baltic region, in Eastern Europe, in Germany, as well as in the Hamburg metropolitan region. The markets supplied consist almost entirely of commercial clients, and include both local and international companies.

The market and client environment is characterised by a progressive consolidation in the logistics sector. A growing number of major market participants are emerging who have evolved from dedicated transportation agents or freight forwarders to become logistics service providers. They are increasingly taking over the establishment and management of the logistics chains, and also offer additional value-added services. In particular, this means that the freight forwarders have evolved into a client group which has a major influence on the flow of cargo and the integration of additional commercial functions. Like the shipping companies, they have become cargo managers whose decisions can have a long-term impact on the success of the port. Hence, it will become increasingly important to work together with shipping companies, handling companies, and logistics service providers to develop sustainable strategic location concepts.

Due to consolidations in the container shipping sector, there are now three line alliances instead of the former four:

- 2M: Maersk, MSC
- Ocean Alliance: CMA CGM/APL, COSCO Shipping, Evergreen, OOCL
- THE Alliance: Hapag-Lloyd, K-Line, MOL, NYK, Yang Ming

This development has far-reaching consequences for the schedules of the shipping companies. Among other things, they need to reorganise slot charter agreements, departure frequencies, and port workflows.

GOALS

Goals for the HPA up to 2025: In this environment, it is of enormous importance for the HPA to formulate its own goals as clearly and bindingly as possible in order to establish reliability. By doing so, it creates a reference point for its clients for its direction in the near future. In this context, the overarching goal of the HPA is to tie cargo more strongly to the location of Hamburg within the supply chain by increasing the value creation intensity on site. Further goals for the coming eight years were defined by the management in 2016 as follows: The HPA

- works according to the principles of sustainability (economy, ecology, social welfare) and is a resource-conserving company, thereby fulfilling its responsibility for the port in the city. With these quality characteristics, it positions the port successfully in the face of competition.
- continuously adapts its business models and its organisation to the changing tasks and framework conditions.
- is transforming the Port of Hamburg into one of the most intelligent ports in the world. The Port of Hamburg operates according to the highest quality and efficiency standards.
- successfully consolidates the supra-regional significance of the Port of Hamburg at national and international levels.
- is transforming the port into one of the leading cruise locations in Europe.
- has established itself as an all-round attractive employer in a core field of competency in the economy of Hamburg.
- continuously improves the interface to the port's hinterland access routes as well as the traffic flows in the port region.
- is, thanks to the smartPORT concept, a driving force for digitalisation along the value creation chain, and develops IT applications that can be transferred to Hamburg and other cities.
- is reducing energy consumption by 5 % as compared to 2015 in order to achieve climate goals via increasing energy efficiency.

Additional short-term qualitative and quantitative goals are categorised according to the corresponding topics and measures in the report.

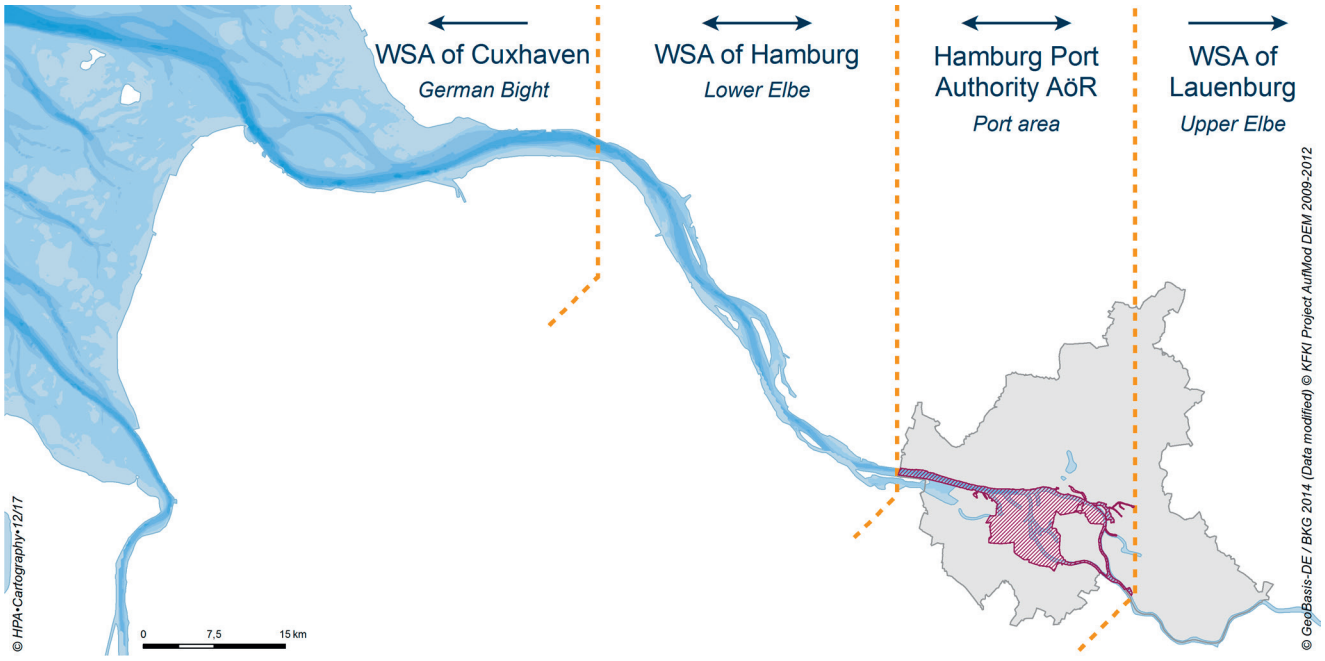
Boundaries of the business model

The Port of Hamburg is a complex entity. It is a networked space which various stakeholders use to conduct economic activity as successfully as possible. Although its borders are clearly defined geographically, its operational boundaries are highly dynamic and embedded in international goods traffic and supply chains.

An exact representation of the various involved parties, who hold responsibility for the Port of Hamburg and the environment, takes place along the various boundary observations. It should be made clear which port-specific entrepreneurial responsibility the HPA carries as well as the extent of its influence and which other involved parties are also responsible for the functioning of the port ecosystem and the supply chain. However, the operational responsibility of the HPA is not limited to the Port of Hamburg alone. In its day-to-day work it is very closely linked to the region — with the neighbouring states of Schleswig-Holstein and Lower Saxony as well as with the Federal Waterways and Shipping Authority (WSV) — and with developments in the entire Elbe catchment area. Due the integration of additional responsible parties into the Port, the boundaries of the business model of the reporting organisation are changing. In doing so, the HPA adheres to the instructions from the current coalition agreement of the Senate of Hamburg.

- The organisational boundary is composed of the organisations which perform the tasks necessary for reliable and efficient operation in the Port of Hamburg.
- The operational boundary describes the activities which are necessary for port operation and (among other things) the construction and maintenance of the infrastructure in the Port of Hamburg.
- The geographical borders are based on the business model of the reporting organisation.
- The dynamic boundaries can have an effect on the delivery and logistics chain. They are determined by the geometry of the infrastructure and by aspects such as accessibility, availability (e.g. climate change and weather conditions) and the capacity of the port.

An illustration of the responsibilities and boundaries of the report is provided in graphical format in Fig. 6. The degree of responsibility is defined as follows:



Functions	German Bight	Lower Elbe	Port area (acc. to the HPAG)	Upper Elbe
Infrastructure: federal waterways and state water bodies (locks, barrages etc.)	Water and Shipping Authority (WSA) of Cuxhaven	Water and Shipping Authority (WSA) of Hamburg	HPA port managers	Water and Shipping Authority (WSA) of Lauenburg
Safety of shipping traffic	WSA Cuxhaven	WSA Hamburg	HPA port managers	WSA Lauenburg
	HPA partners	HPA partners		HPA partners
Traffic control for ships (Navigation)	WSA Cuxhaven	WSA Hamburg	HPA port managers	WSA Lauenburg
	HPA partners	HPA partners	HVCC*	HPA partners
Infrastructure: roads, bridges			FHH	
			HPA port managers	
Traffic control: state traffic routes			FHH	
			HPA partners	
Infrastructure: public flood protection			FHH	
			HPA partners	
Infrastructure: private flood protection			Private	
			HPA port managers	
			FHH	
Infrastructure: railway network			HPA port managers	
Traffic control: port railway			HPA port managers	
Port railway usage fee			FHH	
			HPA port managers	
Landowners			Private	
			HPA port managers	
Rental and lease of HPA land and water areas			FHH	
			HPA port managers	
Port usage fee			FHH	
			HPA port managers	
Port development			FHH	
			HPA service providers	
Services — haulers, boatmen, maritime pilots			Private	
			HPA port managers	
Ship disposal services			FHH	

* Hamburg Vessel Coordination Center

Owner or comprehensive responsibility

Contractor or consultant

Influence

Fig. 6: Overview of responsibilities and boundaries of the HPA

1.2 The port: international hub, supra-regional driver of jobs

The Port of Hamburg is of vital economic importance. It is the largest and most important German port and the third-largest container port in Europe. It generates a large percentage of jobs and value creation, making it one of the most significant economic factors in the Hamburg metropolitan region.

The Port of Hamburg therefore offers a range of advantages: Its favourable geographic location — waterways connected to the ocean that lead 130 km inland — significantly cuts down on cost-intensive and environmentally harmful land transportation. Furthermore, it also benefits from its well-developed connections to the hinterland. As the most eastern of the north range ports located close to the Kiel Canal, it records the highest departure density for feeder traffic for the Baltic Sea region. As Europe's largest railway port, Hamburg ensures that onward transportation of goods to the metropolitan region, within Germany, and to Scandinavia and Eastern Europe takes place with the lowest possible emissions. In this respect, Hamburg benefits overall from the prospering economic environment in Hamburg, which is characterised a the high degree of innovation and the training of specialists.

Turnover figures: the port as the heart of the maritime economy

The Port of Hamburg is the heart of a cluster structure that has been developed over decades. As a universal port, Hamburg is able to handle all cargo categories.

Located in the port and in its surroundings is a wide mixture of both traditional and new economic sectors with large, medium-sized, and small companies which contribute significantly to the stability and the economic development of the metropolitan region and provide it with connections to regions of the world with strong growth. In 2016, the Port of Hamburg recorded a total turnover of 138.2 million tonnes, which is 0.3 % higher than the reference figure from the previous year.

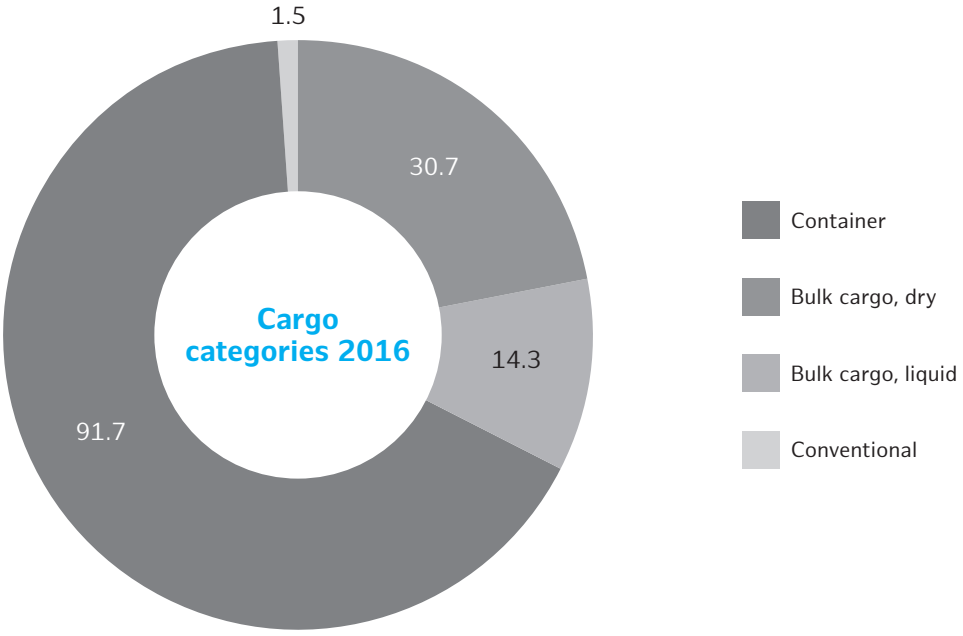


Fig. 7: Tonnage per cargo category for 2016 in mil. t

Modal split (in mil. t)	2013	2014	2015	2016
Sea cargo turnover	139.0	145.7	137.8	138.2
Transshipment	40.8	47.0	38.0	38.6
Hinterland, rail	41.5	44.4	45.8	46.4
Hinterland, inland waterway	10.8	11.6	12.2	11.5
Hinterland, lorry	46.0	42.7	41.9	41.7

Fig. 8: Sea cargo turnover according to means of transport in mil. t

Modal Split (TEU[4] in thousands)	2013	2014	2015	2016
Sea cargo turnover	9,257	9,729	8,821	8,907
Transshipment	3,890	4,116	3,278	3,322
Hinterland, rail	2,095	2,240	2,304	2,360
Hinterland, inland waterway	98	100	117	117
Hinterland, lorry	3,175	3,273	3,122	3,108

Fig. 9: Sea cargo turnover according to means of transport in thousands of TEU

Where the market shares of the four largest north range ports are concerned, the Port of Hamburg has more than held its own. Hamburg's share of total turnover at the end of 2016 was 15.6 %, the same as the previous year. After a difficult start to the year, container turnover exhibited predominantly positive growth rates starting from April 2016, such that the total turnover at the end of 2016 was 8.9 million TEU, thereby achieving a slight growth of 1.0 % as compared to 2015. The tonnage share of containers as part of total turnover increased to 91.7 million tonnes.

The BWVI target values could not be reached in 2016. The HPA has little influence over the achievement of these targets.

	2014	2015	2016	2020
Target value	145.7	137.8	145.2	155.8
Current value	145.7	137.8	138.2	

Fig. 10: Sea cargo turnover in mil. t

	2014	2015	2016	2020
Target value	9.7	8.8	9.9	10.4
Current value	9.7	8.8	8.9	

Fig. 11: Sea cargo turnover in mil. TEU

[4] Twenty-foot Equivalent Unit (Twenty-foot-container)

Import and export showed contrasting trends: The import side recorded an increase of 2.5 % at 79.1 million t — and the export side a decrease of 2.6 % at 59.1 million t. The turnover of bulk cargo showed a positive development during the reporting period; it continues to remain an important pillar of the universal port. In particular, the import of mineral oil and oleaginous fruit increased perceptibly.

Import	2015 (in mil. t)	2016 (in mil. t)
Coal	7.7	7.4
Ores	9.5	9.5
Oleaginous fruits	3.2	3.4
Mineral oil	7.5	9.7

Export	2015 (in mil. t)	2016 (in mil. t)
Grain	4.2	3.2
Mineral oil	2.8	2.2
Fertilisers	2.7	2.4

Fig. 12: Important import and export goods in mil. t

The breakdown of container turnover according to the various shipping routes of the Port of Hamburg gives an inconsistent picture for the year 2016: In container traffic with the largest trade partner China, growth of 1.6 % was recorded, and with Russia an increase of 4.5 %. On the other hand, there was a significant drop in container traffic with South Korea (-12.9 %), as well as with Sweden, Poland, and Japan (all approx. -10 %). A significant to stark decline was also recorded for North Africa, Brazil, Canada, and Singapore.

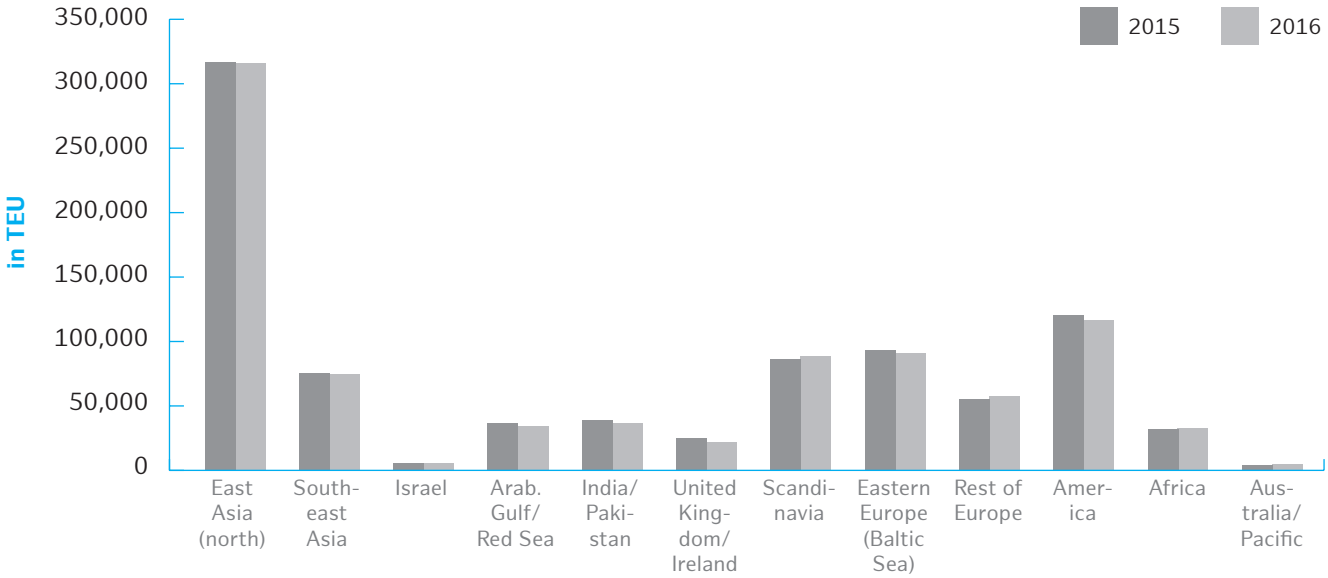


Fig. 13: Container turnover of the Port of Hamburg acc. to shipping routes

With a total of 171 calls at the Port of Hamburg and over 722,000 passengers, cruise traffic set new records in 2016. Here, in conjunction with the CGH, the HPA is pursuing the goal of increasing the number of shipping companies calling at Hamburg by at least one per year. Thus Hamburg underscored its position as the most important port for cruises in Germany in the past year. Despite the number of calls remaining constant, the cruise business is recording enormous growth rates for passengers due to the increase in the size of ships.

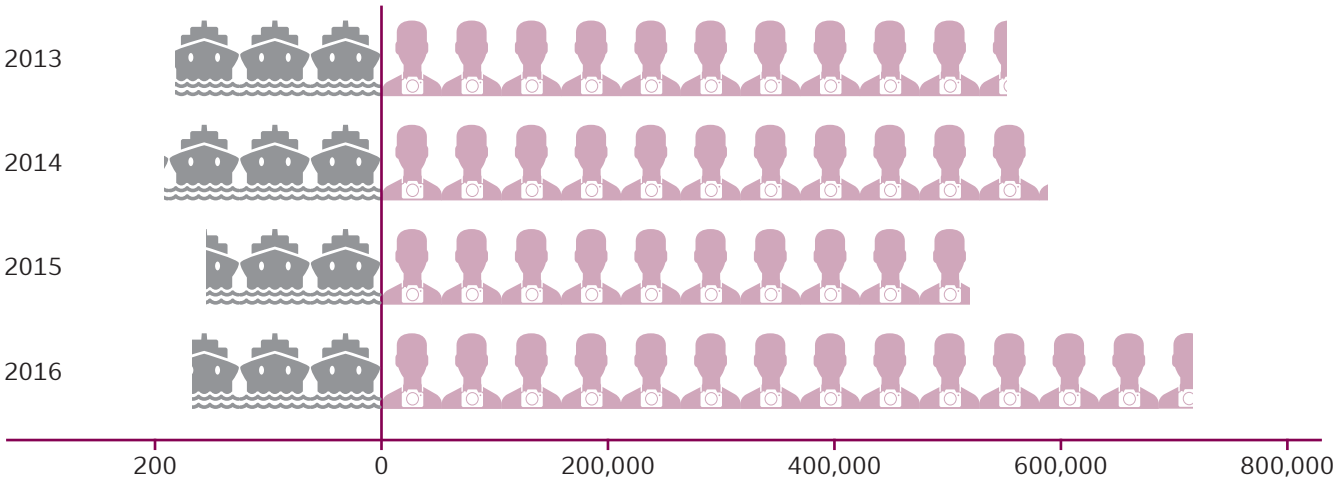


Fig. 14: Cruise ship calls and number of passengers

At the moment, the shipping and passenger quantities can be handled optimally at the three existing terminals. An additional increase in capacity is expected via the planned construction of the new terminal in the HafenCity. Whether and when the current positive trend forecast for the cruise sector in Hamburg will require the construction of another new terminal or the expansion of existing capacities still needs to be assessed. Apart from the developments where ship size is concerned, this will definitely also depend on how attractiveness for calling on weekdays can be increased.

Value creation and employment effects

As well as the two large container handling companies, around 500 individual companies are also based in the Port of Hamburg. Renowned industrial companies from the energy sector, the raw materials industry, drive technology, the shipbuilding and machine engineering sectors, and the fertiliser industry also play an important role in the economy of the port. The producing port industry and port-related industries account for a particularly high percentage of industrial jobs.

In order to represent the regional and overall economic importance of the Port of Hamburg, the HPA regularly has PLANCO Consulting GmbH analyse the effects for employment, gross value added, income, and tax revenue arising from the port. The results for the years 2015 and 2016 were not yet available at the time of writing. However, the socio-economic data from the years 2013 and 2014 attest to the economic effects generated by port activities.

	2013	2014
Investment grants paid to the HPA by the government (in mil. €)	237.5	232.0
Port-dependent tax revenue of the FHH (in mil. €)	824.0	910.0
Overall share of port-dependent tax revenue of the FHH (in %)	11.0	11.1
Port-dependent gross value added (in mil. €)	11,702.0	12,649.0
Overall share of port-dependent gross value added in Hamburg (in %)	13.4	13.6

Fig. 15: Economic effects from the operation of the Port of Hamburg versus investment grants to the HPA

Consequently, a total of 21.8 billion euros were generated nationwide in 2014 via activities dependent on the Port of Hamburg. This underpins the national importance of the Port of Hamburg. At a good 7.1 billion euros, more than half of port-dependent gross value added generated in Hamburg came from port activity. This includes the industry sectors of shipping, logistics, and land transportation. The most important driver of jobs continues to be logistics, which accounts for around 40 % of all employment effects via its interdependencies with upstream and downstream economic sectors. 13.6 % of overall gross value added in Hamburg was generated via the port. If we compare this to the employment ratio of the Port of Hamburg in 2014, which was 10.9 %, it can be seen that the jobs in the Port of Hamburg are particularly productive.

The number of port-dependent employees in the Free and Hanseatic City of Hamburg was 129,800 in 2014, and 155,600 in the entire metropolitan region. This means that around a tenth of all jobs in Hamburg depend on economic activities related to the Port of Hamburg. In Germany, around 268,700 jobs depend on the Port of Hamburg. For the 2015 reporting year, no forward projection was performed for the number of employees. However, there are a number of indications that there was zero growth in the number of employees dependent on the Port of Hamburg this year. Current employee figures based on a new survey are expected at the end of 2017. The HPA's degree of influence lies in the establishment of employment-intensive companies.

	2014	2015	2016	2020
Target value	129,800	(no data)	131,700	131,700
Current value	129,800			

Fig. 16: Port-dependent employment (direct and indirect) in Hamburg

Compared to the cargo categories, the category "Passengers" recorded the greatest employment growth. Accordingly, the percentage of port-dependent jobs it accounted for in Hamburg grew constantly from 1.8 % in the year 2011 to 3.1 % in the year 2014. In Hamburg, around 4,000 persons were employed in the cruise sector and/or in areas that depended on it in 2014. The annual gross value added from the cruise segment in the Port of Hamburg grew from 220 million euros to 411 million euros from 2011 to 2014. In the metropolitan region, a gross value added of 452 million euros dependent on the cruise segment was generated in 2014; the total nationwide gross value added was 658 million euros.

Port-dependent employment	2013	2014
Bulk cargo	44,000	43,300
Conventional break bulk cargo	16,500	16,500
Container cargo	88,500	91,200
Passengers	4,400	4,500

Fig. 17: Port-dependent employment (direct and indirect) in the Hamburg metropolitan region

The Port of Hamburg: a growing interface to the hinterland

In hinterland transportation, an increase of 0.7 % was recorded for container turnover in 2016. The stable development affirmed the traditional strengths of the Port of Hamburg in this area.

In particular, port hinterland rail traffic showed a positive development. Hamburg possesses outstanding and environmentally friendly connections to the continental rail network. Today, 30 % of the cargo volume in the Port of Hamburg is already being handled via the high-performance railway network and the supra-regional networks. No other European port has achieved this value.

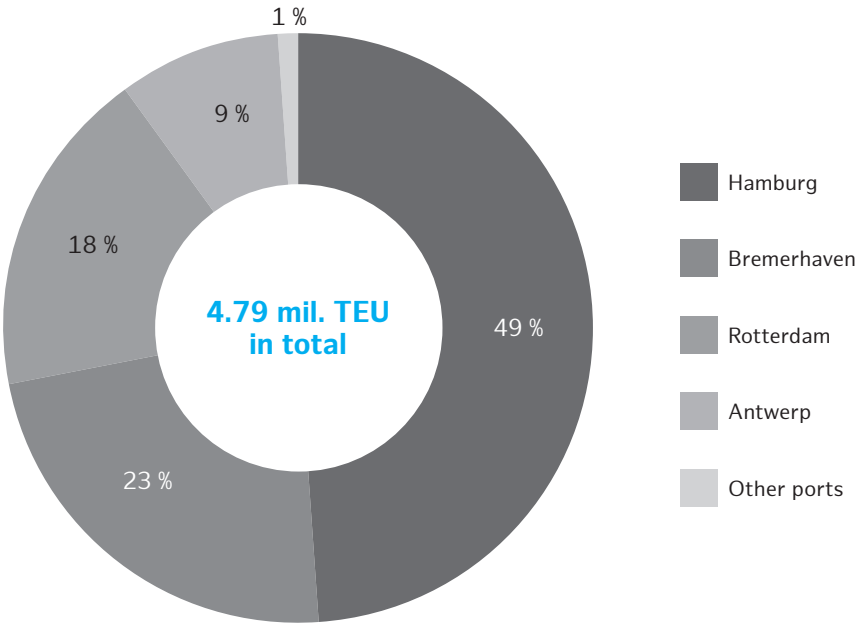


Fig. 18: Rail traffic of major north range ports in 2016

For TEU and the total cargo weight of all goods transported in wagonload and container traffic, new all-time records of almost 2.4 million TEU or 46.4 mil. t were set. This corresponds to an increase of 2.4 % for TEU and 1.5 % for cargo weight. In the year of the 150th anniversary of the port railway (2016), it celebrated record values for traffic handling on the network. Never before had the port railway transported so many carriages with so much cargo via the rail network.

The BWVI's target value was significantly exceeded. The HPA assists with the achievement of these target values by making available additional capacities.

	2014	2015	2016	2020
Target value	44.4	45.8	43.4	47.4
Current value	44.4	45.8	46.4	

Fig. 19: Port railway turnover in mil. t

	2014	2015	2016	2020
Target value	39.0	41.6	42.3	45.0
Current value	39.9	41.6	42.3	

Fig. 20: Modal split share in %

The Port of Hamburg is also seeing growth where connections to inland waterway transport are concerned. In 2015, the Port of Hamburg became the second-largest inland port in Germany for the first time with a turnover of 12.4 million t. In 2016, turnover fell to 11.5 million t. However, container hinterland transportation rose to a record result of 117,000 in 2015, and maintained this value in 2016. For all goods types, inland transportation had a modal split share of 12.3 % in 2015. The goal is to increase this value to 15 % by 2020. For the inland port, solid bulk goods are the most significant for cargo weight — followed by liquid bulk goods, containers, and break bulk cargo.

With the smartPORT project "Intelligent Barge Information Services (IBIS)", the HPA is pursuing the goal of increasing transparency and visibility of inland waterway transport and actively improving the Port of Hamburg's connection to the inland waterway network. The HPA has set up additional berthing and waiting areas in the Port of Hamburg and both simplified as well as accelerated port calling processes via the digitalisation of the registration and deregistration procedures.

However, the HPA has little influence over the BWVI's target values.

The development of inland waterway transport in Hamburg does not depend on the infrastructural circumstances within the port alone, but is also determined by many other external factors at the same time. Examples of this are the continuous navigability of the Elbe (Overall Elbe Concept) and the transportation capacity of the Elbe-Seiten Canal (construction of new Scharnebeck ship lift near Lüneburg). Goods and container turnover continue to be volatile.

	2014	2015	2016	2020
Target value	11.6	13.5	11.5	15.3
Current value	11.6	13.5	11.5	

Fig. 21: Inland waterway transport turnover in mil. t

	2014	2015	2016	2020
Target value				15.0
Current value	11.8	12.3	11.6	

Fig. 22: Modal split share of inland waterway transport in %

Our goal: binding more value creation to Hamburg

These ups and downs of global trade are felt very directly at the Port of Hamburg. But there was one constant: the volume of local goods and the amount of traffic in the hinterland remain at a high level. Overall, the Port of Hamburg was able to maintain its good competitive position as a quality port with a high degree of reliability in this challenging environment. Illustrating this is the fact that the Port of Hamburg received the title of "Best Seaport Europe" in Asia in 2016, an influential industry prize.

The goal of future port development is to tie cargo even more strongly to the location. This can be achieved both via the establishment of industries and a greater value creation depth for logistics services. Such a strengthening of the Loco ratio[5] allows jobs to be preserved in this area, while also creating additional ones.

[5] Loco ratio = in port traffic, this refers to the percentage of goods that remains in the metropolitan region of the corresponding port

1.3 The content: Information on sustainability reporting

The HPA reports on its sustainability achievements every two years. This report covers key topics and special activities from the years 2015 and 2016. It has been adapted to the existing organisational structure of the HPA and comprises all units that are under the control of the HPA. The report does not include the subsidiary Cruise Gate Hamburg and its subsidiaries.

As the party responsible for port and area development topics, the HPA also reports on aspects whose effects lie outside the organisation. The boundaries of the business model of the report are indicated in the diagram in Fig. 6 on page 16. All operational and organisational responsibilities are reported on according to the degree of responsibility. From a spatial standpoint, the report refers to the area within which the HPA owns, leases, and manages properties and land, and is responsible for roads, waterways, railway tracks, and areas. Furthermore, the HPA is also reporting on port-specific aspects and indicators (PO[6]) as well as the voluntary involvement of port companies in climate protection — both for the first time. See also chapter 5.3. Because this report complies with the Global Reporting Initiative (GRI) G4 standard, a direct comparison with the indicators of the reporting years 2013/2014 is possible.

The HPA has voluntarily had the correctness, completeness, transparency, and comprehensibility of this report validated by an external party. The audit review (IDW PS 821) was performed by the independent auditing firm Ebner Stolz GmbH & Co. KG. Conformity with regard to the option "Core" in accordance with the GRI G4 reporting standard was certified.

The content of this report was determined by the HPA core team for sustainability in accordance with the reporting principles of GRI G4. This core team is composed of members with various corporate roles, such as strategy, financing, personnel, marketing and communication, as well as risk and opportunity management, and a representative from company management. In 2011, the management authorised this team to oversee the sustainability process on behalf of the company and to submit important decisions for a board resolution.

[6] See annex, figures section

Participation

With the introduction of the GRI G4 standard, the company committed itself to actively involving internal and external stakeholders of the HPA in sustainability reports. This took place in three major steps:

- In the first step, the HPA conducted an online-based quantitative survey among 100 selected stakeholder groups on their topic preferences for the 2013/14 report.

- In the second step, the HPA followed up on this survey in 2015 with an employee survey on the perception and acceptance of the sustainability report in their own company. The participation ratio of 48 % showed how dedicated the employees were to sustainability reports and the sustainability performance of the HPA. The survey findings indicated improvement potential, on the one hand for the visualisation and the textual design of the sustainability report itself, and on the other with regard to the organisation and communication of sustainability at the HPA.

79 %
of employees

wished to be informed more regularly on sustainability topics.

The integration of the suggestions and requests took place in all areas of the HPA and were also taken into account during the compilation of this report. The full results can be accessed via the functional inbox (nachhaltigkeit@hpa.hamburg.de).

- In the third step, the HPA delved deeper into the results of these surveys by — based on an intensive internal stakeholder analysis — surveying representatives of the major stakeholder groups in the port in the form of qualitative interviews. The goal of the interviews was to identify topics and aspects in greater detail which stakeholders considered to be particularly vital for the HPA's sustainability reports. These guideline-supported interviews took place in the period from mid-September 2016 to early January 2017. The following persons were surveyed as representatives of various groups:

  - NABU Hamburg, Alexander Porschke/Malte Siegert/Sönke Diesener, 22/09/2016
  - BWVI, Dr Wibke Mellwig/Rika Kramer, 29/09/2016
  - Zukunftsrat [Future Committee] of the City of Hamburg, Dr Delia Schindler, 04/10/2016
  - Hamburg Chamber of Commerce, Tobias Knahl/Jens Aßmann, 04/11/2016
  - Unternehmensverband Hafen [Port Companies' Association] Hamburg, Dr Peter Hesse, 29/12/2016 (in writing)
  - Hamburg Parliament: Dr Anjes Tjarks (Alliance 90/The Greens), 17/11/2016
  - Logistik-Initiative [Logistics Initiative] Hamburg, Carmen Schmidt, 07/12/2016
  - DGB Hamburg, Katja Karger, 05/01/2017

The parties surveyed considered the following topics to be particularly crucial:

- Availability of infrastructure
- Land utilisation/efficiency
- Air pollution/noise emissions
- Employment/HPAnext
- Sediment management/water protection and nature conservation

While economic representatives focused on the availability of port infrastructure both on land and on water as well as a sustainable solution for sediment management in the Port of Hamburg, the environmental associations emphasised aspects of efficient land use more strongly as well as preventing air pollution. The employee representatives prioritised both the process of change under the roof of HPAnext as well as better accessibility of the workplaces in the port for employees from the Hamburg hinterland.

Overall, the stakeholders agreed that the HPA is on the right path where professional sustainability reporting is concerned. However, they also suggested that the company not only depict successes, but also goal conflicts and the challenges of sustainability management at the HPA in the report in a more transparent manner.

We have attempted to include these important suggestions in this report in the best possible way as part of the materiality analysis. At the same time, the following holds true: All aspects of the materiality analysis were derived in a topic-dependent manner in accordance with the GRI and categorised according to the specific standard data, which reflect the major economic, ecological, and societal effects of the HPA.

Major aspects

Compared to the 2013/2014 sustainability report, the report scope has been expanded to include the aspects "EC8 – Indirect economic effects", "EC9 – Procurement“ and "LA12 – Diversity and equal opportunity". The validation of the content of the report with regard to sustainability context, materiality, and completeness was performed under consideration of the audit findings of Deloitte & Touché GmbH. The selection of the indicators was performed while taking into account the delimitation of the major aspects, and was confirmed by company management.

02

INVESTMENTS IN A SUSTAINABLE PORT INFRASTRUCTURE

Developing the port infrastructure with foresight, with an eye on what is crucial in the present, but also what is necessary for the future — those who follow this line of thinking need to be familiar with major future trends. It is easier to identify these trends than to predict their effects. For this reason, thinking in scenarios continues to grow in importance for the HPA, which needs to assume a range of various development paths.

For the HPA, equipping the port for the future means not only developing a market-ready land use strategy, but also designing traffic infrastructure that is as resilient as possible.

2.1 Land use strategy

The Port of Hamburg has set itself the goal of being an innovative port that operates sustainably, and which develops its creativity and quality from its unique location at the heart of a major European metropolis. This location brings Hamburg competitive advantages; however, it also entails a limited amount of available land and limitations with regard to development due to its proximity to the city and its inhabitants. The goal in this context is to develop a port development plan that is directed inwards, which optimally utilises existing land potential and generates correspondingly higher rental revenue. A conflict of goals which the HPA needs to reconcile as best as possible in this context is the issue of land development; i.e. keeping conservation vs. development in a reasonable economic and ecological balance. When new areas need to be created, either the periphery of the existing port utilisation area is expanded, or port basins need to be filled in, in a targeted manner. At the same time, Hamburg has made it one of its goals to conserve nature and to keep the loss of water areas in the port area to a minimum. This is also because the loss of water areas results in the deterioration of hydrological conditions and ultimately hampers water depth maintenance, as this generally leads to greater sediment accumulation in the remaining areas. The HPA is aware of this conflict of goals. It needs to weigh up the options as best it can and find a balance in each specific project context. When doing so, things will not be viewed in black and white along the vein of: "We will only do this and not that." Instead, there will continue to be collaboration between port development, nature conservation and water protection, as well as dialogue with neighbours.

The district of Moorburg with its 740 inhabitants is located in the port expansion area. Since the Port Development Act (Hafenentwicklungsgesetz) came into force in 1982, the inhabitants have been affected by the planning concepts of the port area. In particular, the village has not undergone any construction measures since then. The "Regular Moorburg Discussion Group" was established in 1998. Together with various Hamburg agencies and organisations, the HPA promotes joint dialogue with the residents in the discussion group on life in the village and on plans in the port expansion area.

Urban development in Hamburg also presents challenges for the HPA's land use strategy. Since 1986, the port has relinquished more than 315 ha of land to the city for urban development projects without having received replacement areas in return. Numerous residential building projects were realised in these former port areas, e.g. in the HafenCity areas and the Harburger Schlossinsel. The handover of additional areas for the purposes of urban development is imminent.

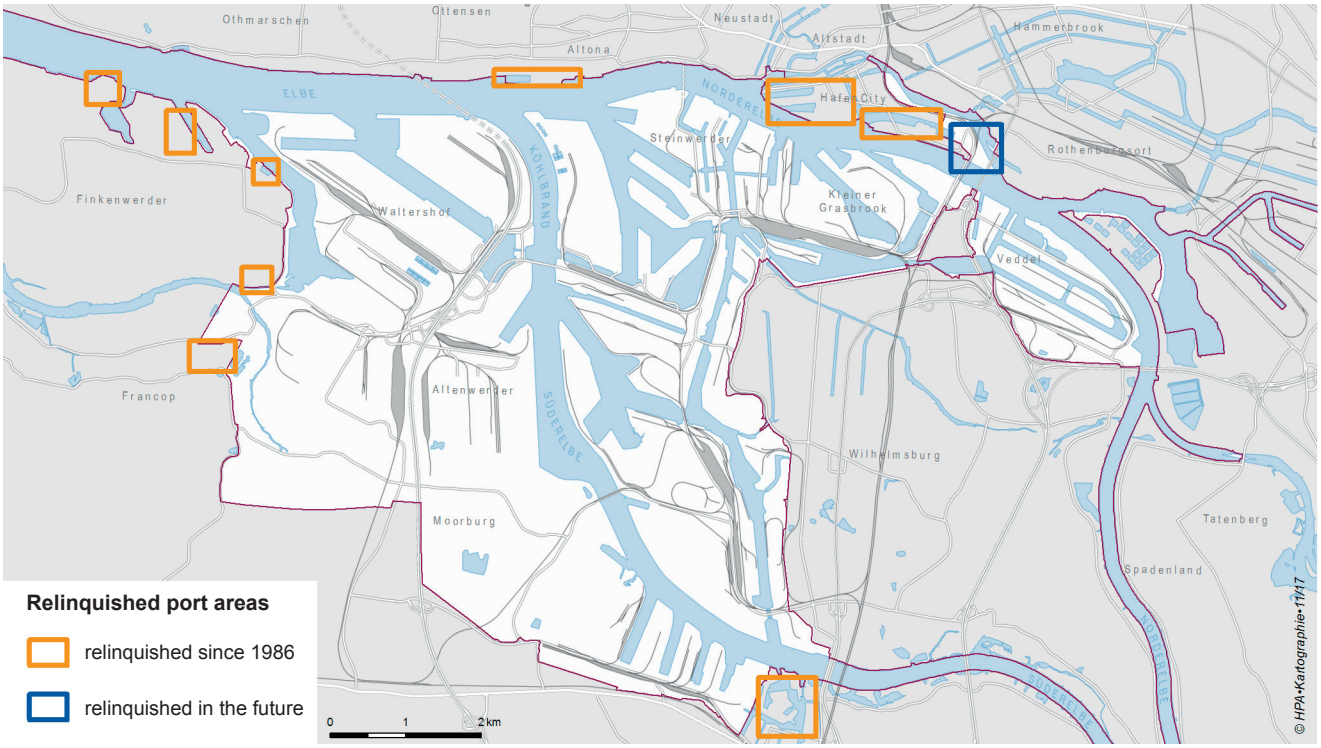


Fig. 23: Overview of a number of areas relinquished since 1986

Goal of the HPA: Increasing land use efficiency

The land areas in the port utilisation area of the Port of Hamburg comprise approx. 3,464 ha. Discounting the areas that are privately owned as well as the areas for infrastructure, flood protection, green areas, and areas for the HPA's own installations, approx. 1,950 ha of leasable land remains. The following is a breakdown of how leasable HPA properties are being utilised: Approximately 183 ha is currently not leased out, of which 140 ha is due to refurbishment requirements that cannot be financed at the moment, due to preparatory measures for restructuring and/or renovation, as well as due to current marketing or planning measures (e.g. due to the western expansion or the interim soil storage facility on Kuhwerder). This brings the degree of utilisation to 90.6 %. "Fallow areas" which observers might notice are unsurfaced and without superstructures are often areas that are yet unused by tenants or owners.

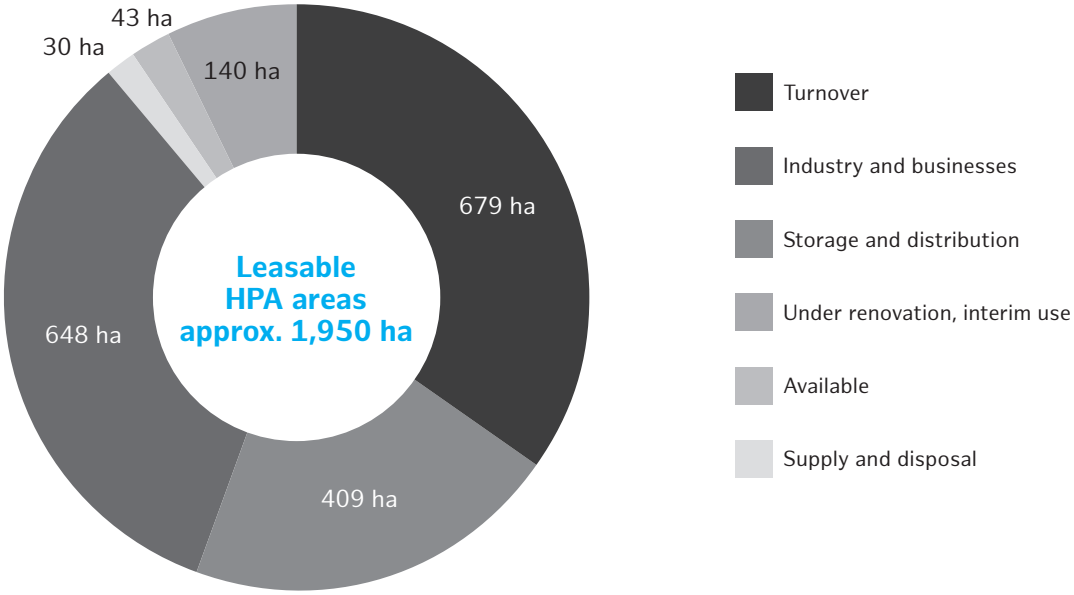


Fig. 24: Leasable HPA areas, 31/12/2016

Since it was founded in 2005, the HPA has leased its properties at prices that are based on their land value. This leads to higher rent at fairer market value, which in turn prompts tenants to use the areas more efficiently. The leasing of larger, more economically attractive properties takes place in transparent, discrimination-free, Europe-wide bidding procedures. Decisive aspects for the awarding of land areas are lease prices, the value creation contribution, and the strategic benefit for the port, as well as the number of directly and indirectly generated jobs, but also the commitment of the tenant with regard to environmental and climate protection. HPA selects the tenant based on a set of sustainable criteria that are defined in advance.

A large number of companies located in the port differ greatly in terms of structure from the companies based in the city area, a fact that can be seen particularly clearly in the utilisation of land area (e.g. the storage of ores, coal, and raw materials over large areas, the handling of containers, and the storage of mineral oils in tanks). Despite having an almost identical number of employees, a container terminal therefore inevitably has a lower surface-to-productivity ratio than a large trading company.

In order to increase the efficiency of land use, economic entities within the geographical structures of the port area are currently being defined. Expenditures and yields of all properties located in an economic entity are consolidated in one profit centre account. With the help of this management instrument, property strategies can be developed in a more targeted fashion for the various assets — properties, quay walls, buildings, floating installations.

Ensuring port productivity via strategic flood protection

Around 70 % of the port area is protected by private polder installations. For flood protection, the HPA acts in part as a landowner and landlord for port areas, and in part assumes an overarching role as a publicly appointed supervisory body.

The HPA is active in 16 private polder associations as a partner. With a sustainable maintenance concept — consisting of inspection, maintenance, and servicing — it ensures the long-term upkeep of the flood protection installations in the port area. The goal of the maintenance and the adaptation of the polders to future design-basis water levels is to ensure flood protection for the entire port area, to fend off hazards, and to keep port operations functioning to the greatest possible extent even during storm floods.

As part of its public administration responsibilities, the HPA has promoted the adaptation of private flood protection installations to the safety standards of public flood protection since 2007. As a supervisory body for polders, it works towards conducting comprehensive structural inspections for the reliable assessment of the status of all flood protection installations in the port. In the long term, the private flood protection installations are to be successfully brought up to the new design-basis water level applicable since 2012 as part of the construction of necessary new and replacement structures.

Managing the life cycle of properties

Currently, approx. 40 % of total CO_2 emissions in Germany still come from real estate. This area holds great ecological potential. For the HPA, the owner of a large property portfolio, this means meaningfully managing the life cycle of each piece of property with commitment, expertise, and consumption measurements. For new buildings, it utilises the highest technical industry standards and invests in the following in a targeted fashion:

- Ecological quality: Protecting the environment, conserving natural resources
- Economic quality: Reducing life cycle costs, preserving economic value
- Sociocultural and functional quality: Ensuring health and comfort in buildings, a humane environment, preservation of social and cultural values

In this manner, the HPA ensures that the properties are tailored to the requirements of users in the long term and that the company portfolio continues to be further optimised.

Steinwerder cruise terminal

Period: 01/2013–12/2015

The project assignment included the construction of the terminal building, the renovation of the areas with parking lots and access roads, as well as the reinforcement of the quay wall installations with additional bollards and fenders for cruise ships of all sizes.

Steinwerder Port

Period: 01/2009–12/2018

Total cost: 23 million euros

Restructuring of the Steinwerder Port: Reclamation of usable areas for increasing break bulk cargo turnover as well as the creation of approx. 40.000 m² of storage area with traffic loads of up to 150 kN/m² for halls and high-value goods.

Steinwerder-Süd ideas competition

With an internationally advertised ideas competition organised by the HPA, deliberations for the restructuring of the port area Steinwerder-Süd have begun. The HPA plans to further develop the approx. 42 ha area in the central section of the Port of Hamburg with an innovative land development concept — also with regard to the creation of permanent, qualified jobs. During this process, the net water area should be preserved to the greatest extent possible. Progressive solutions such as networked logistics processes, novel production workflows, and innovative digitalisation concepts will be included in the deliberations. The result is expected in 2017.

Port experience route

Period: 2013–2015

Total cost: 7 million euros

In order to create a pleasant neighbourhood, the HPA also strives to make the port more accessible to visitors and residents. This includes making it more attractive to ride bicycles in the port. The fascination of the port can now be experienced on over 45 km of bicycle paths. The large number of employees in the port area, the proximity to the city, and high experiential value for tourism which an internationally significant port offers, point towards a change in the traffic situation — the number of cyclists is increasing both in daily and leisure traffic.

2.2 Investments in resilient traffic infrastructure

During the reporting period, the HPA made highly targeted investments in the sustainability of the Port of Hamburg's traffic infrastructure. The core idea here was to make the infrastructure as resilient as possible for the future. This applied equally to all the three dimensions of sustainability. Specifically: The infrastructure should be able to adapt itself to changing environmental conditions just as much as it needs to react to digitally modified value creation processes and new requirements for work and life in a port city.

2.2.1 Waterways

The HPA is responsible for maintaining the federal waterways and the state port water bodies (turning circles, port basins) within the Hamburg port area. The Port of Hamburg is an open tidal port and is located in the river bifurcation area in which the current of the Elbe slows down. The consequence of this is: Sediment from the North Sea and from the upper reaches of the Elbe are transported into Hamburg and increasingly deposited in the port. Hence, the bed of the water bodies constantly needs to be kept at a particular depth. Individual measures are a component of the ongoing approval procedure for navigation channel adjustments. The goal here is to ensure that ships always have the proverbial handspan of water under their keel.

Water depth maintenance: Continued pursuit of sediment removal strategy

One particular focus during the reporting period was on the maintenance of the waterways. In Hamburg, the maintenance of water depth is primarily influenced by two factors: The quantity of the sediment to be dredged and the quality of the sediment. While the quantity can fluctuate a great deal depending on natural boundary conditions that are practically impossible to influence, the quality of the sediment has shown a trend towards improvement over the past 25 years. However, the HPA's efforts to rehabilitate the Elbe in its entire catchment area as well as the sustainable development of the Elbe estuary via river conservancy measures that aim to positively influence the tide dynamics should also be viewed with equal importance. Ultimately, both pillars help to support conservancy.

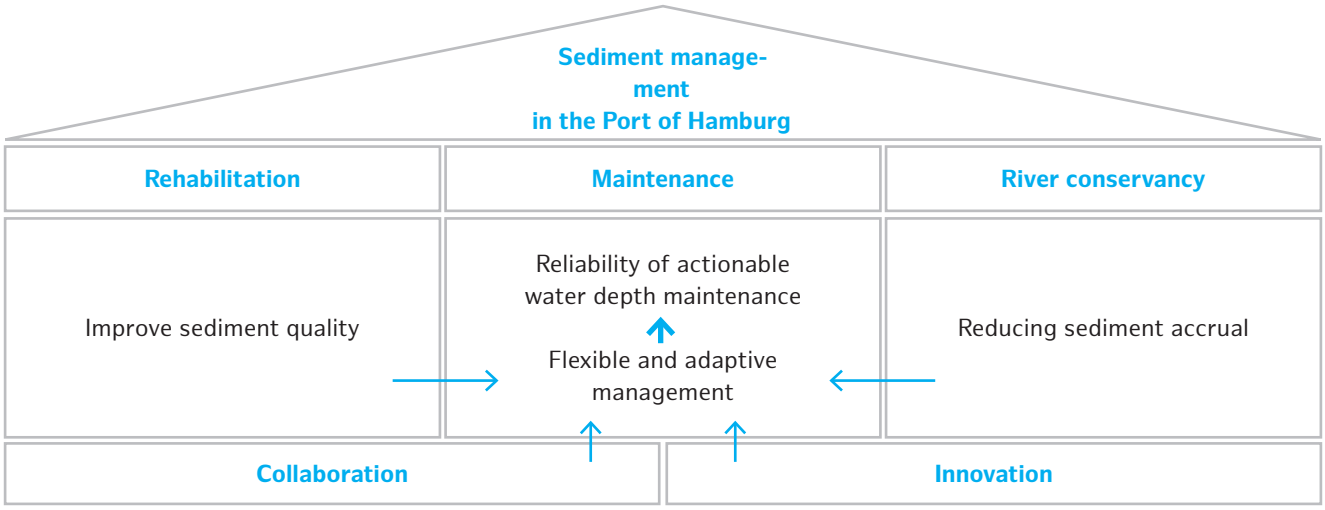


Fig. 25: Areas of activity for sediment management in the Port of Hamburg

Due to a prolonged and historically low upstream flow in the Elbe, the flushing effect of the ebb tide stream in the Elbe was highly weakened both in 2015 and 2016. The result: The flushing strength of the Elbe was insufficient to remove sediment from the Hamburg region and transport it towards the North Sea in a natural fashion. In 2015, a total of 4.64 million t of dry matter (DM) was dredged up during maintenance measures, and 4.76 million in 2016.

Due to a new approval by the state of Schleswig-Holstein, it was possible for the HPA from April 2016 onwards to transport up to 1.5 million t of dry matter annually out into the North Sea at "Tonne E3". Not only could sediment from the federal waterway be brought to the sludge deposition area at "Tonne E3", but also from traffic-critical port basins. This meant that despite high sedimentation rates, it was possible to maintain the water depths in the port even during the critical summer months.

This transportation to the North Sea is a decisive investment in the future. Its purpose is to gradually relieve pressure on the sediment balance in the Hamburg region — and hence also successively reduce the maintenance quantities. It should be noted that the transportation of sediment to "Tonne E3" is subject to extremely strict environmental regulations. Before transportation, all affected port areas are comprehensively sampled and analysed. Only when the sediment is clean enough will it be transported. With over 300 analyses per trip, a comprehensive monitoring programme at and around the deposition site at "Tonne E3" ensures that the environmental effects are observed extremely closely. In 2015/16, all environmental conditions were complied with; i.e. no changes were observed outside the immediate deposition area. Naturally, this also applies for the surrounding protected areas, tidal flats, coasts, and beaches.

The quantities which were transferred from the island of Neßsand decreased by approx. 280,000 t DM from 2015 to 2016 –from 3.26 mil. t to 2.98 mil. t. Even the quantities which had to be transported to the state treatment and disposal facilities due to a higher pollutant content decreased by 166,500 t DM from 0.45 mil. t to 0.29 mil. t. This allowed valuable landfill capacity to be saved.

Sediment transportation: Consciously planning resources

The HPA strives to reduce emissions resulting from transportation. Fuel consumption depends on the actual use of the trailing suction hopper dredgers, such as transportation distance, unloading type (e.g. dumping or suction), and the weight transported. In light of the urban air pollution problems and the HPA's climate goals, current plans include using environmentally and climate friendly tender criteria such as the use of alternative fuels or more efficient drives to influence the amount and quality of the emissions of the trailing suction hopper dredgers. At the moment, the dredgers are leased at standard prices. Therefore although the company commissioned has a great deal of interest in keeping consumption as low as possible, the actual consumption values are unknown. Trailing suction hopper dredgers with liquefied natural gas (LNG)-compatible drives are currently still in a trial phase and cannot yet be operated cost-efficiently in Hamburg due to the lack of LNG infrastructure and time-consuming bunkering procedures.

Generally, transport paths should be kept as short as possible. However, this goal is influenced by a wide range of factors, particularly where relocation/deposition is concerned — including political and approval-related factors — such that the technically possible minimal transportation distances cannot always be achieved.

Rehabilitation of the Elbe: avoiding new pollution, rehabilitating old harmful substance deposits

Hamburg has been leading the way for years when it comes to depollution — with the removal and treatment of sediments with a high pollutant content, both on land in Hamburg as well as via the ELSA project for removing harmful substances from sediments in the Elbe. This project is one-of-a-kind in Germany and promotes the removal of legacy contaminants from sediment close to the source in the Elbe catchment area.

During the reporting period, ELSA's work focused on the release of polychlorinated biphenyls (PCBs) which originated in the Czech Republic. At times, the values exceeded the typical measurement values for the Elbe by more than 30 times. The reason for this specified by the International Commission for the Protection of the Elbe (IKSE) was the improper removal of PCB-containing paint from a railway bridge in Usti nad Labem in the Czech Republic. At the insistence of the Federal Government and the Free and Hanseatic City of Hamburg, on-site rehabilitation of the areas of the Elbe contaminated with PCB was initiated by the Czech government in 2016. This allowed a percentage of the pollutants to be removed. By the end of 2016, only very slightly elevated PCB values could be identified in the Port of Hamburg, which were below all permitted values required for relocation.

One positive result of the incident: At the end of 2016, the Czech government established a new expert commission for the refurbishment of the Elbe and its tributary Bilina, to which the representatives of the Hamburg ELSA Project will be contributing their knowledge.

River conservancy: giving the river more space

In the report on the findings of the Tidal Elbe River Conservancy and Sediment Management Dialogue Forum dated July 2015, the major interest groups on the Lower Elbe agreed that the continued loss of tidal volume which has contributed to the current hydromorphological situation over the past decades can no longer be accepted without replacement. The declared goal is to positively modify the tide dynamics such that less sediment is carried into the upper section of the Tidal Elbe (Wedel/Hamburg) in the long term.

Various measures are expected to lead to improved tide dynamics.

- With the pilot project of a tide-influenced shallow water area "Kreetsand", Hamburg intends to lead the way on a path that the neighbouring states on the Tidal Elbe are also expected to follow in the future.

- Hamburg is also developing another measure to create tidal capacity "according to the principles of nature" in the Ellerholz region to the south of the Kreetsand area, which is under construction. The HPA is providing both technical and financial support for this project.

- Founded in 2016 by the City of Hamburg, the Tidal Elbe Forum's mission is to review, assess, and prioritise additional suitable river conservancy measures along the Lower Elbe using a ranking list. If the Tidal Elbe Forum reaches a consensus regarding a measure during an ongoing process, it can already be considered as a recommendation for political and administrative stakeholders — before the compilation of the later ranking list.

The HPA is aware of its unique responsibility and commits itself to handling existing water areas in the port with the greatest care and to utilising all options for implementing additional substantial measures in Hamburg. In this context, innovative approaches from the Netherlands and Belgium where "working with nature" projects are planned and realised on a large scale can also supply useful templates for our region.

ENLARGEMENT OF OFFSHORE TERMINAL ENTRANCE

Period: 01/2008–12/2017
Total cost: 97.5 million euros

There are limitations for the passage of large ships in the Norderelbe/terminal entrance area, due to the flow situations. To ensure the safety and ease of shipping traffic, the access area is being enlarged.

2.2.2 Rail network

The HPA is the owner and operator of large sections of the rail network located in the port area. This network comprises a total of 290 km of tracks with approx. 800 switches and 61 engineering structures such as railway bridges and passages, with eight signal towers and a carriage repair workshop. 77 private railway companies are served (with approx. 130 km of tracks and 540 switches). 13 % of all goods transported by rail in Germany have the Port of Hamburg as their source or goal. The same applies to 40 % of all containers transported on the German railway network.

Expansion of port railway infrastructure expedited

Shortly before its 150th anniversary in 2016, the Hamburg port railway expanded its offerings to include eight new locomotive parking spaces in the Hohe Schaar station. The current total of 107 parking spaces distributed over the entire port area provide the current total of 137 (2015: 124) railway companies active in the port with more freedom and flexibility. The parking installation is equipped according to the latest standards, with overhead lines, electrical connections for pre-heating locomotives, and with maintenance-friendly tipping illumination masts.

Since 2016, cargo trains with a total of 835 m instead of the previous 740 m can now stop at the Hohe Schaar station section of the port railway. This is made possible by a joint project of the HPA and DB Netz AG, via which the connection between the Port of Hamburg and the Maschen — Padborg (Denmark) line was upgraded to accommodate long trains. The servicing of the Port of Hamburg with 835 m trains increases the capacity and efficiency of hinterland traffic. Both the port location and the clients in rail goods traffic benefit from this improved connection. At the same time it also increases the competitiveness of rail transportation.

Expansion options created for growing traffic

The preservation of expansion options for growing freight quantities is of great importance for the port railway. Without additional targeted expansion of infrastructure capacities, it will not be possible to achieve the political goal of shifting goods transport to the environmentally friendly railway network. In the intensively utilised port area, a wide range of agreements with users and developers will be necessary for this.

Condition of rail infrastructure assessed with foresight

In order to ensure a high availability of the rail installations and reliable railway operations, the HPA pursues a forward-looking and needs-compliant maintenance strategy. Unavoidable operational restrictions for clients are minimised via the chronological coordination of measures identified as being necessary.

Similar to the road network, the assessment of the infrastructure installations is performed by assigning marks for their condition ranging from 1.0 (very good) to 4.0 (inadequate). It has set itself the goal of continuous positive development, and monitors the achievement of goals for tracks and railway bridges. All railway bridges which are not judged as being in a very good, good, or satisfactory condition have already been designated for renovation or closure/dismantling.

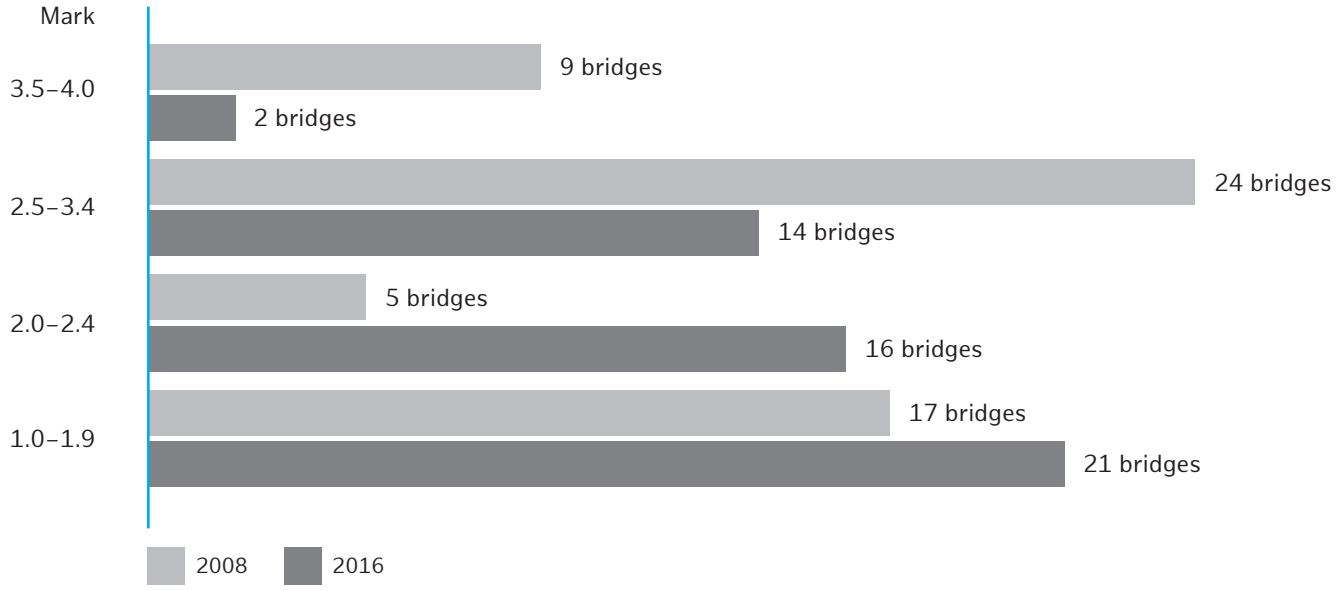


Fig. 26: Positive development in the condition of railway bridges

Electrification of railway expedited

Overall, more than half of all the HPA's rail installations are equipped with overhead lines. All entrances and exits to the six port stations and almost all tracks used for trains entering and exiting the railway station segments have now been electrified. The remaining tracks are used almost exclusively for shunting tasks or for parking carriages, such that it is not operationally necessary to outfit them with overhead lines.

Hausbruch: Noise emissions reduced

The track conditioning tested in the Hausbruch area in 2014 for reducing noise emissions (cf. 2013/14 sustainability report, page 29) have been consistently implemented since then, and have proven their effectiveness. As part of the port railway maintenance concept, the surfaces of the tracks are conditioned twice annually in noise-sensitive areas, thereby perceptibly reducing noise emissions. The port railway attempts to achieve a high acceptance of the measures via the use of modern construction machines and by informing residents early.

REBUILDING OF WALTERSHOFER BRIDGES

Period 01/2009–12/2019
Total cost: 30.7 million euros

As part of the project "Buchardkai Transport Connection", the existing railway bridges will be replaced and a third track added to the south of Mühlenwerde station. This will help make the operational workflows between Mühlenwerder station and the CTB and Eurokombi terminals smoother, and also reduce waiting times.

2.2.3 Land transport routes

The success of the port is heavily dependent on the rapid availability of infrastructure that meets the needs of the port industry. The HPA is responsible for the road network dedicated to the public. According to the Hamburg Road Act (Wegegesetz), the HPA is responsible for the following installations within the port area: the approx. 142 km long road network plus the 111 bridge constructions, as well as the 70 km of road drainage systems. The "road entities" consist not only of the road surface, but also include bridges, tunnels, passages, dams, ditches, drainage systems, embankments, ramps, retaining walls, road shoulders, greenery along these entities, illumination, light signal systems, and traffic signs. One important basis for maintenance management is the regular surveying and assessment of the condition of the infrastructure. In this context, the HPA's goal is to ensure traffic safety, structural stability, and the durability of the bridges and road surfaces in the Port of Hamburg via a preventative maintenance strategy for the road network.

The maintenance strategy is guided by the following basic principles:

- Infrastructure management is performed with the goal of cost effectiveness over the entire life cycle. Hence, a long-term prognosis of conservation measures and the resources needed is necessary.
- The utilisation costs of a bridge amount to approx. 150 % of the cost of producing it. The age of the structures and the rise in the amount of traffic require an increasing amount of structural maintenance. Hence, cost-effective maintenance strategies need to be applied to minimise the utilisation costs.
- Maintenance measures need to be consolidated into larger phases (measure blocks) in order to minimise traffic interruptions, both with regard to spatial extent and temporal duration.

Keeping a systematic overview of the condition of roads

The maintenance planning system and hence the basis of each strategy is the good maintenance of inventory data as well as the comprehensive collection and assessment of the condition of these entities. Assessments are performed by assigning marks for their condition ranging from 1.5 (good) to 5 (inadequate). The BWVI has set the goal of continuous positive development for the HPA, and supervises the achievement of goals via these marks for the condition.

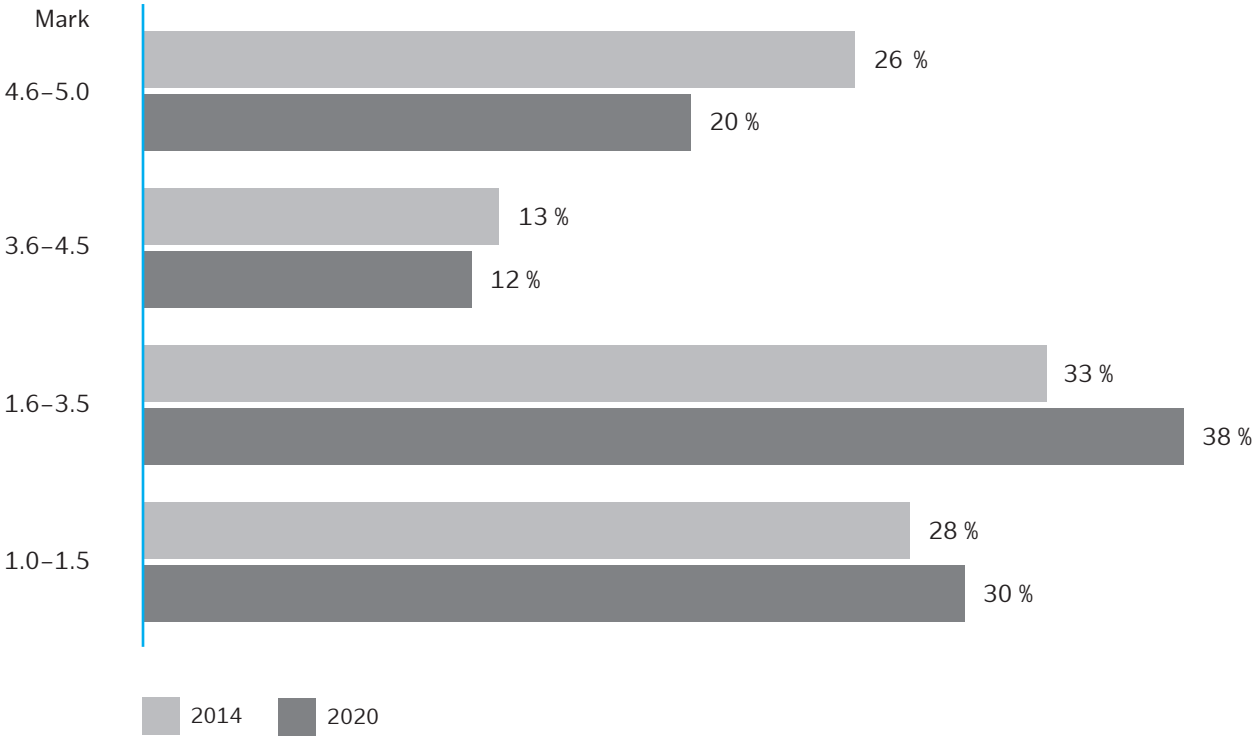


Fig. 27: Outlook of the positive development of the overall road network up to the year 2020

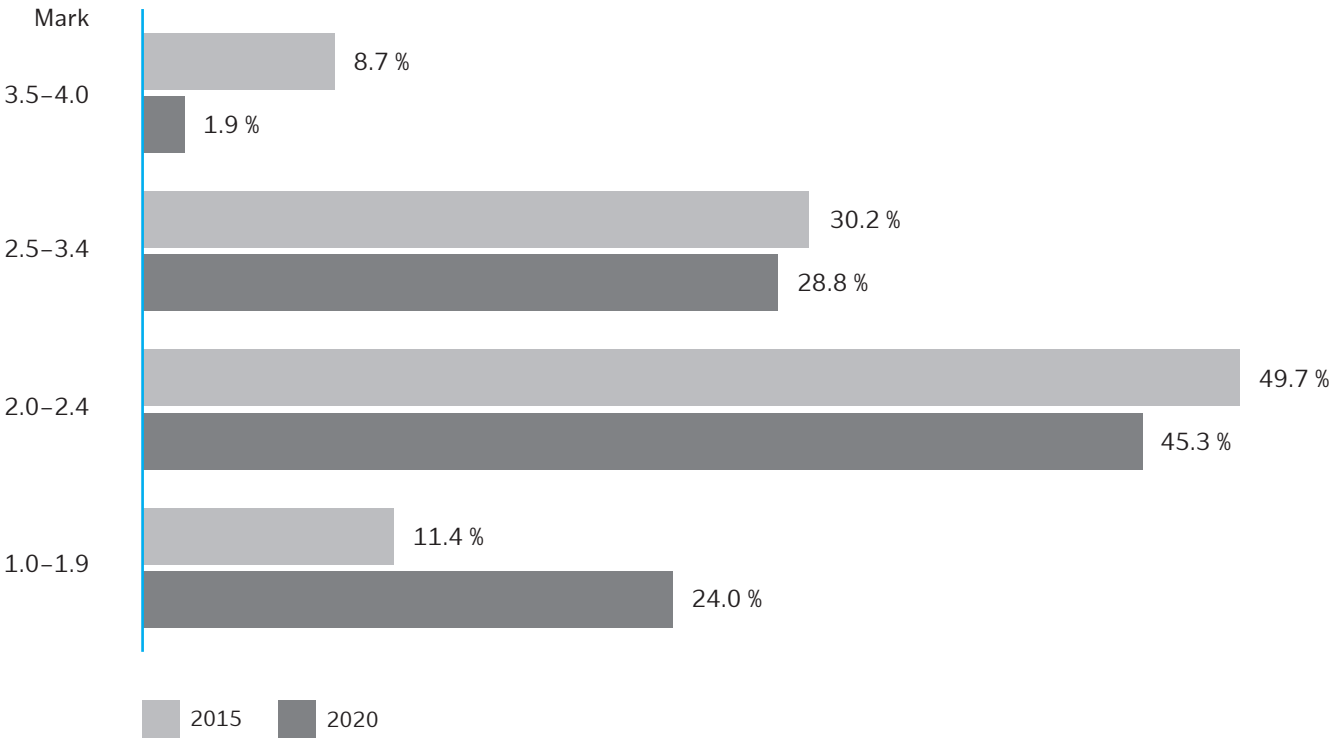


Fig. 28: Outlook of the positive development of fixed road bridges up to the year 2020

Material efficiency: HPA develops new procedures

The HPA strives to continuously implement novel procedures which reduce resource consumption in road construction. For one, the HPA developed a resource-conserving full recycling procedure in 2013 for renewing the surface layer in road construction. Since 2014, it has been used over an area of 17,334 m². Via the shorter transportation routes, CO_2 emissions amounting to 7,973 kg have been saved, and the use of recycled materials has resulted in savings of 839 t of rock as raw materials and 45 t of bitumen. The renewal of another 12.000 m² using this new procedure is planned for 2017.

7,973 kg

of CO_2 emissions were saved thanks to shorter transportation routes.

839 t

of rock was saved through the use of recycled materials.

Overhaul of Köhlbrand Bridge

Period: 2007–2016

Total cost: approx. 60 million euros

The overhaul of the entire bridge was performed to carry traffic up to the year 2035.

Rebuilding of Rethe Bridge (bascule bridge)

Period: 01/2009–12/2019

Total cost: 173.63 million euros

The Rethe Bridge is being rebuilt as a two-segment bascule bridge to replace the old vertical lift bridge. The new Rethe Bridge will be a double bascule bridge with a greater clearance width (64 m instead of 44 m) for ships; furthermore, there will no longer be a height limit for passage. In addition, higher performance will be achieved via the separation of rail and road transportation. Via intelligent energy and peak load management, the energy requirement per opening procedure will not exceed double that of the old bridge — despite the significantly higher weight of the folding segments.

2.2.4 IT infrastructure

The megatrend of digitalisation will result in a massive change to the business processes in the HPA and in the Port of Hamburg. Through the use of intelligent IT, the HPA is developing innovative technological solutions (e.g. intelligent measurement systems, digital networking of devices, automation of workflows) which will improve the reliability and safety of the port logistics processes of today and tomorrow (smartPORT philosophy). This will allow the existing and future challenges the HPA faces and the portfolio of port-specific services to be continuously expanded.

The HPA's own fibre optic network covers a distance of more than 300 km and is built as a ring structure in order to make it fail-safe.

The availability of the network infrastructure is almost

100 %

This makes it possible to successfully employ sensitive procedures. In particular, it is used in the shipping and rail traffic sector in round-the-clock operations. The HPA's infrastructure is only to be used by the company itself. Its use by other companies, e.g. from the port industry, is not possible due to regulatory reasons. However, the HPA successfully acts as an intermediary between infrastructure providers and the companies in the port industry.

What the HPA does in its area of responsibility:

- Internal cloud technologies and fibre optics networks are continuously optimised and collaboration with European cloud service providers expanded. The solutions run on cutting-edge, scalable, resource-conserving, reliable, and resilient IT infrastructure.
- The HPA is planning the use of mobile infrastructure via the use of the latest technologies, such as 5G mobile data transfer. In this manner, network components can be integrated into the HPA network without a direct physical connection. This will allow for the elimination of construction measures which are still necessary today.
- Building on its digitalisation strategy, the HPA is expanding its sensory technology infrastructure. In this way it promotes the expansion of wireless networks in the Port of Hamburg. The goal here is to build a management infrastructure for the sensory and actuator technology in the port in order to ensure the resource-conserving management of the rapidly growing world of IT.
- In close collaboration with tertiary institutions and universities, the HPA's digital strategy continues to evolve with the latest scientific findings.

For the use of IT, the relevant standards are applied for the protection of the HPA's and its clients' intellectual property against theft, loss, unauthorised disclosure, illegal access, and abuse.

03

INTELLIGENT SYSTEMS FOR EFFICIENT TRAFFIC MANAGEMENT

Together with its partners, the HPA works towards the goal of making goods traffic in the Port of Hamburg as smooth as possible — also in light of constantly growing ship sizes and freight volume per trip. The key to foresighted port development is an optimised trimodal traffic management concept which connects ship, rail, and lorry transport with each other in the best possible manner. In this context, the possibilities of digitalisation within the transportation chain play a central role for an uninterrupted and reliable flow of traffic.

Port Traffic Center

The port could essentially be managed via a tablet from the year 2025. The goal is to accelerate the goods turnover through the port. For this purpose, what are currently four individual control centres — the Nautical Centre for shipping, the Railway Control Centre, the Port Road Management Center for road traffic, and a control centre for mobile infrastructure — are to be combined into one. Doing so will allow traffic to be controlled from a single location, traffic routes to be viewed in an overall context, and synergies capitalised on. The IT architectures of the current control centres are already designed such that such future integration is possible.

3.1 Shipping traffic

The Port of Hamburg sees a high daily volume of ocean-going, inland, traditional, and sports vessels. The HPA's responsibility for water-side traffic flow management extends to all arms of the Elbe and the water bodies connected to it between a line that crosses the Elbe at an angle at Oortkaten (km 607.5) and the Hamburg state line which runs from Tinsdal (km 639) to Cranz over the Elbe.

Approx. 10,000
Calls by inland vessels
took place in the Port of Hamburg in 2016.

In 2016, 10,000 inland vessels called at the Port of Hamburg, and there were a total of 8,719 calls from turnover-generating ocean-going vessels. The available water area for offshore cargo handling in the Port of Hamburg is 2,849 ha.

An increase in productivity needs to take place without requiring additional water surface area. The offshore turnover was 4.85 t/m² in 2016.

8,719
turnover-generating calls by ocean-going vessels
took place in the Port of Hamburg in 2016.

The number of container ships in the size range of 4,000 to 13,999 TEU calling at the port has consistently declined. The largest decrease was around 71 % for ships with a capacity of 6,000 to 7,999 TEU. In this size range, 61 fewer ships called at the port than in 2015. In the size range of 10,000 to 13,999, the number of ships that called decreased by around 10 %. On the other hand, the number of ships with a capacity of at least 14,000 TEU calling at the port increased significantly. Hence, the trend from previous years continues.

Ship size	Dimensions in m			TEU	2013	2014	2015	2016
	Draught	Width	Length					
Megaship	> 15.5	> 49.0	> 370.0	> 14,000	139	272	434	529
Flottemax	15.5	49.0	370.0	14,000	465	453	420	411
Reference ship	14.6	46.0	350.0	8,700	367	308	197	81
Postpanmax	14.6	42.0	318.0	6,000	340	309	225	253
Panmax	13.5	32.4	295.0	4,500	1,103	1,107	1,097	1,162
NOKmax	9.5	27.0	210.0	1,500	1,070	1,002	903	639
Feeder	8.0	28.0	170.0	1,333	1,333	988	885	981
Overall result					4,817	4,439	4,161	4,056

Fig. 29: Development of container ship sizes in the context of annual port calls

Traffic flow management in the Port of Hamburg — with digital support

The Port of Hamburg is a hub where ocean-going vessels share the waterways with all other users of the routes. At the same time, nautical safety must constantly be ensured — an enormous challenge for the traffic flow management of the Nautical Centre, in particular with regard to the dynamic development in ship size. In order to ensure the safety of shipping traffic, precise coordination between all port stakeholders, including the pilots on the Elbe and in the port, is imperative.

The Nautical Centre operates as a modern traffic control centre. It utilises control centre software that was developed specifically for the Port of Hamburg. The PORT Monitor integrates all data necessary for planning and a smooth flow of traffic. This includes ship data, tide and weather data, current water levels, information on berths, bridge heights and widths, as well as daily updated information such as construction sites, dives, and much more. Therefore the employees in the Nautical Centre are able to maintain a complete overview of the current traffic activity in the water. The PORT Monitor is now also available in a mobile version. With the help of tablets, information can be entered directly and accessed on site in real time (e.g. in the case of accidents on the waterways) and directly transmitted to the control centre.

An important component of shipping traffic processing is the preventative fulfilment of tasks. The goal here is to identify foreseeable malfunctions early on and to take preemptive measures before something happens. To do so, nautical call conditions must be included in management processes, as do the transportation of hazardous goods, customs and clearance requirements, port handling, as well as disposal and supply services for ocean-going vessels. In order to maintain an overview of traffic processing, a Port Information Guide[7] that was developed in conjunction with other ports is made available to clients of the port.

The Nautical Centre is assisted by the private coordination agency for large vessel, feeder, and inland vessel traffic of the Hamburg Vessel Coordination Center (HVCC), organised by the Port of Hamburg and Logistik AG (HHLA) and EUROGATE Container Terminal Hamburg GmbH. It provides the terminals and shipping companies with operational coordination services for ships heading towards the Port of Hamburg, with the rotation between the terminals and loading points in the port, as well as departure after handling — a service that is unique worldwide. Since 2016, the HVCC's offerings have also been available to all inland vessel operators. In this way the container hinterland traffic on the waterway has been boosted.

Prudent coordination as a key task for optimal workflow management

The geometric and dynamic limitations in the Port of Hamburg and on the Lower Elbe pose special challenges for traffic flow management. At all times, it needs to keep in mind varying water depths, the vertical clearance of the Köhlbrand Bridge, but also current-, draught-, and weather-dependent factors. There also exists an increased need for coordination due to the prohibition on ships with a cumulative width exceeding 90 m meeting on the Elbe between Glücksstadt and the boundary of the Port of Hamburg. For smooth and punctual goods handling, congestion and waiting times are a major economic factor. The key to efficient ship traffic flow management lies in the coordination of the various involved parties with influence over the dwell time of the ship in the port, such as terminal operators, haulers, maritime pilots, boatmen, and lashers.

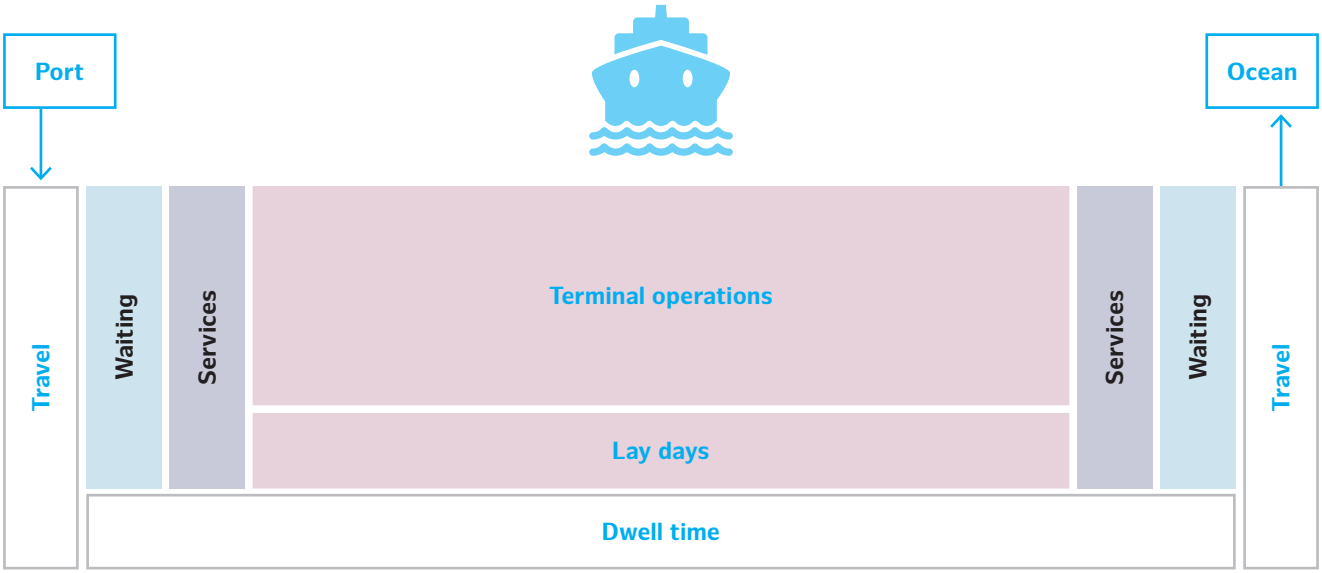


Fig. 30: Aspects which influence congestion and waiting times

One aspect which influences the dwell time is the approach management of the ships, which already begins when the ship heads towards the port. An example: Already before it completes its loading and loading procedures in Rotterdam, the Nautical Centre in Hamburg has informed a container ship at what time it needs to be at the pilot station at Elbe 1. This allows the ship to determine the optimal departure time and an average speed in order to be there on time. Here too, success depends on the good coordination of all involved parties along the Lower Elbe. This applies particularly to the water transportation and shipping authorities from the Elbe estuary up to Lauenburg.

In order to guarantee a smooth flow of traffic in the Port of Hamburg, the HPA has set up holding areas for ocean-going ships. Recently, the change in the water situation at the terminal entrance near the Tollerort container terminal has offered the possibility of providing public holding areas for feeder ships.

[7] See also: http://www.hamburg-port-authority.de/de/hafenkunden/oberhafenamt/Documents/PortInformationGuide.HPA.pdf

The HPA increased traffic safety for inland vessels by installing digital vertical clearance signs along the Süderelbe between Harburg and Pionerinsel in 2016. Hence, there is now a permanent sign for the bridges "Alte Harburger Elbbrücke", "Brücke des 17. Juni", "Autobahnbrücke A 253", as well as the adjacent railway bridge. With a visual range of approx. 1,000 m, inland vessels have the opportunity to halt their vessel in time at the pile mooring berths and wait if the vertical clearance is too low.

Financial incentives for low-polluting ocean-going ships

As part of the port usage fees, the HPA offers various tariff aspects which reward environmentally friendly ships with a bonus. The Environmental Sustainability Index (ESI) serves as the basis for this, which since 2011 has served as an incentive programme for environmentally friendly ships in the Port of Hamburg. Registered ships with an ESI value of zero fulfil all international requirements, while ships with an ESI value of 100 are categorised as particularly low-emission.

In Hamburg, the number of low-emission ships calling at the port has increased measurably. In particular, the percentage of particularly clean ships with more than 35 ESI points has increased.

During the reporting period, these ships accounted for almost a third of vessels calling at the port. Compared to 2015, this corresponded to an increase of

41 %

Additional incentives for the use of environmentally friendly ships are provided by the HPA in the form of rebates for the use of tankers with a double hull, for the use of Liquefied Natural Gas (LNG), and of onshore power. Furthermore, "Blue Angel" and "Green Award" certifications are also rewarded for particularly environmentally or safe ships.

Air pollutants and noise — onshore power installations provide residents with relief

In light of the increasing number of cruise ships calling at the port, the Senate and the Hamburg Parliament commissioned the HPA with the construction of an onshore power installation at the Altona cruise terminal and to install an onshore power supply system via an LNG Power Barge at the HafenCity cruise terminal. This allows cruise ships to significantly reduce the utilisation of their own power supply during lay days.

The substitution of diesel fuel during lay days not only cuts down on the emission of air pollutants such as nitrous and sulphur oxides and particulate emissions, but also reduces noise emissions. Both installations reduce air pollutants with similar efficiency, and by doing so contribute to small-scale emissions protection within a max. radius of 500 m.

The supplying of cruise ships in the HafenCity commenced in May 2015. The installation in Altona was put into regular operation in October 2016. To date, only the AIDAsol could be supplied with onshore power. Additional cruise ships compatible with onshore power are expected for the future. In total, the installations contributed to climate protection by reducing CO_2 emissions by 56.4 t in 2015 and 2016.

	2015		2016	
	Port calls	Savings	Port calls	Savings
HafenCity	11.0	10.2 t	16.0	43.5 t
Altona	-	-	1.0	2.7 t

Fig. 31: Number of calls made by the AIDAsol and CO_2 savings

Modern cruise ships outfitted with a dual fuel motor can also be operated using LNG. The AIDAprima has been utilising this option during its lay days since May 2016 at the new Hamburg CC3 cruise terminal. This reduces emissions significantly compared to the use of diesel fuel. Sulphur dioxide and soot particles are not emitted at all. The quantity of nitrous oxides is reduced by up to 80 %.

WAITING AND BERTH AREAS FOR LARGE SHIPS

Period: 01/2014–12/2018
Total cost: 27 million euros

The large ship waiting area Finkenwerder is a waiting and emergency berth primarily for large ships with a length of 330 m or more. The two berths are to be modernised and expanded to meet requirements over the next few years.

ALTERNATIVE ENERGY SUPPLY FOR CRUISE SHIPS

Period: 01/2013–12/2015
Total cost: 14.4 million euros

As part of the smartPORT energy initiative, the HPA has set up a fixed onshore power supply installation (12 MVA) for cruise ships in Altona that runs on green power, as well as infrastructure for the operation of a Powerbarge in the HafenCity. The dimensions of the onshore power installation in Altona make it one-of-a-kind in Europe.

3.2 Rail traffic

As the owner of the rail network in the port, the HPA is responsible for the traffic management of rail operations. A third of all tonnage which reaches the Port of Hamburg via ocean-going vessels is transported onwards via rail. In 2016, this meant the following: 59,729 trains with 1,603,411 carriages and 2,360,229 standard containers (TEU) needed to be handled and transported. At the same time, the port railway needed to coordinate a wide range of different traffic flows between the hinterland and the various loading points in the port with each other in order to ensure the smooth flow of traffic.

The goal of the port railway is to make the flow of traffic on the tracks in the port as efficient as possible — train lengths were able to grow continuously over the past few years. The result: With 71 TEU per train in the years 2015 and 2016, the capacity utilisation in container traffic remained at a high level.

Fig. 32: Annual train utilisation in TEU/train

Via efficiency augmentation measures, the HPA supports the modal shift towards railway transportation, which is more environmentally friendly — a container train with up to 108 TEU replaces around 70 lorries (1.5 TEU per lorry). With a CO_2 emissions ratio of 45: 30 per container, railway transportation results in lower carbon emissions. By optimising operational workflows, the turnover times have also decreased, and the efficiency of the network has increased to the current 8,139 TEU/km of track length or to 160,000 t/km. This allows infrastructural measures, which always entail intervening in the environment, to be delayed up to a later point in time or their spatial scope reduced.

TransPORT rail – optimising logistics via the exchange of data

With the smartPORT project, the HPA operates the most advanced information system for port logistics worldwide. It regulates all train journeys and track assignments, assists with loading procedures, and ensures the transparent exchange of information among the parties along the transport chain that are involved in the rail process. This means that the 137 rail transport companies in the Port of Hamburg are able to communicate with each other almost entirely automatically via data interfaces. An online portal is available for these communications. TransPORT rail is constantly being upgraded in order to increase the benefits for clients via additional features and to make railway transportation even more attractive. In 2016, planning commenced on a RailDataGate at the entrance to the western port area. With its help, important data on the arriving and departing trains will be recorded using camera systems and fed into the transPORT rail system. The focus of the optimisation is on better advance operational plannability along the transport chain all the way to the hinterland, as well as the automation of data collection and processing.

137

rail transport companies

in the Port of Hamburg are able to communicate with each other almost entirely automatically via data interfaces.

Towards more efficient infrastructure use with INES

The Infrastructure Use Fee System (INES in German) is the port railway's second adjusting lever for efficient infrastructure use. INES provides targeted incentives for users. For one, staggered parking fees are charged for stationary traffic which categorise tracks according to function and importance.

INES also provides incentives for more ecologically conscious traffic behaviour by promoting the use of modern vehicles with reduced noise and pollutant emissions in a targeted fashion. In this context, the Hamburg port railway was the first in Europe to introduce a noise-dependent fee component on railway infrastructure. The number of registered carriages with low-noise brakes was 62,555 in 2015, and increased significantly to 106,157 in 2016. In the same year, these carriages crossed the port boundary 787,584 times. The port railway grants a bonus per passage.

Furthermore, the incentive to use shunting locomotives with particulate filters was increased significantly as of 01/01/2017. Locomotives which are outfitted with these filters currently receive a fee rebate of 50 % (previously 20 %). Currently, 38 locomotives are equipped with particulate filters, of which two are hybrid locomotives.

The number of carriages with low-noise brakes increased significantly in 2016: by

70 %

as compared to 2015.

3.3 Land traffic

The success of the port as a hub for international trade and a node for goods traffic depends significantly on the rapid accessibility of port operations. As the infrastructure operator of the port, it is the HPA's duty to achieve a high level of reliability, safety, and cost-effectiveness for the traffic network for all users in this context. In times of growing traffic, the goal is to ensure availability and to design goods transportation efficiently — with as little waiting and congestion time as possible.

The mix of passenger and heavy goods traffic, whereby heavy goods traffic makes up almost a third of the kilometres travelled on weekdays, poses a particular challenge.

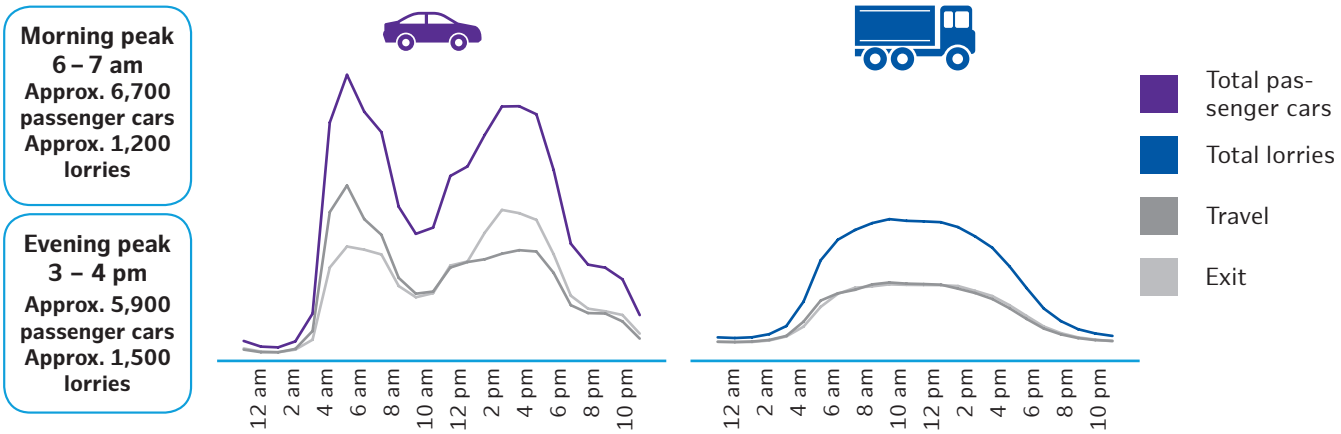


Fig. 33: Trips into and out of the port over the course of a weekday in 2015

The number of passenger cars entering the port has increased steadily over the past five years (+15 %), while the number of lorry trips has stabilised (+3 %).

On an average weekday
in 2016, approx.
59,400 passenger cars
and
15,600 lorries
travelled into the port.

The distribution of traffic volume shows that the network is most heavily utilised during peak passenger traffic periods.

Traffic limiting factors include load limits for traversing bridges, which are made perceptible in the form of speed limits, no-passing zones, and minimum distance rules. In addition to e.g. water levels and bridge positions, 800 sensors in the entire port also record the weight of lorries. Measurements confirm that a number of lorries in traffic are more heavily laden, such that the load limits of the bridges are unnecessarily stressed. As a countermeasure, lorries are now only permitted to use one lane on the Köhlbrand Bridge in order to extend the service life of the bridge. Construction measures, accidents, and capacity bottlenecks at the critical traffic nodes also lead to lost time, as do regular closures of the lifting and folding bridges.

Considering the very limited expansion options for traffic surfaces in the port area, the traffic infrastructure needs to be utilised as optimally as possible. This requires not only the needs-based maintenance and adaptation of the road network, but also a reduction in traffic load and the accel-

eration of the traffic flow. This undertaking is the responsibility of the police, who are assisted by the HPA's Port Road Management Center. Their job is to record traffic data in the port in a targeted manner, to analyse it, and to provide it to traffic users in a user-friendly manner via intelligent IT networks. For one, automatic traffic messages can be displayed using LED boards in real time at various traffic nodes in the port area. The goal of the project is to identify disruptions in the road network as rapidly as possible and to inform users of traffic bottlenecks so that they can be bypassed.

The HPA evaluates accident data at neuralgic points in the road network at which the risk of accidents and the resulting risk of congestion are comparably high. In collaboration with experts from the Würzburg Institute for Traffic Sciences GmbH (WIVW), the HPA analyses the causes of accidents and develops solutions which contribute to increasing traffic safety. One point of emphasis is the traffic at Finkenwerde Ring, a major accident site in the port.

The accident quotas in the Port of Hamburg are distributed relatively evenly across all accident types and parties involved. The goal is to further reduce the rate of accidents.

	2014	2015	2016	2020
Target value				3.2
Current value	5.6	6.5	5.2	

Fig. 34: Accident rate of the main traffic road network in accidents/million vehicle km

Efficient traffic situation determination

Via the sensory technology installed, travel times and time lost in the road network can be recorded and evaluated in the future as indicators for the quality of accessibility, availability, and reliability.

Parking space management in the Port of Hamburg

A core component of traffic management in the Port of Hamburg is the long-term development of a dynamic parking space management system. The major components of this system include both the construction and assignment of lorry parking spaces as well as the display of free parking capacity on digital information boards (DIVA) in the port.

The heart of this project funded by the European Commission is Smart Area Parking, which was realised during the reporting period. It comprises parking space detection for incoming and outgoing traffic at a total of four lorry parking facilities in the Port of Hamburg.

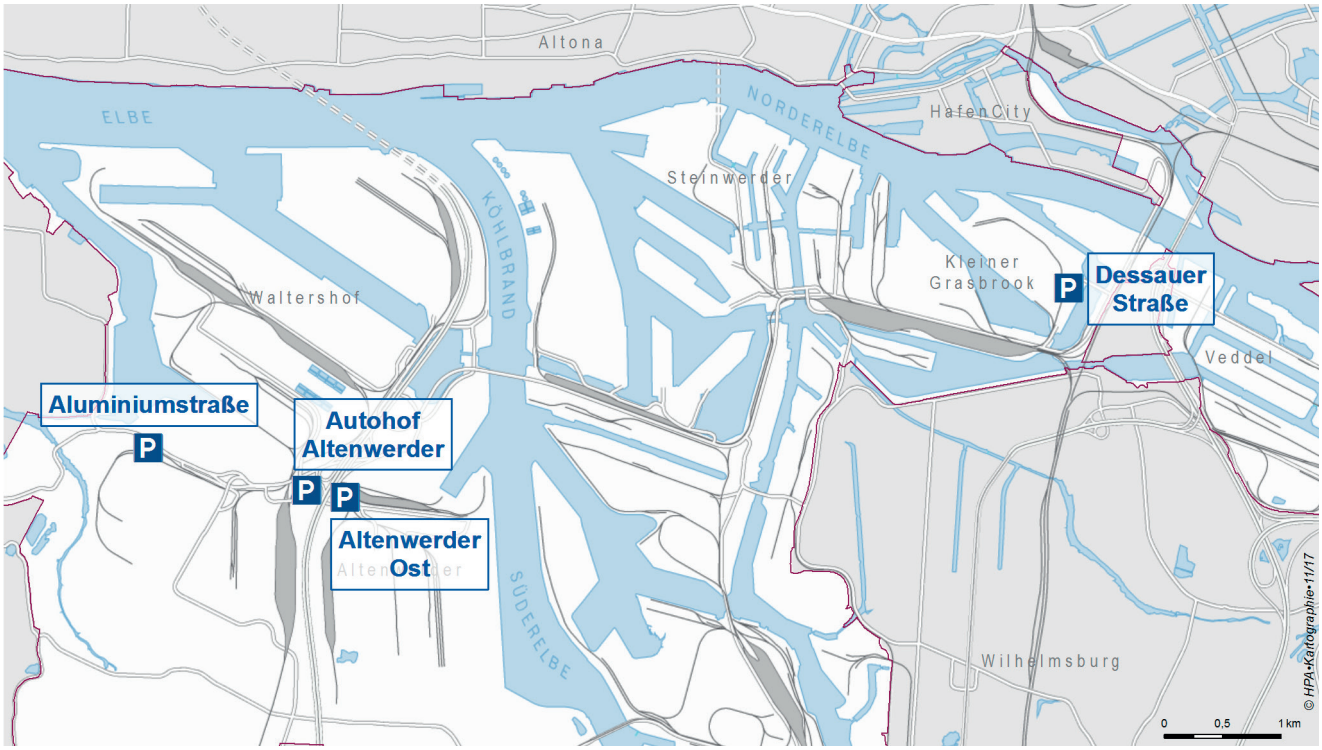


Fig. 35: Overview of lorry parking facilities in the Port of Hamburg with parking space detection

The goals of this project are:

- The utilisation and efficiency of lorry parking is improved, as information on the availability of parking space can be accessed by drivers and dispatchers at any time thanks to the detection system. This prevents free parking spaces from being overlooked.

- Traffic loads and environmental pollution are reduced, as the provision of information leads to drivers driving directly to a lorry parking facility with free spaces. This avoids traffic resulting from the search for a parking lot and prevents lorries parking arbitrarily along roads. This reduces traffic loads in the port road network, emissions, traffic safety risks, and nuisances for the residents living in areas near the port.

- Increasing traffic safety and improving services for lorry drivers, as the risk of accidents is reduced by minimising the number of lorries parked arbitrarily along roads. This allows lorry drivers to spend their breaks at lorry parking areas at which sufficient service facilities are available.

Lorry traffic in the port — traffic avoidance and relocation

The goal of the HPA is to reduce the load on roads in the port. According to estimates, more than a million lorry trips per year are due to empty container logistics alone. The HPA provided financial support for the development of the "virtual depot" by Fachverband der Packbetriebe e. V. (an association of packing establishments) as a suggested solution for reducing the traffic in the port, and commissioned the project partner IBM with its implementation. With the help of this IT application, it was calculated that up to 200,000 lorry trips (corresponds to approx. 100,000 containers per year) could be avoided annually. Over the course of the project, it was determined that the realistic potential was in fact approx. 14,000–15,000 lorry trips (6,000–7,200 containers per year). The IT tool is currently free of charge for the port companies. The use of the "virtual depot" actively contributes to improving the air quality in Hamburg and reduces the load on road traffic infrastructure. By the end of 2016, almost 1,500 lorry trips could be avoided. The HPA handed over the further development and operation to an IT services provider.

Approx.
1,500
lorry trips
could be avoided
by the end of 2016.

However, lorry traffic can also be reduced by transferring it to the waterways. In order to ensure a logistically meaningful and financially feasible handling of transportation with inland vessels, operational framework conditions such as a minimum volume per trip, a suitable route for communal trips, suitable congestion planning within the barge, and free time slots at the terminals need to be taken into account. Based on company surveys by Hafen Hamburg Marketing for the years 2013 to 2016, an average of around 60,000 TEU per year was transported in the Port of Hamburg via inland vessels. The HPA created the infrastructural foundations for this in 2016. For example, the Neuhöfer Canal was refurbished nautically in 2016 to allow the HCS empty container depot to be reached via the inland waterway.

60,000
TEU per year
was transported on average
via inland waterway vessels in the
Port of Hamburg instead of with
lorries in the years 2013 to 2016.

04

MOBILITY FOR A CLEAN, DISCRIMINATION-FREE FUTURE

Intelligent mobility is an important future task for the HPA. The transportation of materials and persons alone accounts for 30 % of its total energy consumption — this excludes the energy required to travel to work and for externally commissioned dredging tasks and transportation. Due to this, the HPA not is not only focused on increasing its own energy efficiency, but also developing new ideas for the sustainable mobility of employees.

Ship fleet — modernisation for the benefit of the environment

Since 2014, the HPA has been successively replacing its floating fleet with new, lower-emission ships and devices as part of a comprehensive programme for the construction of new ships. By doing so, it is complying with the emissions standard of the Central Commission for the Navigation of the Rhine (CCNR), which has been in effect since 2007. For example, compared to engines complying with older standards (CCNR Level I), nitrous oxide emissions (NOx) are reduced by around 30 %, and particulate emissions (PM_{10}) by around 65 %. Since the standard came into force, the HPA has outfitted a total of five ships with new motors complying with CCNR Level II, and also entirely rebuilt two ships. As the following diagram shows, the NOx emissions behaviour of the fleet has decreased continuously due to the new engines alone, without the accompanying increase in efficiency being taken into account.

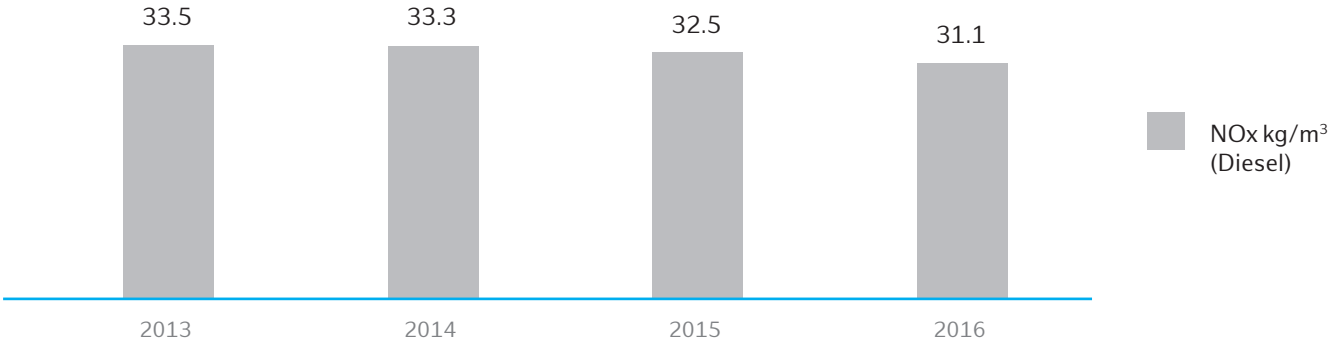


Fig. 36: Positive development of pollutant behaviour of the ship fleet

Newly built ships follow the criteria of the "Blue Angel for Eco-Friendly Ship Design". Additional ecological effects for new ships are, where technically possible, achieved via a lightweight aluminium design and a hull geometry that enables fuel-saving gliding. Furthermore, water-lubricated instead of oil-lubricated drive shafts will increasingly be used in future.

The new icebreakers put into operation in 2016 in were outfitted with diesel particle filters on the primary engines or auxiliary diesel engines. The 40 m class fireboat commissioned in 2016 for the fire department is equipped with diesel particulate filters and nitrous oxide catalytic converters on both main machines. In the field of innovative drive technologies, the HPA has developed various approaches for a new vessel to be built in 2017 in collaboration with DNVGL. Various hybrid solutions and fully electric drives are being considered.

In the field of low-emission fuels, GTL (gas to liquid) fuel was trialled on multiple ships in the HPA fleet in collaboration with Shell. The evaluation of measurement runs of the barge "Carl Feddersen" indicated savings of approx. 50 % for particulate emissions (PM_{10}) and approx. 10 % for nitrous oxides (NOx) when compared with the DIN EN 590 lorry diesel used to date. A complete conversion of the fleet to use GTL is planned for 2017.

With the senate resolution dated 14/06/2016, the HPA was commissioned with the establishment of a central fleet management system for the City of Hamburg. In future, the ship fleet will be expanded by eleven boats for the water police, three for the fire department, and five boats for the State Office for Roads, Bridges, and Water Bodies (LSBG). The goal is to reduce the costs for the procurement and operation of water vehicles and to optimise the acquisition of replacements and repairs. Furthermore, the ships should become more multifunctional such that they are ready for a wide range of uses.

At the same time, the resolution of the Hamburg Parliament dated 27/04/2016 aims to minimise the emission of carbon dioxide, nitrous oxide, sulphur oxide, and particulate matter from the city's own fleet via trials of new drive systems and filter technologies. For this purpose, modern and low-emission technologies are to be used in new acquisitions, and existing ships are to be retrofitted wherever technically possible and economically feasible. In light of this, the HPA has developed a five-pillar model for reducing the emissions of the city's fleet.

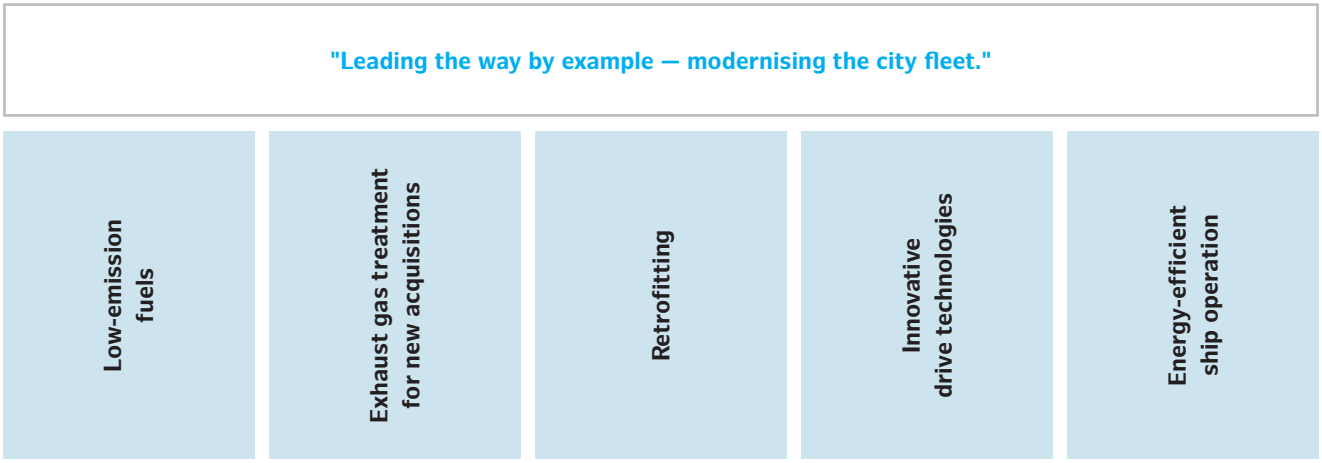


Fig. 37: Five-pillar model for reducing emissions

For all pillars, initial results were either achieved in 2016, or specific concepts were developed for implementation in the following years. For environmental accounting, parameters such as speed, operating time, distance, and the fuel consumption of the fleet will also be measured in the future. Furthermore, selected crews will also be trained in energy-efficient ship operation by DNVGL in 2017.

The fleet management lives up to its exemplary role as a city fleet. Among other things, it constantly engages in professional discussions with NABU on this topic.

The HPA's vehicle fleet — more electric cars, fewer CO_2 emissions

The HPA operates the infrastructure of the Port of Hamburg over an area of 7,200 ha. For all tasks that lie within the scope of infrastructure maintenance as well as the construction and operation of installations, it had a fleet of 248 vehicles at its disposal in 2016. During the reporting period, 13 gas-operated (CNG) passenger cars were used, and the number of electric vehicles increased from seven to 18 passenger cars.

In order to fulfil the HPA's climate protection concept, the fleet is reviewed regularly for optimisation potential with regard to emissions performance, and the efficiency of the vehicles assessed in the case of new acquisitions. The focus is not only on technical improvement: the HPA regularly trains its drivers in learning how to drive in an environmentally friendly manner, as well as internalising such driving behaviour. As a contribution towards improving air quality with regard to nitrous oxides and particulate matter, a percentage of the fleet was able to be converted to use lower-emission petrol instead of diesel fuel. Because this measure is in conflict with the climate goals due to the higher fuel consumption and hence higher CO_2 emissions, it is a necessary, but temporary measure. In the long term, a switch to electromobility is planned.

The diagram shows that the specific CO_2 emissions of the passenger car fleet have decreased overall:

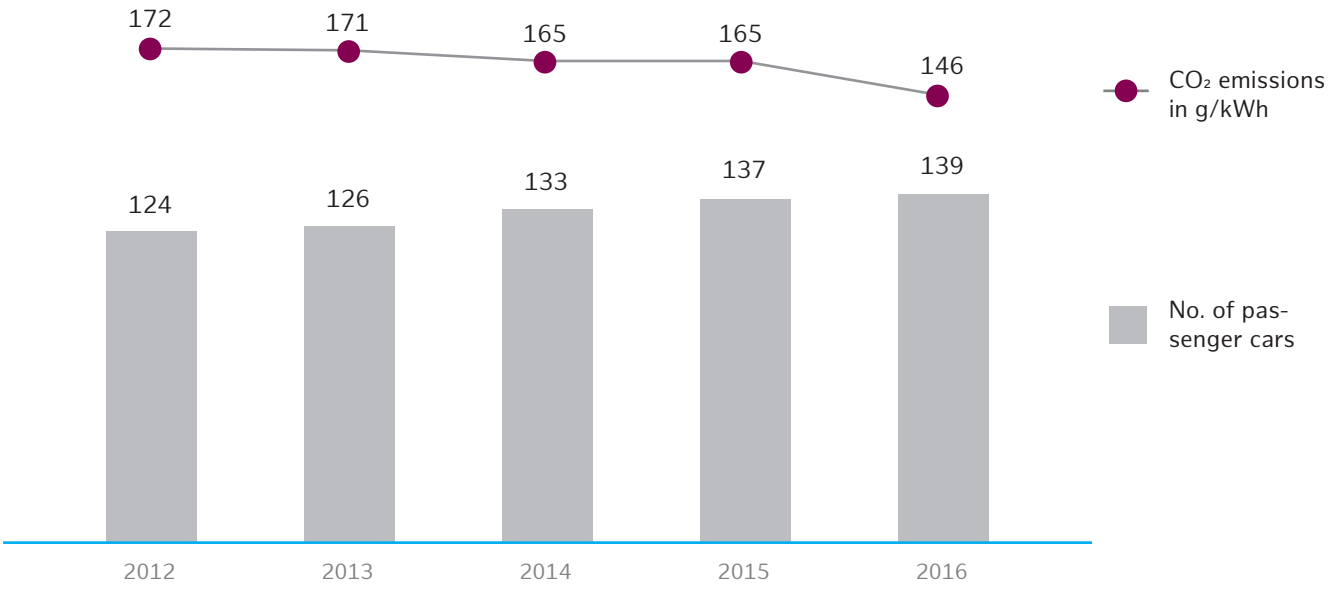


Fig. 38: Positive development of the specific CO_2 emission performance of the passenger car fleet

The goals include an annual reduction of 3.5 % in the specific CO_2 emissions of the passenger car fleet in the annual comparison and an increase in efficiency with regard to fuel or energy consumption by a factor of -0.5, also compared to the previous year. The loss in efficiency in 2016 is due to the switch to petrol vehicles.

	2014	2015	2016	2020
Target value	165	159	153	132
Current value	165	165	146	

Fig. 39: Specific CO_2 emissions in g/kWh

	2014	2015	2016	2020
Target value				1.00
Current value	1.56	1.05	1.22	

Fig. 40: Efficiency factor of the passenger car fleet in kWh/km year-on-year

Business trips — towards a modal shift

For many employees it is necessary to go on both national and international business trips. These may take the form of plane and railway journeys, trips with the fleet's vehicles, or with their own cars. The HPA compensated for CO_2 emissions resulting from plane journeys during the reporting period via atmosfair.

A comparison of modes of transportation is planned for the future, in the context of which, savings potential such as CO_2 emissions, travel times and costs arising from the optimal selection of the mode of transportation by each traveller will be reviewed. In this context, the goal is to promote rail travel even more strongly as the most environmentally friendly and mobile mode of transportation for business trips. The aim is to successfully bring about a modal shift towards local public transportation via additional incentives for sustainable connecting transportation — including car sharing.

Getting to work — providing incentives for selecting the most efficient means of transport

The HPA is providing highly targeted incentives to make it easier for its employees to switch from individual transportation to public local passenger transportation. For example, it selected an improved tariff of the Hamburg Transport Association (HVV) in 2016, and supports subscribers of annual passes with a monthly grant. At the same time, it is gradually reducing subsidies for leased parking spaces in two nearby multi-storey car parks in the Speicherstadt district. The immediate reaction observed was that the number of HVV subscribers grew.

	2014	2015	2016	2020
Target value				200.0
Current value	-	241.4	263.6	

Fig. 41: CO_2 emissions of flights in t

	2014	2015	2016	2020
Target value				40.0
Current value	-	30.8	35.8	

Fig. 42: Number of employees with the HVV-Profi-Card in %

As a partner of the Hamburg Transportation Association, the HPA works on innovative solutions for improving local public transportation connections to companies in the port. The goal is to provide more incentives for shared journeys in future, which can be offered, discussed and arranged online via a new commuter portal. However, a switch to bicycles or local public transportation would be even better.

Project: "Intelligent Commuter Mobility"

"Intelligent Commuter Mobility" – with this project, the HPA intends to take advantage of synergy effects in the field of commuter mobility in the port and the city, on business trips, and on the way to work. The sustainable approach takes into account financial, ecological, and social effects. The basis of this is a potential analysis performed in 2016. It considered the changes in vehicle technology that are to be expected over the next five to ten years, as well as the future interaction of the various means of transport.

One important result: A change in the mode of transportation chosen by employees could not only reduce CO_2 emissions and mobility costs, but also promote the health of the employees as well as the social and economic participation of all employees.

An analysis of the passenger car fleet was performed with the goal of identifying savings potential which resulted from the use of one's own and external vehicles, as well as from the use of bicycles. The analysis also considered the degree of utilisation and the electrification of the vehicles. Initial findings show that all destinations in the port can easily be reached using electric vehicles on a single charge. Another study is determining the optimisation potential of the journey to work with regard to costs, time, CO_2 emissions, and physical exercise when using the most efficient means of transportation.

The HPA will derive suitable measures and incentives from the findings of the potential analysis. These may be of an infrastructural nature (e.g. suitable bicycle storage facilities and showers, promotion of local public transport) or function at an individual and psychological level (e.g. dynamic carpooling platforms of the latest generation).

05

THE HPA SETS THE COURSE FOR A SUSTAINABLE PORT

Since 2011, the HPA has followed its sustainability strategy, pursuing its vision of a humane and ecological economy. At the same time, the HPA is committed to fulfilling its responsibility for ensuring the healthy growth of the port, favourable working conditions for its employees, and a fair supply chain which it is involved in as a value-creating company in the region.

The HPA considers sustainability to be a regulatory idea which serves as an orientation point for the future development of the port. Correspondingly, it is important that the HPA consistently works towards a sustainable port — with fields of activity that are as transparently defined and verifiable as possible.

5.1 HPA employees

Compared to the previous year, the number of HPA employees decreased slightly by 15 persons, amounting to 1,749 active employees on 31/12/2016. As in the previous years, the percentage of civil servants in this figure is approx. 10 %. The approx. 90 % of HPA employees with collective agreements are under the collective agreement of the Labour Law Association of Hamburg (AVH). At the same time, all employees with collective agreements receive a company pension and performance-based pay.

The targeted promotion of new talent in the company itself has proven effective. This is indicated by the average age of employees at 46 years, which continues to be stable, and the decreasing fluctuation rate.

At

3.7 %,

the fluctuation rate of employees was significantly under the average value for the FHH public administration.

Additional benefits such as the use of the canteens, company sports groups, discounts for sports offerings, as well as emergency childcare are available to all employees. Overall, the employment figures compiled in 2015/2016 are a clear indication that the HPA is an attractive employer in Hamburg and the metropolitan region due to its company benefits and flexible, family-friendly working hours models. It received the "Excellent Training Organisation 2016" prize from the Hamburg Chamber of commerce for its commitment.

For outstanding achievements, employees

- received the Human Resources Excellence Award for the development of interactive apps that strategically manage optimal personnel deployment,
- the Process Solution Award in the "Process Modelling" category for a concept for decentralised process management on demand — the innovative and sustainable approach received particular mention.

Employee development as a success factor

Employees are the capital of the HPA — each and every person is needed. Well-grounded vocational training and individualised employee development form the basis for excellent specialists and promote identification with the company. As well as apprentices in industrial and commercial professions, the HPA also accepts trainees, university students in cooperative programmes, and interns. The figures for the number of apprenticeships, which have been declining since 2014, are due to the conscious decision to only provide training to fulfil the company's own needs.

Leadership quality also plays an important role, as it has a decisive influence on employee satisfaction, the company culture, and the attractiveness of a company as an employer. All management personnel are assessed every two years as part of a systematic executive feedback process which evaluates their strengths and areas for development. Since 2015, a compulsory qualification programme has been in effect which imparts in-depth knowledge related to the topic of leadership.

Safety in the workplace

The staff unit for work safety at the HPA has grown, and now comprises seven employees. This allowed support for the business units to be optimised and its role as an internal service provider and partner to be strengthened. One particular success was the review and assessment of the German Institute for Occupational Safety and Health (BAuA) for the port railway business unit. It was recognised as an "Enterprise with an exemplary occupational safety system".

The number of accidents that needed to be reported increased by 12.8 % in 2015, from 34 to 39, and by 4.9 % in 2016, from 39 to 41. This slight increase is still within the range of natural fluctuations. The goal is to reduce the frequency and severity of accidents. Fortunately, the rate of injuries has been declining since 2011 in annual comparisons.

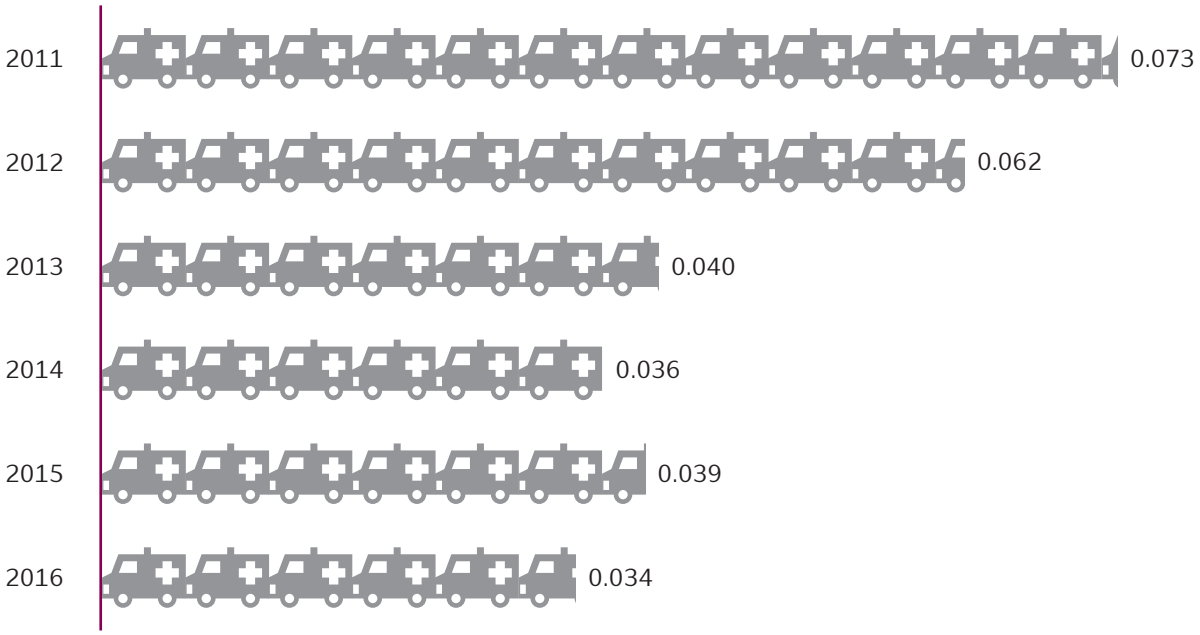


Fig. 43: Injury rate — number of accidents compared to total workforce (active) in the years 2011 to 2016

Where hazardous substances were concerned, storage could be optimised and storage quantities reduced thanks to good on-site briefings during the inspections. The variety of individual substances continues to be high due to the different activities. Carcinogenic, mutagenic, and reprotoxic materials were able to be substituted entirely.

All of the machines, installations, and mobile infrastructure manufactured by the HPA must be produced and operated in compliance with statutory requirements. For this purpose, the organisation has appointed CE representatives, CE coordinators, and a technical editorial team to implement and verify the requirements. The medium-term goals of the HPA also include the description of a manufacturing and procurement process for complying with CE conformity for all installations publicly produced and operated by the HPA. During the reporting period, no violations of CE conformity were reported.

Adherence to the core labour standards of the International Labour Organisation (ILO) as well as the European chemicals directive REACH takes place in all steps of the product development cycles.

Commitment to a healthy working environment

Similar to the frequency of accidents, the rate of absence due to illness has increased slightly, remaining at a high level. The exertion of direct influence by the employer is a complex affair, as the reasons for absences are highly individual. When examining the "light and dark sides" of work, both stresses and resources need to be taken into account. The goal here is to establish a holistic, systematic corporate health management (CHM). Hence, the evaluation of the rate of absence needs a change of focus — away from illness towards parameters such as "ability to work" in order to better work out the causes and the options for influence.

A greater emphasis is on activities for re-integrating employees who have been ill for a long time. In this case, an initial attempt is made to adapt the existing job to the health-related limitations, or in cases where this is not feasible, to find another suitable assignment. During this process, the persons receive support from corporate re-integration management, the CRM representative, as well as the severe disability representative.

According to a report by the health insurance provider DAK, the number of mental health problems is increasing, and now accounts for the majority of absences. Due to the circumstances, the HPA's corporate health management reacted to this in 2015 and placed the thematic emphasis on "mental health". The goal was to lift the taboo on this difficult issue. Hence, the thematic focus in 2016 was "Remain in Balance", which pointed to the fact that both the health promotion team as well as many employees concentrated too strongly on factors which were a strain on health. On the other hand, existing resources, personal abilities, and sources of strength frequently go unnoticed.

Repeated surveys of employees are necessary to identify potential for improvement. For the health survey, the HPA used a scientifically well-founded and anonymous survey questionnaire provided by the DAK, which was again sent out to all employees in autumn 2016, after the previous round in 2012. With over 900 completed questionnaires, the evaluation was performed by an external service provider.

The HPA's overall result for both health surveys is the same, and lies in the upper mid-level. Overall, this is a satisfactory result, but also one with a need for optimisation. The evaluations compiled in the individual categories as well as in the business units differed significantly from each other.

According to the employees, the greatest need for action is seen in the topics "Time constraints and interruptions" as well as "Co-determination and involvement".

On the other hand, the best results were achieved in the categories "Ergonomics" (above all activities that were strenuous for the back) and "Relationship with colleagues". A welcome tendency can also be seen for the topic "Management behaviour"; in this case, the evaluations improved slightly, which is seen as being in part due to the ongoing qualification programme for leadership personnel that was established in 2013.

For the first time, the HPA took part in the "Hamburg's Best Employer" competition in 2016, and received a reply from 746 employees. The topic of "Management and collaboration" was highly prioritised. For the respondents, the augmentation of the management role and the understanding of management appeared to be particularly important. Apart from guiding principles and guidelines, management personnel should get involved in discussions on management in day-to-day activities, for example via job rotation and work shadowing, mentoring, workshops, or the formation of management pairs.

Equal opportunity

There are many reasons why we should dedicate energy and commitment to the issue of equal opportunities. In a successful organisation talented people must have equal opportunities, irrespective of their sex and family duties. Inequality between the sexes is often linked to an economic loss, in addition to a loss of integrity. In 2015, the HPA appointed an Equal Opportunities Officer, in response to the Hamburg Act on gender mainstreaming in public service. An equality plan was drawn up in accordance with the statutory requirements and three key objectives were formulated:

Objective 1:

	2014	2015	2016	2020
Target value				22.5
Current value	20.3	20.6	20.6	

Fig. 44: Increase in the proportion of women in %

Objective 2:

	2014	2015	2016	2020
Target value				22.0
Current value	18.1	18.6	19.2	

Fig. 45: Increase in the proportion of women in leadership positions in %

Objective 3: Further development of support to combine family and career

The equality plan contains a total of twelve individual measures. The goal is to have a positive overall balance by 2020.

0

Cases of discrimination

at the Hamburg Port Authority.

5.2 Protected or renaturalised habitats

As part of construction projects and other activities, the HPA inevitably avails itself of vegetation structures or aquatic areas — and therefore the habitat of various groups of organisms (e.g. birds, insects, bats, fish). In these contexts, the various pioneer habitats in the port, such as dry grasslands, which constitute biotopes subject to particular conservation regulations and fall under the protection of Section 30 of the Federal Natural Conservation Act (BNatSchG), need to be taken into account. Such habitats are particularly attractive for flora and fauna that are have now become rare.

In the project planning, the HPA takes into consideration the natural protection laws regulating interventions as part of the environmental compatibility review, statutory species protection regulations, as well as the regulations of the EU Water Framework Directive. The main objective here is the avoidance and/or minimisation of the impact on the environment and the ecosystem. Negative impacts that cannot be avoided due to the nature of the project will be compensated for via suitable balancing and/or alternative measures. For this purpose, both the company's own areas in the port as well as areas outside the port will be utilised. The goal here is to upgrade their significance and functionality for the ecosystem.

With the passing of the Ecological Account Directive (Ökokontoverordnung) on 03/07/2012, the HPA has utilised the option of stocking up on compensatory measures over the past few years. To date, it has set up two eco-pool areas[8]. In these areas, upgrading measures for nature protection are initially carried out and maintained — independently of any direct requirements. By December 2016, the areas for the measures in the Kirchwerder Meadows (16.2 ha) had been fully established. Of the Lower Saxon pool area, 12 ha (52 % of the total area) have currently been developed.

Where protected species are affected, a spatially functioning relationship must generally be ensured between the areas being utilised and the compensatory areas. For example, one of the renaturalisation measures carried out in 2015/2016 in the Old Moorburger Port was for Oenanthe conioides, a highly protected plant species endemic to the Tidal Elbe. The development of this plant species will be included in the regular monitoring procedures of the relevant nature protection authority starting in 2017. The area is expected to serve as a stepping stone between existing growth locations.

Construction of new shallow water area

Period: 2008–2019

Total cost: 65 million euros

With the Kreetsand project, the HPA — by using the processes of nature — is developing a new, tide-influenced shallow water area in an outer dyke area in eastern Wilhelmsburg measuring approx. 40 ha. For the creation of the shallow water area, approx. 2 million m³ of soil will need to be removed and utilised or disposed of. By March 2016, the halfway point of the removal goal was reached. Sections of the areas have already been connected to the tidal regime.

[8] See 2013/2014 sustainability report, page 31

5.3 Climate protection with a focus on resource conservation

In December 2015, Hamburg's climate plan was adopted during the ongoing climate negotiations in Paris. The HPA's climate protection concept is based on this plan. The HPA has set itself the goal of reducing CO_2 emissions by 40 % by 2020, and by at least 80 % by the year 2050 as compared to 1990. 2012 serves as the year of reference. The emissions are calculated according to the greenhouse gas protocol.

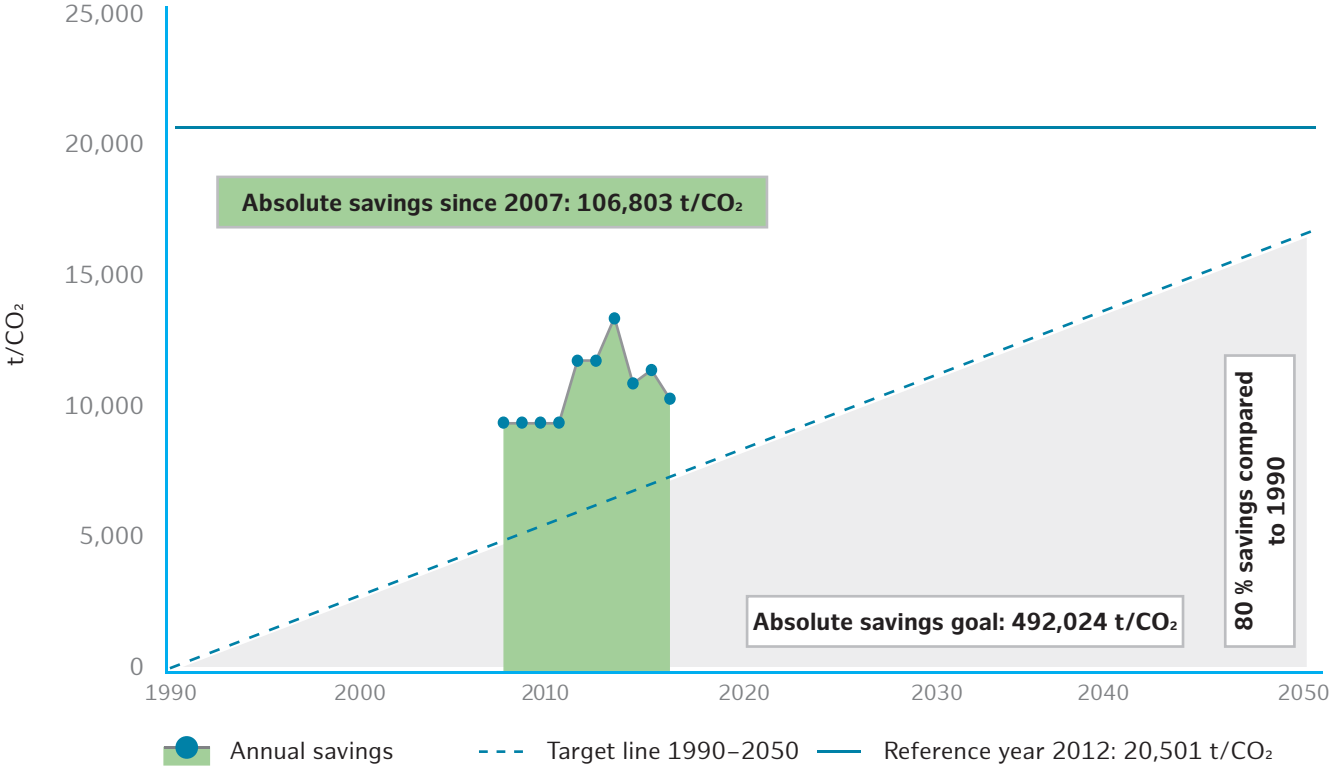


Fig. 44: Climate protection model of the HPA analogue to the Paris Agreement (SCOPE 1 and 2)

The HPA calculated its CO_2 footprint for the first time in 2007. Since then, 106,803 t of CO_2 emissions have been saved. Initial savings were achieved from 2007 to 2011 via the purchase of green certificates. Since 2011, the electricity drawn by the HPA has been 100 % green (emissions factor = 0) by being included in the electricity supply contract of the Free and Hanseatic City of Hamburg. Hence, in 2016, 56 % of the company's total CO_2 emissions – electricity consumption accounts for approx. 33 % of total energy consumption — could already be compensated for or reduced via measures. The green electricity contract ratio increased by an additional 3 % to 98 % during the reporting period. Hence, the HPA's annual CO_2 emissions goals for 2020 have already been fulfilled.

	2014	2015	2016	2020
Target value	6,559	6,832	7,106	8,199
Current value	7,972	8,004	8,464	

Fig. 45: CO_2 emissions saved in t

	2014	2015	2016	2020
Target value	78,708	85,400	92,378	122,985
Current value	85,188	96,555	106,803	

Fig. 46: CO_2 emissions saved (cumulative) since 1990 in t

Therefore, up until 2020, the HPA will be focusing primarily on energy savings, increasing efficiency, and the conservation of resources.

Measures which support the phasing out of fossil energy carriers are highly prioritised. The areas of activity are the ship fleet and the energetic refurbishment of buildings, as well as the use of renewable energies.

As a result of these climate protection measures and the participation in the beginner's programme for environmental management ÖKOPROFIT of the Free and Hanseatic City of Hamburg, the HPA has been recognised for its commitment to environmental protection for the fifth time in a row. It will also remain an environmental partner of the City of Hamburg for 2017.

Fields of activity in 2016	CO_2 emissions	CO_2 savings
Diesel	459.0	2.0
Heating oil	799.6	0.0
Natural gas	2,188.4	0.0
Diesel, ship fleet	3,760.8	0.0
District heating	343.2	0.0
Electricity	182.8	10,246.0

Fig. 47: CO_2 footprint of the major areas of activity in 2016 in t

Example of successful practical implementation: Paper consumption

Since 2013, the HPA has utilised certified RC paper ("Blue Angel") in the entire company, and has set the default printer settings to double-sided printing and black-and-white. Furthermore, the HPA is continuously pursuing digitalisation of administrative procedures. Since then, the paper consumption per person has decreased by 14 %.

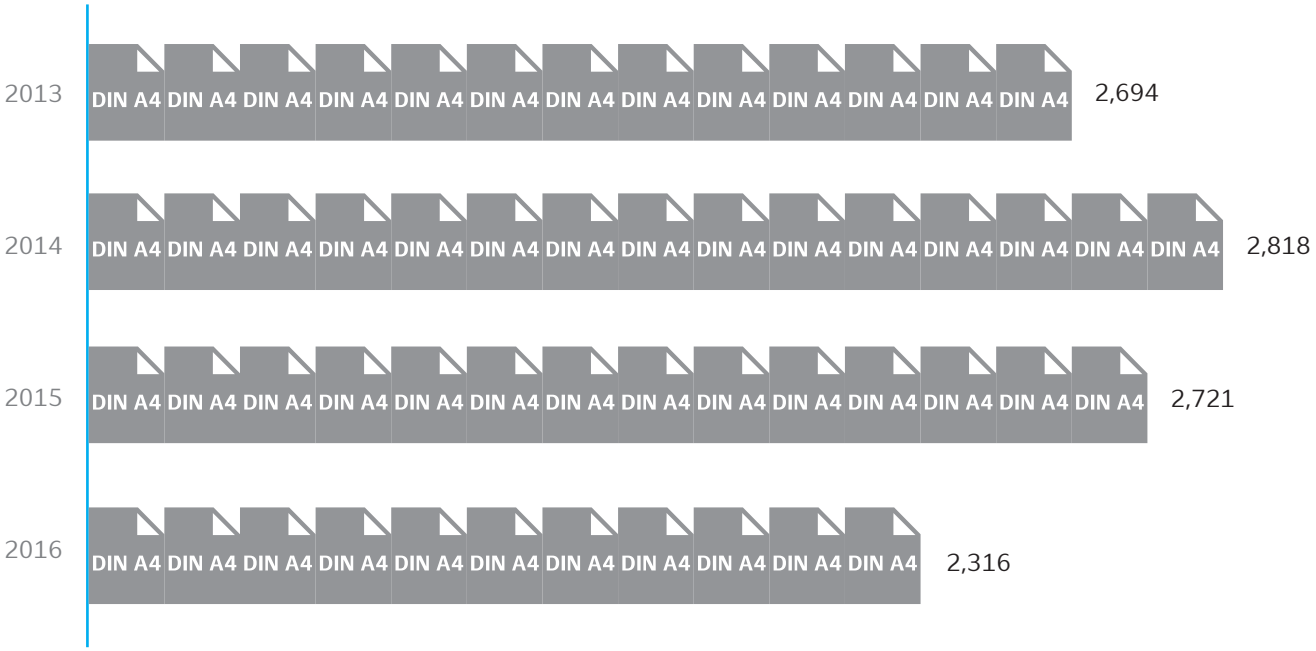


Fig. 48: Paper consumption per person by year in the number of A4 sheets

Example of successful practical implementation: Waste and soil management

The HPA is on the right path when it comes to sustainable soil management. This was illustrated by the team responsible, among others, as part of a symposium in October 2015 at the Department of Environment and Energy (BUE), which was held as part of the International Year of Soils.

The material flows in the port are highly significant not only for project management, but in particular also due to reasons of soil protection, especially because recycling also leads to a reduction in costs. The HPA has set itself the goal of dealing as sustainably as possible with soil, a valuable resource — this also includes the fractions sand and sediment.

The optimisation of the soil material flows is managed centrally. This allows soil needs and surpluses to be coordinated, which are established as early as possible in the concept and planning phase of projects. In this case, the soil needs within the HPA are generally higher than the percentage of surplus soils.

	2015	2016	2017–2021
Required	298,000	1,040,000	2,260,000
Surplus	515,000	831,000	1,490,000

Fig. 49: Reported sand requirements and surpluses in m^3 with the sand fraction as an example

The HPA maintains the depth of the port. To do so, sediment needs to be dredged from fairways and the port basin. The majority of this port sludge can be relocated or deposited in the water bodies. Sediment with a higher pollutant content needs to be treated in the METHA (which stands for mechanical separation and drainage of port sediment in German) treatment installation and on drainage fields, and disposed of on land. Disposal includes both the use of waste as well as its removal.

In 2015, around 500,000 t of dry matter (t DM) was disposed of on land, and around 380,000 t DM in 2016. The utilisation ratios were 56 % and 50 % respectively. The accounting from the past 10 years shows that, apart from the naturally fluctuating output quantities induced by varying input amounts of port sediments, varying utilisation ratios result. The ratio depends on internal HPA utilisation options. In 2015, the utilisation path for construction substitute dominated, because around 200,000 t DM of METHA sludge was used to fill in the Dradenau logistics area. In 2016, the utilisation path for seal construction dominated. At the HPA monofill Francop, around 130,000 t DM of METHA sludge, which exhibits strong sealant properties, was used in the construction of the upper seal. Furthermore, METHA sand was once again used to construct drainage layers in the HPA's own landfills, and METHA fine sand was used in the construction of methane oxidation windows in the HPA's Dradenau project. The external utilisation paths involve the acceptance of METHA sludge as construction substitutes as well as the utilisation of METHA sludge for the manufacturing of pellets.

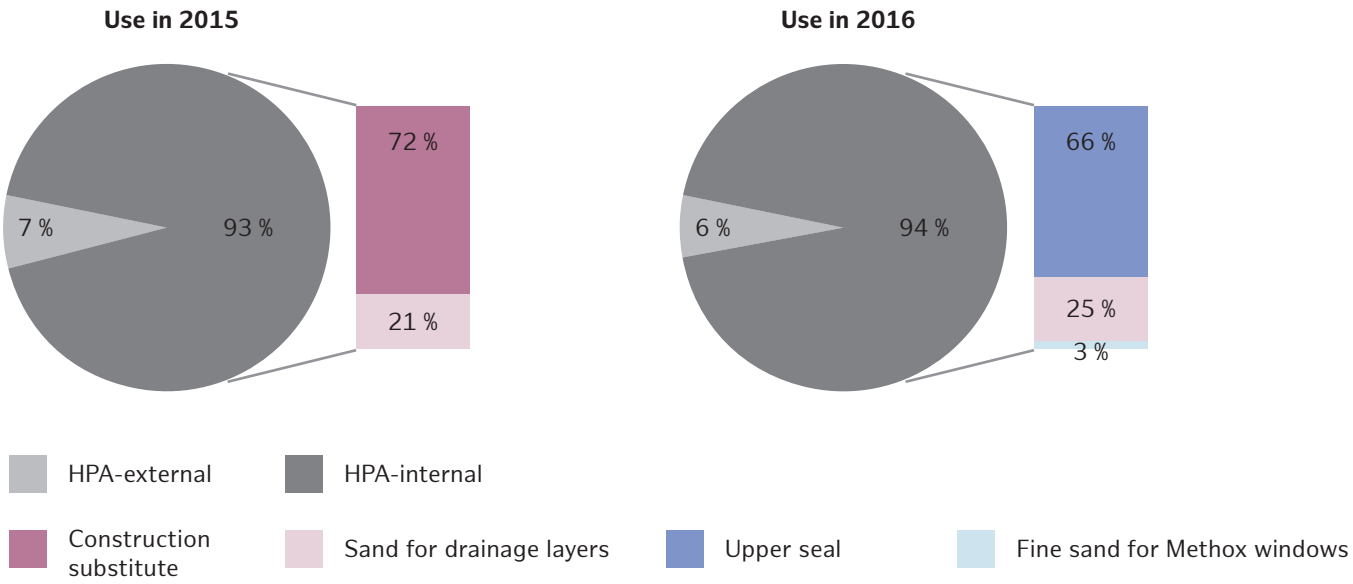


Fig. 50: HPA-internal utilisation paths for waste from port sediment

During the reporting period, three projects could be used to demonstrate how modern soil management which relies on the recycling of soil on site functions.

- Spadenlander Busch/Kreetsand – Steinwerder Port: A percentage of the soil resulting from the creation of a tide-influenced shallow water area could be used to partially fill in the Steinwerder Port.

- Enlargement of offshore terminal entrance: At the construction site, sophisticated soil management was conducted in a very limited area. This allowed usable soil to be saved and re-incorporated at a later point in time.

- Dradenau Port: The HPA took a new tack for the utilisation of port sediment as part of the filling in of the Dradenau[9] port basin. According to a detailed geotechnical procedure, it incorporated METHA Material on a large scale for the first time — at a scale of approx. 290,000 m³. This allowed the material which was categorised as waste to be utilised instead of depositing it in a landfill, which would have resulted in high costs and occupied a large area. Furthermore, after sealing off the edges of the area, the largest methane oxidation area worldwide was built, where the methane gas generated in the next 20 years will be converted into carbon dioxide and water via microbial decomposition. In addition, due to the elimination of transportation of a portion of the materials to the more distant landfill location Feldhofe via lorries, fuel consumption could be reduced considerably.

In summary, via the option of utilising the METHA materials, the following goals were achieved:

- Two annual quantities of landfill capacity were saved

- 290,000 m³ of waste was utilised instead of being disposed of

- 250,000 m³ of the valuable resource of sand was saved

- 240 m³ of diesel fuel was saved — and due to this: The environment was spared approx. 584 t of CO_2 emissions, 36 kg NOx, and 2.7 kg of particulate matter (PM_{10})

[9] See project description in 2013/2014 sustainability report, page 13

Examples of successful practical implementation: Company associations in Hamburg voluntarily get involved in climate protection in the Port of Hamburg

The business association Unternehmensverband Hafen Hamburg e. V. (UVHH[10]) and industrial association Industrieverband Hamburg e. V. (IVH[11]) are long-standing supporters of the UmweltPartnerschaft Hamburg environmental partnership, and their committees represent the interests of the port industries, the Hamburg industries, and the industry-related service providers. In this partnership, which also enjoys supra-regional recognition, both associations jointly promote voluntary, cooperative environmental protection. 48 member companies of the IVH and 20 members of the UVHH are already involved as environmental partners.

As the supporter and moderator, the federal initiative of the IVH has supported the Energy Efficiency Networks Initiative since 2015. Two of these networks have already been created: The energy efficiency network of the Hamburg industries was founded by 13 companies, and the energy efficiency network of the Hamburg suppliers and disposal companies was founded by eight companies from the supply and disposal industry. These companies have agreed to work together in each of their networks for 36 months, and to share their experience on energy efficiency projects. Also involved are the IVH member companies which conduct business activities in the Port of Hamburg – including HHLA Hamburger Hafen- und Logistik AG, ArcelorMittal Hamburg AG, Aurubis AG, HOLBORN Europa Raffinerie GmbH, Trimet Aluminium AG, H&R Ölwerke Schindler GmbH, and MVR Müllverwertung Rugenberger Damm GmbH & Co. KG.

Using energy as efficiently and regeneratively as possible — this is also the declared goal of many of the member companies of the UVHH. According to a breakdown as of 2016, individual companies are currently saving at least 60 million kWh annually via targeted best practice measures, thereby avoiding the emission of 76,000 t CO_2 each year. A number of examples of successful practical implementation from the three areas "Electrification", "Energy savings", and "Digitalisation" will be listed here as examples.

Electrification:

- By switching from 60 diesel vehicles to electrically powered passenger cars, 1,335 t CO_2 are saved in terminal operations each year.

- As part of a pilot project for electromobility funded by the federal government, electrically operated container vehicles are only charged during terminal operations when green electricity peaks are available in the network.

Energy savings:

- With the help of the optimisation of illumination management at terminals, approx. 1.2 million kWh of energy are saved annually.

- Via novel energetic recovery technology, kinetic energy is converted back into energy during lowering procedures on container bridges. This reduces annual electricity consumption by 25 % on average.

Digitalisation:

- Since 2016, the digital "Truck Avis App" has made it possible for lorry drivers to register in advance at the gate with the help of an online check in. Via bluetooth, the arrival of the lorry in the port is registered and the gate is opened for the vehicle. This cuts down on waiting time, the traffic flow improves, and fuel consumption and CO_2 emissions are reduced.

[10] See also: http://www.uvhh.de

[11] See also: http://www.bdi-hamburg.de

5.4 Air quality — top 1 on the environmental ranking list for European ports

Via two specific projects, the HPA assists the City of Hamburg with air pollution control planning.

Smart Air Pollution Tracking

As part of the Smart Air Pollution Tracking project, the HPA recorded measurements of the air quality in the port for the very first time, combined it with traffic data, and analysed it. This provided a holistic representation of the air pollution in the port from chronological and spatial perspectives.

From April to July 2016, the HPA installed three sensors at various locations in the port. In addition, the data (September 2015 to August 2016) from two port-relevant measurement stations of the urban air measurement network of the BUE was evaluated. The sensors registered the concentration of the pollutants sulphur dioxide (SO_2), nitrous oxides (as NO and NO_2), and particulate matter (PM_{10}) in the air. This provided a compelling image of the air quality in the port. Via the additional intersection of this environmental data with meteorological conditions and information on the movement of ship and road traffic, short-term effects of the modes of transportation on air quality could also be investigated.

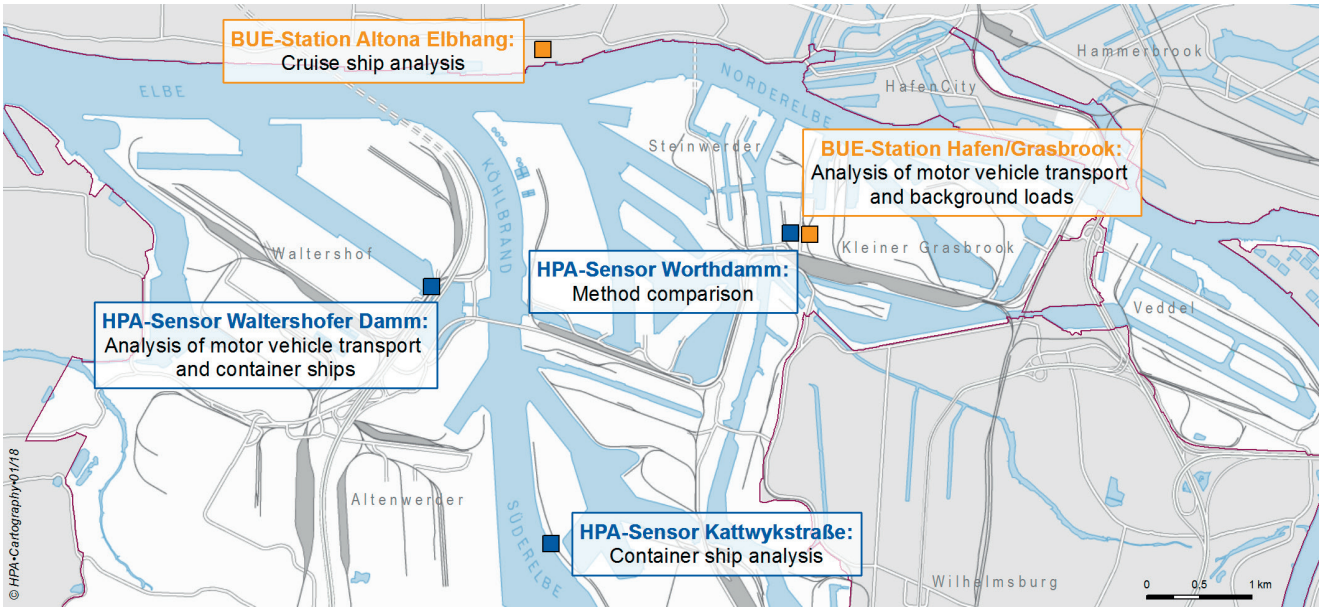


Fig. 51: Locations of the five air measurement installations in the Port of Hamburg

The analyses showed that the air quality in the port were in a good to moderate range. The annual threshold values defined by the 39th German Federal Emission Protection Directive (BImSchV) for NO_2, SO_2 and PM_{10} were safely complied with, and the 35 permitted instances of exceeding the daily mean threshold values for PM_{10} per calendar year were also not exceeded during the investigation period.

Emissions cataloguing for the Port of Hamburg

The emissions of the port contribute significantly to the sum of all emissions released in the City of Hamburg. In particular, industries and shipping in the port area produce large quantities of nitrous oxides and particulate matter, which lead to an increase in the background presence of pollutants in the city. Hence, the HPA compiles a separate emissions register for the Port of Hamburg, in which the air pollutants NOx, SO_2, PM_{10} and CO_2 are recorded, evaluated, and depicted for various emitter groups. Since 2013, the HPA has used a model developed specifically by the Institute of Shipping Economics and Logistics (ISL) for the Port of Hamburg in order to determine the air pollutant and CO_2 emissions of past and future years. This model, called the Elbsimulation, represents shipping traffic in the Port of Hamburg faithfully down to the berth, thereby making it possible to calculate the emissions from ocean-going vessels, inland vessels, and internal port traffic. The dates of the emissions register are updated annually where possible, and the methodology constantly further developed.

Emitter group	t NOx	t SO_2	t PM_{10}	t CO_2
Shipping traffic	7,612.0	265.0	50.0	474,007.0
Vehicle traffic	124.0	0.2	2.0	44,946.0
Port railway	314.0	0.1	6.0	18,486.0
Handling equipment	684.0	1.0	39.0	140,480.0
Industry	1,991.0	3,995.0	871.0	2,998,272.0
Building fire	102.0	20.0	6.0	(no data)
Total	10,827.0	4,281.0	974.0	3,676,191.0

Fig. 52: Values of the emission groups as a share of the calculated total emissions for 2016

The goal of the emissions cataloguing is to record the status quo, identify trends, and to point out fields of action in order to be able to exert a positive influence on the emissions trend. It forms the basis for developing targeted measures for reducing emissions in the Port of Hamburg and also to be able to verify their effectiveness in the long term.

5.5 Financing – opportunities and risks

The HPA understands economic sustainability as being the conscious decision to maintain and increase capital in accordance with the port development plan. The basis for the economical use of funds provided consists of expert opinions and studies for determining macroeconomic and political trends and benchmarks and preserving directional impulses for port development planning. The funds made available are utilised by the HPA in three main areas:

- For the restructuring of port areas according to current traffic requirements,
- For preserving, renewing, and managing port infrastructure, as well as
- For the provision and the development of port areas.

Procurement

In 2016, construction, supply, and service contracts with a value of 288 million euros were awarded. For clients from the public sector, compliance with public procurement law is mandatory.

It specifies various sustainable criteria for issuing calls for tender for products and services, e.g. EURO standards or energy labels for transportation services, criteria for the procurement of energy consumption-relevant services, e.g. based on life cycle costs, or also the procurement of road vehicles according to efficiency criteria. As a company of the Fairtrade City of Hamburg, the HPA utilises the guidelines for environmentally friendly procurement of the Free and Hanseatic City of Hamburg (environmental guidelines) published in 2016 as an informational pool for sustainable tender criteria.

Two examples of sustainable criteria with regard to procurement at the HPA:

- Social criterion: Suppliers must affirm their adherence to the ILO core labour standard in writing.
- Ecological criterion: Suppliers must prove that they only use wood certified according to FSC or PEFC.

A preference for local suppliers is not possible due to public procurement law. As part of the framework conditions of procurement law, the HPA can take into account sustainable aspects such as the CO_2 emissions of the supply chain of products. The establishment of a supplier management system is planned.

Consequences of climate change

The HPA regularly evaluates the financial consequences as well as the additional risks and opportunities of natural events. Climate-induced events with an influence on the port and the transportation chain may result in significant changes in the business operations of the HPA. These may involve physical changes such as wind speed or an increase in sea level, the availability of raw materials, heat-induced changes to working conditions, but also regulatory aspects, such as assessment thresholds or air pollution limits.

Over the past years, the consideration of climate change consequences was based on the information in the reports by the Intergovernmental Panel on Climate Change (IPCC). These contained, among other things, information on observed and projected climate changes in Europe, as well as trends in the development of climate factors and effects. The analysis is not suitable for a derivation of short- to medium-term climate change consequences with effects on e.g. operational costs.

Hence, in 2016 the HPA commissioned the Climate Service Center Hamburg with the analysis of the climate changes to be expected in the Port of Hamburg region. The data is based on an ensemble of climate change projections from multiple high-resolution spatial climate models for the entire 21st century. The results for 17 relevant climate parameters (e.g. the change in mean annual temperature or the number of days where the temperature remains below 0 °C) is expected for 2017. The opportunities and risks to be derived from the findings may affect all management processes along the HPA's value creation chain.

Fig. 53: Climate change risks along the value creation chain

Climate-induced traffic limitations already exist today, such as wind speed, water depths, ice and fog, which affect the accessibility and availability of the port and safety. Rather, in certain cases, the design of our installations and the raw materials used have clearly reached their stress limits. The climate prognoses constitute a compelling basis for the evaluation of the follow-up costs of climate change. Concepts for adaptation and avoidance can be developed with foresight according to the precautionary principle.

Corruption prevention

Preventing corruption is one of the basic and ongoing tasks of the HPA. For this purpose, it utilises an internal, comprehensive catalogue of measures for corruption prevention. The goal is to establish clear behavioural guidelines and transparency when dealing with corruption. The basic aspects of corruption prevention include, among other things, the internal control system according to the dual control principle as well as clearly regulated authorised signatures. For tips regarding suspected cases, an internal anti-corruption unit and an ombudsman have been established.

Employees undergo training sessions conducted by internal speakers as part of a five-year cycle. Among other things, they cover the HPA guidelines on corruption prevention and a code of conduct for employees. In both 2015 and 2016, three full-day training courses were conducted for new employees (no. of participants: 34/59 (m/f)). Furthermore, 270 (2015) / 113 (2016) employees also attended refresher courses in the form of e-learning training. Upon conclusion of the initial five-year cycle at the end of 2014, all employees had completed the advanced corruption prevention training for the first time.

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Cases of corruption

at the Hamburg Port Authority

During the reporting period, there were no confirmed cases of corruption at the HPA, nor were there any reported cases of suspected corruption.

5.6 Social involvement

Social involvement in Hamburg is part of the company's corporate responsibility. A coordination unit that is newly appointed each year is responsible for all issues related to social involvement. Together with a patron from the management, the annual budget of 25,000 euros is managed in support of organisations in the following fields of activity: "Maritime", "Education", "Dialogue", and "Environment".

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Projects, organisations, and initiatives

were supported in 2016.

Examples of this include the sponsoring membership for a mentor pair from the association "Zeit für Zukunft" as well as the port cruise organised annually by the HPA for socially disadvantaged children and their mentors. HPA employees are not only actively involved in these projects in their free time. Inclusion of the staff is a basic aspect of the social involvement concept at the HPA. Hence, an internal "Marketplace for social projects" takes place each year, where project partners are invited to present options for getting involved.

06

ANNEXES

6.1 Facts, Figures, Data – General and specific information in accordance with GRI G4 and PIANC

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G4-8	Markets supplied			1.1
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GENERAL STANDARD DISCLOSURES

Organisational profile

G4-9 Scale of organisation	Unit	2013	2014	2015	2016
Business locations	Number	1	1	1	1
Sales	MEUR	281	176	182	185
Equity capital	MEUR	1,017	1,098	1,047	1,010
Loan capital (incl. special items)	MEUR	818	833	941	1,059
Total assets	MEUR	1,836	1,931	1,988	2,069

G4-10 Workforce matrices	Unit	2013	2016	2015	2016
Total workforce	Persons	2,092	2,060	1,977	1,933
Active staff, male	Persons	1,642	1,621	1,553	1,515
Active staff, female	Persons	450	439	425	418
Total active staff	Persons	1,819	1,810	1,764	1,749
Part-time staff	Persons	255	258	241	232
Part-time staff, male	Persons	-	119	103	90
Part-time staff, female	Persons	-	139	138	142
Active staff (permanent employment)	Persons	1,775	1,764	1,730	1,721
Active staff (permanent employment), male	Persons	1,422	1,419	1,376	1,371
Active staff (permanent employment), female	Persons	353	345	354	350
Active staff (tempory employment)	Persons	44	46	34	28
Active staff (tempory employment), male	Persons	25	23	24	17
Active staff (tempory employment), female	Persons	19	23	10	11
Non-active staff (apprentices, on leave, representatives, other)	Persons	273	250	213	184
Trainee employments (incl. working students and aspiring civil servants)	Persons	109	90	82	65
Trainee employments (incl. working students and aspiring civil servants), male	Persons	94	79	75	60
Trainee employments (incl. working students and aspiring civil servants), female	Persons	15	11	7	5
Active civil servants	Persons	183	182	177	174
Active civil servants, male	Persons	131	129	125	124
Active civil servants	Persons	52	53	52	50
Percentage of trainees	%	5.2	4.4	3.7	3.1
Average age	Years	45.0	46.0	45.9	46.2
Percentage of part-time employees	%	12.2	12.5	12.2	12.0
Percentage of female employees	%	20.5	20.3	20.6	20.6

The majority of business operations is caried out by employees of the HPA.

G4-11 Collective bargaining agreements	Unit	2013	2014	2015	2016
Percentage of employees covered by collective agreement	%	99.8	99.7	99.7	99.7

G4-12 Supply Chain	Unit	2013	2016	2015	2016
Supply chain – order value	MEUR	209.8	390.8	260.0	287.7
Supply chain – order value in Germany	MEUR	208.9	372.4	258.5	273.6
Supply chain – order value of overseas suppliers	MEUR	0.9	18.4	1.4	14.0
Number of supplying numbers	Number	20	17	16	16
Total numbers of suppliers	Number	2,511	2,628	2,257	2,270

OVERVIEW II

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Anti-corruption			
G4-SO3	Total number of business operations assessed for risks related to corruption	8	5.5
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Product and service labelling			
G4-PR4	Incidents of non compliance concerning product labelling and information		5.1

[1] See financial report 2016, p. 27 et seq. „Profit and loss calculation, balance sheet and assets analysis“

SPECIFIC STANDARD DISCLOSURES

Economic performance

G4-EC4 Financial assistance received from government	Unit	2013	2014	2015	2016
Received from government – tax relief and credits	MEUR	0	0	0	0
Received from government – subsidies	MEUR	0	0	0	0
Received from government – investment subsidies	MEUR	237.5	232.0	207.4	214.9
Received from government – awards	MEUR	0	0	0	0
Received from government – remission	MEUR	0	0	0	0
Received from government – financial support from export credit agencies	MEUR	0	0	0	0
Received from government – financial performance bonus	MEUR	0	0	0	0
Received from government – other financial advantages	MEUR	0	0	0	0

PO1 Area productivity	Unit	2013	2014	2015	2016
Port-related gross added-value (direct and indirect) in relation to water surface usage	MEUR/ha	4.107	4.440		
weight of transported goods in relation to water surface usage	t/m²	4.88	5.11	4.84	4.85
Leased area in relation to available and leasable land surface area	%	-	-	-	90.6

Market presence

PO2 Seaward freight volume	Unit	2013	2014	2015	2016
Total number of passengers	Number	552,459	588,690	520,000	722,000
Number of transit passengers	Number	32,475	29,420	22,570	41,438
Number of containers TEU	Number	9,257,000	9,729,000	8,821,000	8,907,000

Energy

G4-EN3 Energy consumption within the organisation	Unit	2013	2014	2015	2016
Fuel consumption	GJ	1,055	964	1,032	1,399
Diesel consumption	GJ	30,979	19,915	14,171	13,219
CNG (compressed natural gas) consumption	GJ	0.20	0.18	0.19	0.15
Marine diesel consumption	GJ	64,932	61,486	60,334	53,339
Consumption GTL	GJ	-	-	-	2,313
Power consumption by e-cars	GJ	0	12	34	31
Fuel consumption from renewable energy sources (5 % bioethanol)	GJ	53	48	103	140
Power consumption	GJ	80,680	70,207	73,430	70,083
Heating oil consumption	GJ	15,228	8,377	10,323	10,284
Natural gas consumption	GJ	33,516	38,446	35,516	38,402
District heating consumption	GJ	5,554.00	4,594.00	3,946.00	4,188.18
LPG/liquefied petrol gas) consumption	GJ	2.10	3.04	2.00	1.86
Propane consumption	GJ	0.541	0.343	0.330	0.290
Cooling energy consumption	GJ	<2 % of total consumption	<2 % of total consumption	<2 % of total consumption	<2 % of total consumption
Steam consumption	GJ	0	0	0	0

G4-EN3 Energy consumption within the organisation	Unit	2013	2014	2015	2016
Energy sold	GJ	0.0	0.0	282.0	464.9
Energy consumption, total	GJ	231,947	204,005	198,789	193,260

G4-EN6 Reduction of energy consumption	Unit	2013	2014	2015	2016
Reduction of energy consumption – total savings	GJ	724	411	8,851	532
Fuel savings	GJ	0	12	8,665	32
Power savings	GJ	354	2	182	500
Heat energy savings	GJ	370	0	0	0
Cooling energy savings	GJ	0	397	3	0
Steam savings	GJ	-	-	–	–
Chosen base year		2012	2013	2014	2015

Water

G4-EN8 Total water withdrawal by source	Unit	2013	2014	2015	2016
Rinsewater extraction from the Elbe	m^3	62,558	30,132	87,535	166,034
Water extraction from groundwater	m^3	0	0	0	0
Water extraction from rainwater directly collected by the organisation	m^3	0	0	0	0
Water extraction from waste water by other organisation	m^3	0	0	0	0
Water extraction by municipal water providers	m^3	48,754	46,735	62,238	66,414

Emissions

G4-EN15 Direct greenhouse gas emissions (SCOPE 1)	Unit	2013	2014	2015	2016
Direct CO_2 emissions (SCOPE 1 of the GHG Protocol Initiative), equivalents	t CO_{2eq}	8,130	7,444	7,498	7,379
Greenhouse gas included in the calculation		CO_2	CO_2	CO_2	CO_2
Emissions in base year 1990 were modelled after the Kyoto Protocol	t CO_{2eq}	7,938	7,938	7,938	7,938

Source of emission factors: Free and Hanseatic City of Hamburg, Ministry of Urban Development and Environment, climate protection control centre

G4-EN16 Indirect greenhouse gas emissions (SCOPE 2)	Unit	2013	2014	2015	2016
Indirect CO_2 emissions (SCOPE 2 of the GHG Protocol Initiative), equivalents	t CO_{2eq}	670	592	537	526
Greenhouse gas included in the calculation		CO_2	CO_2	CO_2	CO_2
Emissions in base year 1990 were modelled after the Kyoto Protocol	t CO_{2eq}	12,563	12,563	12,563	12,563

Source of emission factors: Free and Hanseatic City of Hamburg, Ministry of Urban Development and Environment, climate protection control centre

G4-EN19 Reduction of greenhouse gas emissions	Unit	2013	2014	2015	2016
GHG reduction of emissions of CO_2 equivalents – direct savings	t CO_{2eq}	13,381.5	10,844.0	12,198.0	10,515.0
Greenhouse gas included in the calculation		CO_2	CO_2	CO_2	CO_2
Chosen base year		2012	2013	2014	2015
GHG reduction of emissions of CO_2 equivalents – savings SCOPE 1	t CO_{2eq}	73.8	1.0	2.0	2.0
GHG reduction of emissions of CO_2 equivalents – savings SCOPE 2	t CO_{2eq}	13,307.7	10,844.0	11,365.0	10,246.0
GHG reduction of emissions of CO_2 equivalents – savings SCOPE 3	t CO_{2eq}	18	0	831	267

G4-EN21 Nitric oxides, sulphur oxides and other significant air emissions	Unit	2013	2014	2015	2016
Significant emissions – NO_x	kg	50,998	50,212	50,773	47,539
Significant emissions – SO_x	kg	1,271	893	1,009	943
Significant emissions – PM_{10}	kg	2,386	2,293	2,380	2,209

Effluents and waste

G4-EN22 Total water discharge by quality and place of discharge	Unit	2013	2014	2015	2016
Total volume of indirect effluents discharge – buildings and plants	m^3	43,491	44,291	56,014	59,773
Place of discharge		Urban drainage			
Treatment method		none			
Water quality (monitoring values)		Waste water			
Total volume of direct water discharge – Francop (SARA)	m^3	1,903,870	1,651,356	1,221,502	753,261

G4-EN22 Total water discharge by quality and place of discharge	Unit	2013	2014	2015	2016
Place of discharge		Finkenwerder Vorhafen (Elbe)			
Treatment method		sedimentation and nitrification			
Water quality (monitoring values)		Monitoring values: pH 6.5–8.5; CSB 85 mg/l; Pges 0.6 mg/l; Nges 80 mg/l; NH_4-N bei T>12°C 2 mg/l; NO_2-N 2 mg/l			
Total volume of direct water discharge – Moorburg Ellerholz	m³	475,024	94,583	482,005	293,101
Place of discharge		Southern Elbe			
Treatment method		sedimentation and deferrisation			
Water quality (monitoring values)		Monitoring values: pH 6.5–8.5; CSB 85 mg/l ; Pges 1 mg/l; Nges 10 mg/l; NH_4-N 2 mg/l; NO_2-N 2 mg/l; Fe 4 mg/l; Fe(II) 0.5 mg/l			
Total volume of direct water discharge – landfill Feldhofe Ringgraben	m³	258,803	185,091	271,808	241,396
Place of discharge		Dove-Elbe			
Treatment method		sedimentation and deferrisation			
Water quality (monitoring values)		Monitoring values: pH 6.5–8.5; CSB 85 mg/l ; Pges 0.6 mg/l; Nges bei T>12°C 8 mg/l; NH_4-N bei T>12°C 2 mg/l; NO_2-N 2 mg/l; Fe 2 mg/l; AOX 120 µg/l; KW 10 mg/l			
Total volume of direct water discharge – Neuwerk	m³	8,462	8,719	8,704	7,858
Place of discharge		German Bight			
Treatment method		purification plant			
Water quality (monitoring values)		85 mg/l CSB; 40 mg/l NPOC, 20 mg/l BSB5; 10 mg/l KW; 120 mg/l AOX; 2 mg/l Fe			
Recycling of other organisation	m³	0	0	0	0

G4-EN23 Total weight of waste by quality and method of disposal	Unit	2013	2014	2015	2016
Total waste of hazardous waste - reutilisation	t	602	1,600	0	0
Total waste of non-hazardous waste - reutilisation	t	5,739	9,773	6	8
Reason for chosen method of disposal		ecological	ecological	ecological	ecological
Total waste of hazardous waste - recycling	t	2,557	3,077	6,690	10,540
Reason for chosen method of disposal		ecological	ecological	ecological	ecological
Total waste of non-hazardous waste - recycling	t	110	208	183	169
Reason for chosen method of disposal		ecological	ecological	ecological	ecological
Total waste of hazardous waste - composting	t	0	0	0	0
Total waste of non-hazardous waste - composting	t	616	419	350	270
Reason for chosen method of disposal		ecological	ecological	ecological	ecological
Total waste of hazardous waste - reprocessing	t	0	0	0	0
Total waste of non-hazardous waste - reprocessing	t	1,501	1,519	200	178
Reason for chosen method of disposal		no alternative	no alternative	no alternative	no alternative
Total waste of hazardous waste - incineration	t	1,535	1,576	3,532	2,421
Reason for chosen method of disposal		no alternative	no alternative	no alternative	no alternative
Total waste of non-hazardous waste - incineration	t	872	160	320	231
Reason for chosen method of disposal		economical	economical	economical	economical
Total waste of hazardous waste - depth immersion	t	0	0	0	0
Total waste of non-hazardous waste - depth immersion	t	0	0	0	0
Total waste of hazardous waste - landfill	t	117,799	106,351	23,377	51,056
Reason for chosen method of disposal		no alternative	no alternative	no alternative	no alternative
Total waste of non-hazardous waste - landfill	t	10,035	5,011	270	160
Reason for chosen method of disposal		economical	economical	economical	economical
Total waste of hazardous waste - storage on-site	t	0	0	0	0
Total waste of non-hazardous waste - storage on-site	t	0	0	0	0
Total waste of hazardous waste - other	t	0	0	0	0
Total waste of non-hazardous waste - other	t	0	0	0	0

Products and services

G4-EN27 Fighting the effects of the environmental impact of products and services	Unit	2013	2014	2015	2016
Number of measures for the reduction of ecological effects	Number	8	5	9	4

Local communities

G4-SO1 Integration of local communites at business locations	Unit	2013	2014	2015	2016
Percentage of business locations for which measures for the integration of local communities, impact assessment and funding programmes were executed	%	100	100	100	100

Anti-Corruption

G4-SO3 Total number of business operations assessed for risks with regard to corruption	Unit	2013	2014	2015	2016
Business locations checked for risk of corruption	Number/ checked	1/100	1/100	1/100	1/100
Corruption risk		Financial losses	Financial losses	Financial losses	Financial losses

G4-SO4 Communication and training on anti-corruption policies and procedures	Unit	2013	2014	2015	2016
Info to controlling bodies	%	100	100	100	100
Info to employees (grouping into employee category not necessary)	%	100	100	100	100
Info to business partner per type of business partner	%	100	100	100	100
Trained employees controlling body	%	0	0	0	0
Trained employees (grouping into employee category not necessary)	%	100 in 5 years	100 in 5 years	100 in 5 years	100 in 5 years

G4-SO5 Confirmed incidents of corruption and actions taken	Unit	2013	2014	2015	2016
Cases of corruption	Number	0	0	0	0
Terminations of work/warnings due to corruption	Number	0	0	0	0
Cases of business partners whose contracts were not terminated	Number	0	0	0	0
Public prosecutions against employees	Number	0	0	0	0

Employment

G4-LA1 New hirings and employee turnover	Unit	2013	2014	2015	2016
Total number of new hirings/rate	Persons/%	-	45/2.49	39/2.21	43/2.46
thereof women/rate	Persons/%	-	11/0.61	10/0.57	14/0.80
thereof women under 30/rate	Persons/%	-	4/0.22	0/0.00	7/0.40
thereof women aged 30–50/rate	Persons/%	-	5/0.28	10/0.57	7/0.40
thereof women over 50/rate	Persons/%	-	2/0.11	0/0.00	0/0.00
thereof men/rate	Persons/%	-	34/1.89	29/1.64	29/1.66
thereof men over 30/rate	Persons/%	-	9/0.50	6/0.34	4/0.22
thereof men aged 30–50/rate	Persons/%	-	23/1.27	17/0.96	23/1.32
thereof men over 50/rate	Persons/%	-	2/0.11	6/0.34	2/0.11
Total turnover, sum total/rate	Persons/%	0/4.73	68/3.76	93/5.27	65/3.71
Turnover women/rate	Persons/%	-	12/0.66	15/0.85	13/0.74
thereof women under 30/rate	Persons/%	-	5/0.28	2/0.11	2/0.11
thereof women aged 30–50/rate	Persons/%	-	4/0.22	4/0.23	7/0.40
thereof women over 50/rate	Persons/%	-	3/0.17	9/0.51	4/0.22
Turnover men/rate	Persons/%	-	56/3.09	78/4.42	52/2.97
thereof men under 30/rate	Persons/%	-	7/0.39	4/0.23	1/0.05
thereof men aged 30–50/rate	Persons/%	-	14/0.77	21/1.19	18/1.02
thereof men over 50/rate	Persons/%	-	35/1.93	53/3.00	33/1.88
Sum of all departed employees	Persons	86	68	93	65

Occupational health and safety

G4-LA6 Type and frequency of injuries in the organisation	Unit	2013	2014	2015	2016
Level of absence	%	9.27	8.79	9.60	9.80
thereof men	%	9.24	8.72	9.50	9.70
thereof women	%	9.38	9.04	10.10	10.30
Level of injuries[1)] (accidents/total workforce)		0.040	0.036	0.039	0.034
thereof men	%	83.5	90.8	94.1	95.0
thereof women	%	16.5	9.2	5.9	5.0
Rate of occupational illness during reporting period		0.22	0.00	8.00	8.00
thereof men	%	100	0	100	100
thereof women	%	0	0	0	0
Type of injuries		Distortsion (strains and sprains), contusion, burns, injuries by electric power			
Level of absence[2)] due to accidents (lost days/planned working days)		0.0022	0.0011	0.0019	0.0019
thereof men	%	89.0	90.0	96.4	97.4
thereof women	%	11.00	9.00	3.59	4.30
Fatal work accidents	Persons	0	0	0	0

The HPA is not liable for contractual partners

1) §2 Accident Prevention Regulation – no set of rules

2) Excl. minor injuries, day = planned working day, accidents that have to/do not have to be reported, excl. accidents on the way to/from work.

G4-HR3 Total number of incidents of discrimination and corrective actions taken	Unit	2013	2014	2015	2016
Cases of discrimination	Number	1	0	0	0
Status and actions taken in the case of an incident		no further action – there was no evidence of discrimination	–	–	–

6.2 Overview of the included Sustainbility Development Goals (SDGs)

Goal 3: Ensure healthy lives and promote well-being for everyone, regardless of their age.

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents.

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

4.4 By 2030, substantially increase the number of youths and adults with relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

Goal 5: Achieve gender equality and empower all woman and girls.

5.1 End all forms of discrimination against women and girls everywhere.

5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.

Goal 6: Ensure availability and sustainable management of water and sanitation for all.

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse at global level.

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

7.2 By 2030, substantially increase the share of renewable energy in the global energy mix.

7.3 By 2030, double the global rate of improvement in energy efficiency.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, also by focusing on high-value added and labour-intensive sectors.

8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, also through access to financial services.

8.4 Progressively improve, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead.

8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

Goal 10: Reduce inequality within and among countries.

10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, also by implementing planned and well-managed migration policies.

Goal 11: Make cities and human settlements inclusive, safe, resilient and susainable.

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

11.6 By 2030, reduce the adverse per capita environmental impact of cities, also by paying special attention to air quality and municipal and other waste management.

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

Goal 12: Ensure sustainable consumption and production patterns.

12.2 By 2030, achieve the sustainable management and efficient use of natural resources.

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

Goal 13: Take urgent action to combat climate change and its impacts.

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Goal 14: Conservation and sustainable use of oceans, seas and marine resources for sustainbable development.

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and reverse land degradation and biodiversity loss.

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

16.5 Substantially reduce corruption and bribery in all their forms.

16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels.

16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements.

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.

17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of sustainable development goals in all countries, in particular developing countries.

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.

6.3 Port-specific indicators – port operator (PO)

PO1 **Area productivity** – ratio of direct economic performance in relation to available water/land area

a. Key figure: Weight of the transported goods in relation to the use of water area
b. Level of land use: Rented area in relation to the available and rentable land area

Relevance: In the ecological and economic context, land and water consumption is an important issue, as availability is limited. The goal is to increase productivity without additional land/water use.

PO2 **Sea-side freight volume** in weight or passengers

a. Weight of transportable goods per year broken down by: Bulk (dry and liquid) and general cargo (container and ro-ro/convention)
b. Total number of passengers
c. Number of transit passengers
d. Total number of TEU

Relevance: The data on the volume of goods and the number of passengers are important for the assessment of economic performance. Impacts on infrastructure, as well as on business and customer services, are becoming clear. The number of arrivals and departures of domestic and international passengers are also important economic factors for the region.

PO3 **Economic vulnerability**

a. Number of cargo categories
b. Number of cargo categories by weight divided by the trade zones Europe, South Africa, America, Asia, Oceania

Relevance: The number of cargo categories and the number of trading zones affected describe the economic dependence in the value chain between the organization as a part and the region. It provides information on the monitoring system and risk mitigation activities, in the event that the port only uses one cargo category or oper-ates only one trading zone. The diversity of goods and markets ensures the future viability of the port.

PO4 **Port infrastructure efficiency**

a. Number of ship startings divided by vessel size and type
b. Key figure: Number of wagons transported, number of containers and transported weight in relation to the track network length

Relevance: The long-term goal of port development as part of the entire value chain is to optimally exploit the infrastructure with a view to the growth of freight. The capacity increase of the existing track network ensures environmentally friendly and fast transport to the hinterland or to the terminals.

PO5 Transport volume and modal split

a. Total transport volume in weight divided into transhipment, hinterland, loco
b. Modal split: Transport volume in the hinterland in weight per mode of transport (pipeline, road, railway, internal waterway)

Relevance: The development of ports with regard to the growth of goods depends on the existing capacity or rather on factors such as the size or life of the infrastructure. In order to avoid adverse socio-economic effects, reliable forecasts for the market development of the maritime economy are needed.

The weighting of individual transport modes is important not only for efficient transport management, but also for the development of a transport policy that is as environmentally friendly as possible. In the spirit of the green supply chain, the objective is to develop the weighting of modal split from road traffic towards rail and inland waterway transport. By strengthening of the loco quota, jobs in the region can be secured and additional created.

PO6 Accessibility and availability of port infrastructure

a. Measure: Availability of the road as a loss time (minutes/year) and in relation to the cost of the measures implemented that contribute to improving the flow of traffic
b. Measure: Availability of the tracks as a delay (minutes/year) and in relation to the cost of the measures implemented that contribute to reducing delays and increase capacity.
c. Key figure: Availability of waterways as congestion times and dwell times of the ships measure and proportionalize the cost of the implemented improvement measures, such as size and number of waiting places.
d. Indication of the dynamic limits limiting the accessibility of the port, such as the geometry (water depth), placed in relation to the maintenance costs
e. Indication of the dynamic limitations affecting the availability and accessibility of the port infrastructure such as speed, weather conditions, ship sizes, capacity, etc. and other provisions

Relevance: In order to ensure the flow of traffic on each mode of transport, optimal and comprehensive traffic management is required. Different criteria determine the differentiation, such as the height of the tides, a direct location of the port by the sea or an inland waterway in the hinterland. Depending on the geographical location of the port, operational functions with an influence on the availability and accessibility of the port infrastructure may be the responsibility of several organisations. Transparent presentation shows the need for cooperation or identifies the participants of a business model port. In particular with regard to the growth of goods and the development of ship sizes, the monitoring and control of port traffic is the key to a trouble-free and safe flow of traffic.

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