

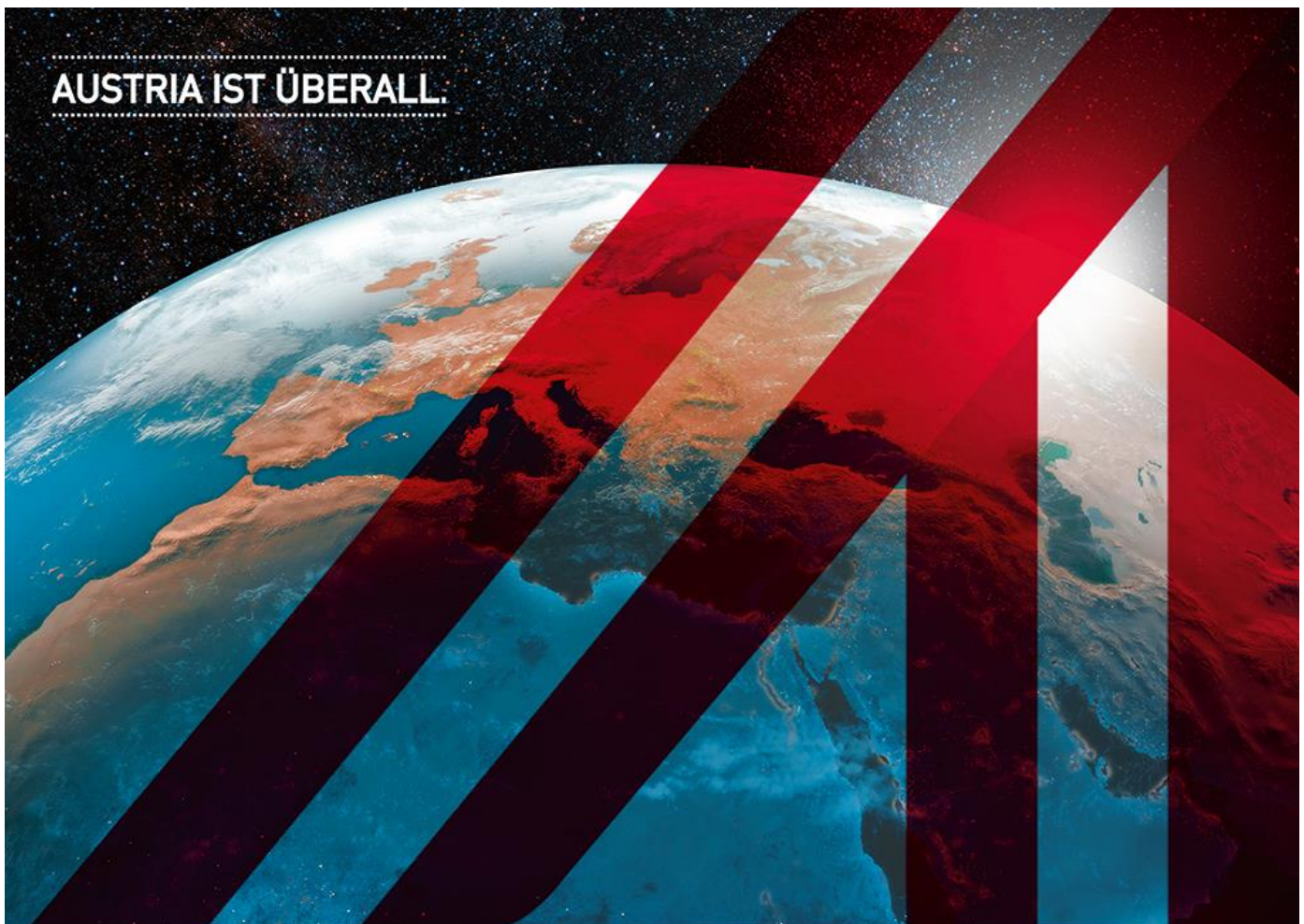
AUSSEN WIRTSCHAFT INDUSTRY REPORT BELGIUM

SEAPORT INFRASTRUCTURE

THE BELGIAN SEAPORTS AS IMPORTANT GATEWAYS TO EUROPE
KEY FACTS & FIGURES
PORT INFRASTRUCTURE
VALUE ADDED, EMPLOYMENT AND INVESTMENTS
SUSTAINABILITY, INNOVATION AND TRENDS

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1. THE BELGIAN SEAPORTS AS IMPORTANT GATEWAYS TO EUROPE

1.1 Introduction and brief history

Belgium is divided into three highly autonomous regions: the Flemish Region (Flanders) in the north, the Walloon Region (Wallonia) in the south, and the Brussels-Capital Region. The three largest Belgian seaports are located in Flanders: Antwerp, Ghent and Zeebrugge. The Flemish government is responsible for the ports policy (and not the Belgian government).

The port of Antwerp

The Port of Antwerp is the port of the City of Antwerp. It is located mainly in the province of Antwerp (the right bank of the port) but also partially in the province of East Flanders (the left bank). It is Europe's second-largest seaport, after Rotterdam. Antwerp stands at the upper end of the tidal estuary of the Scheldt. The first written record of the Port of Antwerp was a mention of the port as a departure point for passengers going to Zeeland and England during the 12th century. The history of the modern port starts in 1811, when Napoleon Bonaparte ordered the construction of Antwerp's first lock and dock (the Bonaparte Dock). In 1813 the Willem Dock was built. Since then, the port has continuously grown.

Some important infrastructural milestones:

1860: Kattendijk Dock

1879: Iron Rhine railway to the German Ruhr area

1908: Royers Lock + 8 new docks

1956-1965: Ten Year Plan with the construction of new docks, addition of a mooring jetty for tankers, and the construction of a new sealock (the Zandvliet Lock)

1989: Berendrecht Lock (the largest lock in the world at that time, 500 x 68m)

From 1989 on, the port expanded with two large container terminals before the locks: The North Sea Terminal and the Europa Terminal. On the left bank a large container dock was built, the Deurganck Dock. This dock became operational in 2005 and was the largest dock in the world with more than 5 km of quay walls. Further expansion of the container handling capacity is planned for the near future. In 2016, the Kieldrecht lock, located at the end of the Deurganck Dock, was inaugurated (and is now the largest lock in the world).

The port of Antwerp is the largest port of Belgium and the second port in Europe with a goods turnover of 239.8 million tons (2021).

The most important features of this port are:

- Deepsea container hub, market leader on 5 out of 6 sailing areas
- Covering all major traffic flows (e.g. fruit and perishables, forest products, project cargo, bulk liquids, containers, steel, roll-on roll-off, cars, coal, iron ore, bulk agricultural produce, fertilizers, energy gases, conventional general cargo)
- World's most important coffee port
- Europe's leading integrated maritime and logistics platform
- Europe's largest oil and chemical cluster
- Excellent inland location: 80 km from the sea
- Accessible for the latest generation of container ships: even +24,000 TEU container vessels
- Widely connected to the fore- and hinterland
- Appropriate storage solutions for each product (i.e. 627 hectares covered storage space), 2 million m³ refrigerated storage capacity, 7.2 million m³ storage capacity for liquid bulk, 680,000 m³ storage capacity for polymers)
- Extensive shortsea and feeder network

The port of Zeebrugge

The port of Zeebrugge is located in the province of West Flanders, near the city of Bruges and directly connected to the North Sea. The history of the port goes back to the origins of the city of Bruges: from the rise of the flourishing economic and cultural centre in the late Middle Ages to its decline from the 15th century onwards. The first part of the port of Zeebrugge on its present location was the result of an agreement, reached in 1894, between the Belgian state, the city of Bruges and Louis Coiseau and Jean Cousin, in which the conditions regarding the construction and operation of the new port were laid down:

- an outpost on the Belgian coast
- a sea channel from the outpost to Bruges
- an inland port in Bruges itself, located north of the city

The first years of the port were difficult. During World War I, the port was heavily damaged and needed to be rebuilt. Also during World War II, the port was largely destroyed and Zeebrugge was once again in need of reconstruction.

The return to the international scene came as a result of the extensive expansion of the port between 1970 and 1985:

- The outer port, built in the sea with two long breakwaters of 4 km long, accessible without locks for large seagoing vessels
- And the Pierre Vandamme Lock, which gave access to the Zeebrugge inner port, which is equipped with two large docks (the North Inlet Dock and the Southern Channel-bassin).

Since these major infrastructure works, the outer port has been further developed with new quay walls and areas for handling cruise passengers, roll on - roll off and containers, and the LNG terminal was built. Various goods are handled in the inner port, but the emphasis is mainly on the handling of new passenger cars.

The port of Zeebrugge is the second largest port with a goods turnover of 49.2 million tons (2021).

The most important features of this port are:

- Deepsea container port, with frequent connections to Asia
- Shortsea: important roll-on roll-off destinations in Europe (Great Britain, Iberian Peninsula, Scandinavia and Baltic)
- Number 1 car handling port in the world
- Important hub for liquefied natural gas (LNG)
- Important forest products distribution centre
- Cruise port
- Accessible at any time for the largest container ships
- Specialized in handling foodstuffs

The port of Ghent

The Port of Ghent is located in the province of East Flanders. The first port of Ghent was situated at the river Scheldt and later at the river Leie. Since the Middle Ages, Ghent has been in search of a connection to the sea. In the 13th century via the Lieve canal to the Zwin near Damme, in the 16th century via the Sassevaart and in the 17th century via the Ghent–Bruges canal. Since the 19th century, the Ghent–Terneuzen Canal connects the port via the Western Scheldt to the North Sea.

As waterborne traffic and port activities increased, the sea canal and the port were extended several times:

1881: Voorhaven and Houtdok

1900–1930: Grootdok with the Noord-, Midden- and Zuiddok

1931: Schepen Sifferdok

1968: Lengthening of the Sifferdok, Petroleumdok, inauguration of the new sealock

1978: Rodenhuizedok

1999: Kluizendok

From 2023 onwards, the Nieuwe Sluis (new lock) in Terneuzen will accommodate post-Panamax seagoing vessels. The locks in Terneuzen are essential for the access of the port of Ghent to the sea.

The port of Ghent is a multimodal port with good connections. With an annual goods turnover of 31.5 million tons (2021) it is the third busiest port.

The most important features of this port are:

- Specialized in dry & liquid bulk: grain, vegetable oils, building materials, coal & iron ore, petroleum products, wood pellets, biofuels ...
- Centre for production & logistics close to consumer markets: automotive (Volvo & Honda), paper industry, bio-energy, roro and containers
- Multimodal port with good connection to France, the Netherlands and Germany by inland navigation
- Space to invest: one of the biggest maritime sites in Europe (660 hectares) around the new Kluizendok
- Excellent inland location & nautical access: 64 km from the sea, accessible via the Ghent-Terneuzen Canal, a new lock in 2023

1.2 Mergers

While mergers between companies are common, for example in the container shipping industry, mergers between port authorities were not often seen. But since very recently all three major Belgian ports are part of a merger.

The cross-border port known as **North Sea Port** was founded on 1 January 2018 and is the result of a merger between the Dutch Zeeland Seaports (Vlissingen and Terneuzen) and the Belgian **port of Ghent**. Therefore, everywhere in this report where the port of Ghent is mentioned, the Ghent part of North Sea Port is concerned (a.k.a. 'North Sea Port Flanders'). North Sea Port ranks no. 10 among European seaports, measured in volume of goods. In 2021, the merged port realized a goods turnover of 68,9 million tons.

North Sea Port has eight public shareholders. On the Dutch side of the border, they are the province of Zeeland (25%) and Borssele, Terneuzen and Vlissingen municipalities (8.33% each). On the Belgian side, they are the city of Ghent (48.52%), the municipalities of Evergem (0.03%) and Zelzate (0.005%) and the province of East Flanders (1.444%). The shareholders are involved and informed by means of a shareholders' committee. It contains representatives of the municipal councils, the Dutch councils and executives and the provincial councils.

As from 28 April 2022, the **ports of Antwerp and Zeebrugge** will continue their growth trajectory under one name: **Port of Antwerp-Bruges**. At a meeting on 22 April 2022, the two cities signed the shareholders' agreement of the unified port company. The merged port will become Europe's most important container port (157 million tons/year), one of the largest break bulk ports and the largest port for the throughput of vehicles. Furthermore, the port will account for more than 15% of Europe's natural gas transited (via the LNG-terminal in Zeebrugge, the Bacton-Zeebrugge Interconnector and the pipeline between Norway and Zeebrugge) and it will remain Europe's most important chemical hub. Finally, it will be the largest port for cruise ships in the Benelux. Based on figures of 2021, the merged port is good for a goods turnover of 289 million tons.

1.3 Management and responsibility of the port authority

Corporate and social responsibility of port authorities

Each Port Authority (PA) fulfils all the criteria concerning corporate and social responsibility (criteria from European Sea Ports Organisation (ESPO) Port Performance Dashboard):

- The Port Authority (PA) holds an Annual Meeting.
- The Annual Report of the PA is publicly available.
- The PA holds regular meetings with the port community and stakeholders.
- The PA publishes reports on socially responsible initiatives.
- The PA publishes financial reports.
- The PA's specific mission statement is publicly available.
- The PA maintains financial accounts audited by external auditor(s).
- The PA has internal analytical accounting processes.
- The PA uses public selection procedures to contract land.

Autonomous management

Each Port Authority (PA) is managed autonomously. They fulfil the following criteria from the ESPO Port Performance Dashboard:

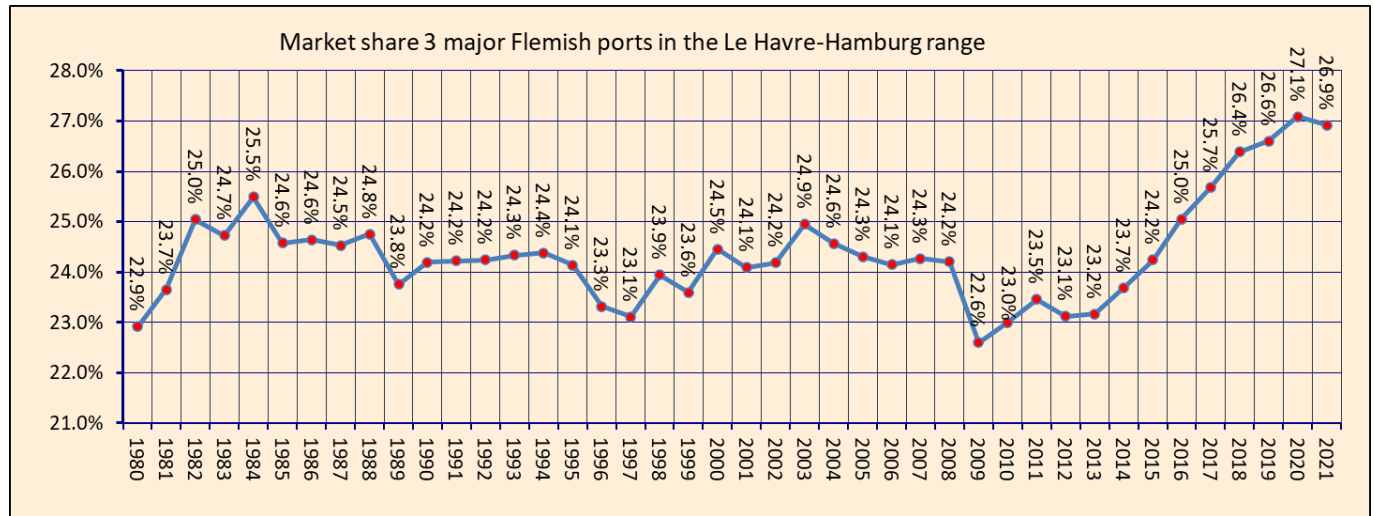
- The PA has its own legal status.
- The PA is directed by a daily management body (e.g. management board or management committee).
- The PA develops a port masterplan.
- The PA is able to contract port land to third parties (e.g. terminal operators) in order to permit these parties to provide port services.
- The PA is responsible to set the rules of agreements with third parties.
- The PA issues safety regulations in addition to (obligatory) national/international regulations.
- The PA issues security regulations in addition to (obligatory) national/international regulations.
- The PA issues environmental regulations in addition to (obligatory) national/international regulations.
- The PA is financially autonomous.

2. KEY FACTS & FIGURES

2.1 Market share: position in the Le Havre-Hamburg range

Figure 1 shows the evolution of the market share of the Belgian seaports in the Le Havre Hamburg range. This range consists of the most important ports in Northern Europe (Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Ghent, Zeebrugge, Dunkirk and Le Havre). Since 2013, the market share of the Belgian ports has increased almost continuously.

Figure 1: Evolution of the market share of the Belgian seaports in the Le Havre Hamburg range (in %)



Source: Pharos Logic, based on data port authorities

2.2 Maritime traffic

Total maritime traffic

Table 1 and figure 2 show the evolution of the total maritime traffic in the three seaports. Both show that the total traffic in the seaports has increased almost continuously, except for 2009 (worldwide economic crisis), 2012 (various causes) and 2020 (Covid pandemic).

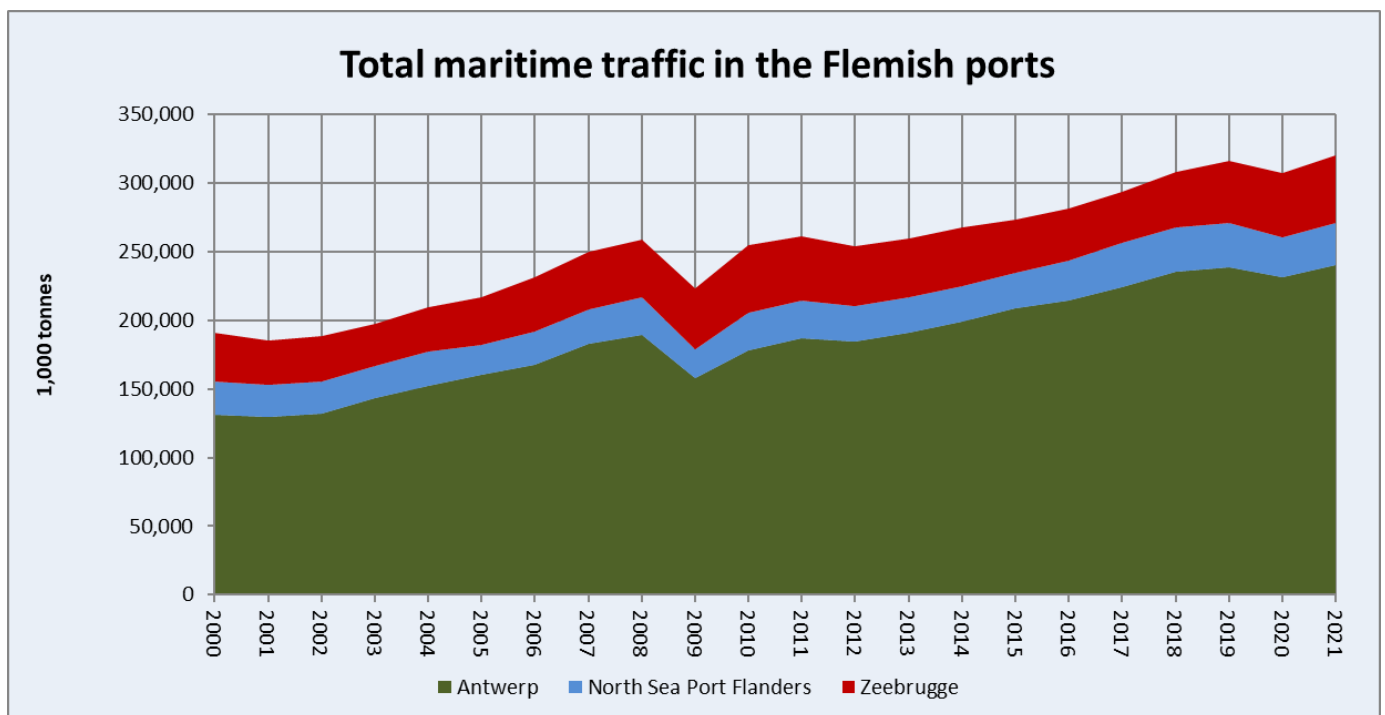
Table 1: Total maritime traffic in the Belgian seaports, 1000 tons

	Antwerp	North Sea Port Flanders	Zeebrugge	Total	% growth
2000	130,994	24,040	35,475	190,509	
2001	129,594	23,456	32,081	185,131	-2.8%
2002	131,630	23,981	32,936	188,547	1.8%
2003	142,875	23,539	30,569	196,983	4.5%
2004	152,328	24,956	31,794	209,078	6.1%
2005	160,059	22,222	34,591	216,872	3.7%
2006	167,388	24,144	39,474	231,006	6.5%
2007	182,949	25,102	42,077	250,128	8.3%
2008	189,423	27,028	42,024	258,475	3.3%
2009	157,810	20,787	44,866	223,463	-13.5%
2010	178,159	27,257	49,601	255,017	14.1%

2011	187,192	27,192	46,958	261,342	2.5%
2012	184,129	26,302	43,544	253,975	-2.8%
2013	190,973	25,955	42,832	259,760	2.3%
2014	199,018	25,889	42,548	267,455	3.0%
2015	208,425	26,362	38,318	273,105	2.1%
2016	214,144	29,110	37,813	281,067	2.9%
2017	223,655	32,509	37,114	293,278	4.3%
2018	235,325	32,586	40,101	308,012	5.0%
2019	238,184	32,469	45,801	316,454	2.7%
2020	230,972	29,090	47,028	307,090	-3.0%
2021	239,774	31,453	49,170	320,397	4.3%

Source: Pharos Logic, based on data port authorities

Figure 2: Total maritime traffic in the Belgian seaports, 1000 tons



Source: Pharos Logic, based on data port authorities

2.3 Most important goods

Traffic portfolio

Figure 3 shows for each port the most important goods: dry bulk, liquid bulk, containers, roll-on roll-off and general cargo. These figures reflect the nature of the ports: Zeebrugge is a fast coastal port with the emphasis on roll on – roll off (both ferry traffic and new cars), containers and liquid bulk (LNG). In Ghent, a large part of the traffic consists of dry bulk for the steel industry. Antwerp is a large industrial port with a very diversified traffic portfolio, but with an emphasis on container traffic and liquid bulk (chemicals and petroleum products).

Figure 3: Pie charts for the most important goods in the Belgian seaports



Source: Pharos Logic, based on data port authorities

Containers

In the mid-1960s, shipping companies transported the first containers between the United States and Europe. While the first purpose-built container vessels could carry a few hundred containers, modern container ships can carry almost 24,000 TEU¹ (for example the container vessel CMA CGM Concorde, a ship of 399 meters long and 61 meters wide). Container ships sail on fixed line connections between major seaports on different continents. These ships also call at Antwerp and Zeebrugge. The port of Ghent handles a small number of containers, but no major container lines are concerned.

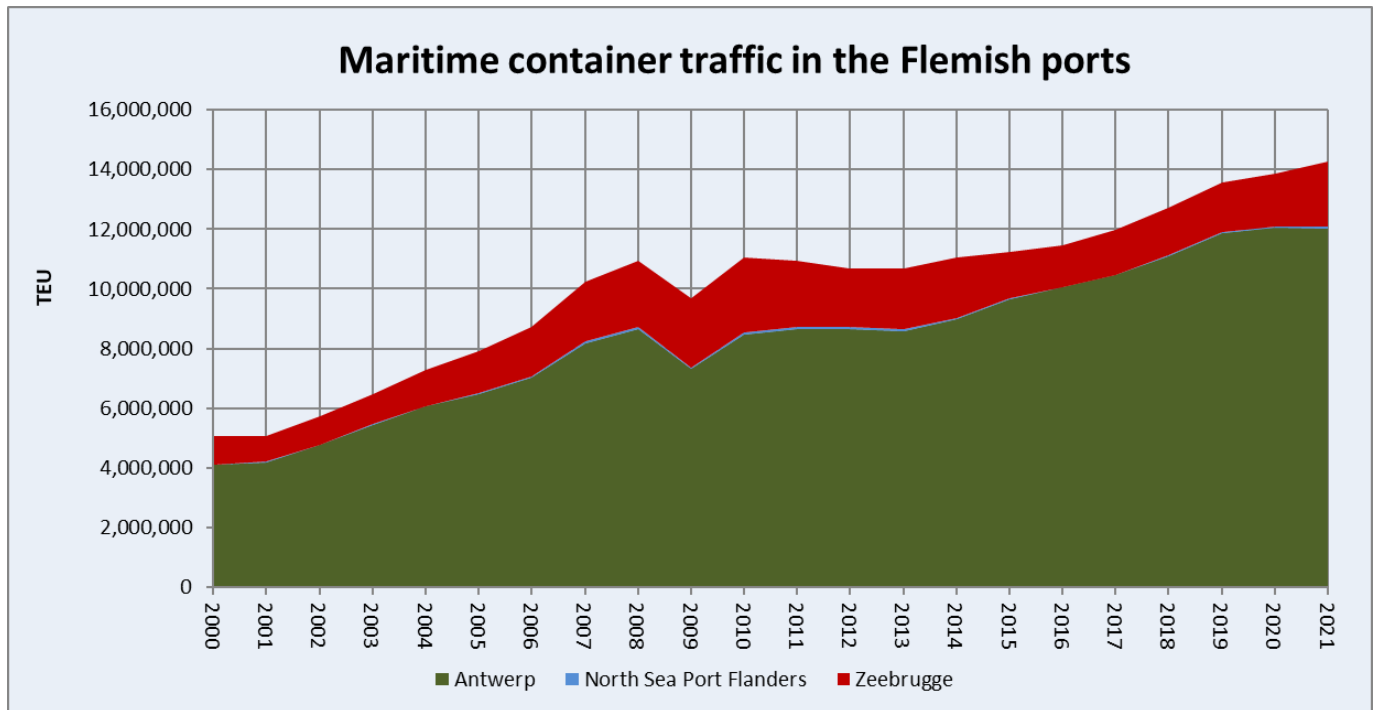
Table 2 and figure 4 show the evolution of the container traffic in the three largest Belgian ports. Container traffic (loading and unloading) is usually measured in TEU. The container traffic in the seaports has increased almost continuously, except for 2009 (worldwide economic crisis) and 2012. Even during the Covid pandemic 2020-2021 the growth figures remained positive.

Table 2: Maritime container traffic in the Belgian seaports, TEU

	Antwerp	North Sea Port Flanders	Zeebrugge	Total	% growth
2000	4,097,247	9,900	965,345	5,072,492	
2001	4,192,582	15,590	875,926	5,084,098	0.2%
2002	4,768,670	21,316	958,942	5,748,928	13.1%
2003	5,441,403	28,688	1,012,672	6,482,763	12.8%
2004	6,050,442	32,441	1,196,755	7,279,638	12.3%
2005	6,482,061	30,529	1,407,932	7,920,522	8.8%
2006	7,018,911	35,888	1,653,493	8,708,292	9.9%
2007	8,175,951	60,835	2,020,723	10,257,509	17.8%
2008	8,664,885	62,868	2,209,713	10,937,466	6.6%
2009	7,309,497	63,657	2,328,198	9,701,352	-11.3%
2010	8,467,219	83,065	2,499,756	11,050,040	13.9%
2011	8,661,223	80,093	2,206,681	10,947,997	-0.9%
2012	8,635,129	88,159	1,953,170	10,676,458	-2.5%
2013	8,578,281	70,228	2,026,270	10,674,779	0.0%
2014	8,977,738	36,800	2,046,586	11,061,124	3.6%
2015	9,653,511	20,195	1,568,938	11,242,644	1.6%
2016	10,037,341	12,211	1,399,309	11,448,861	1.8%
2017	10,450,900	13,205	1,520,406	11,984,511	4.7%
2018	11,100,409	12,472	1,599,080	12,711,961	6.1%
2019	11,860,205	39,249	1,675,927	13,575,381	6.8%
2020	12,031,469	38,750	1,804,992	13,875,211	2.2%
2021	12,020,245	49,317	2,205,458	14,275,020	2.9%

Source: Pharos Logic, based on data port authorities

¹ TEU = 'Twenty foot Equivalent Units'. One 20 Foot container = 1 TEU, one 40 Foot container = 2 TEU.

Figure 4: Maritime container traffic in the Belgian seaports, TEU

Source: Pharos Logic, based on data port authorities

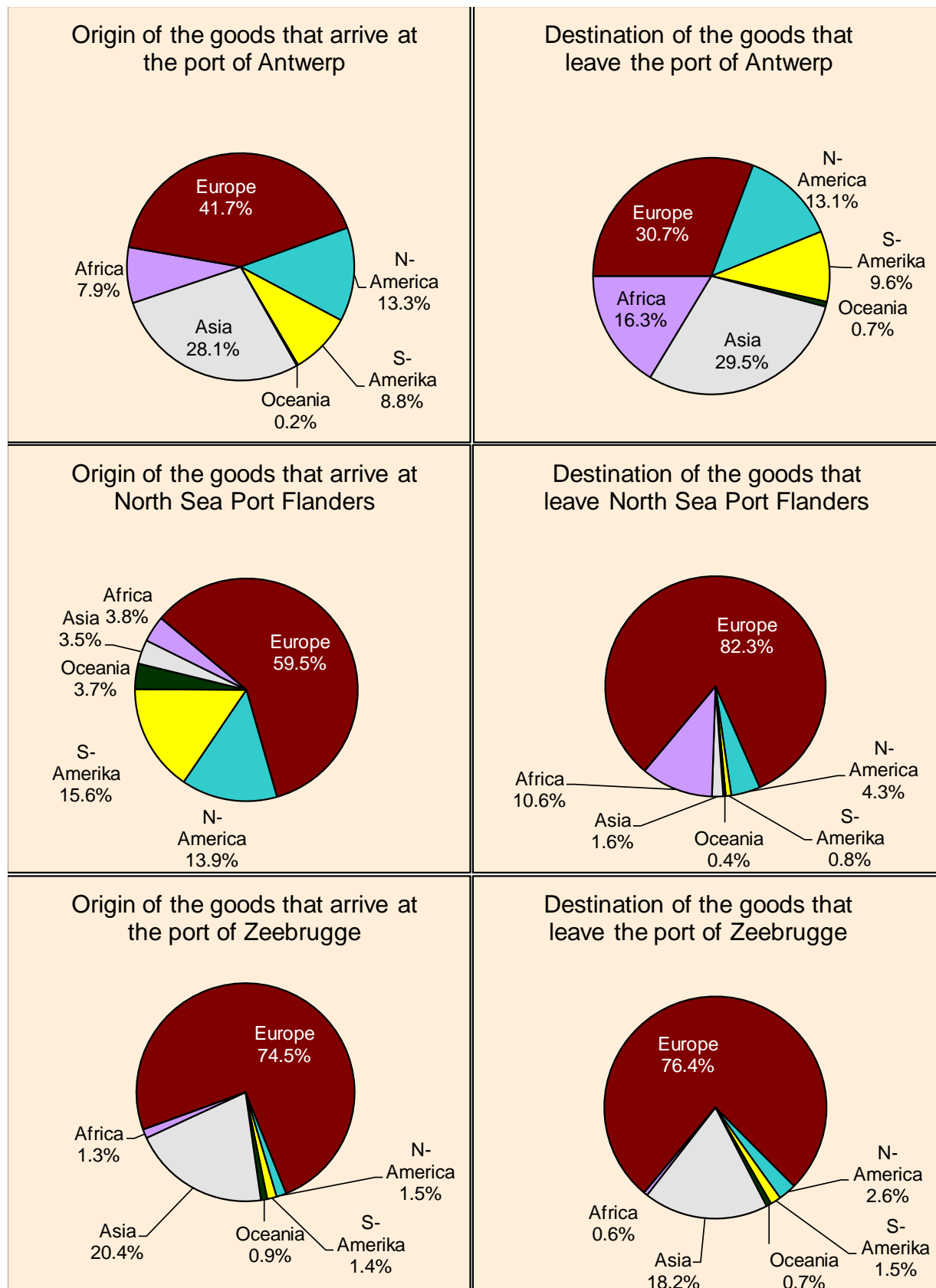
Number of passengers & number of cruise ships

In normal years – without Covid – each year approximately 1.1 million passengers embark or disembark in the seaports, especially in Zeebrugge. Zeebrugge is an important cruise port with appr. 150 cruise ships a year. North Sea Port Flanders welcomes 300 river cruise ships a year.

2.4 Origin and destination of the goods shipped

The ports of Antwerp, Ghent and Zeebrugge have each a different traffic portfolio and are also different in origins and destinations, see figure 5. While the port of Antwerp ships goods to and from most continents, the ports of Zeebrugge and North Sea Port are more Europe-oriented. The typical origins and destinations of the port of Zeebrugge are the UK, Scandinavia and the Iberian Peninsula.

Figure 5: Origins and destinations of the goods shipped in the Belgian seaports (2021)



Source: Pharos Logic, based on data port authorities

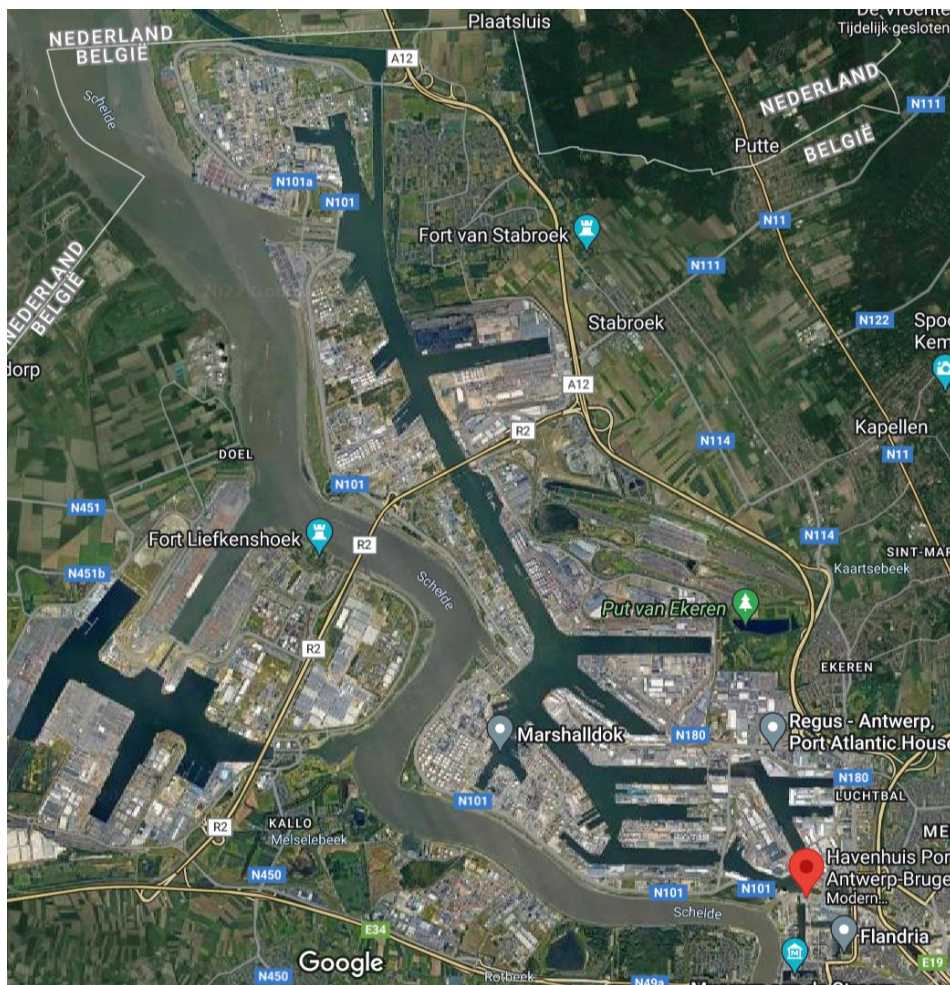
2.5 Central location of the Belgian seaports in Northwestern Europe

The Belgian seaports are located in the centre of Europe and are gateways to the European hinterland. Geographically speaking, 60% of the European purchasing power is located within 500 km of Belgium. In this area, more than 100 million consumers can be reached. Antwerp, Ghent and Zeebrugge are situated a mere 100 km apart. But what is more: Paris is at barely 300 km, the Ruhr area at 150 km at most. Brussels, the centre of international networks and home to the headquarters of the European Commission, the European Council and the European Parliament is at the same time the capital of Belgium itself.

3. PORT INFRASTRUCTURE

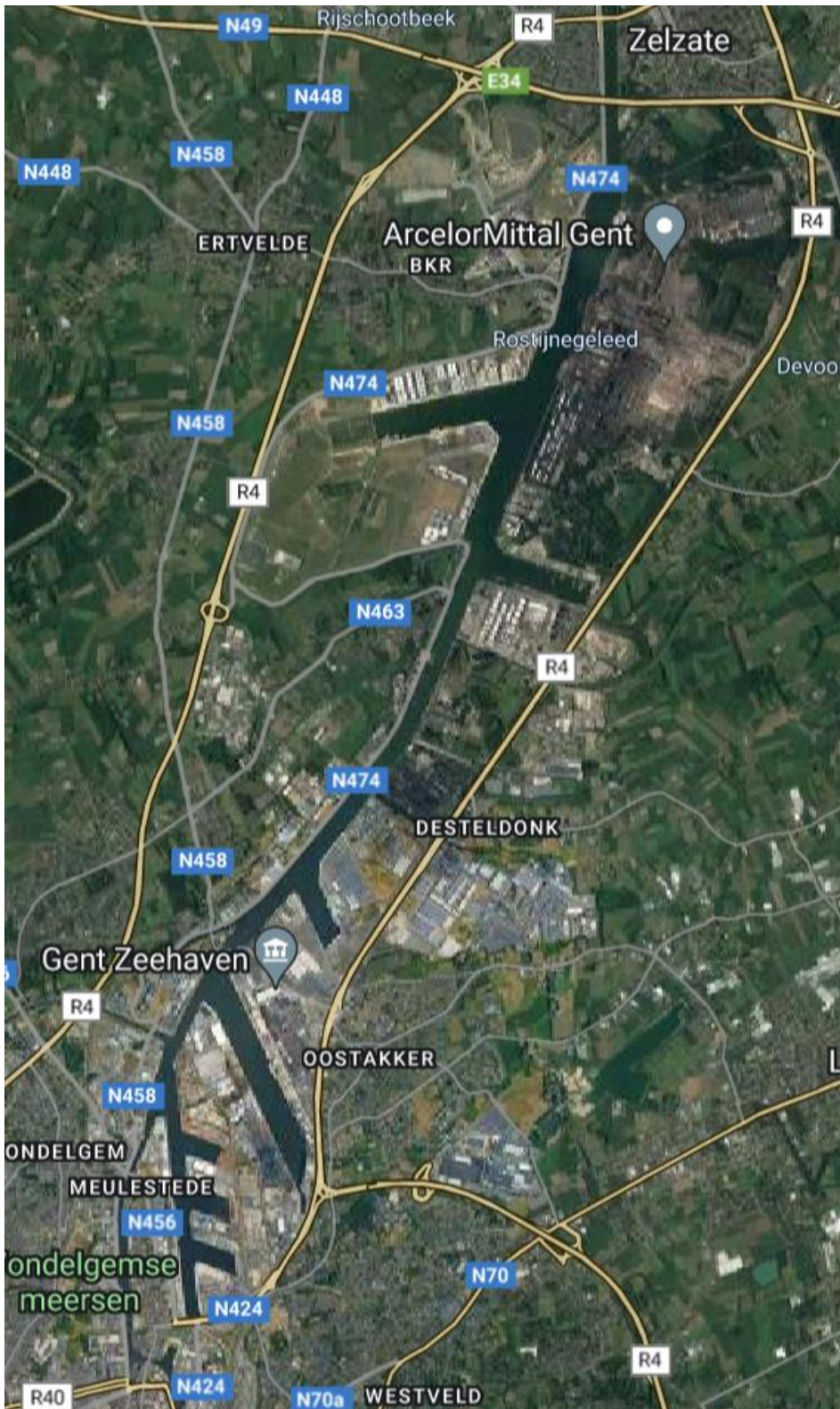
To realize the industrial output and the goods turnover in the ports, it takes a lot of equipment, port surfaces, specialized workforce, companies and infrastructure. The ports are more than quay walls and the activity in the ports is a lot more than loading and unloading goods. In the next pages, a few figures are given to illustrate the size of the three seaports.

Port of Antwerp



Surface Left Bank: 4,467 ha
 Surface Right Bank: 6,778 ha
 Total Surface: 11,246 ha
 Water surface of the docks: 2,008 ha
 Water surface of the locks: 20.4 ha
 Total length of the quay walls: 120 km
 Total length of railways: 1,028 km
 Total length of roads: 340 km
 Number of locks: 7
 Antwerp stands at the upper end of the tidal estuary of the Scheldt. The estuary is navigable by ships of more than 100,000 gross tons as far as 80 km inland. Like the Port of Hamburg, the Port of Antwerp's inland location provides a more central location in Europe than the majority of North Sea ports. Antwerp's docks are connected to the hinterland by rail, road, and river and canal waterways.

Port of Ghent



Total surface: 4,648 ha
 Water surface: 623 ha
 Total length of the quay walls: 31 km
 Total length of railways: 206 km
 Total length of roads: 132 km
 Number of locks: 3 (in Terneuzen)
 Terneuzen and Ghent can be reached by seagoing and inland vessels via the lock complex at Terneuzen, which lies at the head of the Gent-Terneuzen Canal. This straight and wide canal offers shipping traffic smooth and rapid nautical access to Terneuzen and all the way to Ghent, at North Sea Port's southern limit.

The non-tidal Gent-Terneuzen Canal is accessible to ships with a maximum draught of 12.5 metres. The Western Lock in Terneuzen can accommodate ships of up to 92,000 DWT ('deadweight tonnage' or carrying capacity), with a maximum length of 265 metres, a width of 37 metres and a draught of 12.50 metres. By 2023, a new lock will be finished that will replace the middle of the three existing locks.

At the hinterland side the port of Ghent is easily accessible for barges, trucks and freight trains.

Port of Zeebrugge



Total surface: 2,857 ha
 Water surface: 986 ha
 Total length of the quay walls: 19.6 km
 Total length of railways: 187.3 km
 Total length of roads: 42.7 km

Number of locks: 2 (the replacement of the oldest lock is planned).

The port of Zeebrugge is accessible for the largest container vessels that exist at this moment (2022). On 8 May 2022, the CMA CGM Concorde, the largest container vessel in the world, in terms of tonnage, was moored at the port of Zeebrugge.

At the hinterland side the port of Zeebrugge is easily accessible for trucks and freight trains. The existing inland navigation connections are not optimal. Solutions to improve the hinterland access are being studied.

Shipyards / ship repair

The three ports each have several (smaller) shipyards and ship repair facilities.

4. VALUE ADDED, EMPLOYMENT AND INVESTMENTS

4.1 Port of Antwerp

Table 3 shows the added value, employment and investments in the port of Antwerp for 2020, as calculated in the most recent report² of the National Bank of Belgium (NBB). In the port, a total value added of 18.9 billion euros was realized in 2020 (companies located in the port area and companies directly linked to activities in the port area). The total employment was 141,947 Fulltime Equivalents (FTE) and investments reached a total of 3.3 billion euros in 2020. As can be seen in the figures, the non-maritime sector, such as the chemical industry and fuel production, is very important. The chemical cluster in the port of Antwerp is the most important chemical cluster in Europe and no. 2 in the world (after Houston, Texas).

Table 3: Added value, employment and investments in the port of Antwerp for 2020

Port of Antwerp (2020)	Value added (million euro)		Employment (FTE's)		Investments (million euro)
Cargo handling	1,805.4	Cargo handling	15,889	Cargo handling	539.8
Shipping companies	800.1	Shipping agents and forwarders	6,018	Shipping companies	353.9
Shipping agents and forwarders	605.5	Public sector	1,752	Port construction and dredging	208.3
Other maritime	717.6	Other maritime	4,281	Other maritime	240.0
Total maritime cluster	3,928.7	Total maritime cluster	27,940	Total maritime cluster	1,342.0
Chemical industry	3,124.2	Chemical industry	11,717	Chemical industry	1,237.2
Trade	1,062.7	Other logistic services	5,495	Fuel production	226.1
Fuel production	1,005.9	Fuel production	2,905	Energy	172.4
Other non-maritime	2,054.7	Other non-maritime	14,724	Other non-maritime	315.6
Total non-maritime cluster	7,247.5	Total non-maritime cluster	34,841	Total non-maritime cluster	1,951.2
Direct	11,176.2	Direct	62,781	Direct	3,293.2
Indirect	7,713.3	Indirect	79,166		
Total	18,889.5	Total	141,947	Total	3,293.2

Source: National Bank of Belgium

Based on value added, the 10 most important companies in the port of Antwerp are, ranked on importance (source: NBB):

1. BASF Antwerpen (Chemical industry)
2. Kuwait Petroleum (Belgium) (Trade)
3. Centrale der Werkgevers aan de Haven van Antwerpen (Cargo handling)
4. Euronav (Shipping companies)
5. TotalEnergies Refinery Antwerp (Fuel production)
6. Exxonmobil Petroleum & Chemical (Fuel production)
7. Gunvor Petroleum Antwerpen (Fuel production)

² Rubbrecht, Ilse, 2022, "Economic importance of the Belgian maritime and inland ports – Report 2020", National Bank of Belgium, Working Paper Research, May 2022.

8. Engie Electrabel (Energy)
9. Dredging International (Port construction and dredging)
10. Antwerp Port Authority (Port authority)

4.2 Port of Zeebrugge

Table 4 shows the added value, employment and investments in the port of Zeebrugge for 2020 (based on the forementioned NBB report). In the port a total value added of 1.9 billion euros was realized in 2020. The total employment was 19,586 Fulltime Equivalents (FTE) and investments reached a total of 261 million euros. Zeebrugge is not an industrial port. The maritime cluster is more important than the non-maritime activities.

Table 4: Added value, employment and investments in the port of Zeebrugge for 2020

Port of Zeebrugge (2020)	Value added (million euro)		Employment (FTE's)		Investments (million euro)
Cargo handling	244.4	Cargo handling	3,065	Port authority	62.8
Public sector	99.2	Public sector	1,310	Cargo handling	26.6
Shipping agents and forwarders	84.2	Shipping agents and forwarders	726	Public sector	24.0
Other maritime	156.0	Other maritime	1,045	Other maritime	17.6
Total maritime cluster	583.8	Total maritime cluster	6,146	Total maritime cluster	131.0
Energy	142.4	Trade	873	Energy	48.0
Trade	106.6	Road transport	699	Other land transport	20.3
Road transport	50.6	Other industries	396	Other logistic services	14.4
Other non-maritime	203.0	Other non-maritime	1,710	Other non-maritime	47.3
Total non-maritime cluster	502.6	Total non-maritime cluster	3,679	Total non-maritime cluster	130.0
Direct	1,086.4	Direct	9,825	Direct	261.0
Indirect	781.5	Indirect	9,761		
Total	1,867.9	Total	19,586	Total	261.0

Source: National Bank of Belgium

Based on value added, the 10 most important companies in the port of Zeebrugge are, ranked on importance (source: NBB):

1. Centrale der werkgevers Zeebrugge (Cargo handling)
2. Fluxys LNG (Energy)
3. Belgian Navy (Public sector)
4. Zeebrugge Port Authority (Port authority)
5. Public sector (Public sector)
6. Fluxys Belgium (Energy)
7. P.B.I. Fruit Juice Company (Food industry)
8. Artes Depret (Port construction and dredging)
9. Mowi Belgium (Fishing and fisheries industry)
10. ECS European Containers (Shipping agents and forwarders)

4.3 Port of Ghent (North Sea Port Flanders)

Table 5 shows the added value, employment and investments in the port of Ghent for 2020 (based on the fore-mentioned NBB report). In the port a total value added of 7.9 billion euros was realized in 2020. The total employment was 64,657 Fulltime Equivalents (FTE) and investments reached a total of 687.8 million euros. The port of Ghent has an important industrial cluster (Arcelor Mittal, Honda, Volvo), which is reflected in the figures.

Table 5: Added value, employment and investments in the port of Ghent for 2020

Port of Ghent (2020)	Value added (million euro)		Employment (FTE's)		Investments (million euro)
Cargo handling	270.0	Cargo handling	2,193	Cargo handling	92.7
Shipping agents and forwarders	34.4	Shipping agents and forwarders	415	Port authority	32.6
Port authority	33.5	Public sector	191	Shipping agents and forwarders	11.4
Other maritime	25.8	Other maritime	166	Other maritime	6.6
Total maritime cluster	363.7	Total maritime cluster	2,964	Total maritime cluster	143.3
Trade	977.7	Car manufacturing	9,671	Car manufacturing	136.1
Car manufacturing	820.1	Metalworking industry	5,790	Metalworking industry	116.6
Metalworking industry	641.8	Chemical industry	2,325	Chemical industry	100.6
Other non-maritime	1,343.7	Other non-maritime	8,127	Other non-maritime	191.1
Total non-maritime cluster	3,783.4	Total non-maritime cluster	25,913	Total non-maritime cluster	544.4
Direct	4,147.1	Direct	28,877	Direct	687.8
Indirect	3,787.8	Indirect	35,780		
Total	7,934.9	Total	64,657	Total	687.8

Source: National Bank of Belgium

Based on value added, the 10 most important companies in the port of Ghent are, ranked on importance (source: NBB):

1. ArcelorMittal Belgium (Metalworking industry)
2. TotalEnergies Marketing Belgium (Trade)
3. Volvo Car Belgium (Car manufacturing)
4. Belgian Shell (Trade)
5. Volvo Group Belgium (Car manufacturing)
6. Taminco (Chemicals industry)
7. BP Europa SE (Fuel production)
8. Stora Enso Langerbrugge (Other industries)
9. Denys (Construction)
10. Alco Bio Fuel (Fuel production)

4.4 The three largest investment projects at present

Every year, large investments are made to improve and maintain the infrastructure in the ports, but some projects have such an importance that we pay attention to them separately.

Port of Antwerp

With the 'Extra Container capacity Antwerp' (ECA) project³, the port of Antwerp, The Scheldt Left Bank Corporation and the Flemish government will realize a project to expand the container capacity of the port of Antwerp. The project consists of the construction of a new dock, next to the existing Deurganck dock. Additional capacity will also be provided at various other locations in the port. ECA ensures that the port of Antwerp will have an extra container capacity of 7.2 million TEU at its disposal.

Port of Zeebrugge

The Flemish government, the City of Bruges and the port of Zeebrugge are preparing the construction of a new lock⁴, which will provide a second nautical access to the inner port. A second important part of this project is the building of the new road 'Nx', which separates through-traffic and port traffic from local traffic. This improved mobility will reduce the current traffic congestion in and around central Zeebrugge.

Port of Ghent

From 2023 onwards, the Nieuwe Sluis (new lock) in Terneuzen will accommodate post-Panamax seagoing vessels. The lock will be 427 metres long and 55 metres wide. The Nieuwe Sluis⁵ is under construction since the end of 2017 and is necessary to accommodate larger vessels and to guarantee that the Ghent-Terneuzen Canal stays easily accessible in case the Westsluis (until now still the only lock for seagoing vessels) should fall out.

5. SUSTAINABILITY, INNOVATION AND TRENDS

5.1 Introduction

The pursuit of sustainability has been going on in seaports for decades, but since the Paris Climate Agreement of 2015, the climate ambitions have become more concrete. Greenhouse gases must be reduced by at least 90% by 2050 compared to 1990 (gross emissions). In July 2021, the European Commission adopted the "Fit for 55" package, consisting of a number of legislative proposals from the European Commission with a view to achieving a binding target of 55% lower net greenhouse gas emissions by 2030. The Belgian seaports are working hard to make their contribution to achieving this goal.

The following paragraphs describe some trends that are mainly related to the pursuit of sustainability. Some cases in the seaports are also described. This topic is very broad and can only be discussed very briefly in this report. The port authorities are intensively working on these subjects and can provide much more information if required.

³ More information:

<https://www.portofantwerpbruges.com/en/our-port/world-port/extra-container-capacity-antwerp-eca?fromSearch=true&query=eca> (English)

<https://www.cpeca.be/> (Dutch: progress, studies, lots of information)

⁴ More information:

<https://www.portofantwerpbruges.com/en/our-port/world-port/new-lock-zeebrugge> (English)

<https://www.nieuwesluiszeebrugge.vlaanderen.be/> (Dutch: progress, studies, lots of information)

⁵ More information:

<https://en.northseaport.com/terneuzen-lock> (English)

<https://nieuwesluissterneuzen.eu/> (Dutch: progress, studies, lots of information)

In 2021, the Flemish Government developed the “Flemish Port Strategy” together with the port authorities. The essence of this document is that the Flemish Government will work together with the port authorities on three major objectives: (1) strengthening the competitive position, (2) achieving sustainable growth and development and (3) increasing added value. To achieve these objectives, three spearheads are inextricably linked: (1) improving the logistics hub function of the ports, (2) realizing the modal shift and (3) realizing the green transition.

5.2 Trends

- Work is underway on the digitization and simplification of the document flow. Better planning provides greater efficiency and opportunities to reduce harmful emissions. There is already a lot of cooperation in the seaports on data sharing, such as NxtPort, RxSeaport, VisuRIS, SWING, Port Neutral Platform and Cargo Community System.
- Digital transformation is also being pursued in inland shipping. The 'Smart Shipping' program will enable ships to sail more energy-efficiently and safely. The waterway infrastructure is being further developed in order to use automated and autonomous ships in the future. There is already a first pilot project with an autonomous ship on the river Yser, which makes this a first for Europe.
- A vision and policy on pipelines are being developed. The emphasis is on multi-user projects, connections between the ports, connections to international routes and connections with neighbouring countries. A concrete example of this is the 'Leidingstraat Antwerp – Ruhr (Geleen)'. Pipelines are important in the energy transition, including for the supply of green hydrogen and CCS/CCU (Carbon Capture and Storage / Carbon Capture and Utilisation).
- Research projects are ongoing for CCS/CCU (Carbon Capture and Storage / Carbon Capture and Utilisation). CO₂ that is created at the production site is captured for final storage (CCS) or as a basic raw material for chemical processes (CCU). In time, through CCU, as much CO₂ emissions as possible will remain in a closed cycle. Antwerp, North Sea Port and Rotterdam, for example, plan to capture up to 10 million tons of CO₂ from the port areas and store it in depleted gas fields in the North Sea. This project has been recognized by Europe as a Project of Common Interest (PCI)⁶.
- Today, industry is a major consumer of fossil fuels: oil, coal and natural gas. The ambition is to partially electrify this consumption and to have the industry partially switch to waste streams and climate-neutral fuels.
- Industry is highly concentrated in clusters around certain maritime logistics industrial nodes. Existing installations can thus exchange and valorise flows, such as CO₂, H₂, heat and materials.
- Emissions in shipping and inland shipping can be further reduced by using cleaner fuels and engines. Shore power installations are built in the ports for inland shipping.

5.3 Recent projects and initiatives in the seaports

In recent years, the Belgian seaports have invested in innovative and sustainable projects.

Some examples (based on information of the port authorities presented on their websites):

- In 2012, the largest hydrogen fuel cell plant in the world was built at Solvin in the port of Antwerp. The installation converts residual hydrogen as a by-product of chlorine production into a continuous capacity of 1 MW of electricity and 1 MW of heat.

⁶ Projects of Common Interest (PCIs) is a category of projects that the European Commission has identified as a key priority for interconnecting the European Union's energy system infrastructure. These projects are eligible to receive public funds. The PCI list is reviewed every two years.

- In 2018, the 'Hydroville' was realized by Compagnie Maritime Belge (CMB). This passenger ship uses a mixture of hydrogen and diesel in a dual fuel solution and is serving in the port of Antwerp.
- A series of seven players (ENGIE, Fluxys, Indaver, INOVYN, Oiltanking, Port of Antwerp and the Flemish Environmental Holding (VMH)) have set up a consortium for the sustainable production of methanol, an essential raw material used by the industry in the port. Construction of a demo plant on the INOVYN site will start in 2022, to produce 8,000 tons of sustainable methanol annually. This "power-to-methanol" approach means that methanol is produced by reusing captured CO₂ in combination with sustainably produced hydrogen.
- The 'hydrogen import coalition' is a collaboration between the port of Antwerp, DEME, Engie, Exmar, Fluxys, Port of Zeebrugge and WaterstofNet. In the first phase, the partners will make a joint analysis of the entire hydrogen import and transport chain. The outcome of the analysis should be a roadmap that indicates the best way to transport hydrogen for various applications within the energy and chemical sector.
- The Greenports study project investigates optimal technical solutions, market economic preconditions and the necessary legislative framework to convert large amounts of onshore and offshore wind energy, available in a port environment, into hydrogen (power-to-gas) via electrolysis and distribute it inland for use in industry or transportation.
- North-C-Methanol is a demonstration project in North Sea Port (ports of Ghent, Terneuzen and Vlissingen) consisting of an electrolysis unit with a capacity of 63 MW, which splits water into green hydrogen and oxygen, using energy from offshore wind farms. Oxygen can be used locally in the steel industry. Green hydrogen will be combined with captured CO₂ from industrial sources in a catalytic methanol synthesis unit with a production capacity of 45,000 tons of methanol per year.
- Autonomous inland navigation vessels are underway to become a reality. For example, Seafar has developed a technology for the remote control of automatic inland navigation vessels. It is already being used on the estuary container ship 'Deseo' which sails semi-autonomously between Zeebrugge and Antwerp. Research by the University of Antwerp and Port of Antwerp-Bruges has shown that 3D sonar sensors, inspired by bats, can help with this technology.
- The 'Echodrone' is an autonomous sounding vessel of the port of Antwerp, capable of performing a variety of depth measurements to guarantee safe passage for shipping. It had a major upgrade at the end of 2021 that included the installation of innovative technology. The Echodrone 2.0 is not only more robust, it is also able to withstand different weather conditions and carries a variety of measuring equipment on board, including a sonar radar.
- The Antwerp Port Information and Control System (APICS) manages the monitoring of shipping traffic to, from and within Antwerp, tug operations, lock planning, berth management, cargo handling, registration of dangerous goods and much more. This data is available to all port users and helps them to make the right decisions. Zedis does the same job in Zeebrugge. Inland skippers can reserve a lock, consult the available berths in real time and register their (de-)mooring movements in APICS. Terminals can enter and modify the planning for seagoing vessels in APICS.
- Port of Antwerp-Bruges is testing a 'digital twin' of the port, which collects and shows information of sensors, autonomous drones and smart cameras for inspection or oil spill detection. The digital twin is a digital copy of the port area with real-time information: which ships are in which locks and docks? How much energy are our wind turbines producing? The Antwerp Port Information & Control Assistant (APICA) is the brain of the application. A 3D interface with real-time information is the face

of the application. With this application moorings can be monitored more accurately, incidents can be detected more quickly, etc.

- The port of Antwerp works with various partners to build a network of autonomous drones. These drones serve to inspect infrastructure, along with surveillance and monitoring, incident management, berth management and oil spill or floating waste detection.
- In the future, 5G will form an important link in Port of Antwerp-Bruges' digital nervous system. The port of Antwerp is cooperating with the City of Antwerp and the police and fire services to build a private 5G network to increase the speed, reliability and security of their digital applications. In Zeebrugge the port authority has rolled out a private 5G network, together with Citymesh and Nokia.
- Using different smart sensors, the port of Antwerp strives to control the port remotely and make it smarter. To enhance safety at the quay walls, the port developed the Bollard Monitor, a digital sensor that measures the tension on a bollard. Also sensors are used to monitor water quality in the docks and extend the service life of asphalt. 3D-sonar sensors, in turn, make unmanned navigation possible. Finally, iNoses identify harmful gases at the port.
- In Antwerp, more than 600 cameras keep an eye on the port. These smart cameras can recognise objects thanks to computer vision technology. This makes the maintenance and inspection of bridges, locks and quay walls easier. The cameras also measure cargo traffic at the port and increase general security. In Zeebrugge, 700 smart cameras have made their entrance at the port. Thanks to artificial intelligence these digital tools can quickly and easily detect individuals and problems in the traffic network.
- NxtPort: All the players in the logistics chain have information that they exchange with each other. NxtPort, a subsidiary of Port of Antwerp-Bruges, makes sharing data easier and more transparent. That way, all the players in the logistics chain get the right information at the right time.
- The 'Bulkchain' application ensures that the administrative processes in the breakbulk sector run faster and more smoothly, while 'Certified Pick up' (CPu) offers a digital, secure and integrated solution for the release of containers.
- Port of Antwerp-Bruges has a permanent place in 'The Beacon', a hotspot where technology providers in Internet of Things and Artificial Intelligence, top researchers, start-ups and scale-ups collaborate on innovative and sustainable solutions.
- 'Plug & Play Maritime' puts international start-ups in contact with the City of Antwerp, CMB, DXC Technology, Euronav and Port of Antwerp-Bruges. The aim is to test new technologies and drive the future of the maritime sector through world-class development and innovation.
- By installing solar panels and parks, companies also generate renewable energy that is supplied to the electricity grid. At Zonneberg in Ghent the 55,000 solar panels generate enough electricity to equal the annual consumption of 4,000 households. Many companies in the port of Ghent also generate renewable energy using solar panels on their roofs.
- Apart from wind and solar energy, biofuels and biomass are also important to North Sea Port regarding energy. Many fuels contain a small part of bio-ethanol or bio-diesel that is produced in the port of Ghent. North Sea Port is one of the leading businesses in Europe in terms of biofuel production. Many companies also generate heat and electricity using combined heat and power generation based on biomass or using a bio-gas installation fuelled by waste products from the agricultural sector.
- Clean vessels that moor at North Sea Port are given a discount on their port dues. This encourages vessels to implement measures that make them more environmentally-friendly and rewards those who already make a tangible effort.

- As in the port of Antwerp, shore power is provided in the port of Ghent for all inland vessels. They can draw power from shore power boxes. This eliminates the need to keep their diesel engines running to have power. As a result, each vessel can contribute to improving the air quality in the port and the surrounding villages, reduce CO₂ and particulate emissions, and lessen nuisance noise. What is more, the quayside electricity is 100% renewable.
- Volvo trucks in the port of Ghent makes use of CO₂-free production for the heating and power required in the plant. This is done by modifying vessels, by using wind turbines and solar cells, by purchasing green power and through energy savings.
- Arcelor Mittal captures the CO and CO₂ released during production and gives it a new lease of life. The CO is transported to another company, which turns it into hydrocarbons. The CO₂ can be used for the production of bio-ethanol. In March 2019, the companies involved started up a pilot installation. Arcelor Mittal uses blast furnace gas, which is released during steel production, to generate electricity.

6. FURTHER INFORMATION

Port of Antwerp-Bruges

General: www.portofantwerpbruges.com/en

Investing, investment opportunities, investment desk, FAQ:
www.portofantwerpbruges.com/en/business/investing

Permits, concession rates and periods:
www.portofantwerpbruges.com/en/business/investing#vragen

Port of Antwerp, Left Bank (Scheldt Left Bank Corporation (MLS0))

General: mlso.be/en/

Support for companies, step-by-step plans, business networks: mlso.be/en/for-companies

Concession tariffs and ground leases in 2022: mlso.be/en/for-companies/concession-tariffs-and-ground-leases-in-2022

North Sea Port Flanders

General: en.northseaport.com

Tariffs and conditions: en.northseaport.com/tariffs-conditions

Abteilung Schifffahrt des belgischen Verkehrsministeriums

mobilit.belgium.be/en/shipping

Royal Belgian Shipowners' Association

kbrv.be

Binnenschifffahrtsbehörde der Region Flandern

www.vlaamsewaterweg.be

Binnenschifffahrtsbehörde der Region Wallonie

voies-hydrauliques.wallonie.be/opencms/opencms/fr

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