

# PEER REVIEW OF THE DUTCH SHIPBUILDING INDUSTRY



## **FOREWORD**

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## 1. Executive summary

The Dutch shipbuilding and marine equipment industries are part of a maritime cluster of about 17 200 Dutch maritime companies that also includes ports, the offshore industry, shipping, dredging, maritime services, fishing, inland shipping, naval activities and the watersports industry. In 2017, the maritime cluster accounted for 3.1% of gross domestic product (GDP) of the Netherlands; its direct and indirect production value was EUR 55.1 billion and its total exports amounted to EUR 25.9 billion.

In 2018, the Netherlands was the 17th-largest shipbuilding economy in terms of seagoing vessel completions, with 179 540 compensated gross tonnes (CGT). Ship completions in the Netherlands accounted for 6.7% of ship completions in Europe, making the Netherlands the seventh-largest European seagoing ship producer in CGT.

In the 1980s, the Dutch shipbuilding industry started to focus on high-tech, specialised vessels. Large Dutch shipbuilders such as Damen and Royal IHC have become multinational companies. At the same time, there are still a significant number of smaller dedicated shipbuilders, particularly in the northern Netherlands, where the focus is on the construction of short sea cargo vessels. The Netherlands has obtained a key position in the construction of dredgers, luxury superyachts and inland vessels.

Dutch shipyards produce a variety of vessel types, including dry cargos, dredgers, offshore service vessels, tugs, work/repair vessels, tankers, gas carriers, superyachts, cruise ships, passenger ferries, fully cellular containers, bulk carriers and roll-on/roll-off vessels. There are approximately 800 Dutch maritime equipment and service suppliers working with domestic shipyards and very actively engaged in export markets. Dutch shipbuilding companies and marine equipment suppliers employ (direct employment) about 12 000 and 17 000 people respectively.

The “Top Sector” policy and the Dutch Maritime Strategy are two broad policy initiatives contributing to the development of the Dutch shipbuilding and marine equipment industries by engaging them in a common vision to reinforce co-operation, innovation and entrepreneurship. They notably promote networks between the private sector, government, trade associations and academia.

- The maritime and the logistics sector are identified as two of the nine “top sectors”, which are export-oriented, knowledge-intensive and considered as important pillars of the Dutch industrial policy.
- The Dutch Maritime Strategy 2015-2025 lists policy priorities and actions to promote the maritime and logistics sectors. The strategy takes into account global economic, demographic, geopolitical, ecological and security policy trends affecting the Dutch maritime sector.

It is pivotal for the Netherlands to ensure that the business sector makes efforts to invest in research and development in order to maintain its competitive advantage, especially given the high labour costs in the Netherlands. Different types of actors are involved in the Dutch Maritime Strategy, each with their own institutional structure, strategy and priorities. It is therefore a challenge to further co-ordinate all of these policy actions under the umbrella of one maritime cluster policy framework. Nevertheless, policy coherence is of particular importance to increase the efficiency of the Dutch Maritime Strategy.

## 2. Peer review of the Dutch maritime industry

In 2012, the OECD's Council Working Party on Shipbuilding (WP6) introduced a peer review process focused on support measures provided by governments to their shipbuilding sectors. Under this process, each economy participating in the WP6 will undergo an in-depth study of its shipbuilding industry and related government measures. Non-WP6 economies may also join the process and be the subject of a WP6 review.

The main goal of the peer review process is to strengthen the identification of government policies, practices and measures affecting the shipbuilding sector and to support discussion of these within the WP6. The analysis of the support measures is accompanied by contextual details of the industry in order to provide a rich discussion of shipbuilding policies and their impact. A key element of the process is the active debate and discussion of peer review drafts by WP6 participants, with a view to promoting transparency and the sharing of experience.

The Netherlands is the seventh country to be subject to a WP6 peer review, following the reviews of Japan (2012), Portugal (2013), Korea (2014), Germany (2015), Norway (2016) and Finland (2017). In 2018, the WP6 decided to conduct an *ad hoc* review of the shipbuilding sectors in selected non-WP6 members, including the People's Republic of China (hereafter China), Indonesia, Malaysia, the Philippines, Singapore, Chinese Taipei and Viet Nam.

The information in this report is based on publicly available information, statistical series available to the Secretariat, the Netherlands' response to the peer review questionnaire, and discussions with government officials and stakeholders. The Secretariat expresses its gratitude to the government and industry stakeholders who participated in the review.

The analysis focuses on the shipbuilding industry (including repair and conversion facilities), but also provides information on the marine supply industry, which manufactures the different components that are used in ships. The report has four principal parts:

1. Global perspective: This part provides a brief overview of the global market and the role that the Netherlands plays in it.
2. Structure and features of the Dutch shipbuilding and marine supply industry: This part analyses the structure of the Dutch industry and assesses recent industry and market developments.
3. Government policies affecting the shipbuilding industry: This part gives an explanation of the policy measures that have been adopted to support the industry in recent years. It then assesses selected policy measures.
4. Issues for discussion: This part suggests tentative issues for discussion.

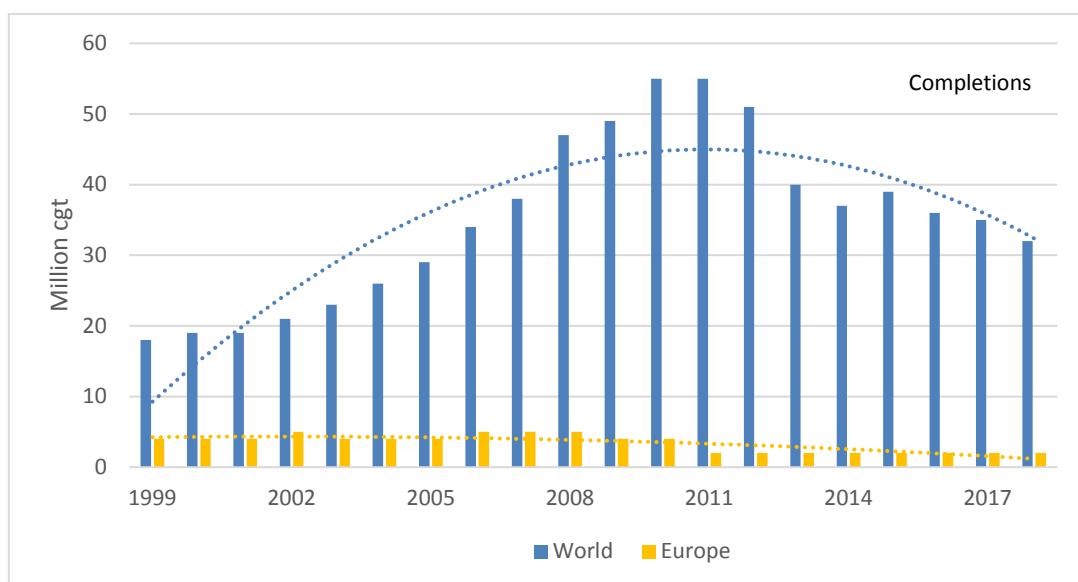
### 3. Global perspective

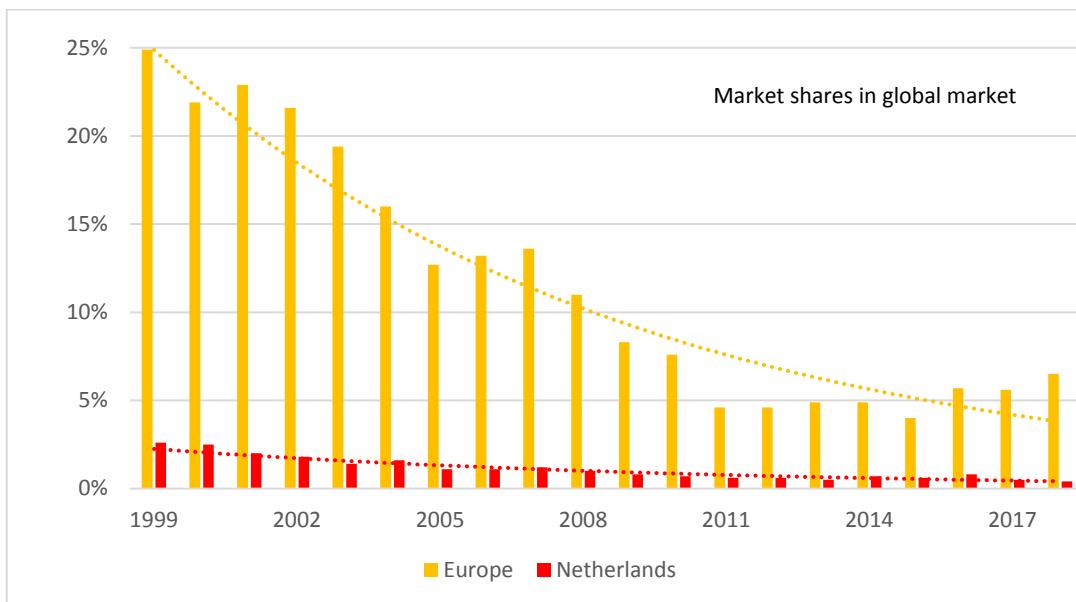
The Netherlands has an open economy, which heavily depends on foreign trade, with exports reaching about 83% of GDP in 2018. The Dutch economy has a strong position in a variety of manufacturing fields, including food processing, chemicals, petroleum refining, electrical machinery and shipbuilding. It has been acting as a logistics hub in Europe, with Rotterdam operating as the biggest port in Europe.

The Dutch shipbuilding industry is part of a maritime cluster accounting for 3.1% of GDP in 2017 (Maritime by Holland, 2018). Other sectors that are part of the cluster consist of ports, offshore industry, maritime suppliers, maritime shipping, dredging, maritime services, navy, fishing, inland shipping and watersports.

In 2018, the Netherlands was the 17th-largest global shipbuilding economy in terms of seagoing vessel completions, amounting to 179 540 compensated gross tonnes (CGT). Ship completions in the Netherlands accounted for 6.7% of total European completions, making the Netherlands the seventh-largest European seagoing ship producer in terms of CGT (Netherlands Maritime Technology, 2018). As many other European shipbuilding economies during the same period, the Dutch global market share decreased sharply between 2000 and 2010 due to the fast development of the shipbuilding industries in several Asian countries, notably China and Korea (Figure 3.1).

**Figure 3.1. Completions of seagoing vessels above 100 GT and market shares of Europe and the Netherlands, 1999-2018**





Source: OECD calculations based on Clarkson's Research Services Limited (2019), *World Fleet Register*, <https://www.clarksons.net/wfr>.

Dutch shipyards have been producing a variety of vessel types over the last ten years, including dry cargo ships and tankers, dredgers, offshore service vessels, tugs, work/repair vessels, tankers, gas carriers, cruise/passenger ferries, fully cellular containers (FCC), bulk carriers and roll-on/roll-off (ro-ro) vessels. Between 2009 and 2018, the Netherlands accounted for 4.6% of the global production of dry cargos in CGT terms, 23.8% of the global production of dredgers, 2.6% of the global production of offshore service vessels, 4.1% of the global production of tugs, and 28% of the global production of work/repair vessels (Table 3.1).

**Table 3.1. Completions of seagoing vessels above 100 GT and GT by ship type in the world and by the Netherlands, 2009-18<sup>1</sup>**

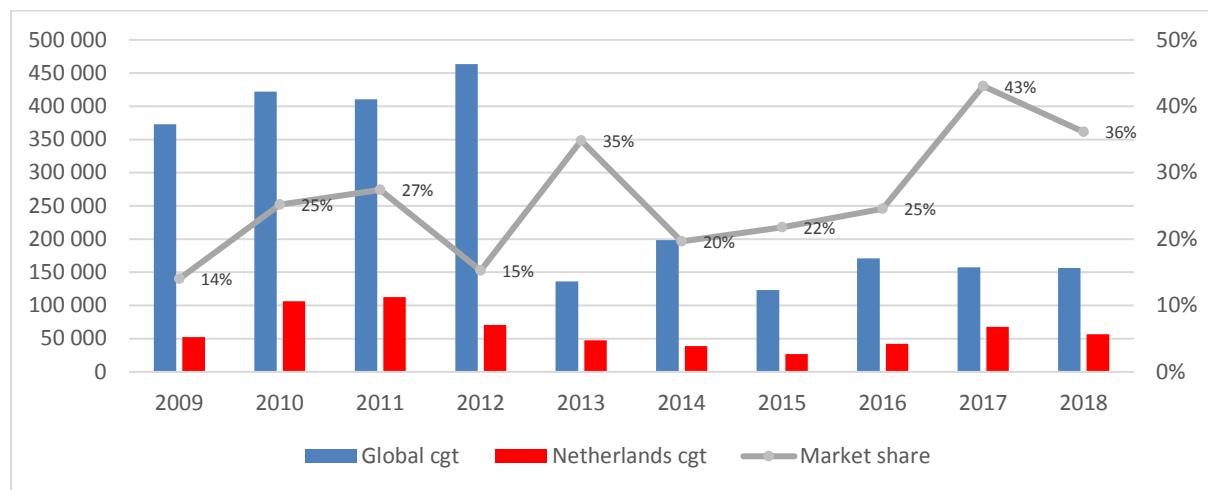
Ship type	World		Netherlands			
	CGT ('000s)	GT ('000s)	CGT ('000s)	% of total	GT ('000s)	% of total
Dry cargo	17 535	15 694	797	4.55%	592	3.77%
Dredger	2 612	1 611	620	23.76%	377	23.43%
Offshore service	23 001	13 004	593	2.58%	385	2.96%
Tug	9 778	1 894	400	4.09%	75	3.97%
Work/repair vessel	273	54	76	27.99%	13	24.48%
Tanker	91 163	180 979	55	0.06%	32	0.02%
Gas carrier	33 442	43 159	45	0.14%	22	0.05%
Cruise/passenger	16 800	13 249	31	0.19%	4	0.03%
FCC (fully cellular container)	68 459	136 987	28	0.04%	24	0.02%
Bulk carrier	136 202	304 762	27	0.02%	26	0.01%
Ro-ro	3 473	5 218	27	0.78%	19	0.37%

1. The construction of superyachts, inland vessels, non-seagoing vessels and small seagoing vessels are not included in these figures. Source: OECD calculations based on Clarkson's Research Services Limited (2019), *World Fleet Register*, <https://www.clarksons.net/wfr>.

The production of the dredger industry in the Netherlands amounted to 60 000 CGT in 2018 (Figure 3.2). The global market share of the Dutch dredger industry increased from 14% in 2009 to 36.1% in 2018. In the past decade, the Netherlands was the second-largest dredger producer worldwide after China. However, based on the level of complexity and sophistication of the Dutch dredgers, the Netherlands has managed to remain at the forefront of this industry.

**Figure 3.2. Completions of seagoing dredgers**

Global and Dutch production, 2009-18



Source: OECD calculations based on Clarkson's Research Services Limited (2019), *World Fleet Register*, <https://www.clarksons.net/wfr>.

## 4. Structure and features of the Dutch maritime industry

### 4.1. The Dutch maritime cluster

The Netherlands has built up a strong maritime position, partly as a result of its strategic position at the estuary of the rivers Meuse, Rhine, Merwede and Winschoterdiep. Rotterdam is regarded as a “gateway” to Europe and is Europe’s largest port. More than half of the turnover of the Dutch maritime cluster is realised abroad. Total exports of the cluster amounted to EUR 25.9 billion in 2017 (Maritime by Holland, 2018).

The Dutch maritime cluster is composed of various market segments. More specifically, it encompasses ports, offshore, maritime suppliers, shipbuilding, maritime shipping, dredging, maritime services (including maritime education and knowledge institutes), inland shipping, watersports, the fishing industry and the Royal Netherlands Navy (Figure 4.1). There are financial and spatial relations between the cluster members. This means that they benefit from knowledge spill-overs and economies of scale. For instance, at a national level, the companies involved in maritime shipping, offshore, inland shipping, marine engineering, watersports industry, fishing industry and ports are important customers of shipbuilding companies, maritime suppliers and service providers. At the international level, export activities of, for example, offshore enterprises provide opportunities for other industries in the maritime cluster.

**Figure 4.1. The Dutch maritime cluster**

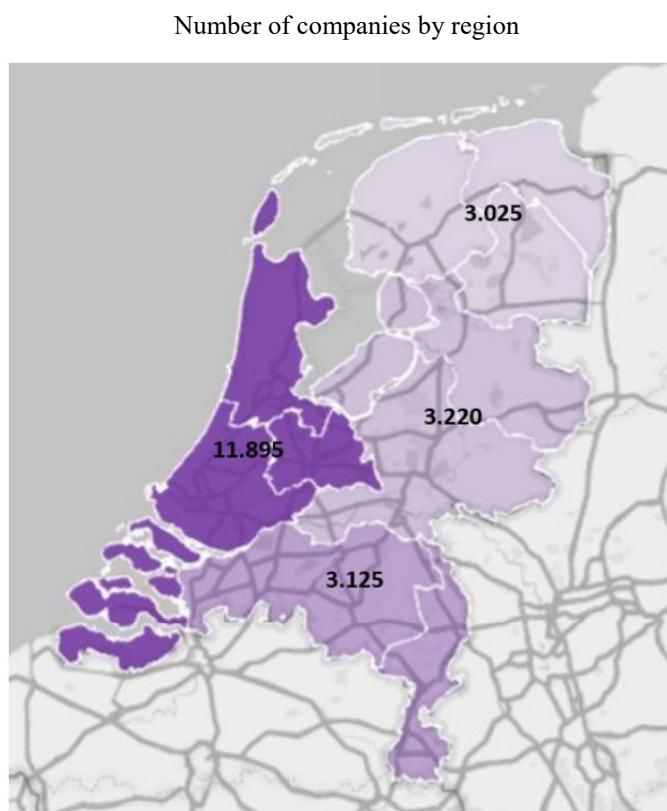


Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>. Figure 4.2 illustrates the geographical overview of all Dutch maritime enterprises in 2019. There is a high concentration of maritime enterprises in the provinces of Southern Holland and North Holland, and to a less extent in

Zeeland, Utrecht and Gelderland. Besides multinational companies like Damen and Royal IHC, the Dutch shipbuilding industry consists of a number of smaller shipbuilding companies across the country, mainly specialising in short sea vessels. The Netherlands also accommodates a strong network of marine equipment (service) suppliers. Among its most notable ship conversion and repair yards are Rotterdam Offshore Group and Royal Niestern Sander.

As indicated by academic research conducted by Nijdam and de Langen, so-called “leader firms”<sup>1</sup> play an important role in the development of the Dutch maritime cluster by encouraging innovation, enabling internationalisation and enhancing the quality of the labour pool (Nijdam and de Langen, 2003). In addition, a number of start-up and scale-up enterprises, often co-operating with leader firms, contribute to innovation in the sector.

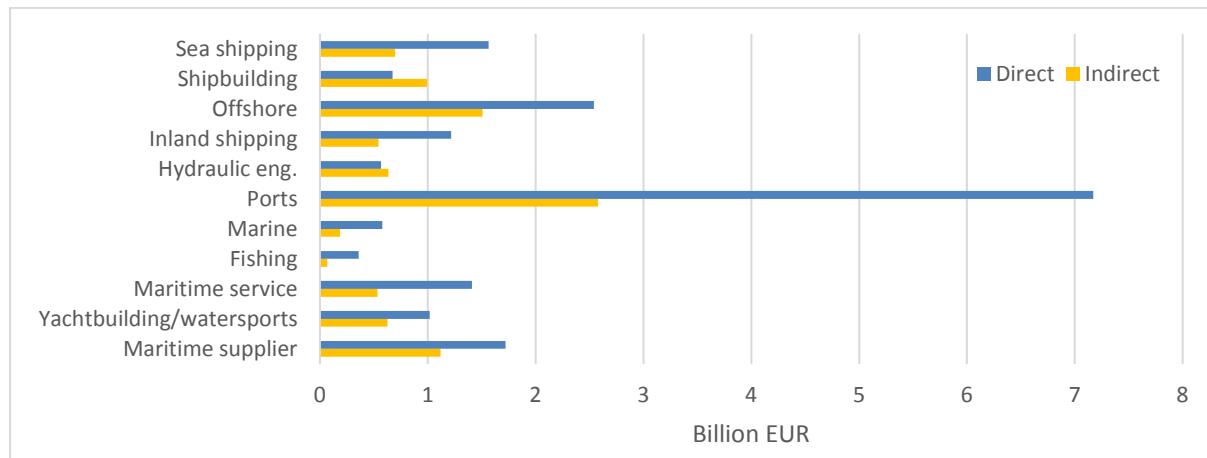
**Figure 4.2. Regional spread of Dutch maritime enterprises**



Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

In 2017, the direct and indirect production value of the Dutch maritime cluster was EUR 55.1 billion (Maritime by Holland, 2018). Direct value added amounted to EUR 18.5 billion and indirect value added to EUR 4.3 billion (Figure 4.3). Port activities provided the largest contribution to the value added within the maritime cluster. In total, the port sector generated a value added of more than EUR 9.7 billion, followed by the offshore sector with a contribution of EUR 4 billion.

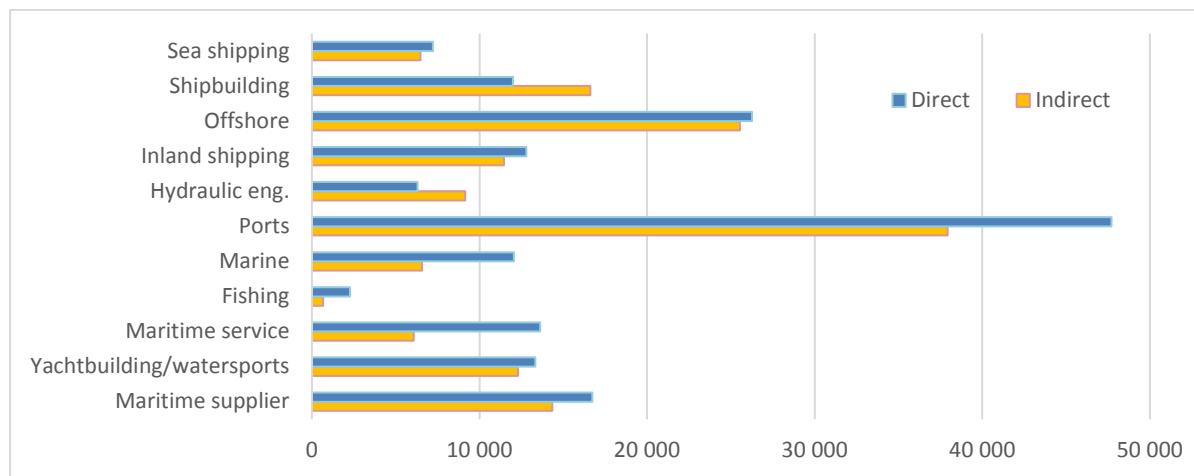
**Figure 4.3. Valued added per sector of the maritime cluster, direct and indirect, 2017**  
Million EUR



Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

In 2017, the Dutch maritime cluster accounted for about 260 000 employees, or 2.85% of total employment in the Netherlands. Of these jobs, 166 763 were created through direct employment. Including indirect employment, the port sector employed more than 85 000 people. This made the port sector the largest segment in terms of employees in the maritime cluster, followed by the offshore sector, which employed more than 50 000 people. The shipbuilding and yachtbuilding/watersports industry, maritime equipment suppliers, and inland shipping sectors also make a substantial contribution to the Dutch maritime cluster of direct and indirect employment in the cluster, as illustrated by Figure 4.4.

**Figure 4.4. Number of employees per sector of the Dutch maritime cluster, 2017**

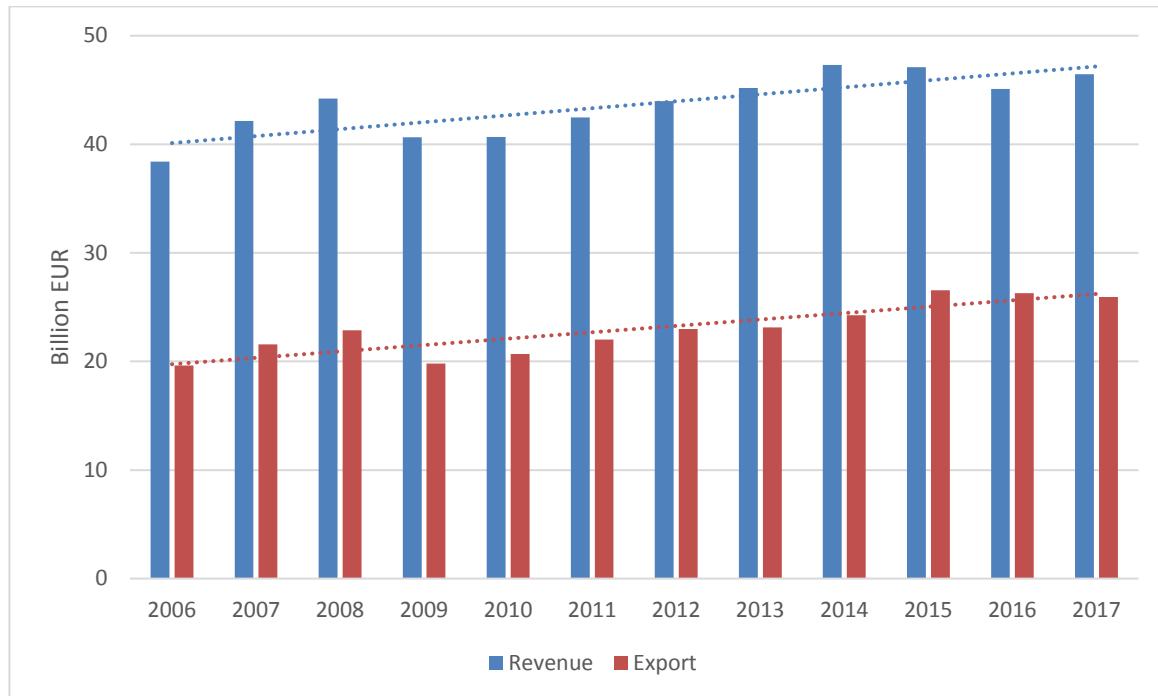


Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

In 2017, the turnover of the Dutch maritime cluster amounted to EUR 46 billion. As such, the cluster accounted for 3.9% of total Dutch exports of goods and services that year. Although the maritime

industry's turnover decreased in 2009 following the global recession, it has been recovering since 2011 (Figure 4.5).

**Figure 4.5. Turnover of the Dutch maritime cluster, 2006-17**



Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

#### **4.1.1. The Dutch shipbuilding industry**

##### *Overview of the industry*

From the 1980s, the Dutch shipbuilding industry started to focus on high-tech specialised vessels. The construction of new ships in Dutch shipyards focuses on niche markets, i.e. complex ships with a high added value. This includes the construction of offshore ships, speciality vessels (such as complex dredgers and multipurpose cargo ships) and superyachts.

The Dutch shipbuilding industry's activities can be divided into four categories: 1) construction of new seagoing vessels; 2) maintenance, repair and conversion of seagoing vessels; 3) inland shipping, fishing and small seagoing vessels; and 4) superyachts. In addition, the Netherlands accommodates around 800 maritime equipment suppliers and service providers.

First, there are 17 shipbuilders constructing seagoing vessels larger than 100 GT in the Netherlands (excluding superyacht builders and shipyards building fishing vessels). These shipyards are mainly active in niche markets, like dredging, offshore, renewable energy and short sea shipping. These ship types typically generate high added value. Because fierce international competition results in shorter delivery times, shipyards increasingly collaborate with equipment suppliers and other actors of the supply chain. The dense infrastructural network (roads, railway and waterways) in the Netherlands

facilitates this co-operation. Development and building of ships for governmental activities like defence and security is also a key aspect of the Dutch shipbuilding industry. Many companies are active both in the commercial as well as the defence and security markets.

Second, the Netherlands is well located to host ships visiting Western Europe for their maintenance and repairs without any major deviation to their route. This contributed to the rise of maintenance, repair and conversion yards (MRC yards) in the Netherlands. Most MRC yards have their own dry docks, slipways and dedicated berths. Several yards have enclosed dry docks, which allow for climate control and specialist jobs. The three biggest dry docks are located in Flushing (Damen Shiprepair Vlissingen), Rotterdam (Damen Verolme Rotterdam) and Amsterdam (Damen Shiprepair Amsterdam). During the last decade, consolidation has taken place as the company Damen has acquired several MRC yards. Damen now owns the majority of MRC capacity in the Netherlands.

Third, the Netherlands has the largest fleet of inland vessels in Western Europe. According to the international association for inland shipping in Europe (IVR) 2017 annual report, about 55% of inland vessels in Western Europe were registered in the Netherlands. Most of the new inland vessels are built for Dutch owners. Most of the shipyards that produce inland vessels in the Netherlands order steel hulls from Eastern European and Chinese shipyards. The Dutch shipyards add most of the inland ships' value during the subsequent outfitting phase.

The Dutch fishing fleet is active in the North Sea, the Wadden Sea and the inland waters. The majority of the fleet consists of relatively old ships, with an average age of 34 years. Certain specialised Dutch shipyards have been focusing on maintenance and repairs in the fishing sector. Fishery shipbuilding is reviving in the Netherlands. A good example of this trend is the construction of the MDV1 Immanuel, completed in 2015. This fishing ship benefits from a 70% reduction in fuel consumption compared to a traditional fishing vessel. The number of new orders show that the prospects for the Dutch shipyards involved in the construction of this type of fishing vessel are positive (see Table 4.5).

Fourth, the Netherlands has been one of the leading countries in building luxurious superyachts. In 2018, the Netherlands ranked second according to figures drawn by the worldwide construction order book. Over the last four years, superyachts accounted for 25-45% of the total value<sup>2</sup> of ships delivered in the Netherlands.

Superyacht construction takes place in around 18 yards in the Netherlands. The majority of these yards are located in small and medium-sized facilities. These yards have benefited from strong global growth in the construction of superyachts. Superyachts are getting longer, wider, higher and deeper. Embarking on these trends, Dutch yacht builders have invested in new production facilities suitable for building larger superyachts. For example, Royal Van Lent opened its new location in Amsterdam at the end of 2018 and Royal De Vries Makkum has started renewing and expanding its shipyards.

Last, there are more than 800 marine equipment and service suppliers located in the Netherlands. Within the wide range of product and service categories in marine equipment, the most important groups are electrical and mechanical installation, engineering services, nautical components, construction parts, coating, interior outfitting and technical maintenance service. Marine equipment suppliers are mainly small and medium-sized enterprises (SMEs) and most of them are actively engaged in export markets.

### *Structure of the industry*

There are over 100 yards located in the Netherlands disseminated all over the country along rivers such as the Rhine, Meuse, Merwede, IJssel and Winschoterdiep. The larger shipyards are concentrated in the western part of the Netherlands. In 2019, the shipbuilding and repair sector, including the superyacht construction companies, embodied more than 1 500 companies (including small self-employed companies subcontracted by yards).

Table 4.1 provides an overview of the main shipyards in the Netherlands. The Damen group and Royal IHC are the two largest shipbuilders in the Netherlands. The Damen group incorporates 36 shipbuilding and repair yards worldwide with a turnover of around EUR 2 billion in 2018. Damen is a family-owned company, which has grown steadily through multiple takeovers of yards specialising in niche markets. Another renowned company is Royal IHC, which operates in 39 locations worldwide. Its turnover amounts to approximatively EUR 940 million. The biggest shareholder of Royal IHC is Indofin Group, an investment company.

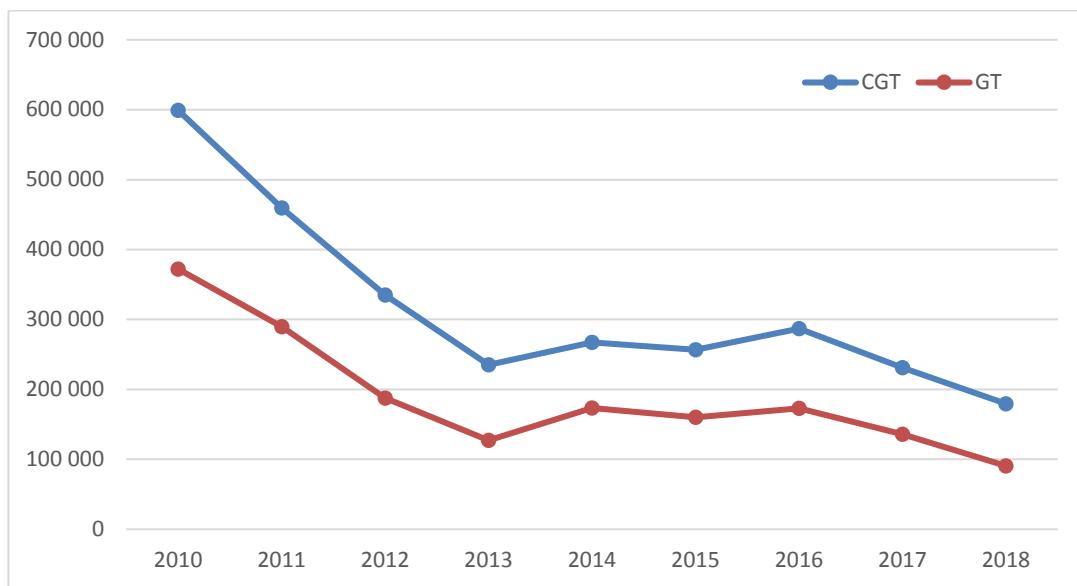
**Table 4.1. Main shipyards in the Netherlands**

Group	Overview	Key figures
Damen Shipyards Group <a href="https://www.damen.com">https://www.damen.com</a>	<p>The Damen group is a Dutch shipbuilding and engineering company based in Gorinchem, South Holland. It is a family-owned company.</p> <p>It has 54 companies worldwide subdivided into 36 shipbuilding and repair yards, 5 engineering companies and 13 other companies. It has delivered more than 6 500 vessels in more than 100 countries since 1969 and delivers around 160 vessels annually to customers worldwide.</p> <p>It has a wide product range including tugs, workboats, patrol crafts, cargo vessels, dredgers, superyachts (Amels) and fast ferries. Product design and engineering are carried out in-house and a broad range of designs is available.</p>	<p>Turnover (2018): EUR 2 billion</p> <p>Employees (2018): 12 000</p> <ul style="list-style-type: none"> <li>– Netherlands: 3 500</li> <li>– International: 8 500</li> </ul> <p>Delivered ships (2018): 176</p> <ul style="list-style-type: none"> <li>– Tugs/workboats: 76</li> <li>– Offshore vessels: 3</li> <li>– High-speed craft and ferries: 40</li> <li>– Pontoons and barges: 21</li> <li>– Dredging and specials: 13</li> <li>– Defence and security: 18</li> <li>– Yachts: 5</li> </ul>
Royal IHC <a href="https://www.royalihc.com">https://www.royalihc.com</a>	<p>Royal IHC is a Dutch company with its head office in Kinderdijk, South Holland. The largest shareholder is Indofin Group, with a majority share of 62.1%. Rabo Capital holds 10% and the employees 27.9% of the shares.</p> <p>It is one-stop shop for vessels, equipment and services for specialist maritime service providers in the dredging, mining and offshore industries. It operates in 39 locations worldwide.</p>	<p>Turnover (2018): EUR 941.7 million</p> <p>Employees (2018): more than 3 000</p> <ul style="list-style-type: none"> <li>– Netherlands (own): 2 368</li> <li>– Netherlands (hired): 721</li> <li>– Abroad: 624</li> </ul> <p>Delivered projects since 2000</p> <ul style="list-style-type: none"> <li>– 150 &gt; EUR 50 million</li> <li>– 2 350 &lt; EUR 50 million</li> </ul>
FEADSHIP <a href="https://www.feedship.nl">https://www.feedship.nl</a>	<p>FEADSHIP is a consortium of Dutch superyacht builders: Koninklijke De Vries Scheepsbouw, Royal Van Lent Shipyard and De Voogt Naval Architects. It designs and constructs high-end luxury yachts and is one of the leading builders of custom superyachts.</p> <p>FEADSHIP's headquarters and De Voogt Naval Architects (the design and engineering centre) are located in Haarlem, northwest Holland.</p>	<p>Turnover:</p> <p>No data available</p> <p>Employees: 2 000</p>
Oceano <a href="https://www.oceancoyacht.com">https://www.oceancoyacht.com</a>	<p>Oceano is located in Alblasserdam, South Holland. It also maintains a sales and marketing office in Monaco. It is owned by Mr. Mohammed Al Barwani (i.e. a foreign private investor from Oman).</p> <p>It specialises in the design and construction of large custom-made yachts, especially superyachts up to 140 metres. Since 1987, it has delivered 29 yachts.</p>	<p>Turnover (2016-18): EUR 200-400 million annually</p> <p>Employees: 228</p>
Heesen Yachts <a href="https://www.hessenyachts.com">https://www.hessenyachts.com</a>	<p>Heesen Yachts is located in Oss, South Holland. It was founded in 1978 by Fran Heesen. It is specialised in the design, construction and engineering of all steel and aluminium yachts.</p> <p>In 2017, it delivered the world's first 50-metre fast displacement steel-hulled yacht with a hybrid propulsion, named "M/Y Home".</p>	<p>Turnover (2016-18): EUR 100-150 million annually</p> <p>Employees: 450</p>
Royal Huisman Shipyard <a href="https://www.royalhuisman.com">https://www.royalhuisman.com</a>	<p>Royal Huisman is a Dutch shipyard that specialises in the construction and repair of yachts. It is located in Vollenhove, Overijssel.</p>	<p>Turnover (2016-18): EUR 75-100 million annually</p> <p>Employees: 310</p>

Source: NMT Questionnaire, 2019 and website of each company.

### *Production and orders*

From 599 029 CGT in 2010, the production of new seagoing vessels has steadily declined (Figure 4.6). This downturn reflects the recession in the global shipping and shipbuilding industry as well as the increasing international competition in the market.

**Figure 4.6. Completions of seagoing vessels above 100 GT, 2010-18**

Note: The construction of superyachts, inland vessels, non-seagoing vessels and small seagoing vessels are not included in these figures.

Source: Netherlands Maritime Technology (2010-2018), *Sectorjaarverslag* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

Dredgers and dry cargo ships and tankers are among the two largest ship types produced by Dutch shipyards. In value terms, the total amount (EUR 643 million) of new orders of seagoing ships (excluding superyachts) in 2018 was comparable to 2016, but considerably lower than in 2017 (EUR 1 143 million) (Table 4.2). A drop in the orders of large, complex projects explains the difference in value between 2017 and 2018. For seagoing vessels (excluding superyachts and fishing vessels), Dutch domestic yards received 39 new orders in 2018 and 56 in 2017 (Table 4.3). The decrease in orders was driven by a reduction in the number of newly ordered tugs and work ships. In 2018, Dutch shipyards received three orders for new cruise ships and/or ferries. De Hoop Lobith booked a second order for an expedition cruise ship and Damen and Thecla Bodewes have each received an order to build a new ferry.

**Table 4.2. New orders of seagoing vessels, 2016-18**

Unit	2016		2017		2018	
	Total	(Export)	Total	(Export)	Total	(Export)
Number	42	(32)	56	(43)	39	(32)
Capacity ('000 CGT)	212	(167)	198	(151)	141	(125)
Total amount (million EUR)	642	(487)	1 143	(901)	643	(601)

Note: This table includes all seagoing vessels from 100 GT and up except for superyachts and fishing vessels.

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

**Table 4.3. Order book and new orders of seagoing vessels, 2018**

Ship type	Order book (as of 31 December)		Delivered		Received	
	Number	CGT	Number	CGT	Number	CGT
Dredgers	10	102 164	7	52 230	5	45 660
Dry cargo ships and tankers	34	203 178	11	65 438	11	49 850
Workboats, tugs and service vessels	19	26 709	33	54 835	17	22 060
Offshore, windfarm service	10	35 733	4	7 037	3	4 240
Cruise ships	2	33 076	0	0	1	16 538
Ferries	2	2 909	0	0	2	2 909
Total	77	403 769	55	179 540	39	141 257

Note: This table includes all seagoing vessels from 100 GT and up except for superyachts and fishing vessels.

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

For smaller seagoing vessels ( $\leq 100$  GT), fishing vessels and inland waterway vessels, the Dutch yards received new building contracts for 185 ships in 2018 (compared to 198 in 2017) (Table 4.4). The order book remained stable with 143 ships in portfolio at the end of 2018 (compared to 146 in 2017) (Table 4.5). The decrease of received orders is mainly due to a decrease in the orders of inland cargo-carrying ships. This number fell from 76 in 2017 to 63 in 2018.

**Table 4.4. Received orders of inland shipping, fishing and small seagoing vessels, 2016-18**

Unit	2016	2017	2018
Number	126	198	185
Total (million EUR)	529	870	873

Note: This table includes seagoing vessels up to 100 GT, all fishing vessels smaller than 500 GT and all types of inland waterway vessels.

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

**Table 4.5. Order book, completions and new orders of inland shipping, fishing and small seagoing vessels, 2018**

Ship type	Order book (as of 31 December)		Delivered		Received	
	Number	Total amount (million EUR)	Number	Total amount (million EUR)	Number	Total amount (million EUR)
Inland cargo-carrying ships	79	577	43	249	63	404
Passenger vessels	14	265	7	122	13	211
Service vessels	21	72	43	67	34	72
Dredgers	4	8	73	178	57	127
Ferries	2	7	6	12	3	11
Fishing vessels	21	77	8	28	12	42
Tugs and pushers	2	5	3	4	3	6
Total	143	1 011	183	660	185	873

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

For superyachts, 16 new orders were booked in 2018, compared to 18 in 2017 (Table 4.7). At the end of 2018, the total order book contained 50 super yachts, corresponding to a value of EUR 4.1 billion.

This number represents a small decrease compared to 2017. The average value of the ships in the order book increased slightly from 2017 to 2018. This increase might be the result of investments by several superyacht builders in new production facilities that are suitable for constructing larger yachts.

**Table 4.6. Received orders of superyacht construction, 2016-18**

Unit	2016	2017	2018
Total amount (million EUR)	1 293	1 184	1 067

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

**Table 4.7. Order book and new orders of superyachts, 2018**

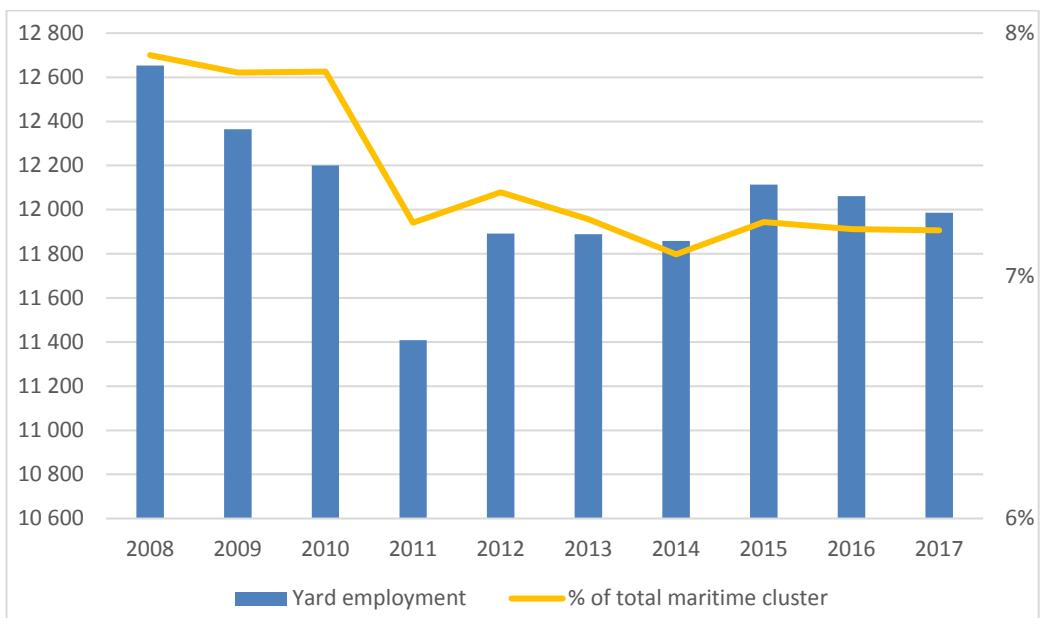
Order book (as of 31 December)			Delivered			Received		
Number	CGT	Total amount (million EUR)	Number	CGT	Total amount (million EUR)	Number	CGT	Total amount (million EUR)
50	198 967	4 078	25	77 166	1 473	16	50 355	1 067

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

### *Employment and skills*

In 2017, the Dutch shipbuilding sector employed almost 12 000 people.<sup>3</sup> In addition, 16 000 people<sup>4</sup> are indirectly employed by this sector, for a total of 28 000 employees. In 2017, the total production value and the value added by the shipbuilding sector decreased respectively by 9% and 21% compared to 2016. In that same year, the total revenue of the Dutch shipbuilding sector fell by 9%, from EUR 4.5 billion to EUR 4.1 billion. By contrast, the employment rate plateaued, marking a slight drop of 1%. Despite the current stagnation of labour market figures, the demand for highly skilled labour (especially production, design and engineering) is expected to grow in the near future. There is particular concern with the ageing of employees and owners and the effect this may have on the survival of family-owned companies.

Since 2008, the direct number of employees in the Dutch shipbuilding sector has fluctuated between 12 600 and 11 400 (Figure 4.7). Within the maritime sector, the shipyard's share of employment slightly decreased, from 7.9% in 2008 to 7.2% in 2017.

**Figure 4.7. Shipyard employment and share of total maritime cluster, 2008-17**

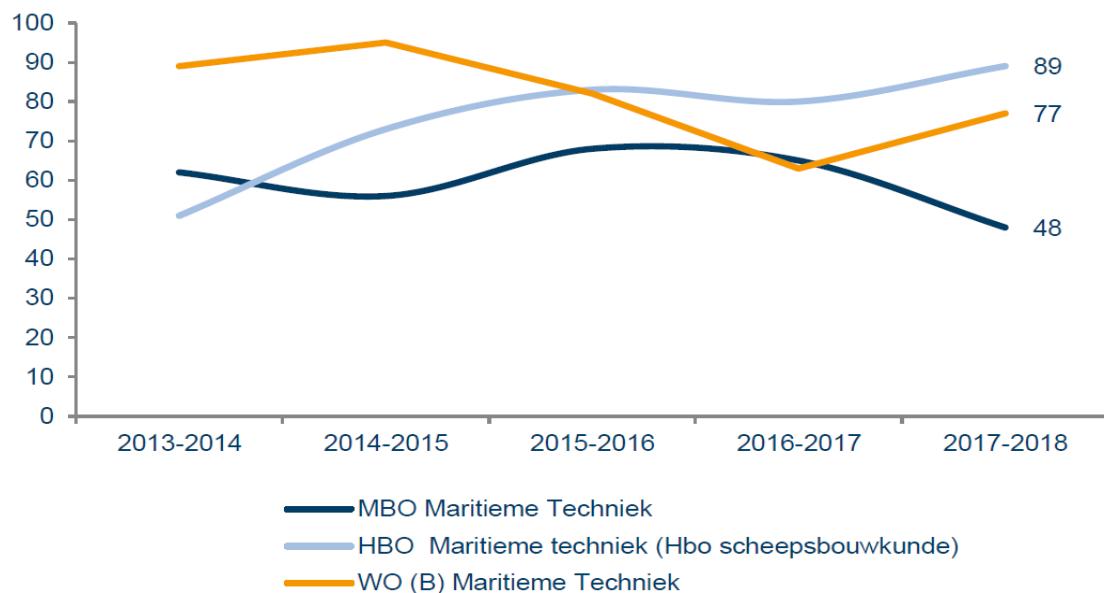
Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

The average<sup>5</sup> Dutch labour costs per hour for the whole economy (excluding agriculture and the public administration) was EUR 35.9 in 2018. This number is 31% higher than the average hourly rate in the European Union, which is EUR 27.4 per hour (Eurostat, 2019).

The Netherlands is currently experiencing a shortage of engineering professionals. Moreover, students of generic technical training can find employment in a wide variety of sectors. As a consequence, it is difficult for the shipbuilding sector to recruit a sufficient number of engineers. As far as the maritime industry is concerned, there is a specific need for engineering profiles in shipbuilding, mechanics, metals and information technologies.

To preserve the knowledge of the maritime cluster in the future, Dutch shipbuilding companies track down future competent and motivated personnel. The industry, educational institutions and the government have taken initiatives to recruit more young people for a technical and maritime education, such as maritime introductory internships and the “Technology Pact”. These measures appear to be successful, as shown by the increased enrolment of young talents in the Dutch maritime cluster (Ministry of Infrastructure and the Environment, 2015).

The inflow of people into higher professional education fields that are relevant for the maritime sector has been stable in recent years (Figure 4.8). The inflow of students into scientific education showed a small decrease between 2014 and 2016, but rose again to 77 new students in 2017. The number of students in middle-level applied education increased between 2013 and 2016 and seems to have stabilised since 2016. In 2017, 89 students started the HBO (higher professional education) training to become a shipbuilding engineer.

**Figure 4.8. Inflow into higher professional education dedicated to the maritime sector, 2013-17**

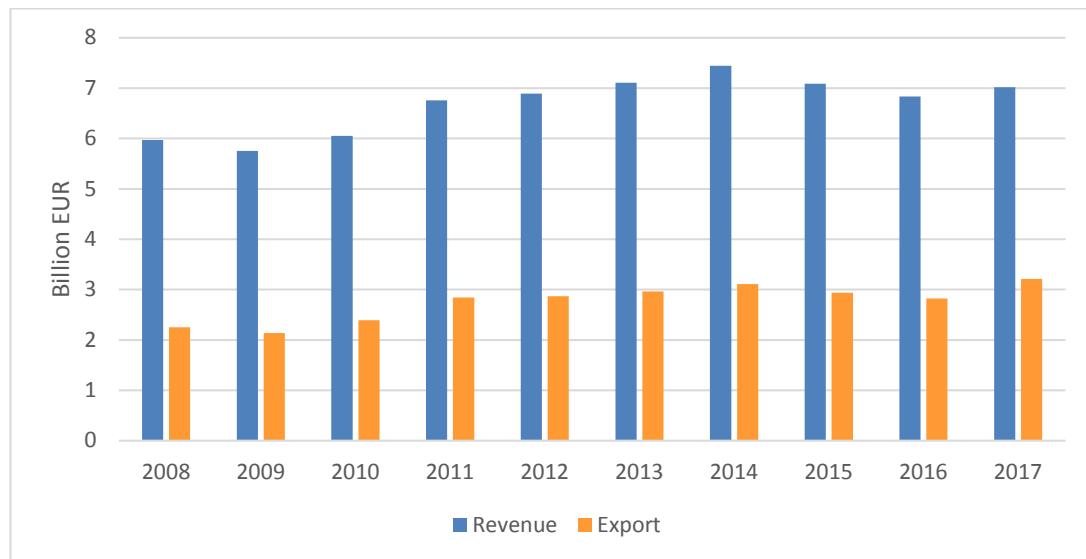
Note: The number of actual students MBO is significantly higher because the shortened MBO-4 qualification in maritime technology is not included in these figures.

Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

#### **4.1.2. The Dutch offshore industry**

The offshore industry is composed of companies that deliver maritime products and services dedicated to the exploration and exploitation of energy available in the oceans, notably oil, gas and wind energy. About 550 companies were active in the Dutch offshore sector in 2017. Dutch companies (e.g. SBM Offshore, Fugro and Heerema) conduct most of their activities abroad. Many offshore companies located in the Netherlands are subsidiaries of foreign enterprises (e.g. Baker Hughes, Schlumberger and Technip). In addition, a large number of SMEs provide specialised services, such as offering offshore cranes, designing offshore construction vessels, etc.

The Dutch offshore industry has experienced rapid growth, with an annual turnover growth rate of 5.3% from 2009 to 2014 (Figure 4.9). However, total revenue and exports fell in 2015 and 2016, as the oil price dropped during the same period. As the oil price rebounded slightly in 2017, the earnings of the Dutch offshore industry recovered accordingly. In 2017, total revenue amounted to EUR 7 billion, of which exports represented EUR 3.2 billion. The offshore industry employed around 26 000 people in the Netherlands in 2017.

**Figure 4.9. Turnover of the Dutch offshore industry, 2006-17**

Source: Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

The offshore sector is going through a transition. During this transition stage, activities in the field of renewables are becoming increasingly important. Offshore wind, in particular, plays a prominent role in the Dutch offshore industry. The Gemini Park consists of 150 wind turbines with a total capacity of 600 MW. This wind farm was inaugurated in 2017 and is located 55 km from the Dutch coast. The Dutch offshore companies have increasingly received orders from overseas. For example, the Heerema Fabrication Group was awarded with a procurement and construction contract for the offshore transformer module of a German wind farm.

#### **4.1.3. Marine equipment suppliers**

An estimated 800 marine equipment suppliers operate in the Netherlands. They provide products and services to shipyards, shipping, offshore, fishing, yachtbuilding companies and the navy. Their products include electrical and mechanical installations, coatings, and interior construction. Services include engineering and maintenance as well as project management or safety analyses. Table 4.8 provides examples of marine equipment (service) suppliers in the Netherlands.

**Table 4.8. Examples of marine equipment suppliers in the Netherlands**

Company	Overview
Wärtsilä <a href="https://www.wartsila.com">https://www.wartsila.com</a>	Wärtsilä develops, produces, delivers and installs engines for vessels and for power stations worldwide. The emphasis is on the complete propulsion power line for vessels – from engineering and development to worldwide service and support.  In 2018, its net sales totaled EUR 5.2 billion, with approximately 19 000 employees, including around 900 employees working in the Netherlands in several locations (Drunen, Harlingen, Kampen, Kruiningen, Schiedam and Zwolle). It has operations in over 200 locations in more than 80 countries around the world and is listed on Nasdaq Helsinki.
Alewynse Marine <a href="https://www.alewynse.com">https://www.alewynse.com</a>	Alewynse Marine designs, delivers and integrates electrical and automation systems on board of all kinds of vessels all over the world.  It operates across a wide range of maritime sectors in new builds as well as refit and conversion. This includes inland shipping, yachts, offshore and transport, tugs and workboats, dredgers, naval vessels, and short sea vessels. It employs over 950 (full-time equivalent).
Alphatron Marine <a href="https://www.alphatronmarine.com">https://www.alphatronmarine.com</a>	Alphatron Marine is a supplier of integrated bridge solutions and manufacturer of complementary products to the Japan Radio Company Ltd (JRC) portfolio. It has fitted over 1 000 vessels.  It employs nearly 450 people globally.
RH Marine <a href="https://www.rhmarine.com">https://www.rhmarine.com</a>	RH Marine is a system integrator and innovator of electrical and automation systems in the maritime industry, and delivers tailored solutions for complex defence, safety and security ships and yachts.
Bakker Sliedrecht <a href="https://www.bakkersliedrecht.com">https://www.bakkersliedrecht.com</a>	Bakker Sliedrecht designs, assembles, installs and maintains complex electrical installations.  It has over 300 employees located in China, the Netherlands and Singapore.
Damen Marine Components <a href="https://www.damenmc.com">https://www.damenmc.com</a>	Damen Marine Components (DMC) specialises in the design and production of rudder and steering systems, nozzles, winches, and controls.  In 2018, nozzle manufacturer DMC was merged with fellow Damen company Van der Velden, a leader in rudder and steering gear products, to create the DMC.
Radio Holland <a href="https://www.radioholland.com">https://www.radioholland.com</a>	Radio Holland is a global NavCom, IT on board, connectivity, and service and maintenance provider. It connects its customers to a network of more than 70 offices and support locations along the global shipping routes.  It is an independent operational company under the holding RH Marine Group.
ERIKS <a href="https://eriks.nl/nl">https://eriks.nl/nl</a>	ERIKS offers customised solutions for flow-related projects. It supplies a complete range of quality valves and instrumentation components.  It has more than 340 branches in Western Europe, North America and Southeast Asia.
Lankhorst Ropes <a href="https://www.lankhorstropes.com">https://www.lankhorstropes.com</a>	Lankhorst Ropes is a supplier of synthetic fibre and steel wire ropes for the maritime and offshore industries. As a Royal Lankhorst Euronete Group company, Lankhorst Ropes is part of one of the world's largest steel and synthetic fiber rope manufacturer, WireCo WorldGroup.
Huisman Equipment <a href="https://www.huismanequipment.com">https://www.huismanequipment.com</a>	Huisman is a worldwide supplier of step changing technical solutions to the world's leading companies in the oil and gas, renewable energy, entertainment, and civil markets.  Its products can be grouped into six main categories: cranes, pipe lay equipment, drilling equipment, winches, vessel designs and special projects.
Veth Propulsion <a href="https://www.veth.net">https://www.veth.net</a>	Veth Propulsion manufactures auxiliary propulsions and propulsion machinery for ships. Its core business is the production of rudder propellers and bow thrusters, generator sets and the supply, service and repair of diesel engines.  This family-owned company was established in Papendrecht in the Netherlands and employs 150 people.

Note: This list is not comprehensive. The list of relatively large equipment suppliers in the Netherlands includes IHC Dredge Equipment, Stigterstaal, ABB Marine & Ports, MTU Benelux, Bosch Rexroth, VAF Instruments and TKF. Source: NMT Questionnaire, 2019 and each company's website.

The total turnover of Dutch marine equipment (service) suppliers rose slightly to EUR 3.5 billion in 2018, up from EUR 3.4 billion in 2017 (Table 4.9). Exports accounted for about 60% of the sales value. The total number of direct employees increased from 16 413 in 2017 to 17 318 in 2018. In addition, more than 14 000 people are indirectly employed by this sector, which corresponds to 30 000 employees in total.

**Table 4.9. Turnover and employment of marine equipment suppliers, 2016-18**

	2016	2017	2018
Turnover (billion EUR)	3.8	3.4	3.5
Employment	16 838	16 413	17 318

Source: Netherlands Maritime Technology (2018), *Sectorjaarverslag 2018* (in Dutch), <https://maritimetechnology.nl/jaarverslagen>.

The marine equipment industry is marked by two main trends, namely digitalisation and sustainability. These trends lead to the growing interlinking of smart systems on ships and more functionalities. Marine equipment suppliers are increasingly focusing on the digital monitoring and maintenance of equipment. Many suppliers also contribute to more sustainable shipping by offering a wide range of sustainable solutions, from battery packs and waste heat recovery systems to highly efficient thrusters. Subsequently, the new international sulphur regulation for bunker fuel led to an increase in demand for scrubbers in 2018. Even though scrubbers are mainly installed outside the Netherlands, a number of Dutch suppliers deliver complete installations or components for scrubbers.

#### *4.1.4. Competitiveness of the Dutch maritime industry*

Table 4.10 describes selected key strengths, opportunities, weaknesses and threats (SWOT) of the Dutch shipbuilding industry on the basis of data and analyses mentioned in the previous sections of this report. The Dutch shipbuilding industry has successfully managed to develop strong positions in some niche markets such as dredgers, superyachts and specialised offshore products. This specialisation strategy allowed the Dutch shipbuilding industry to be less vulnerable to factors such as higher labour costs than some of its competitors.

The Dutch government's industrial policies (maritime cluster strategy, top sector approach, etc.) along with the strong network of companies within the maritime cluster can be seen as a key strength. In addition, competitive SMEs that are involved in many sub-sectors contribute significantly to innovation in the Dutch shipbuilding industry. According to a number of equipment and system suppliers, a stable home market is considered essential to a stable market.

The relatively small size of Dutch shipyards can be seen as a weakness. Several Dutch shipbuilding companies benefit less from economies of scale than companies with bigger facilities, notably in Southeast Asia. The retention of a high-skilled workforce of sufficient size for Dutch shipbuilding companies as well as high labour costs remain important challenges. In addition, the Dutch shipbuilding industry is facing a number of threats, including the sluggish recovery of the global shipbuilding market. Although new shipbuilding orders slightly increased in 2017 and 2018, especially for LNG (liquefied natural gas) carriers, a substantial recovery in the cargo shipbuilding market appears unlikely in the short term given the weak growth of global trade, which is expected to increase by only 1.2% in 2019 and 2.7% in 2020 according to the forecast by the World Trade Organization released on 1 October 2019. Weakness in demand can also lead to the entry of new competitors in niche markets such as dredgers and superyachts.

On the other hand, there are also opportunities for Dutch shipbuilders and maritime equipment suppliers, as demand for environmentally friendly ships and smart solutions for autonomous sailing

are expected to increase, notably driven by the reinforcement of environmental regulations. The strong innovation capacity by the Netherlands as well as intense co-operation between marine equipment suppliers, shipyards and the national government are key factors to obtain a significant market share in the green and smart shipping markets. Increasing demand for cruise ships and luxury yachts in the Asian market, especially in China, is another opportunity for the Dutch shipbuilding industry.

**Table 4.10. SWOT analysis of the Dutch shipbuilding industry**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>– Specialisation in niche markets.</li> <li>– Competitiveness and relevance of the maritime cluster, notably with numerous innovative small and medium-sized enterprises and a strong marine equipment industry.</li> <li>– Well co-ordinated government policies.</li> </ul>	<ul style="list-style-type: none"> <li>– High labour costs.</li> <li>– Shortage of skilled labour and aging workforce.</li> <li>– Relatively modest size of companies, compared to selected competitors.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>– Development of new segments in the ship market requiring high and continuous innovation.</li> <li>– Greening of the shipbuilding industry.</li> <li>– Increasing demand for cruise ships and luxury yachts in certain emerging countries.</li> </ul>	<ul style="list-style-type: none"> <li>– Sluggish recovery of the global shipbuilding market.</li> <li>– Entry of new competitors into niche market.</li> <li>– Support by selected competitor countries to their shipbuilding industry.</li> </ul>

## 5. Government policies affecting the shipbuilding industry

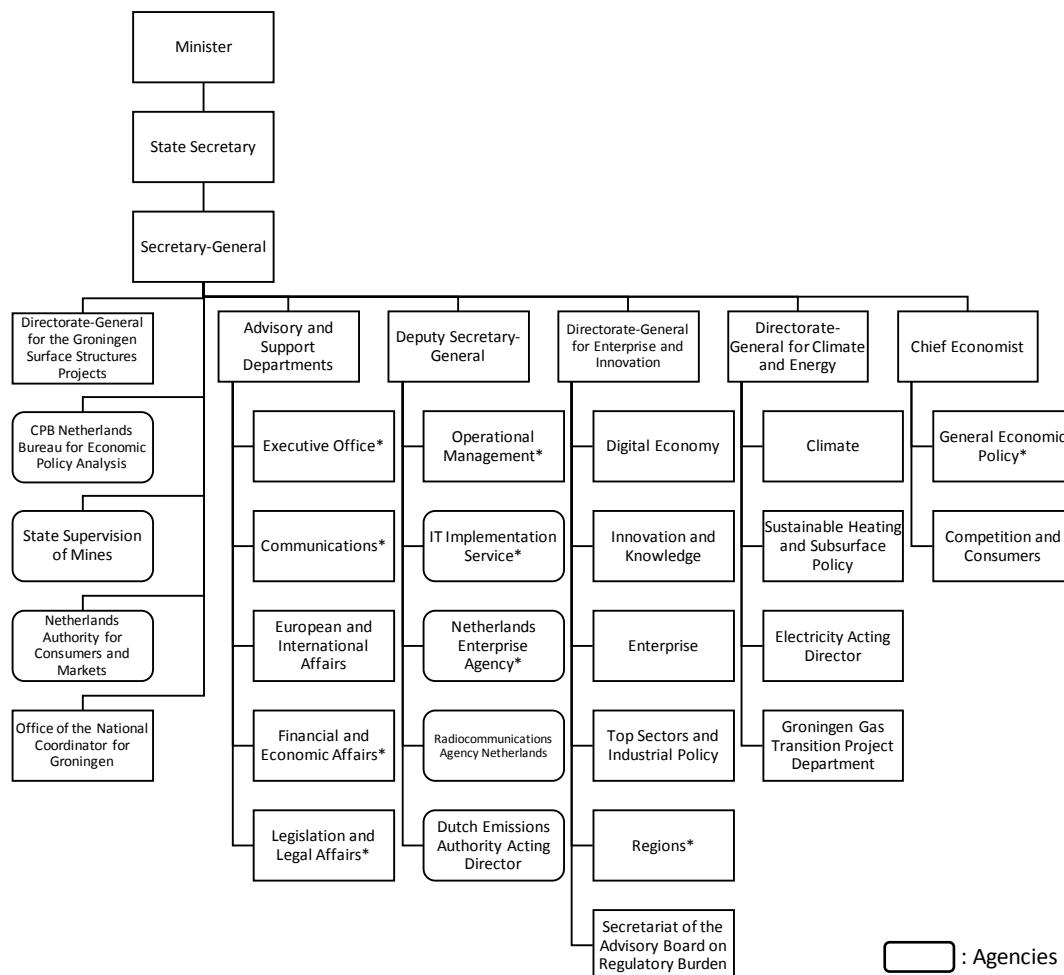
### 5.1. Government policy

#### 5.1.1. *Government structure and enterprise policy*

##### *Government organisation*

The Ministry of Economic Affairs and Climate Policy contributes to the design and implementation of the policies for the shipbuilding and the marine equipment industries in the Netherlands. Specifically, the Top Sectors and Industrial Policy Department prepares policy measures and the Netherlands Enterprise Agency implements these policy measures (Figure 5.1).

The Netherlands Enterprise Agency is a government agency which operates under the auspices of the Ministry of Economic Affairs and Climate Policy. Its activities are commissioned not only by the Ministry of Economic Affairs and Climate Policy, but also by other relevant ministries. The Netherlands Enterprise Agency implements a number of support measures and programmes, and assists companies to apply for grants, find business partners, access the right expertise, and comply with legislation and regulations.

**Figure 5.1. Organisation chart of the Ministry of Economic Affairs and Climate Policy**

\* Also performs tasks for the Ministry of Agriculture, Nature and Food Quality.

Source: <https://www.government.nl/ministries/ministry-of-economic-affairs-and-climate-policy/documents/leaflets/2019/05/01/organisation-chart-ministry-of-economic-affairs-and-climate-policy>.

### *Industrial policy: Top sector approach*

Industrial policy in the Netherlands has changed its focus over time (Table 5.1). In 2011, the government renewed its approach for the national enterprise policy. It selected nine sectors in which the Netherlands has competitive advantages, which are highly export-oriented and spend a significant portion of their research and development (R&D) in the Netherlands. The nine sectors benefit from government support through a combination of generic (i.e. financial) instruments and a focused emphasis on achieving optimum co-operation in the so-called “golden triangle” formed by companies, research institutions and the government. The primary focus of the top sector approach is joint research, development and innovation (RDI) programming of public and private partners. Improving human capital and trade and investment is a secondary objective.

A lead team for each top sector shapes a mutual vision, which then serves as the basis for a strategic agenda with associated activities. This strategic agenda integrates research and development (innovation), establishes links to education and the labour market (human capital), sustains economic diplomacy (internationalisation), and harnesses legislation.

The main reasons for introducing the top sector policy were:

- leveraging fiscal policy as a replacement for support measures and grants
- encouraging public-private partnerships
- reducing fragmentation in innovation policy
- increasing the involvement of government ministries (other than Economic Affairs).

The top sectors (Table 5.2) are characterised by:

- high productivity
- knowledge intensity
- export orientation
- solutions for societal challenges.

**Table 5.1. Development of the Dutch industrial policy**

<b>1945-70</b>	<b>Active industrial policy</b>
<b>1970-80</b>	Defensive industrial policy
<b>1980-90</b>	Start modern innovation policy
<b>1990-2000</b>	Focus on market liberalisation (EU)
<b>2000-10</b>	Strong business–strong government
<b>2010-20</b>	Top sectors and mission-driven policy

Source: Presentation by the Dutch government during the OECD peer review mission.

**Table 5.2. Top sectors**

<b>Horticulture and propagation materials</b>
<b>Agri-food</b>
<b>Water and maritime industry</b>
<b>Life sciences and health</b>
<b>Chemicals</b>
<b>High-tech</b>
<b>Energy</b>
<b>Logistics</b>
<b>Creative industries</b>

Source: Information provided by the Dutch government.

The introduction of the top sector policy in 2011 meant a major change to the Dutch industrial policy framework. There are two aspects to this change: the first involves the sector-based and integrated approach of industrial policies, while the second relates to a new way of financing and organising public-private partnerships through a greater emphasis on demand-driven aspects. The targets and goals were also set in 2011 (Table 5.3).

This sector-based and integrated approach has been accompanied by the loss of funding for knowledge and innovation from the Economic Structure Enhancing Fund (FES).<sup>6</sup> The funding mechanisms of existing institutes and programmes have changed, while the range of fiscal instruments has expanded. The government's role and management philosophy has also been transformed: from management-by-subsidy to network management. These changes to the system were far-reaching and profound, particularly due to the concurrent combination of these aspects in times of budgetary constraints.

In 2018, the new Ministerial Cabinet stressed the importance of environmental challenges for RDI policy and reframed the general strategy on “top sector policies” to a “mission-driven top sector and innovation policy”. This shift of focus intended to centre the top sector policy even more around big

societal challenges, such as climate and energy, security and agriculture, food supply and water. The Dutch government, in collaboration with the top sector teams, is currently drafting the overarching and specific missions for each of these challenges.

**Table 5.3. Targets and goals of the enterprise policy**

<b>Targets</b>	
	Top 5 position in the Global Competitiveness Index by 2020
	R&D 2.5% of GDP by 2020
	Total volume of Public-Private Partnership Allowances amounting to EUR 800 million in 2020, of which 40% is financed by the private sector
<b>Goals</b>	
	Increasing innovative capacity for productivity growth and competitiveness
	Providing solutions to societal challenges

Source: Information provided by the Dutch government.

### **5.1.2. The Dutch Maritime Strategy 2015-2025**

The important share of the maritime sector for the Dutch economy explicates its strategic position for Dutch policy makers. In 2015, the Dutch government established the Dutch Maritime Strategy 2015-2025, in close co-operation with the maritime cluster. This government-wide strategy was justified by the increasing correlations and cross-linking of the maritime industries and the need to better align it with societal trends and developments. Furthermore, this integral maritime government policy aims at facilitating closer co-operation between all the stakeholders of the maritime cluster, including the shipbuilding industry. This strategy is in line with experts stating that maritime clusters not only foster economic development, but also support technological innovation and technological development (e.g. knowledge exchange between all segments of the cluster) (Doloreux, 2017).

The Dutch Maritime Strategy aims to be an integrated strategy. For instance, it also aims to guarantee port accessibility while reducing port congestion through the integration of maritime transport into the logistical value chain. To implement this integrative approach, different pieces of infrastructure are connected and administrative procedures are harmonised. Some of the ongoing projects to enable maritime traffic flows through the increased accessibility of the Dutch ports are the construction of the Blankenburg connection, which links two existing highways, as well as the expansion of the Utrecht Ring and the extended A15 aiming to reduce congestion. In addition, the Netherlands provides capital for additional locks, mooring projects and enhancements of waterways (e.g. Twente channels).

One of the reasons for establishing a maritime strategy was to present an overarching sectoral response by the Dutch maritime industry to the worldwide economic developments. To face these challenges, the maritime sector needed important positive spill-over effects between the members of the maritime cluster and other sectors in terms of knowledge sharing, innovation and economies of scale. Companies active in maritime shipping, offshore, inland shipping, marine engineering, the watersports industry, the fishing industry and ports are often customers of Dutch shipbuilding companies.

The Dutch Maritime Strategy lists policy priorities and actions to promote the maritime and logistics sectors. It offers a comprehensive framework for the entire Dutch maritime sector, cross-linking several maritime industries across the maritime cluster (see Section 4.1).

The Dutch Maritime Strategy aims to fortify the Dutch maritime sector as international world class by guaranteeing the global transport of raw materials and goods as well as by warranting secured access to maritime infrastructure. To reach this objective, the strategy takes into account the worldwide economic, demographical, geopolitical, ecological and security policy tendencies that affect the Dutch

maritime sector, notably the growing importance of emerging markets. It targets niche sectors in which the Netherlands has built particular expertise.

The Dutch Maritime Strategy stimulates the private and the public sectors to collaborate on core challenges such as employment, innovation, trade, logistics, safety and the environment in order to form synergies.

Creating network effects between all the different participants of the maritime cluster is conducted by a private sector organisation called “Nederland Maritiem Land” (NML). By virtue of its “Maritime by Holland” agenda, this organisation facilitates the convergence of the 11 sectors of the maritime cluster into a common vision to reinforce the Dutch maritime cluster by creating an atmosphere of co-operation, innovation and entrepreneurship. NML also co-finances maritime projects. Furthermore, it establishes and maintains networks between the private sector, government, trade associations and academia (“triple helix”) to engage in knowledge sharing.

In this respect, the Dutch Maritime Strategy involves the establishment of a Maritime Learning and Development Centre, measures to promote exports, and RDI support.

The government focuses on policy support and on providing some support to framework conditions like RDI infrastructure. Research institutions involved in shipping include the Maritime Research Institute Netherlands (MARIN), the Netherlands Organisation for Applied Scientific Research (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, TNO) and various universities.

### **5.1.3. The Dutch Maritime Strategy and the working programme**

The working programme “Dutch Maritime Industry & Ports 2018-2021” deepens some of the elements of the Dutch Maritime Strategy with concrete action points, notably in the fields of education, innovation, trade and investment, and infrastructure policies. Some of these policy areas apply across various sectors or go beyond the maritime sector. For accuracy reasons, the sections below are limited to those policy parts that are relevant for the shipbuilding sector. Both the education and trade and investment part are discussed here. The greening of the shipbuilding sector and innovation will be elaborated on in Sections 5.1.4 and 5.1.5 respectively.

#### *Education*

The Dutch Maritime Strategy targets the development of sector-specific knowledge by attracting new talents as well as by retaining people that are currently contributing to the maritime cluster. New enrolments in relevant maritime and technical education programmes are supported by initiatives such as “maritime introductory internships” and the “Technology Pact”.<sup>7</sup> This strategy is reinforced by the Dutch system of lifelong learning and it encourages labour mobility to ensure long-term career prospects. To enhance the impact of these programmes, co-ordination between the Human Capital Agenda of the top sector approach (see above) and the Technology Pact could be strengthened even further. An example of employing technology as a tool to alleviate people’s work is the “Fieldlab Smart Industry”.<sup>8</sup> Thanks to virtual reality technology, employees can upgrade their skills off-site.

The Maritime Learning and Development Centre (Maritieme Leer-en Ontwikkel Centrum, MLO) was created in 2018 to support the Dutch educational objectives. The centre is a network of human resources professionals that are active in the maritime sector. Its main goal is to facilitate the temporary exchange or transfer of employees from one maritime company to another. It aims to maintain staff that is interested in a career shift within the maritime cluster. Actions conducted by the Maritime Learning and Development Centre include joint training initiatives, as well as knowledge sharing through a specifically designed platform.

In addition to the Dutch national policies, many educational and labour policies are based on initiatives taken by international organisations, notably the International Maritime Organisation (e.g. standards of training, certification and Watchkeeping Convention) or the International Labour Organization (e.g. Maritime Labour Convention and the Work in Fishing Convention; Code of Practice Safety and Health in Shipbuilding and Ship Repair).

### *Trade and investment*

The Dutch maritime sector has a strong international orientation. The “Maritime Hotspots” agenda contributes to developing relationships between the Netherlands and other important maritime regions in the world (e.g. Southeast Asia, the Gulf of Mexico and the Arabian Gulf). The focus is not only on trade topics, but also on creating synergies in the fields of innovation and human capital. The “Partners for Water” programme relates to this idea and underpins projects by virtue of establishing partnerships related to aid and trade. A network of business associations collaborates with several Dutch ministries (Netherlands Enterprise Agency and Netherlands Foreign Investment Agency) and supported by economic diplomats (Netherlands business support offices) aims to improve the attractiveness of the Dutch maritime sector. The brand “Maritime by Holland” was specifically designed to develop promotional activities in the Dutch maritime sector. In addition, some Dutch embassies and consulates house an “innovation attaché” who liaises with private Dutch firms and research organisations and identifies international co-operation opportunities in RDI.

In order to promote strategic partnerships and attract supplementary international investments, the Netherlands stimulates a sustainable business climate. That is why the Netherlands tends to focus on setting up synergies between human capital, innovation, a European and global conducive business environment, an adequate shipping register, export promotion, and market access through free trade agreements, with a desire to establishing and maintaining a level playing field in shipbuilding and shipping.

Financial incentives are granted to promote the Netherlands as an important investment hub for the maritime sector. By the same token, a brief reference can be made to the “Partners for International Business” (PIB) funding scheme. This programme supports clusters to promote the Netherlands abroad and has a budget of EUR 4 million (2019), for which there is a maximum contribution by the Dutch government of EUR 350 000. The most important support measures that are designed to promote specific parts of the Dutch maritime industry are addressed in more detail in Section 5.2.

While providing governmental support, the Dutch government aligns its policies with EU competition law and other international conventions. The schemes on tonnage tax, wage cost taxes or any other support measures<sup>9</sup> have, for instance, all been notified to or approved by the European Commission which has reported them on its turn to the WTO. The Dutch government intends to promote national and international co-operation between inspection platforms and to enhance the enforceability of inspections.

In addition to public co-operation, the Netherlands provides incentives to the sector federation, Netherlands Maritime Technology (NMT),<sup>10</sup> to build connections with similar institutions in other countries. For instance, the NMT has built up partnerships with the European sector federation (SEA Europe), its Asian counterpart (Active Shipbuilding Experts’ Federation, ASEF) and the International Maritime Organization (IMO) through the Community of European Shipyards’ Association (CESA).<sup>11</sup> The Netherlands is also (indirectly) actively involved in the international JECKU network of shipbuilding associations. This international forum, comprised of the major international shipbuilding countries (i.e. China, Europe, Japan, Korea and the United States) exchanges views on global economic and trade developments, technological and regulatory developments in the shipbuilding sector, and environmentally friendly ships.

### ***5.1.4. Green ships and the blue economy***

The maritime sector is confronted with increasingly stricter environmental norms. Some examples include more stringent norms for greenhouse gas emissions, the use of alternative combustion fuels, the non-road mobile machinery norms for inland waterway shipping,<sup>12</sup> (from 2025) the CCR-II norm for inland ships entering the port of Rotterdam, and the Ballast Water Management Convention. In addition, the Netherlands and other countries have established two Emission Control Areas (ECAs)<sup>13</sup> in the North Sea in line with MARPOL Annex VI.<sup>14</sup> Stricter environmental norms on the exhaustion of air pollution from ships apply in these ECAs.

Because of the domestic and international objectives to comply with more rigorous environmental norms, the green and sustainable development of the maritime sector is considered to be one of the key challenges of the Dutch Maritime Strategy. The shift towards more sustainable ships is also related to the Dutch initiatives to promote more innovative shipbuilding solutions.

Sustainability goes beyond the scope of exhaust emissions. It also encompasses topics such as clean air and water, safe and environmentally production processes, activities that limit environmental damage, and biodiversity. The Dutch vision to increase the greening of its economy, including the maritime sector, is set out in the Dutch “Green Deal Plan”. The Green Deal on Maritime and Inland Shipping and Ports is a shift towards more sustainable sea and inland shipping. Some concrete initiatives include zero-emission ships, a sustainability label for inland ships and greater use of sustainable energy supporters/carriers. The Green Deal Plan focuses on framework conditions, and in particular on research and development for future applications. It does not support market development or create additional capacity in the sector.

The Netherlands has identified the reduction of ship emissions and the promotion of the sustainable use of the sea and inland ports as key objectives. To reach these goals, the “zero-emission vessels” initiative was launched. This ambitious initiative commits the Dutch maritime sector to launch a zero-emission seagoing vessel and 150 zero-emission inland vessels by 2030. The project is supported by the Dutch government, which has already pledged to invest EUR 5 million on studies to research and validate the feasibility of new technologies. The Dutch zero-emission plan requires that at least 40% of CO<sub>2</sub> emissions from inland shipping are cut by 2030. The Dutch inland shipping sector is even deemed to be virtually climate-neutral by 2050. Regarding maritime shipping, the Dutch maritime cluster’s intention is to reduce the maritime shipping sector’s emissions by 70% by 2050, compared to the situation in 2008. This goal for 2050 is more ambitious than the international target of the IMO, which is a 50% CO<sub>2</sub> reduction by 2050.

Various measures will need to be taken to reach the “zero-emission vessels” objective. As indicated in the Dutch Maritime Strategy,<sup>15</sup> the Dutch authorities have committed to eliminate legal barriers to innovation, promote alternative fuels and mooring systems, foster system innovations to pool cargo and procure a Green Award. Additionally, the implementation of the European Clean Power for Transport Directive<sup>16</sup> and the Energy Agreement for Sustainable Growth<sup>17</sup> contributes to lowering emission levels. To facilitate the transition towards zero-emission vessels, the Dutch government cooperates with the independent research institution MARIN to assess the feasibility of zero-emission ships. MARIN thereby acts as a bridge between the design and the operational phase of the project. Against this backdrop, a Zero Emissions Lab was established to simulate the “engine room of the future”. For this project, MARIN works on sustainable marine propulsion and power systems. Private organisations are also taking initiatives to lead to zero-emission ships.

Another example of an alternative fuel project in the Dutch zero-emissions agenda involves the partnership established between the port of Rotterdam and the Dutch start-up Skoon Energy BV. This start-up assembles rechargeable batteries that can be employed in combination with diesel engines (hybrid engine). Thus far, the port of Rotterdam has engaged to provide for the incumbent

infrastructure to recharge the batteries. In a similar vein, the Dutch company Damen Shipyards Group is already putting a hybrid vessel running on electrical power to the test. Portliner is also planning to build 15 new ships and is retrofitting existing ships to run on electricity. The Green Circles coalition has the goal to use modular energy concepts to achieve zero-emission inland navigation.

A third example of Dutch efforts to reduce CO<sub>2</sub> emissions touches upon the idea of a “Sail Assist”. This relatively recent development in shipping looks for efficient ways to assist in a ship’s fuel consumption reduction with the help of wind power. The advantage of this energy efficient improvement is that such a system can be used in existing ships as well. Indeed, the Netherlands aims to tackle climate change through a variety of measures, including retrofitting existing ships to improve their environmental footprint. For instance, the Wind Assisted Ship Propulsion (WASP) Ecoliner, which is still in the design phase, aims to deploy advanced technology combining sail propulsion with traditional fuels. Moreover, the WASP Ecoliner is a good illustration of a broader strategy to build multipurpose cargo ships. Another example of a multipurpose vessel is the project initiated by the Dutch government in co-operation with Bijlsma Wartena and EST-Floattech. This initiative resulted in the construction of three multipurpose vessels that contain solar panels and battery systems to provide the ship with electrical power. The batteries are recharged during the night. Some of the retrofitting projects benefit from European funding under the umbrella of the Horizon 2020 Programme.<sup>18</sup>

A fourth example to promote sustainable ships is the research conducted on the application of renewable methanol as a marine fuel. In the wake of this research, the Green Maritime Methanol Consortium was established. This consortium consists of academic institutions, the private sector, government agencies and interest groups. To verify the feasibility of methanol as an alternative marine fuel, data are collected regarding a ship’s type, its sailing route and its cruising speed.

Even though the design of green ships is not specifically targeted in the Green Plan, it certainly coincides with its general objective. The Easymax vessel is a nice illustration of how the Netherlands strives to reduce a ship’s CO<sub>2</sub> emissions in every stage of the production phase. This ship has specifically been designed to lower CO<sub>2</sub> emissions (e.g. hull shape) and embeds an energy-efficient propulsion system resulting in a significantly lower Energy Efficiency Design Index (EEDI). The EEDI was established under the auspices of the IMO and is based on a mathematical formula to measure a ship’s emissions. It intends to gradually reduce emissions contingent upon the vessel’s class. In line with MARPOL Annex VI,<sup>19</sup> each new ship or each existing ship that has undergone a major conversion must respect the predetermined EEDI norm.

In addition to green shipping design, alternative fuel sources and sustainable ship conversion techniques, the Netherlands endeavours to increase sailing and port infrastructure efficiency. Some projects embed the optimisation of navigation routes, automation of nautical tasks and more efficient use of (un)loading cargo. According to data from the World Economic Forum (Schwab, 2017: 219), the Netherlands ranked first on port infrastructure for the fifth consecutive year in a row in 2017.

Making a shift towards zero emissions in the shipping sector is expected to be costly though. In 2019, the Netherlands set out concrete measures in its Green Deal on Maritime and Inland Shipping and Ports to move towards a more sustainable shipping sector. The Green Deal is a joint initiative of the Dutch Ministries of Economic Affairs and Climate Policy, Infrastructure and Water Management, and Defense. The plan unites businesses, the government and research institutions to promote green growth. It is acknowledged that there is still a lot of potential for the maritime cluster to engage in green growth. Specifically for the inland shipping sector, there is a budget of EUR 15 million aimed at making inland shipping more sustainable. Part of this budget will be spent on replacing the current fleet with cleaner engines. One of the use cases relates to the introduction of a sustainability label for inland vessels. Such a label can offer a reduction for port dues and as such may attract favourable funding for a vessel.

Another example of a green deal project relates to the optimisation of ship-generated waste at port reception facilities.

### **5.1.5. Research, development and innovation support**

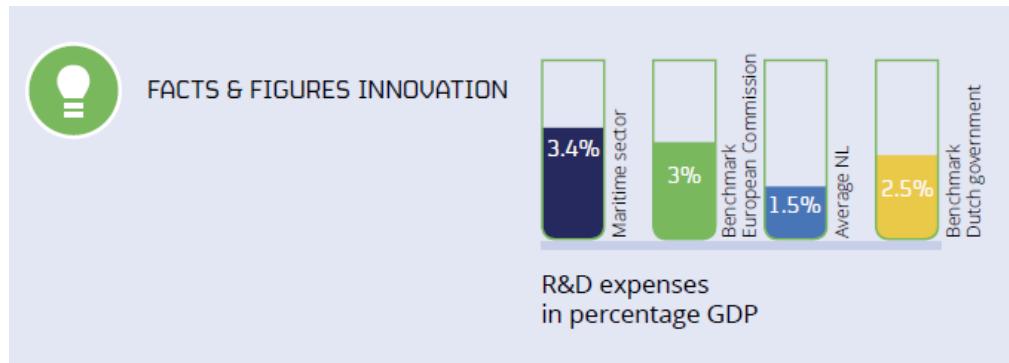
#### *General overview of RDI policy*

Innovation is conceived as an important driver of economic growth and constitutes a predominant pillar of the top sector approach and of the Dutch Maritime Strategy. The Netherlands has identified a number of key societal challenges and has linked those societal challenges to pivotal technological improvements. The transformative power of innovation for the Dutch economy has resulted in an action plan of extensive co-operation between enterprises, knowledge institutions and the national government.

The Dutch government has developed different forms of RDI support schemes as described in the next section. Since 2015, the Netherlands has been increasing its RDI spending. The national ambition for RDI spending strives to match 2.5% of the Dutch GDP by 2020. This objective is in line with the EU's goal of 3% of GDP in its Europe 2020 Strategy.

Figure 5.2 depicts Dutch RDI expenses, expressed as a percentage of GDP. According to the *Dutch Maritime Monitor 2018* (Maritime by Holland, 2018), RDI expenses in the maritime sector amount to 3.4% of its value added, thereby exceeding the European objective of 3%.

**Figure 5.2. Dutch research, development and innovation expenses**



Source: © Maritime by Holland (2018), *The Dutch Maritime Cluster Monitor 2018*, <https://www.maritimebyholland.com/maritime/publications/maritime-monitor-2018>.

As already observed in the *OECD Review of Innovation Policy* (OECD, 2014), it is pivotal for the Netherlands to ensure that the business sector makes a similar effort to invest in fundamental RDI. According to Holland Trade and Invest, the private sector currently contributes 40% of the RDI investments in the top sectors.<sup>20</sup>

#### *Top Sector Water & Maritime*

The Top Sector Water & Maritime covers a wide range of water-related industries, from water treatment to dredging, shipbuilding and marine equipment. This top sector envisages three innovation agendas for RDI:

1. delta technology (building, construction and water management in river delta areas)
2. water technology (drinking water, sewage water treatment, resource efficiency and smart cities)

3. maritime technology (energy and resources at sea, clean shipping, smart and safe shipping, effective infrastructure).

The shipbuilding industry is part of the Top Sector Water & Maritime and mainly relates to the maritime technology part. Every top sector has a dedicated foundation and is composed of a steering committee made up of high-level members from industry, research and government. The Top Consortia for Knowledge and Innovation (TKI) constitutes the executive body/office of the top sector that co-ordinates the RDI agenda of the respective top sector and research and development programmes in which private companies, research institutes and public entities participate. These RDI programmes are conducted by companies and research institutes, each attributing their own budget and conducting an independent risk assessment. The three areas in the Top Sector Water & Maritime Industry each have a separate TKI and agenda. The TKI Maritime Technology consists of the following four themes:

1. winning at sea (offshore projects, oil and gas projects, sustainable energy, offshore wind farms)
2. clean ships (fuel saving, emission reduction, alternative fuels, noise reduction)
3. smart and safe shipping (marine equipment development, cost reduction of construction, operation and maintenance, efficient design of ships)
4. effective infrastructure (traffic optimisation, efficient port design, safety development).

The TKI Maritime Technology consists of a wide range of members, including private companies, research institutes and ministries, also known as the “triple helix” (Table 5.4). The TKI Maritime Technology includes more than 40 RDI programmes. Table 5.5 shows some examples related to the shipbuilding industry. The Public-Private Partnership Allowance can be deployed for these RDI programmes (see below for more details). The RDI projects in these programmes focus on concepts developed from research for early identification of promising novel techniques for future application. These projects do not support market developments and do not add capacity. Projects require the participation of multiple partners and knowledge developed in these programmes has to be distributed to several companies. The maritime innovation agenda was prepared by the Innovation Council of the Maritime by Holland association, in which the major maritime associations and a number of major companies worked together on innovation themes. The board members of the TKI Maritime Technology were also members of the Innovation Council.

**Table 5.4. Members of the TKI Maritime Technology**

Member	Description
<b>Maritime Research Institute Netherlands (MARIN)</b>	MARIN provides advanced expertise and independent research. It combines software, model test facilities, simulators and full-scale monitoring capabilities to help its clients make ships and operations cleaner, safer and smarter during each phase of the lifecycle.
<b>Netherlands Maritime Technology (NMT)</b>	The NMT trade association is the first port of call for and primary representative of the Dutch maritime technology sector. Its 400+ members include shipyards, marine equipment suppliers and service providers.
<b>Toegepast Natuurwetenschappelijk Onderzoek (TNO)</b>	TNO, the Netherlands Organisation for Applied Scientific Research, is an independent research organisation that was founded in 1932. It is an independent organisation, not part of any government, university or company. The TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way. It counts over 3 200 professionals.
<b>Alewijnse Marine</b>	Alewijnse Marine designs, delivers and integrates electrical systems, automation systems and advanced marine electronics on board of all kind of vessels. The company works in both new-build and refit on a great number of vessels every year in sectors that include yachts, naval and governmental, dredging, offshore, and transport.
<b>Damen Shipyards Group</b>	The Damen Shipyards Group is a group of companies that operates over 30 ship and repair yards and related companies all over the world. The Damen portfolio includes small utility vessels, advanced high-performance tugs, tankers, dredgers, offshore support vessels and superyachts.
<b>TU Delft</b>	Delft University of Technology acts as a public legal entity under the Higher Education and Research Act. Its main tasks include providing a scientific education, conducting scientific research, transferring knowledge to society and promoting social responsibility.
<b>Maritime Knowledge Centre (MKC)</b>	The MKC is a co-operation between knowledge leaders, industry experts, and governmental representatives and universities. The MKC comprises the TNO, the Technical University Delft, MARIN, the Royal Naval Institute (part of the Dutch Defence Academy), and other knowledge leaders and industry giants who focus on innovation.

Source: Website of the Top Sector Water & Maritime: <https://www.topsectorwater.nl/ledenoverzicht>.

**Table 5.5. Examples of research programmes of the TKI Maritime Technology**

Category	Title	Institution	Summary of research programmes
<b>Smart and safe shipping</b>	HELIOS II	MARIN NLR	Improving the safety of helicopter operations on floating, production, storage and offloading vessels and offshore working vessels
	DeFoS	MARIN	Method for estimating margins to design seagoing vessels
	Silent Ship	TNO MARIN	Procedures and design tools for measuring underwater noise from ships
	Ishar@sea	TU Delft TNO	Development of data protocol for monitoring and communicating on sea and offshore
<b>Clean ships</b>	Hybrid 111	TNO	Hybrid configurations for propulsion and energy systems
	Ecodynamic Design	Imares Deltares NIOZ TNO	Methods for determining the environmental effects at the design stage
	Luchtsmerings JIP	MARIN TU Delft	Air lubrication mechanisms to reduce ship resistance
	Save	MARIN	Improving the performance of domestic vessels by retrofits

Notes: MARIN: Maritime Research Institute Netherlands; TNO: Netherlands Organisation for Applied Scientific Research; NIOZ: Royal Netherlands Institute for Sea Research.

Source: Website of the TKI Maritime Technology: <https://www.maritiemland.nl/innovatie/projecten/tki-maritiem-innovatiethemas>.

### *Specific initiatives related to the maritime cluster to promote innovation*

The “Knowledge and Innovation Agenda 2018-2021” sets out the Netherlands’ strategy to promote innovation by virtue of sharing technological advancements between different sectors. Regarding the

maritime cluster, particular attention was paid to offshore wind energy, aquaculture, autonomous ships and circular transportation networks to tackle the societal challenges of climate change, energy efficiency, water scarcity, the circular economy, and creating an inclusive and innovative society.

The financial part of the Knowledge and Innovation Agenda is described in more detail in the Innovation Contract 2018-2019. An innovation contract determines the financial commitment of each of the parties involved and captures the societal challenges envisaged by the Netherlands as part of its top sector industrial policy. With regard to the maritime sector, the Innovation Contract has identified the following broad areas: energy extraction at sea, zero-emission ships, smart shipping, and effective port infrastructure.

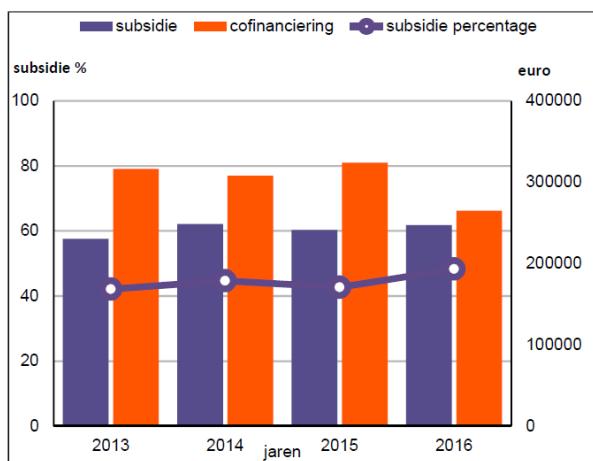
The Dutch authorities have taken several additional initiatives to stimulate innovation. For instance, the Dutch government offers opportunities for tests or evaluations and/or acts as a launching customer (e.g. the Royal Netherlands Navy). Actions to promote technological innovation are co-ordinated by the NMT. This association establishes a network of shipyards, suppliers and service providers and represents the interests of each respective industry with regard to issues linked to trade, innovation and human capital.

Important innovation areas adhere to the environmental performance of ships, smart and safe marine navigation equipment, social innovations, as well as the integration of the maritime cluster into the logistics chain. In addition, the regulatory framework will be updated (e.g. removing redundant regulations, goal-based rules, more efficient registry and certification of seagoing vessels) to foster an innovative business climate. The “Fieldlab Smash” is a highly technological project which intends to optimise the maintenance and repairs of ships by collecting real-time data about a ship’s condition so the exact timing of maintenance and repair can be calculated more precisely, repair costs can be lowered, and a ship’s reliability and safety can be improved.

To pursue the objectives of the Knowledge and Innovation Agenda, the Innovation Council of Nederland Maritiem Land, in co-operation with the Dutch Ministry of Economic Affairs, has established annual maritime innovation impulse projects (MIIPs). The goal of these MIIPs is to stimulate maritime innovations. MIIPs are connected with the Innovation Contract discussed above and are accessible to all players of the maritime cluster. The Netherlands conducts a mission-driven and project-led approach, meaning that companies, researchers and non-governmental associations all collaborate on concrete projects, such as on the development of a carbon-neutral shipping industry. There seems to be a tendency for a cross-sectoral approach. To tackle common issues in various industries, the Netherlands therefore endeavours to create networks between the maritime sector and other sectors.

One of the 2019 projects falling under the MIIPs relates to the smart production of ships. The purpose of this project is to increase the productivity of the Dutch shipyards through the use of digital technologies and robotization, with particular attention given to ship security and port security. The total budget of the MIIPs amounts to EUR 250 000. Each project can be subsidised up to 50% of the project cost, with a maximum of EUR 30 000. As illustrated by Figure 5.3, most of the projects between 2013 and 2016 received a subsidy amounting to around EUR 250 000.

**Figure 5.3. Average amount of Dutch maritime innovation impulse projects subsidies, co-financing and percentage of subsidy, 2013-16**



Source: RVO (2018), *Evaluatie Subsidie aan Nederland Maritiemland (NMT) Ten Behoeve Van Maritiem Innovatie Impuls Projecten*, <https://www.rijksoverheid.nl/documenten/rapporten/2018/09/26/evaluatie-subsidie-aan-nederland-maritiemland-nml-ten-behoeve-van-maritiem-innovatie-impuls-projecten>.

In 2018, the Netherlands Enterprise Agency conducted an evaluation of the effectiveness of the MIIPs. It examined each MIIP's effectiveness based on collaboration, knowledge sharing and feasibility of the project. Taking into account these three evaluation criteria, it concluded that nine out of ten projects in 2016 scored “reasonable to good”, as opposed to seven out of ten in 2015. The vast majority of the projects resulted in follow-up projects. Communication about the results could, however, be improved.<sup>21</sup>

## 5.2. Support measures

Support measures relevant for the shipbuilding industry contain generic and sector-specific instruments (Table 5.6). Under the Netherlands Enterprise Policy, a wide range of financial and non-financial instruments is made available for RDI purposes (see above). Any company can benefit from generic support measures such as the WBSO (RDI tax reduction), regardless of its sector (including the top sectors). In addition to the Netherlands Enterprise Policy, the Dutch Policy for Sustainable Energy offers generic instruments that can equally be utilised by the shipbuilding and the shipping industries.

There is one specific support measure for the shipbuilding sector, which is the Subsidy for Sustainable Shipbuilding (SDS). The SDS is an instrument for innovation; it does not add capacity. All the support provided under this measure has been reported to the WP6 committee in the yearly declaration of the inventory of government subsidies and other support measures. The Public-Private Partnership Allowance (PPP) is a subsidy that applies to all nine top sectors for RDI projects conducted through the TKI. The Top Sector Water & Maritime Industry is one of the nine top sectors that in total cover some 80% of the Dutch economy. The following sections discuss both support measures in more detail.

**Table 5.6. Support measures in the Netherlands with relevance for shipbuilding**

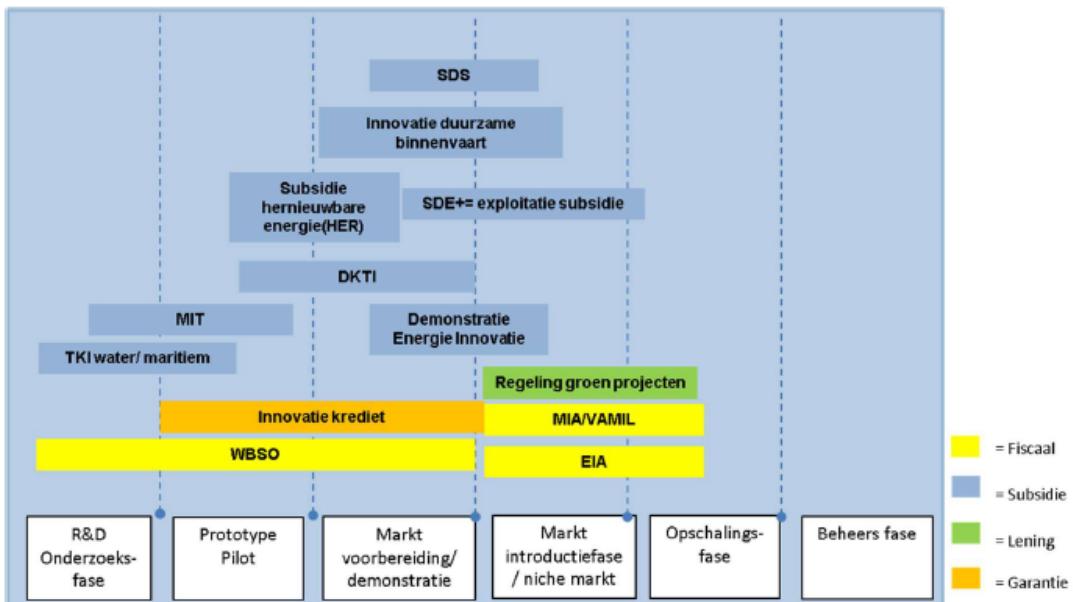
Sector-specific support measures	
	Subsidy for Sustainable Shipbuilding (SDS)
	Public-Private Partnership Allowance (PPP)

Generic support measures	
<b>Innovation</b>	
	WBSO (RDI tax reduction)
	Innovation Box
	Innovation Credit
	Innovation allowance for SMEs
<b>Sustainability</b>	
	MIA and Vamil
	Demonstration Energy Innovation (DEI)
	Energy Investment Allowance (EIA)
Export and home credits	
	Export Credit Insurance
	Export Credit Guarantee
	Insurance for working capital financing
Corporate Finance Guarantee provided by the government	

Source: Based on responses to the peer review questionnaire.

The Dutch support measures aim to provide support in different stages of a shipbuilding project. They may pursue different policy objectives and can take different forms. Figure 5.4 (in Dutch) summarises the main general and specific support measures for the Dutch maritime industry.

**Figure 5.4. Overview of support measures for the Dutch marine industry**



Source: RVO (2019), *Subsidieregeling Duurzame Scheepsbouw: Evaluatie 2017-2018*, <https://www.rijksoverheid.nl/documenten/rapporten/2019/07/11/subsidieregeling-duurzame-scheepsbouw-evaluatie-2017-2018>, 2019, 30.

### 5.2.1. Sector-specific support measures

#### *Subsidy for Sustainable Shipbuilding*

In 2017, a direct support scheme for research and development in sustainable shipbuilding, the SDS, was launched and was expected to remain active until at least the end of 2019 (Table 5.7). Support is provided to shipbuilding companies for specific orders. The SDS may be granted for the industrial application of innovative products that contribute to sustainable development in the shipbuilding sector. These should be technologically new or substantially improved products when compared to the state of the art that exists in the market. The implementation of the innovative products must carry a risk of technological or industrial failure. The scheme is in line with EU state-aid rules and contributes to a common European interest.

**Table 5.7. Summary of the Subsidy for Sustainable Shipbuilding**

<b>Grant rate</b>	Up to 25% of the eligible costs.
<b>Maximum grant limit for each applicant</b>	EUR 1.25 million
<b>Eligible costs</b>	Personnel costs, equipment, subcontracting and other project-related costs. (specified in Article 25, Paragraph 3, under a, b, d and e of the General Block Exemption Regulation). <sup>1</sup>
<b>Eligible applicants</b>	Shipyards in the Netherlands.
<b>Conditions</b>	Applicants want to build or refit inland or seagoing vessels with a gross weight of more than 100 tonnes and with more than 365 kW power. Fishing boats do not qualify. Applicants have not yet signed a contract for the building or refitting of a ship when the application for the subsidy is submitted. The contribution to sustainable development must fall into at least one of following categories: emission reduction noise reduction sustainable life cycle sustainable employability.
<b>Project duration</b>	Up to three years.
<b>Budget</b>	2017: EUR 4.78 million 2018: EUR 5.6 million 2019: EUR 4.6 million
<b>Implementation agency</b>	Netherlands Enterprise Agency

1. EU Commission (Regulation) No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014R0651-20170710&from=EN>.

Sources: <https://www.rvo.nl/subsidies-regelingen/subsidieregeling-duurzame-scheepsbouw-sds>; WP6 Inventory of Subsidies and Other Support Measures.

Initially, the SDS had a duration of one year. It was launched in 2017, but the Dutch parliament requested its prolongation twice, first in 2018 and again in 2019.

On 11 July 2019, the Ministry of Economic Affairs and Climate Policy published its evaluation report on the SDS. The report covered the period between 2017 and 2018 and assessed the effectiveness, efficiency and legitimacy of the SDS. The evaluation was conducted by the Ministry of Economic Affairs and Climate Policy with the support of the Netherlands Enterprise Agency and with contributions from the NMT. According to the report, 23 projects were filed to the SDS and 16 shipyards eventually received the subsidy (Table 5.8), 11 of which (69%) classified as SMEs. The 16 shipyards received ship orders for EUR 569 million, of which almost EUR 59 million (10.31%) was spent on sustainable shipbuilding (Table 5.9). In particular, there were numerous projects related to emission reductions and to dry cargo ships and tankers (Table 5.10).

**Table 5.8. Number of projects filed and approved for the SDS**

	<b>Applied</b>	<b>Accepted</b>	<b>Rejected</b>
<b>2017</b>	12	7	5
<b>2018</b>	11	9	2
<b>Total</b>	23	16	7

Source: RVO (2019), *Subsidieregeling Duurzame Scheepsbouw: Evaluatie 2017-2018*, <https://www.rijksoverheid.nl/documenten/rapporten/2019/07/11/subsidieregeling-duurzame-scheepsbouw-evaluatie-2017-2018>.

**Table 5.9. Amount of subsidies provided through the SDS**

Million EUR

	<b>Order amount</b>	<b>Eligible costs</b>	<b>Requested subsidy</b>	<b>Provided subsidy</b>
<b>2017</b>	451	28	6.1	5.1
<b>2018</b>	118	30	7.6	5.6
<b>Total</b>	569	59	13.8	10.7

Source: RVO (2019), *Subsidieregeling Duurzame Scheepsbouw: Evaluatie 2017-2018*, <https://www.rijksoverheid.nl/documenten/rapporten/2019/07/11/subsidieregeling-duurzame-scheepsbouw-evaluatie-2017-2018>.

**Table 5.10. Number of project themes filed to the SDS by ship type and category**

	<b>Ship type</b>	<b>Emission reduction</b>	<b>Noise reduction</b>	<b>Sustainable life cycle</b>	<b>Sustainable employability</b>
<b>Seagoing</b>	Dry cargo ships, tankers	4			1
	Dredgers				
	Workboats, tug service vessels				
	Offshore windfarm service	2			2
	Cruise ships	1			
<b>Inland</b>	River cruise vessels				
	Dry cargo ships and tankers	5	3		
	Tugs and pushers	3	2		1
	Service vessels	1	1		1
	Dredgers	2			
	Fishing vessels				
<b>Superyachts</b>	Ferries	2	1	1	
		1			1
<b>Total</b>		21	7	1	6

Source: RVO (2019), *Subsidieregeling Duurzame Scheepsbouw: Evaluatie 2017-2018*, <https://www.rijksoverheid.nl/documenten/rapporten/2019/07/11/subsidieregeling-duurzame-scheepsbouw-evaluatie-2017-2018>.

While the evaluation report concluded that the SDS was effective as it was sufficiently utilised by shipyards, it also concluded that more time was necessary to evaluate the subsidy's efficiency given the long implementation time of the projects involved. Consequently, the Ministry of Economic Affairs and Climate Policy suggested extending the period of the SDS for three years to the House of Representatives of the Dutch parliament.

*Public-Private Partnership Allowance*

The PPP provides an incentive (grant) of 30% of every private contribution for joint RDI projects between the public and the private sector, with regard to the TKIs of the top sectors. As of 2019, 12 TKIs (Table 5.11) promoted programming and co-ordination of collaborative research initiatives. The PPP aims to facilitate private-public collaborative projects within the TKIs in the area of research and innovation. For every euro a private company contributes to a research organisation for R&D, the Ministry of Economic Affairs and Climate Policy adds EUR 0.3 as a PPP allowance. The PPP allowance must be used for R&D purposes.

**Table 5.11. List of Top Consortia for Knowledge and Innovation (TKIs)**

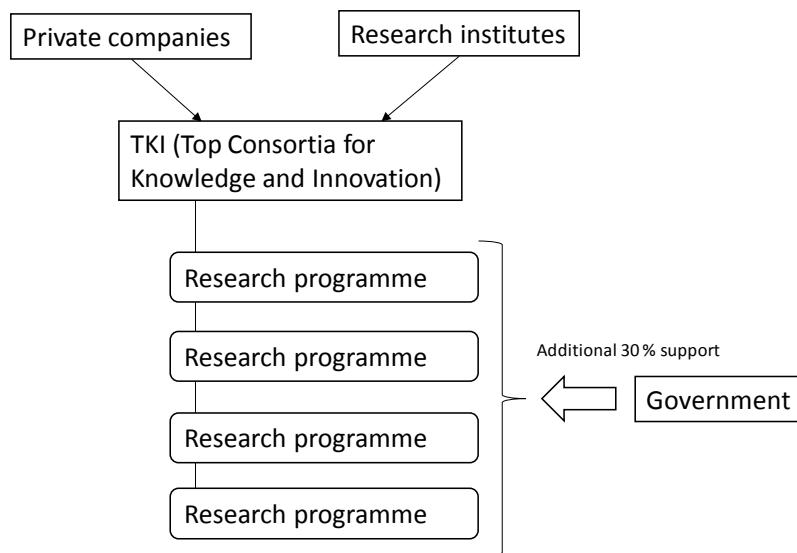
Number	Name
1	TKI Agri and Food
2	TKI Bio-based Economy
3	TKI Chemistry
4	TKI Creative Industry
5	TKI Energy
6	TKI High Tech Systems and Materials
7	TKI Life Sciences and Health
8	TKI Logistics
9	TKI Horticulture and Propagation Materials
10a	TKI Maritime Technology
10b	TKI Delta Technology
10c	TKI Water Technology

Source: [http://rijksbegroting.nl/2019/voorbereiding/begroting.kst248548\\_30.html](http://rijksbegroting.nl/2019/voorbereiding/begroting.kst248548_30.html).

The PPP was introduced in 2013 (Figure 5.5). The characteristics of the scheme are:

- Top-up percentage of 30% (for the first EUR 20 000 per company, the percentage is 40%).
- The PPP is used in public-private partnership projects of the TKI research programmes. The overall objective is to enable research and development for innovative technologies and components that can be integrated in downstream applications in the sectors involved.
- The scheme is in line with EU state-aid rules and contributes to a common European interest.

All TKIs get a budget up to a maximum of EUR 400 000 per top sector, not including the 30% incentive, for their programme-supporting activities.

**Figure 5.5. Mechanism of Top Consortia for Knowledge and Innovation and PPP allowance**

### **5.2.2. Generic support measures**

#### *Innovation*

##### **WBSO**

The Ministry of Economic Affairs and Climate Policy's WBSO (R&D tax reduction) is a governmental tax incentive scheme that offers compensation for R&D wage costs, other costs and expenditures such as prototypes or research equipment (Table 5.12). It is intended to provide entrepreneurs with an incentive to invest in R&D.

For the purpose of this scheme, research and development is defined as:

- the development of technically new physical products, physical production processes, software or components thereof
- technically scientific research seeking to explain phenomena in fields such as physics, chemistry, biotechnology, production technology, and information and communication technology.

**Table 5.12. Summary of the WBSO's characteristics**

<b>Deduction rate</b>	The deduction amounts to 32% of the first EUR 350 000 of the total underlying R&D cost, and to 16% of the remaining costs (in 2019).
<b>Conditions</b>	The R&D project must meet the following conditions before one can apply for the WBSO: – sustainable employability of the proposed R&D activities take place in the applicant's own company – the technological development is new to the applicant's organisation – the development is accompanied by technical problems – the R&D work has yet to take place.
<b>Eligible area</b>	An application can be submitted for either one of two project types: – the development of technically new (components of) – physical products – physical production processes or – software – technical scientific research.
<b>Budget</b>	EUR 1 205 million
<b>Implementation agency</b>	Netherlands Enterprise Agency

Source: <https://english.rvo.nl/subsidies-programmes/wbso>.

### Innovation Box

The Dutch Innovation Box is a fiscal instrument that aims to stimulate technical innovation in the Netherlands (Table 5.13). The Ministry of Finance and the Ministry of Economic Affairs and Climate Policy are both responsible for the Innovation Box. Profits derived from intangibles that qualify for the Innovation Box regime are taxed at an effective 7% rate (from 2018) provided that these assets were created by a Dutch taxpayer and that the assets fall under the R&D tax credit scheme (WBSO). Considering that the normal Dutch corporate income tax rate equals 25% for taxable profits above EUR 200 000, innovative companies can correspondingly realise significant tax savings in the Netherlands.

**Table 5.13. Summary of the Innovation Box's characteristics**

<b>Normal corporate tax rate</b>	The taxable amount is understood as the taxable profit in a year minus deductible losses. If the taxable amount is less than EUR 200 000, the tax rate is 20%. If the taxable amount is EUR 200 000 or higher, the tax rate is 25%.
<b>Reduced tax rate</b>	7% (2019)
<b>Eligible profits</b>	Taxable profits derived from a self-developed intangible asset that was developed by research and development activities benefiting from the WBSO (R&D tax reduction).

### Innovation Credit

The Innovation Credit of the Ministry of Economic Affairs and Climate Policy aims to provide SMEs with financial support for risky innovation projects (Table 5.14). The Ministry of Economic Affairs and Climate Policy renders a direct loan that enables SMEs to finance part of the technical or clinical development costs of a new product, process or service. In this way, the government aims to fill the gap in the capital market in a phase where entrepreneurs are building their company, without having generated any returns yet. The Innovation Credit is available for innovative SMEs that require financing to support innovative ideas.

**Table 5.14. Summary of the Innovation Credit's characteristics**

<b>Loan amount</b>	<ul style="list-style-type: none"> <li>– 25% for large companies, 35% for medium-sized companies and 45% for small companies of relevant project costs.</li> <li>– In case of a collaborative project, loan amounts may be increased up to 40% for large companies and 50% for medium-sized or small companies.</li> <li>– The minimum project size of the Innovation Credit is EUR 150 000.</li> <li>– The maximum loan amount is EUR 10 million for technical projects and EUR 5 million for clinical projects.</li> </ul>
<b>Condition</b>	<ul style="list-style-type: none"> <li>– Business must be established in the Netherlands, Bonaire, Sint Eustatius or Saba.</li> <li>– The Innovation Credit is only meant for companies that do not have sufficient funds to finance a complete technical or clinical innovation.</li> <li>– Projects should serve a new product, process or service to the market within five years.</li> <li>– The Innovation Credit cannot be accumulated with other government grants.</li> </ul>
<b>Budget</b>	Clinical project: EUR 40 million (2019) Technical project: EUR 30 million (2019)
<b>Implementation agency</b>	Netherlands Enterprise Agency

Source: <https://www.rvo.nl/subsidies-regelingen/innovatiekrediet>.

#### Innovation Allowance for SMEs (MIT Scheme)

The Innovation Allowance for SMEs (MIT Scheme) stimulates innovation by SMEs in feasibility studies, knowledge vouchers, innovation performance contracts (IPCs), hiring knowledge workers, and public-private co-operation in research and development, which helps businesses in the proof-of-concept phase or the innovation phase (Table 5.15). Another objective of this allowance is to connect SMEs to the agendas of the top sectors. Start-ups and SMEs can use a loan from this allowance to examine whether their idea is potentially feasible in the market. The loan plus the interest need to be repaid.

A crucial phase in the process is the step from idea to start of product development, i.e. creating and verifying commercial concepts, identifying suitable markets, and developing the right patents. For innovative start-ups, this phase is called the proof-of-concept phase. For existing SMEs, this phase is called the innovation phase. Innovation funding for the proof-of-concept stage is granted to ensure that an idea develops from the planning phase into the start-up phase.

**Table 5.15. Summary of the characteristics of the Innovation Allowance for SMEs**

<b>Loan condition</b>	– An interest rate of 4.84% (2019).
<b>Target groups</b>	<ul style="list-style-type: none"> <li>– Both start-ups and established businesses can benefit from the proof-of-concept funding.</li> <li>Proof-of-concept funding is aimed at three target groups: <ul style="list-style-type: none"> <li>– small and medium-sized enterprises (SMEs)</li> <li>– innovative start-ups (five years old or newer)</li> <li>– academic, hbo (polytechnic) and TO2 innovative start-ups.</li> </ul> </li> </ul>
<b>Budget (2019)</b>	<ul style="list-style-type: none"> <li>– EUR 8 million for SMEs and innovative start-ups.</li> <li>– EUR 2.4 million for academic, polytechnic and TO2 start-ups.</li> </ul>
<b>Implementation agency</b>	<ul style="list-style-type: none"> <li>– The Netherlands Enterprise Agency co-ordinates the implementation for SMEs and innovative start-ups.</li> <li>– Technology Foundation TTW implements it for innovative academic, "hbo" (university of professional education) and TO2 start-ups.</li> </ul>

Source: <https://english.rvo.nl/subsidies-programmes/proof-concept-funding>.

### *Sustainability*

#### Environmental Investment Rebate and Arbitrary Depreciation of Environmental Investments

The Netherlands has established two cross-sectoral support schemes that specifically target the development of environmentally friendly technology: 1) the Environmental Investment Rebate (MIA); and 2) the Arbitrary Depreciation of Environmental Investments (Vamil). Under the MIA, it is possible for corporations that pay taxes in the Netherlands to deduct up to 36% of the investment costs for an environmentally friendly investment on top of its regular tax deductions. The Vamil allows Dutch tax-paying companies to write off up to 75% of their investment costs. The Dutch government has circulated a list of investments that are eligible for the MIA and/or the Vamil (i.e. the “Environmental List”).<sup>22</sup> With respect to the shipbuilding sector, some examples on the Environmental List include electrical engines, dual fuel motors, sustainable hulls for inland waterway ships and an NO<sub>x</sub> reduction system. Besides, companies can file a request to add their innovative idea to the Environmental List. In 2019, the Dutch government attributed EUR 114 million of its funds for the MIA and Vamil scheme combined.

Sustainable shipping also gains ground in the financing by private financial institutions. In terms of green ship financing, the Dutch commercial banks ABN AMRO and ING engaged – together with other big international banks – to take into account climate considerations while assessing requests for loans. These green criteria for ship loans are set out in the “Poseidon Principles”.<sup>23</sup> This set of principles should contribute to the overall goals of the IMO and the Dutch government to significantly reduce CO<sub>2</sub> emissions of ships by 2050.

#### Demonstration Energy Innovation

The Demonstration Energy Innovation (DEI) is a broad plan by the Dutch government to reduce CO<sub>2</sub> production. It covers projects like investments in wind, solar or geothermal energy. The programme is subdivided into several central themes, each operated under a specific budget. Some areas that are relevant for the shipping sector are the circular economy (EUR 44 million); CO<sub>2</sub> reduction in the industrial sector (EUR 23.74 million); transforming into a more flexible electricity network, including switching to hydrogen power (short-term projects: EUR 21.1 million, long-term projects: EUR 12.5 million), and energy innovation (EUR 35 million). The duration of each subsidy programme depends on the type of project and on the category to which the project belongs.

#### Energy Investment Allowance

The Energy Investment Allowance (EIA) offers a tax deduction for the promotion of investments in energy-saving technology and sustainable energy. The tax deduction may be up to 45%, with an average tax deduction rate of 13.5%. For 2019, the earmarked budget amounted to EUR 147 million.

The EIA only applies to generic or specific investments that are included in the Energy List, which is subdivided into seven chapters, including sustainable energy and energy transition. Each investment needs to correspond to a specific investment code or to a generic code that involves energy reductions.

The MIA, Vamil, DEI and EIA have the overall objective to facilitate the development of environmentally friendly technology. The schemes are in line with EU state-aid rules and contribute to a common European interest. These instruments are mainly used by investors in capital goods like ships and hardly by shipyards.

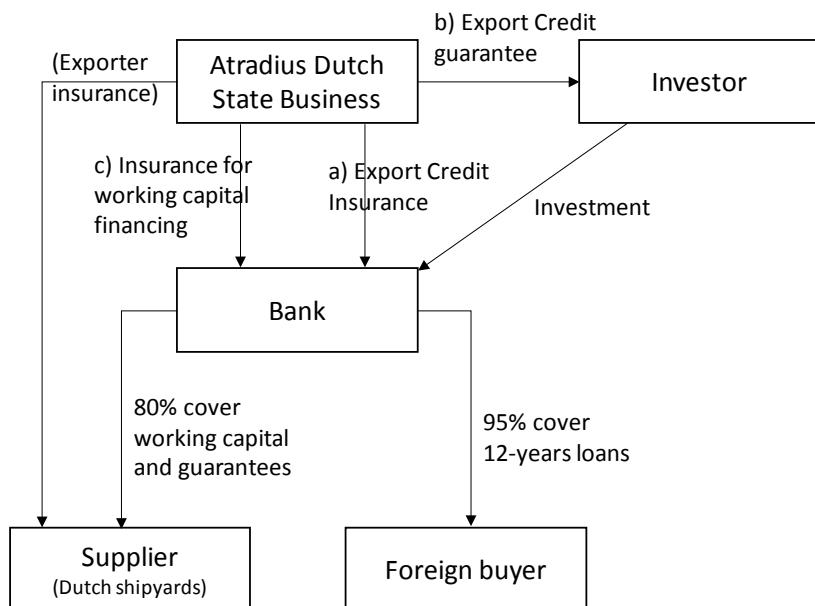
### 5.2.3. Export and home credits

#### *Summary of Atradius Dutch State Business*

The Atradius Dutch State Business, a full subsidiary of the Atradius Group, was tasked to manage the Dutch official export credit facility on behalf of the Dutch government. The Atradius Dutch State Business offers a wide range of insurance and guarantee products for Dutch exporters of capital goods, their financiers and/or investors. Its mission is to promote Dutch exports and investments abroad by providing credit and investment insurance complementary to what is available in private markets.

Export Credit Insurance (ECI) is intended to complement the facilities available in the private credit insurance market. It is therefore principally designed for transactions that are difficult or impossible to insure in the private credit insurance market because of their long credit period, large size or the country risk involved. Figure 5.6 shows typical guarantees and insurances from the Atradius Dutch State Business regarding the sale of ships.

**Figure 5.6. Guarantees and insurances from the government regarding the sale of ships**



Source: Atradius Dutch State Business.

#### Export Credit Insurance

The ECI is primarily used for the export of capital goods or capital-intensive services to non-EU countries. The corresponding high-risk sectors include shipbuilding, contracting, dredging, glasshouse construction and medical equipment. All the support provided under this support measure has been reported to the WP6 committee in the yearly declaration of the “Inventory of government subsidies and other support measures”.

The ECI covers the risk of non-payment of the principal amount, interest and late payment interest due on export loans granted by banks. Claims for damages will be honoured if a borrower defaults on a payment as a direct result of political or commercial issues (whether these arose prior to or after the exporter’s delivery of the goods/services).

The maximum amount that can be made available under an insured export loan depends on several factors, including:

- The creditworthiness of the borrower for the duration of the loan.
- The maximum amount of the contract value which may be financed. In accordance with OECD rules,<sup>24</sup> this is usually no more than 85% (80% for ships).
- Current capacity under the limit for the relevant country.
- The financial position of the exporter.

The maximum cover for regular transactions is typically 90-98% of the insured loan. This means that an exporter will bear 2-10% of the risk.

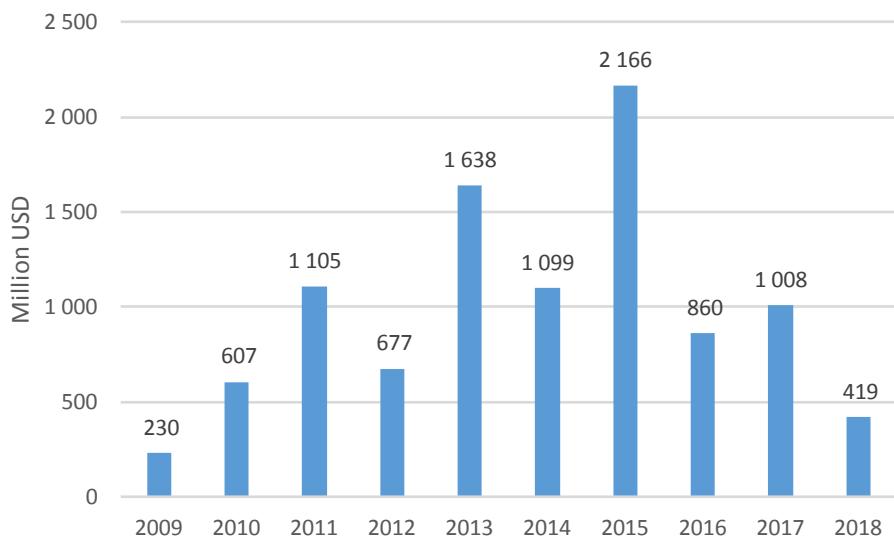
#### Export Credit Guarantee

The Export Credit Guarantee is designed for investors that wish to invest in export credits. This scheme was introduced in 2009, during the economic crisis, to rekindle the financing of export credits. The scheme makes it more attractive for investors to provide capital to banks for financing the export of Dutch capital goods. It creates a new investment opportunity for institutional investors, like pension funds and insurance companies. As the guarantee is irrevocable, the financier's or refinancier's risk of non-payment is fully covered.

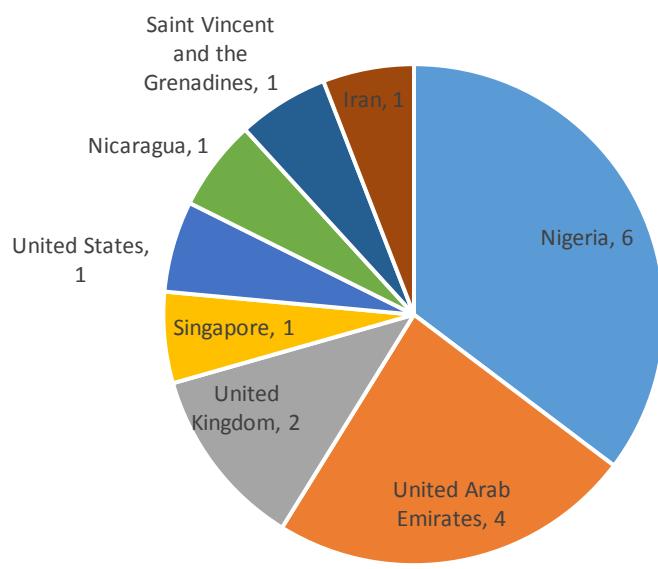
When a bank finances capital good exports, it will need funding. It may use its own resources, but in practice, it will often reach out for external funding. However, sufficient funding is not always available on the private market. In this case, investors can either take over or refinance the export credits granted by banks. In order to protect these financiers or refinanciers from the risk of default, the Dutch state is prepared to issue them an irrevocable payment guarantee. This gives them absolute certainty of recouping their investment plus interest on time. Atradius Dutch State Business, acting on behalf of the Dutch government, can issue an Export Credit Guarantee to investors in conjunction with an export credit insurance policy to the bank.

#### Insurance for working capital financing

Insurance for working capital financing protects financial institutions that granted suppliers extra working capital for exports. It insures the financier against the risk that a supplier will not pay any amounts owed on the facility for principal, interest and/or late payment interest. The purpose of working capital financing cover is to create financial headroom, thereby enabling suppliers to conclude more export transactions. The financier providing the working capital facility will bear 20-50% of the risk.

**Figure 5.7. Amount of Export Credit Insurance**

Source: WP6 Inventory of Subsidies and Other Support Measures.

**Figure 5.8. Countries where Export Credit Insurance was provided by the Atradius Dutch State Business in 2018**

Notes: The number in the figure shows the number of export credit insurances provided to the country.

Source: OECD based on the insurance policies issued in 2018 published by the Atradius Dutch State Business, <https://atradiusdutchstatebusiness.nl/en/article/policies-issued-by-atradius-dsb.html>.

#### 5.2.4. Corporate Finance Guarantee

The Corporate Finance Guarantee is a mechanism designed for large and medium-sized businesses. A state guarantee makes it easier for banks to provide substantial loans to businesses. Since the

government guarantees part of the loan, banks will be more willing to grant the rest of the amount. The state guarantees 50% of new bank loans, subject to a minimum amount of EUR 1.5 million and a maximum of EUR 50 million. The maximum term of the guarantee is eight years.

The budget for 2019 was EUR 200 million. Since 2009, participating banks have provided more than EUR 3.5 billion in loans, half of which were guaranteed by the government. Agriculture, fishery, aquaculture, real estate, and the financial and healthcare industries are excluded from this guarantee scheme.

## 5.3. Policy assessment

### 5.3.1. Assessment of maritime strategy and top sector approach

Different types of actors are involved in the Dutch maritime strategy (e.g. specific research institutions for the marine industry, universities, several government agencies, several private players), each with their own institutional structure (e.g. the TKI Watertechnology has its own Board, Programme Council, Bureau, Knowledge Centre, NWO/STW Co-ordinator and specific subteams),<sup>25</sup> and each operating at different levels (local, national and European). All of these actors have developed their own strategy and priorities. It is therefore a challenge to further co-ordinate all of these instruments under the umbrella of one maritime cluster policy framework while at the same time maintaining policy coherence, which is of particular importance for increasing the transparency and accountability of the Dutch Maritime Strategy.

The introduction of a top sector approach was inspired by different objectives. As pointed out by the Dutch technological research institution Rathenau, the top sector approach was designed to decrease the total amount of direct subsidies by replacing subsidies by lower corporate taxes and tax incentives (Deuten et al., 2014). In a 2017 evaluation report conducted by a Dutch consultancy firm,<sup>26</sup> it was observed that the top sector approach improved the collaboration between the public and the private sectors, led to more research and knowledge spill-overs, and promoted exports. On the other hand, the report mentioned that additional efforts were needed to attract private investments, engage all of the different government agencies to co-operate in the implementation of the top sector policies, and reduce red tape. In addition, the objectives of the top sectors needed to be set out more concretely to alleviate the evaluation afterwards. Next, the aims of the top sectors needed to be better aligned with broader societal challenges. Finally, the 2014 evaluation report conducted by Rathenau contends that the current Dutch innovation approach “induces a focus on incremental rather than radical innovations” (Deuten et al., 2014).

While the top sector approach seems to create synergies and spill-overs between different strategic sectors in the Netherlands, it appears to be predominantly technology-oriented. It could be relevant to equally increase awareness for non-technological innovation and the role of social sciences (e.g. the effect of different management styles; more innovative human resources policies; lenient business structures; human skills training in an increasingly digitalised world; working with a diverse workforce; change management). Furthermore, it could be useful to frame the Dutch policy outcomes in terms of overall societal value and not only in economic terms.

As indicated in the 2014 *OECD Review of Innovation Policy* (OECD, 2014), the impact of the top sector approach could be improved by increasing the level of knowledge sharing between the different top sectors, by including more SMEs in the general top sector framework, by attracting a higher share of private funding, and by better co-ordinating the agendas of all the different entities involved (e.g. Human Capital Agenda and the Technology Pact). In addition, the sectoral approach of the top sectors calls for attention on how the top sectors are selected and how “future winners” are picked

(asymmetry of information). Also, the Netherlands may want to reflect on the more general criticism regarding sectoral industrial policies, that this type of policy instrument does not always take into account global value chains, that it risks diverting resources from horizontal policies (e.g. education or fundamental research) to the sectoral level, and that the gains from co-operation between business and government may be overrated.

### *5.3.2. Assessment of selected support measures*

The subsequent subsections assess the impact of the selected Dutch support measures related to the shipbuilding sector. These measures may be generic or specific in nature. More specifically, this section examines the sector-specific support measures for R&D, the SDS and the PPP.

Additionally, the granting of export credits is evaluated in the context of their effect on the level playing field in the global shipbuilding industry. This analysis is based on the fact that the overall objective of the WP6 is to assist governments in designing and implementing policies that foster normal competitive conditions. This section mainly analyses the effect, intensity, efficiency, and amount of subsidies and transparency, and makes recommendations to ensure a level playing field.

#### *Effects of subsidies for R&D on trade*

One of the key discussion points is linked to the question of whether subsidies for R&D would have market-distorting effects. In 1994, major shipbuilding economies approved the “Agreement Respecting Normal Competitive Conditions in the Commercial Shipbuilding and Repair Industry” (the 1994 Agreement)<sup>27</sup> to remove market-distorting practices and ensure a level playing field in the global shipbuilding industry. Though the 1994 Agreement has not entered into force, its terms and conditions to allow for R&D subsidies can be used as an interesting reference while assessing the potential market-distorting effect of R&D subsidies.

More specifically, taking into account that R&D and new technologies are increasingly playing a pivotal role in the shipbuilding industry, both in the development of high-performance ships and in ship construction, the 1994 Agreement allowed for several types of R&D assistance,<sup>28</sup> including:

- fundamental research<sup>29</sup>
- basic industrial research,<sup>30</sup> where the aid intensity was limited to 50% of the eligible costs
- applied research,<sup>31</sup> where the aid intensity was limited to 35% of the eligible costs
- development,<sup>32</sup> where the aid intensity was limited to 25% of the eligible costs.

In other words, the 1994 Agreement deemed that fundamental research was remote from products sold in the market and thus could rarely have a direct impact on a product’s price, and that the more R&D relates to commercial sales, the bigger the risk that it has an impact on a product’s price.

#### *Effect of the SDS on normal competitive conditions*

The SDS appears to fall under the 1994 Agreement’s classification of “development”. The purpose of the SDS is to support the development of new innovative technologies which carry a risk leading to a failure to meet performance requirements and to apply the technologies to ships. In other words, the SDS is only valid for the costs associated with the development of innovative parts of ships. Therefore, it is unlikely that the SDS will fall outside the “development” category as long as applicants comply with its purpose. The SDS also does not contribute to excess capacity, so this instrument has no market-distorting effects.

The SDS scheme falls under the General Block Exemption of the EU State-Aid Rules,<sup>33</sup> which allow for prototyping as a form of “experimental development” (R&D). To ensure that the SDS is used within the scope of the 1994 Agreement and that it does not have any adverse effect on normal

competitive conditions, it is recommended that the government continue its efforts to monitor the end-use of the subsidy and to confirm that applicants use the subsidy in compliance with its purpose.

#### *Effect of the PPP on normal competitive conditions*

The PPP appears to be categorised under the 1994 Agreement as “basic industrial research”, “applied research” or “development”, depending on the project. Partially because all projects must be conducted in co-operation with research institutes under the PPP’s mechanism, it seems that the projects are medium to long term and that their achievement cannot be immediately applied to commercial ships sold (Table 5.5). Therefore, it is unlikely that the PPP will deviate from the scope of “basic industrial research”, “applied research” and “development”. It did not contribute to excess capacity, so it does not have any market-distorting effects.

To ensure that the PPP allowance is used within the scope allowed in the 1994 Agreement and that the PPP does not have an adverse effect on normal competitive conditions, it is recommended that the government continue its efforts to evaluate the relation with commercial products and the planned innovation of the applied projects before deciding to provide the PPP allowance and to continuously and regularly monitor the end-use of the PPP allowance.

#### *Intensity of the SDS and PPP*

The grant rate of the SDS is up to 25% of the eligible costs. Assuming that the SDS is within the scope of “development”, it appears to be consistent with the exceptions of prohibited subsidies in the 1994 Agreement.

In the PPP mechanism, the government adds EUR 0.3 as a PPP allowance for every euro of a private cash R&D contribution, and the whole PPP allowance has to be used in the R&D projects. In other words, the PPP allowance can be considered to be contained in the total eligible cost of the projects. The PPP allowance is therefore provided within the range of exceptions of prohibited subsidies in the 1994 Agreement as the allowance does not represent more than 23% (this is the ratio of the allowance [EUR 0.3] to the eligible cost [EUR 1.3] of the eligible costs).

#### *Efficiency and amount of the SDS*

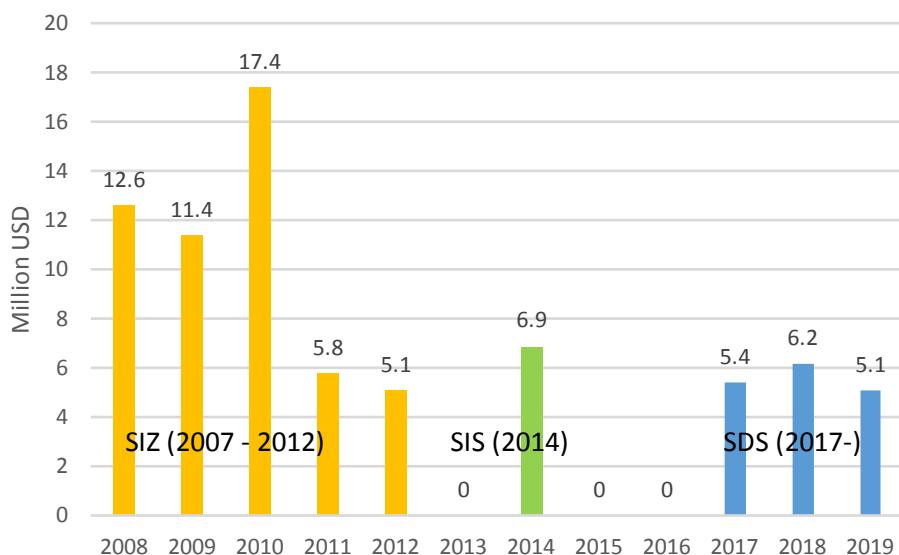
As indicated in the Ministry of Economic Affairs and Climate Policy’s evaluation of the SDS, the SDS initially had only a two-year maturity (2017-18). It consequently appears to be too early to assess the efficiency of the subsidy. This sub-section also includes an analysis of past Dutch R&D subsidies.

The Subsidy for Innovative Shipbuilding (called “SIZ” from 2007 to 2012, and “SIS” in 2014) was provided to shipbuilding companies, ship repair companies and ship conversion companies to encourage innovations in the Dutch shipbuilding industry. The subsidy was granted for the industrial application of innovative products and processes. These had to be technologically new or substantially improved products and processes compared to the state of the art that existed in the European Union. The subsidy could be granted up to a maximum aid intensity of 20% (30% for costs concerning environmental innovation) of the eligible costs. These costs are limited to expenditure on investments, design, engineering and testing activities directly and exclusively related to the innovative part of the project.

The SIZ and SIS are similar to the SDS, but the SIS focuses on sustainable innovations. As shown in Figure 5.9, the average amount of the subsidy provided in the SDS is, on average, lower than those in the SIZ and SIS. R&D subsidies were discontinued in 2013, 2015 and 2016. The SDS was originally only open for one year (2017), but later extended to 2018 and 2019. A long-term vision on the duration and the available funding of the SDS is recommended to increase legal certainty for its applicants.

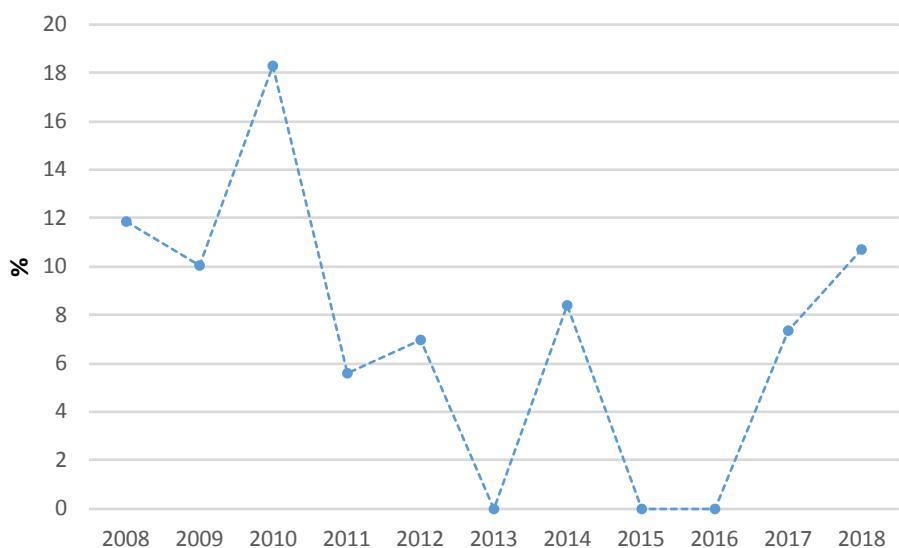
The average ratio of this series of Dutch R&D subsidy to the total amount of R&D subsidies provided by WP6 members between 2008 and 2018 was 7.9%. The highest ratio was 18.3% in 2010 (Figure 5.10). In comparison to the total amount of the 11 R&D subsidies reported on average by WP6 members per year, the amount of R&D subsidies provided by the Netherlands appears relatively small. In light of the amount of these subsidies, there is no evidence that the Dutch subsidies had an impact on the normal competitive condition in the shipbuilding industry.

**Figure 5.9. Amount of R&D support to shipyards in the Netherlands**



Source: WP6 Inventory of Subsidies and Other Support Measures.

**Figure 5.10. Ratio of Dutch R&D subsidy to WP6 R&D subsidies**

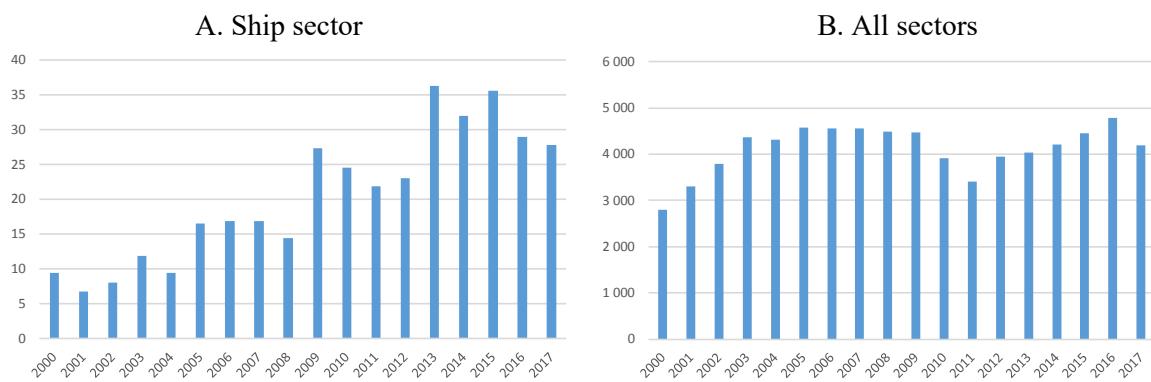


Source: WP6 Inventory of Subsidies and Other Support Measures.

### *Efficiency of the PPP*

As explained above, the PPP was introduced in 2013, providing an incentive of 30% for every private R&D linked to the 12 TKIs. The number of patent applications in the Netherlands generated by the ship sector between 2013 and 2017 (i.e. after the PPP was introduced) increased compared to its level prior to 2012 (Figure 5.11). The share of the ship sector in total number of patent applications in the Netherlands has increased and is higher than the world average for the period 2009-17 (Figure 5.12). This may suggest that the top sector policy including the PPP has helped improve R&D in the Dutch shipbuilding sector.

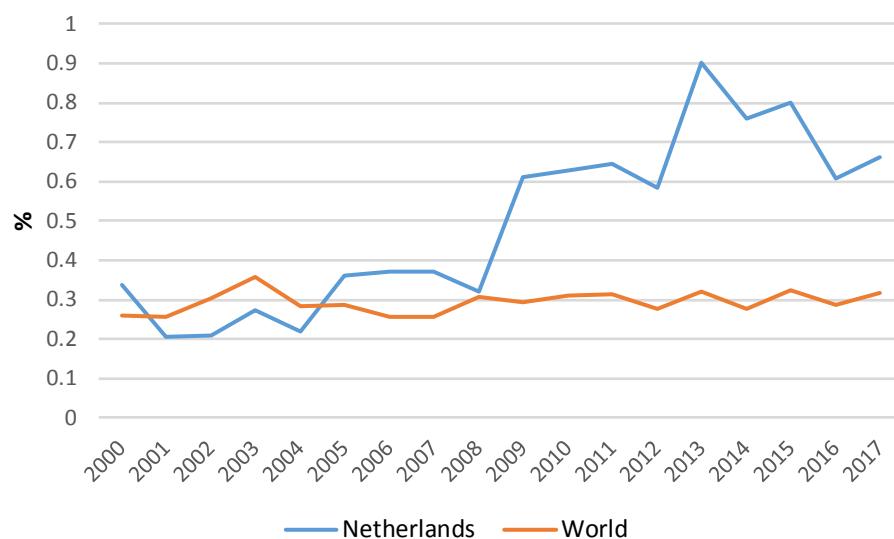
**Figure 5.11. Number of patent applications in the Netherlands**



Notes: The number of ship-related patent applications includes B63B or B63C or B63G or B63H or B63J in the International Patent Classification. The data set comprises the patents subdivided by type of technology and contains the following characteristics: reference date: application date; patent office and patent families: patent applications filed under the Patent Cooperation Treaty; reference country: applicant(s)' country(ies) of residence. Data extracted on 13 August 2019.

Source: OECD.Stat Patents by IPC – Section B, <https://stats.oecd.org>.

**Figure 5.12. Share of ship sector in total number of patent applications**



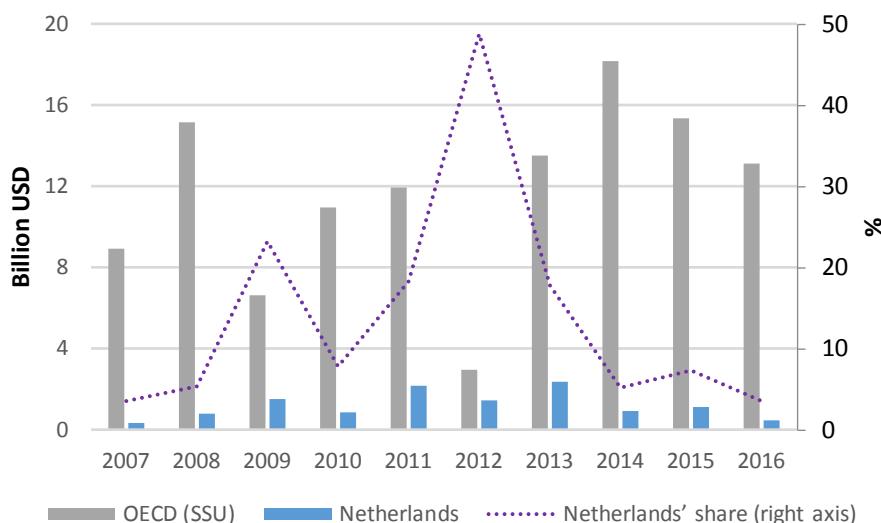
Notes: The number of ship-related patent applications includes B63B or B63C or B63G or B63H or B63J in International Patent Classification. The data set enumerates the patents by type of technology and includes the following characteristics: reference date; application date; patent office and patent families; patent applications filed under the Patent Cooperation Treaty; reference country; applicant(s)' country(ies) of residence. Data extracted on 13 August 2019.

Source: OECD.Stat Patents by IPC - Section B, <https://stats.oecd.org>.

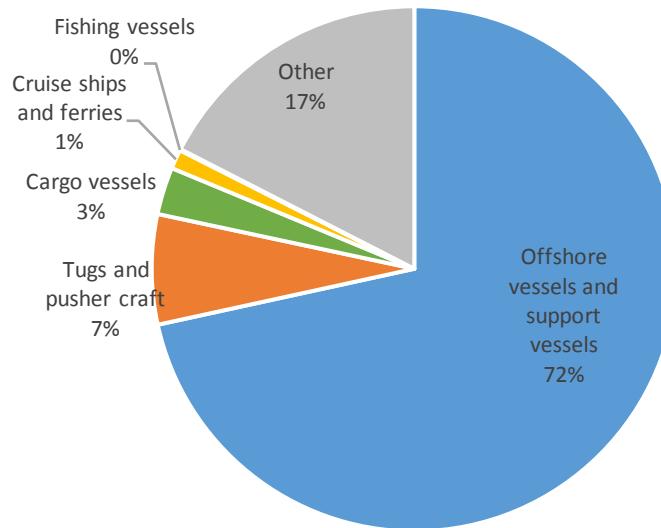
### *Amount of export credits*

The amount of export credit for ships in the Netherlands accounted for 10.4% of the total OECD export credit for ships between 2007 and 2016 (Figure 5.13). In the Netherlands, export credits for offshore vessels and support vessels accounted for 72% of total export credits for ships between 2009 and 2018 (Figure 5.14). The share of export credits for ships in the Netherlands reached a maximum of 48.9% in 2012, but has been declining since 2013. In 2012, the global shipping market faced a large decline in new shipbuilding orders, notably for cargo vessels, tankers and cruise ships, and the amount of export credits for those vessels dropped correspondingly. The share of export credit for offshore vessels and support vessels, by contrast, remained high in 2012. This indicates that the amount of Dutch export credits was not large compared to other WP6 members.

**Figure 5.13. Amount of export credits for ships**



Source: OECD calculations based on data in annual inventory submission and data on OECD Export Credit website available at: [www.oecd.org/trade/topics/export-credits/statistics](http://www.oecd.org/trade/topics/export-credits/statistics).

**Figure 5.14. Share of export credits for ships by segments, 2009-18**

Source: OECD data from the Trade and Agriculture Directorate.

#### *Transparency of export credits*

The OECD has established and continues to update the “[Arrangement on Officially Supported Export Credits](#)” (hereafter, the Arrangement) and its annex, the “Sector Understanding on Export Credits for Ships” (hereafter, the SSU). The Arrangement (including the SSU) is referred to in Annex I, k) of the WTO’s Agreement on Subsidies and Countervailing Measures and is known under the term “Safe Haven”.

According to Appendix V of the Arrangement, export credit is defined as “an insurance, guarantee or financing arrangement which enables a foreign buyer of exported goods and/or services to defer payment over a period of time. An export credit may take the form of a supplier credit extended by the exporter, or of a buyer credit, where the exporter’s bank or other financial institution lends to the buyer (or its bank)”.

The Export Credit Insurance (ECI) provided by the Atradius Dutch State Business (see above) falls into the “Export credit guarantee or insurance (pure cover)” as defined in Article 5a of the Arrangement. Transactions falling under the SSU shall comply with the terms of the SSU, such as a maximum repayment term (i.e. 12 years) and a minimum cash payment (i.e. 20%). Due to reasons of confidentiality, it is not possible to undertake an assessment of each of the individual export credit transactions. The system regarding export credits is basically based on the responsibility of each country.

On the other hand, it can be considered that the transparency of the Dutch export credits appears to be ensured as the website of the Atradius Dutch State Business clearly and specifically indicates the conditions in accordance with OECD rules and publishes the summary of each transaction, including country, debtor, exporter and guarantor’s name, issued date, product type, contents of transactions, and maximum liability. It is recommended that the Atradius Dutch State Business continue this effort to ensure the transparency of Dutch export credits. In general, the Netherlands is commended for not contributing to excess capacity and it recommended that this approach continues.

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<sup>1</sup>. Defined by Nijdam and de Langen (2003) as “firms in a cluster that have – because of their size, market position, knowledge and entrepreneurial skills – the ability and incentive to make investments with positive externalities for other companies in the cluster.”.

<sup>2</sup>. The deliveries of superyachts are indicated in value and not in CGT, as the CGT unit is considered to underestimate the production of this specific type of ship. The WP6 discussed these issues during the period 2015-17 following presentations notably by the Superyachts Builders Association, which supported a revision of the CGT coefficients. SEA Europe suggested to review the different categories so the large diversity of ship types within the non-cargo carrying vessels category could, for instance, be reflected in a more accurate fashion.

<sup>3</sup>. Temporary staffing through employment agencies are excluded from this figure.

<sup>4</sup>. This figure embodies temporary staffing through employment agencies and independent contractors.

<sup>5</sup>. There are no specific figures available for labour costs in the Dutch shipbuilding industry.

<sup>6</sup>. The FES was established in 1995 and continued until 2010 to strengthen the economic structure, which was funded from the profits coming from natural gas.

<sup>7</sup>. This pact aims to attract more graduate students to technological sectors to meet the demands from the Dutch labour markets. For more information see: <https://www.techniekpact.nl/wp-content/uploads/2014/03/Dutch-Technology-Pact-Summary.pdf>.

<sup>8</sup> . For an application in the maritime sector, see: <https://www.duurzaamheidsfabriek.nl/kennis-innovatie/toegepaste-innovaties-voor-maritieme-automatisering-tima> (in Dutch).

<sup>9</sup> . See the European Commission’s Database on State Aid at: <https://webgate.ec.europa.eu/competition/transparency/public/aidAward/show/28074>.

<sup>10</sup>. NML has set up a specific Trade Council to promote equal international competition in the maritime cluster.

<sup>11</sup>. CESA is part of SEA Europe. This non-governmental organisation has consultative status within the IMO, where it represents the voice of the European shipyards and the European maritime equipment industry.

<sup>12</sup>. See, for instance, Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No. 1024/2012 and (EU) No. 167/2013, and amending and repealing Directive 97/68/EC.

<sup>13</sup>. The two ECAs are the SOx Emission Control Area (SECA) and the NOx Emission Control Area (NECA).

<sup>14</sup>. Resolution MEPC.203(62), Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto, adopted on 15 July 2011, [www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/Resolution%20MEPC.203\(62\).pdf](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/Resolution%20MEPC.203(62).pdf).

<sup>15</sup>. <https://www.government.nl/documents/reports/2015/07/07/the-dutch-maritime-strategy-2015-2025>.

<sup>16</sup>. Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

<sup>17</sup> . <https://www.energieakkoordser.nl/doen/engels.aspx> and <https://www.government.nl/topics/renewable-energy/documents/publications/2013/09/06/energy-agreement-for-sustainable-growth>.

<sup>18</sup>. For more information, see: <https://maritimetechnology.nl/en/projects/retrofit>.

<sup>19</sup>. Resolution MEPC.203(62), Amendments to the Annex of the Protocol of 1997 to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto, adopted on 15 July 2011, [www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/Resolution%20MEPC.203\(62\).pdf](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/Resolution%20MEPC.203(62).pdf).

<sup>20</sup>. <https://www.hollandtradeandinvest.com/business-information/trade-and-invest-information>.

<sup>21</sup>. For a more detailed assessment, see RVO (2018).

<sup>22</sup>. See: <https://www.rvo.nl/sites/default/files/2019/02/Brochure%20en%20Milieulijst%202019.pdf> (in Dutch).

<sup>23</sup>. For more information, see: <https://www.poseidonprinciples.org/#about>.

<sup>24</sup>. Arrangement on Officially Supported Export Credits and Sector Understandings.

<sup>25</sup>. For an overview, see Deuten et al. (2014: 15-16).

<sup>26</sup>. For more information, see Dialogic (2017).

<sup>27</sup>. Shipbuilding Agreement, <https://www.oecd.org/sti/ind/shipbuildingagreement-overview.htm>.

<sup>28</sup>. In addition, R&D undertaken by small and medium-sized shipyards as well as R&D related to safety and the environment could benefit from higher than normal rates.

<sup>29</sup>. The term “fundamental research” means research activities independently conducted by higher education or research establishments for the enlargement of general scientific and technical knowledge, not linked to industrial or commercial objectives.

<sup>30</sup>. “Basic industrial research” is understood to mean original theoretical and experimental work whose objective is to achieve a new and better understanding of the laws of science and engineering in general and as they might apply to an industrial sector or to the activities of a particular undertaking.

<sup>31</sup>. “Applied research” is understood to mean investigation or experimental work on the basis of the results of the basic research with a view to facilitating the attainment of specific practical objectives, such as the creation of new products, production processes and services. It normally ends with the creation of a first prototype and does not include efforts whose principal aim is the design, development or testing of specific items of services to be considered for sale.

<sup>32</sup>. “Development” is understood to mean work based on the systematic use of scientific and technical knowledge in the design, development, testing or evaluation of a potential new product, production processes or service or of an improvement to an existing product or service to meet specific performance requirements and objectives. This stage will normally include pre-production models, such as pilot and demonstration projects, but does not include industrial application or commercial exploitation.

<sup>33</sup>. Commission Regulation (EU) No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014R0651-20170710&from=EN>.