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E-fuels in the shipping industry

A survey of decision-makers at companies in the maritime industry

Published October 2023

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Summary

Significance of e-fuels in shipping

Summary of the key results (1/2)

In 2018, within the framework of the UN IMO (International Maritime Organization), more than 170 states undertook to at least **halve the total greenhouse gas emissions caused by shipping by 2050.** When it comes to moving forward with decarbonisation in shipping, 60 percent of the shipping industry’s decision-makers consider **retrofitting existing ships** so they run on alternative fuels to be the **best medium-term strategy** (page 28).

More than nine out of ten companies in the maritime industry believe that **e-fuels** play a **substantial role** and could make shipping more sustainable (page 7). The **potential** of this synthetic fuel to reduce greenhouse gas emissions in shipping is rated **as very good to good** by 93 percent (page 8). Other meaningful alternatives to the marine diesel predominantly used at present are primarily considered to be biofuels (biodiesel, biomethanol, biogas) or liquefied natural gas (page 9).

Nevertheless, e-fuels are largely expected to play only a **niche role** in the global shipping industry, at least until 2030 (page 11). In addition to the **technical complexity** (page 18), other **obstacles** to the implementation of e-fuels are seen as the **high investment costs** involved in the changeover to e-fuels and in the **lack of availability** at the global level (page 20).

Significance of e-fuels in shipping

Summary of the key results (2/2)

According to considerably more than half of the decision-makers surveyed, the **availability of e-fuels** will remain poor until 2030 (page 14). Here, companies see it as the **responsibility of governments to create incentives for the production of e-fuels** and **fund research and development** in this field. The experts also consider it necessary to **establish infrastructure** both for the production and the distribution of this fuel in order to improve availability (page 16).

Three-quarters of those surveyed in the shipping industry assume that the **cost of e-fuels** will remain higher than that of fossil fuels over the next 12 years (page 24). Even taking tax incentives into account, the majority of those surveyed do **not expect cost parity** to be reached **before 2040** (page 26). The largest cost driver is the **construction and operation of production facilities** (page 27).

However, three-quarters of those surveyed anticipate that the shipping industry will **no longer be able to do without e-fuels from 2045** at the latest (page 13).

On this basis, 52 percent of **shipping companies and ship operators** already see e-fuels as a potential alternative, and 47 percent have concrete investment plans (page 22). More than one in three shipping companies or ship operators are also looking into retrofitting their ships to allow for the use of e-fuels (page 23).

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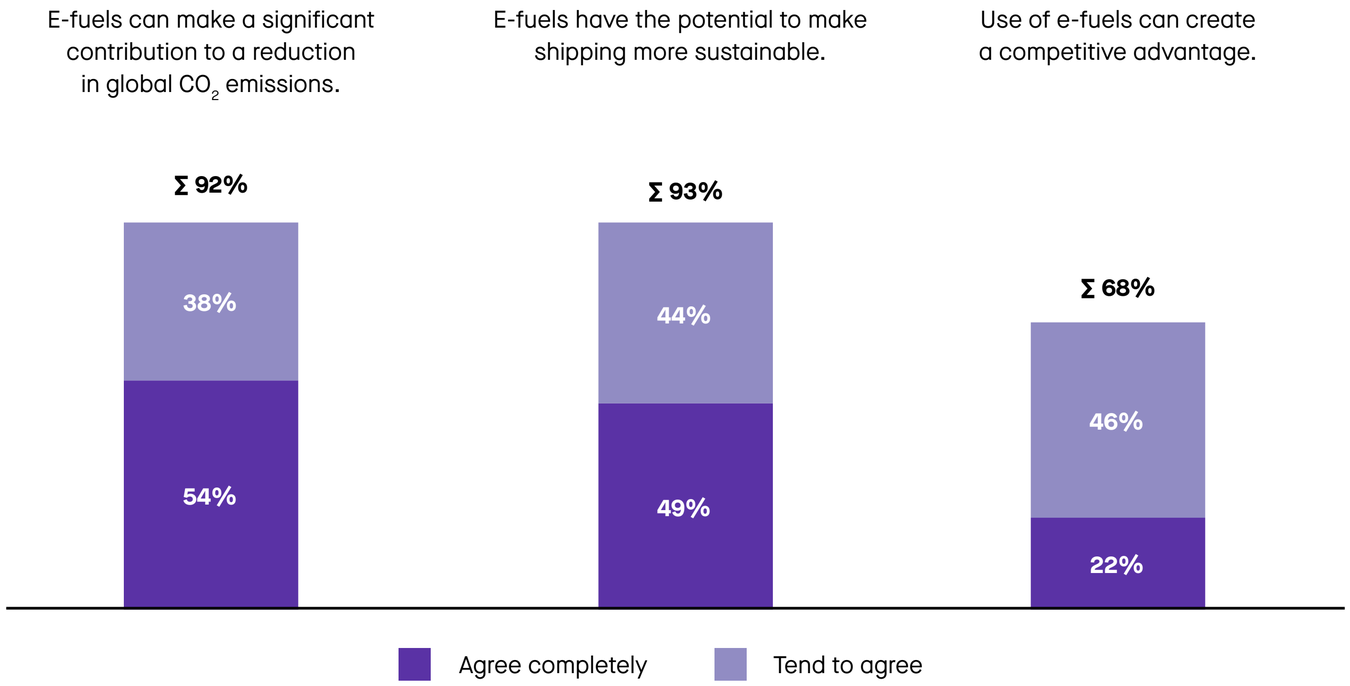
Overall results

Significance of e-fuels in shipping

Image of e-fuels



More than nine out of ten decision-makers from the maritime industry see e-fuels as important when it comes to making shipping more sustainable and playing a significant role in reducing global CO_2 emissions.

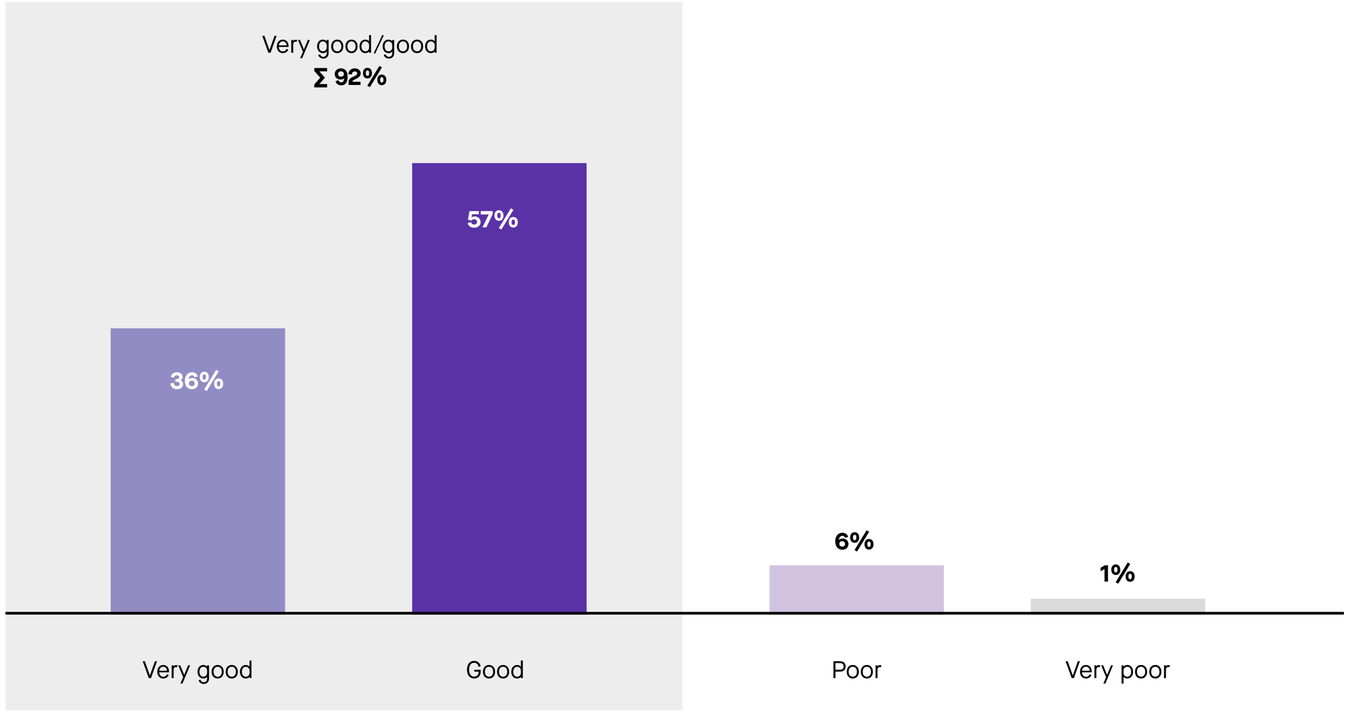
Two-thirds of the companies currently see a competitive advantage in the use of e-fuels.

Question 1: What alternative fuels other than e-fuels do you see as a meaningful supplement or alternative to the marine diesel predominantly in use at present?

Basis: all respondents, N = 200 (multiple responses)

Significance of e-fuels in shipping

Potential of e-fuels to reduce GHG (greenhouse gas) emissions



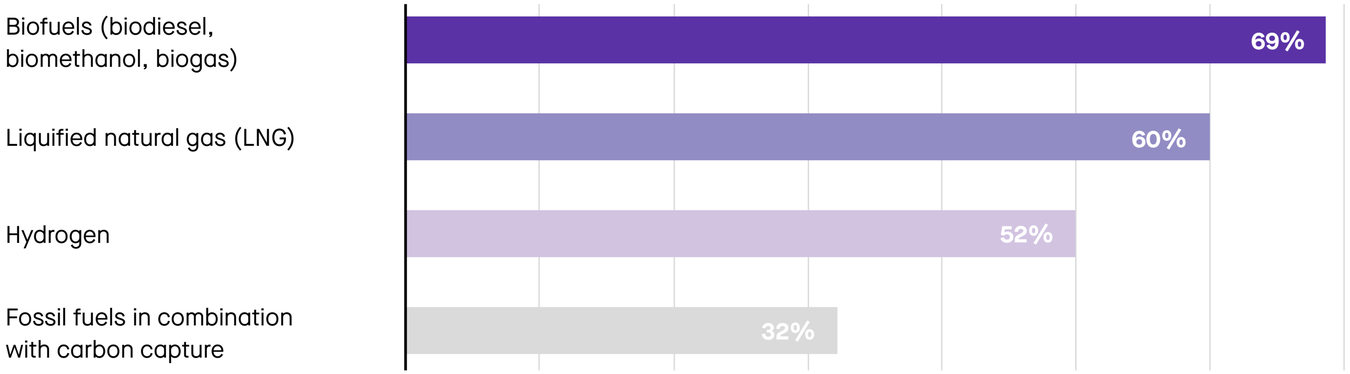
The potential of e-fuels to reduce GHG emissions in shipping is rated as (very) good.

Question 2: How do you assess the potential of e-fuels to reduce GHG emissions in shipping?

Basis: all respondents, N = 200 (single response)

Significance of e-fuels in shipping

Meaningful alternative fuels (other than e-fuels)



Biofuels such as biodiesel, biomethanol and biogas are primarily seen as a supplement or alternative to the marine diesel currently used.

However, liquefied natural gas is also named as a meaningful substitute by 60 percent of the decision-makers surveyed.

Question 4: What alternative fuels other than e-fuels do you see as a meaningful supplement or alternative to the marine diesel predominantly in use at present?

Basis: all respondents, N = 200 (multiple responses)

Acceptance of e-fuels in shipping

Meaningful alternative fuels (other than e-fuels)

		Sector within the maritime industry			Annual turnover	
	Total	Shipping company/ ship operator	Logistics/ operations	Other sector*	Below EUR 100 million	EUR 100 million or above
Basis	200	70	88	42	113	87
Biofuels (biodiesel, biomethanol, biogas)	**69%**	73%	**63%**	**74%**	65%	**74%**
Liquified natural gas (LNG)	**60%**	**54%**	61%	64%	**52%**	**69%**
Hydrogen	**52%**	**46%**	**60%**	**43%**	53%	49%
Fossil fuels in combination with carbon capture	**32%**	**37%**	31%	**26%**	28%	**37%**

Min. 5 percentage points below the overall average

Min. 5 percentage points above the overall average

In addition to biofuels and liquefied natural gas, logistics companies in the maritime industry increasingly see hydrogen as a meaningful alternative.

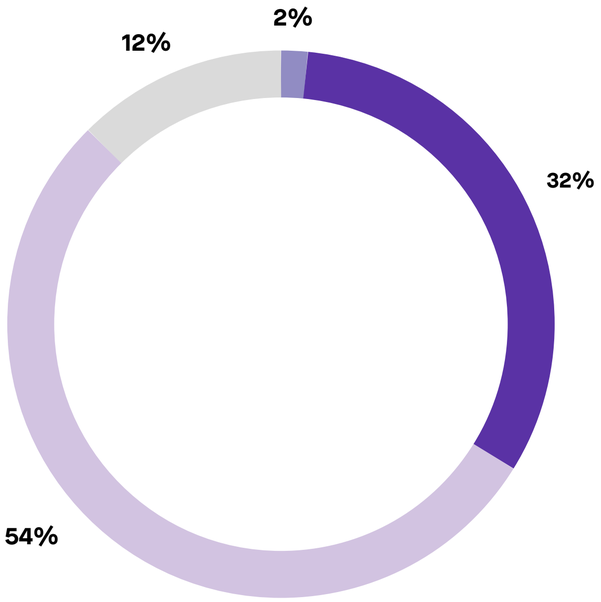
Question 4: What alternative fuels other than e-fuels do you see as a meaningful supplement or alternative to the marine diesel predominantly in use at present?

Basis: all respondents, N = 200 (multiple responses)

*Other sector = port operators, shipping financiers, ship classification societies

Significance of e-fuels in shipping

The significance of e-fuels by 2030



- E-fuels will play an important role
- E-fuels will be the predominant fuel source
- E-fuels will play a niche role
- E-fuels will play an insignificant role

One in three respondents believes that e-fuels will play an important role in the global shipping industry in the next seven years.

More than half see e-fuels in a niche role by 2030.

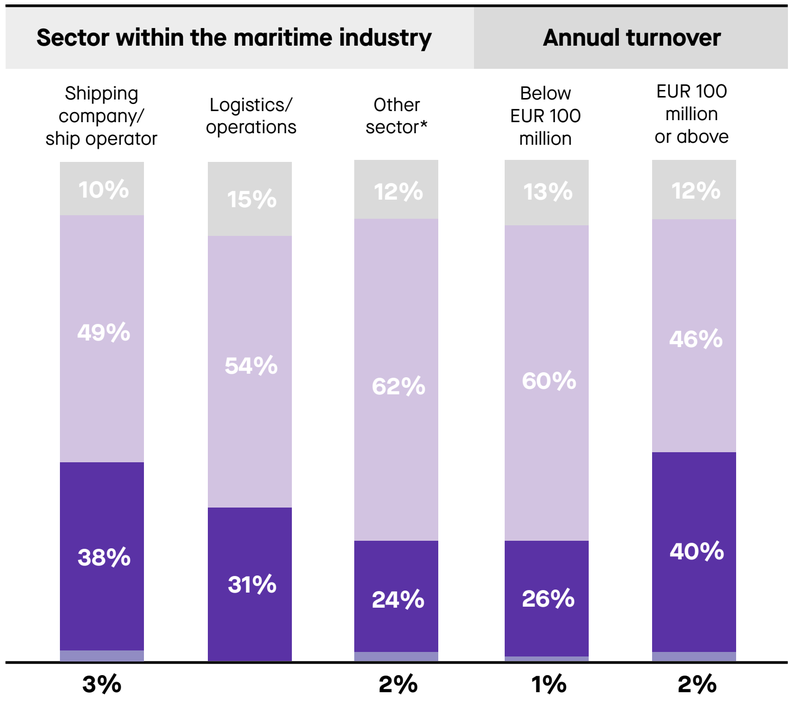
Only one in eight decision-makers believe that e-fuels will have no significance in the global shipping industry by 2030.

Question 5: : How do you see the role of e-fuels in the global shipping industry by 2030?

Basis: all respondents, N = 200 (single response)

Acceptance of e-fuels in shipping

Role of e-fuels by 2030



- E-fuels will play an important role
- E-fuels will be the predominant fuel source
- E-fuels will play a niche role
- E-fuels will play an insignificant role

Shipping companies and companies from the maritime sector with an annual turnover of above EUR 100 million, in particular, expect e-fuels to play an important role in the global shipping industry by 2030.

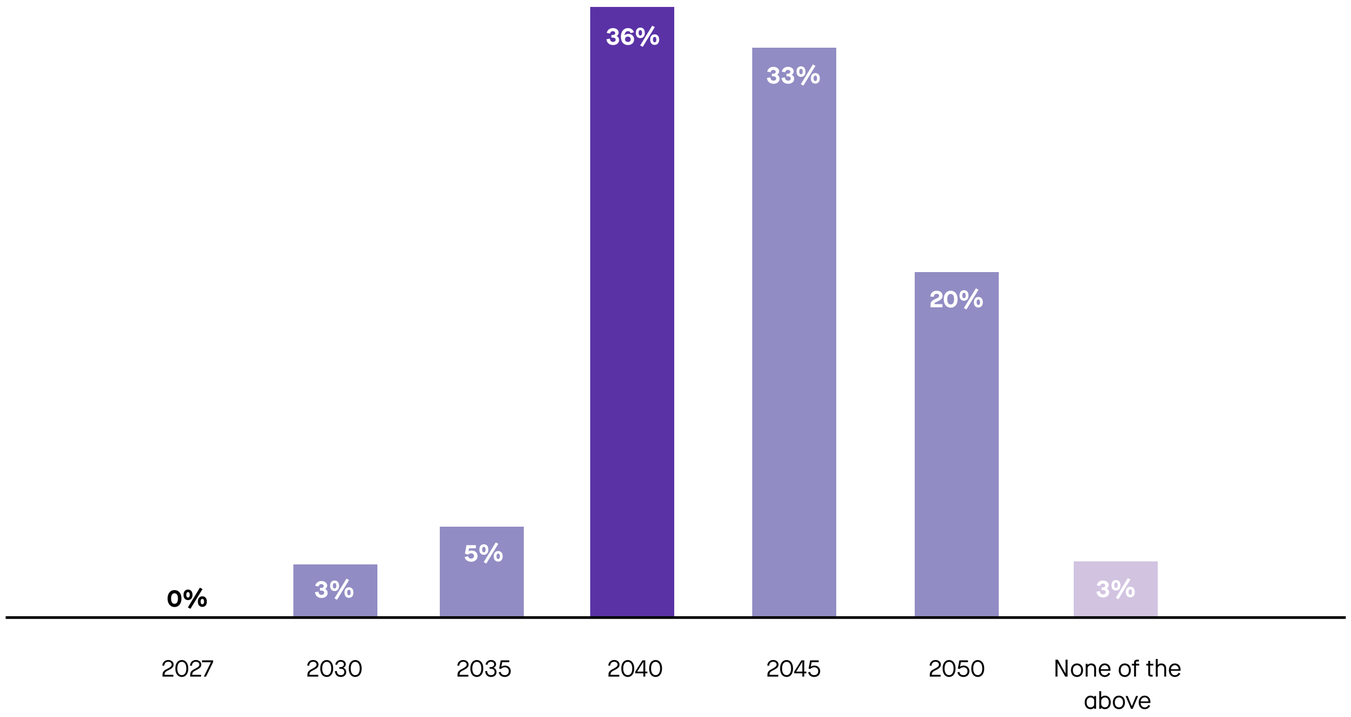
Question 5: How do you see the role of e-fuels in the global shipping industry by 2030?

Basis: all respondents, N = 200 (single response)

*Other sector = port operators, shipping financiers, ship classification societies

Significance of e-fuels in shipping

The point at which e-fuels become essential



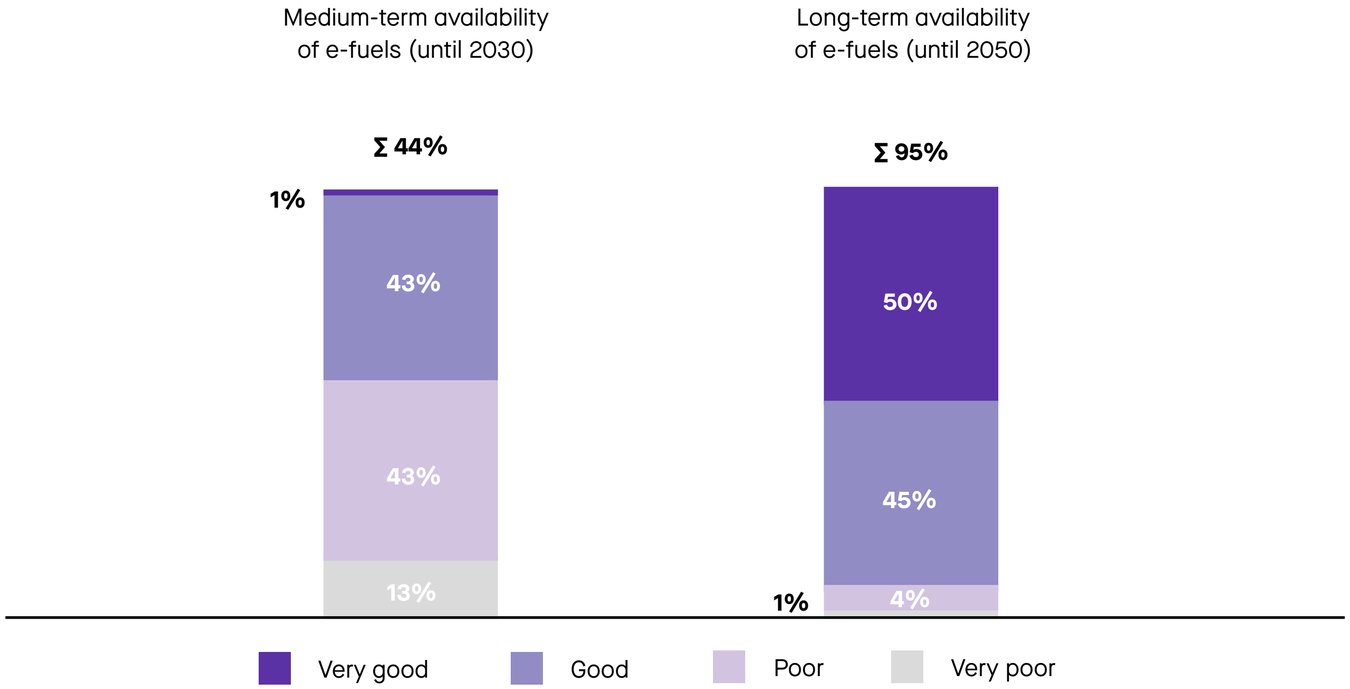
Three-quarters of the decision-makers surveyed anticipate that the shipping industry will no longer be able to do without e-fuels from 2045 at the latest.

Question 6: When will the use of e-fuels become essential?

Basis: all respondents, N = 200 (single response)

Availability of e-fuels

Assessment of the medium- and long-term availability of e-fuels



The availability of e-fuels for shipping through to 2030 is predominantly rated as poor.

Almost all companies, however, anticipate good to very good availability by 2050.

Question 7/8: How do you rate the medium-term availability (until 2030) of e-fuels for shipping? How do you rate the long-term availability (until 2050) of e-fuels for shipping?

Basis: all respondents, N = 200 (single response)

Availability of e-fuels

Assessment of the availability of e-fuels

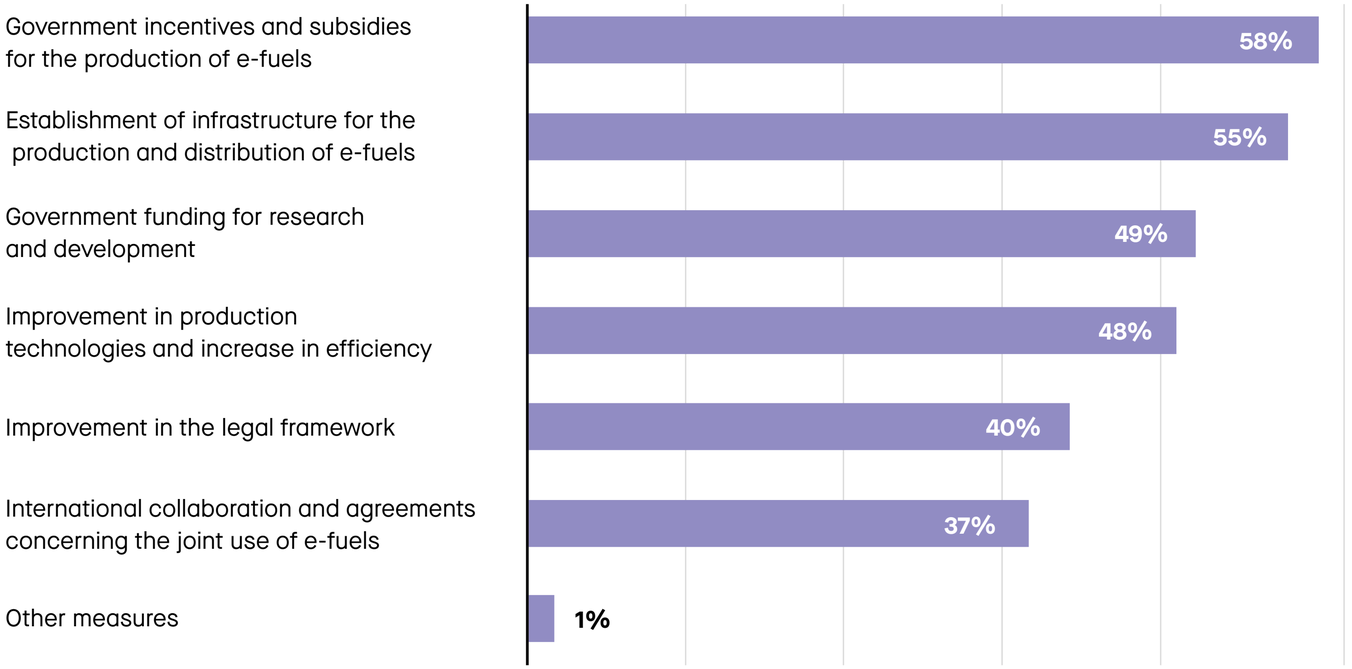
Shipping companies and companies with an annual turnover of above EUR 100 million tend to see the medium-term availability of e-fuels through to 2030 as less problematic.

Question 7: How do you rate the medium-term availability (until 2030) of e-fuels for the shipping industry?

Basis: all respondents, N = 200 (response scale: very good/good/poor/very poor; shown here: top 2 (very) good)

Availability of e-fuels

Measures to improve the availability of e-fuels



More than half of the companies name government incentives and subsidies for the production of e-fuels and the development of a corresponding infrastructure for the production and distribution as suitable measures for improving availability.

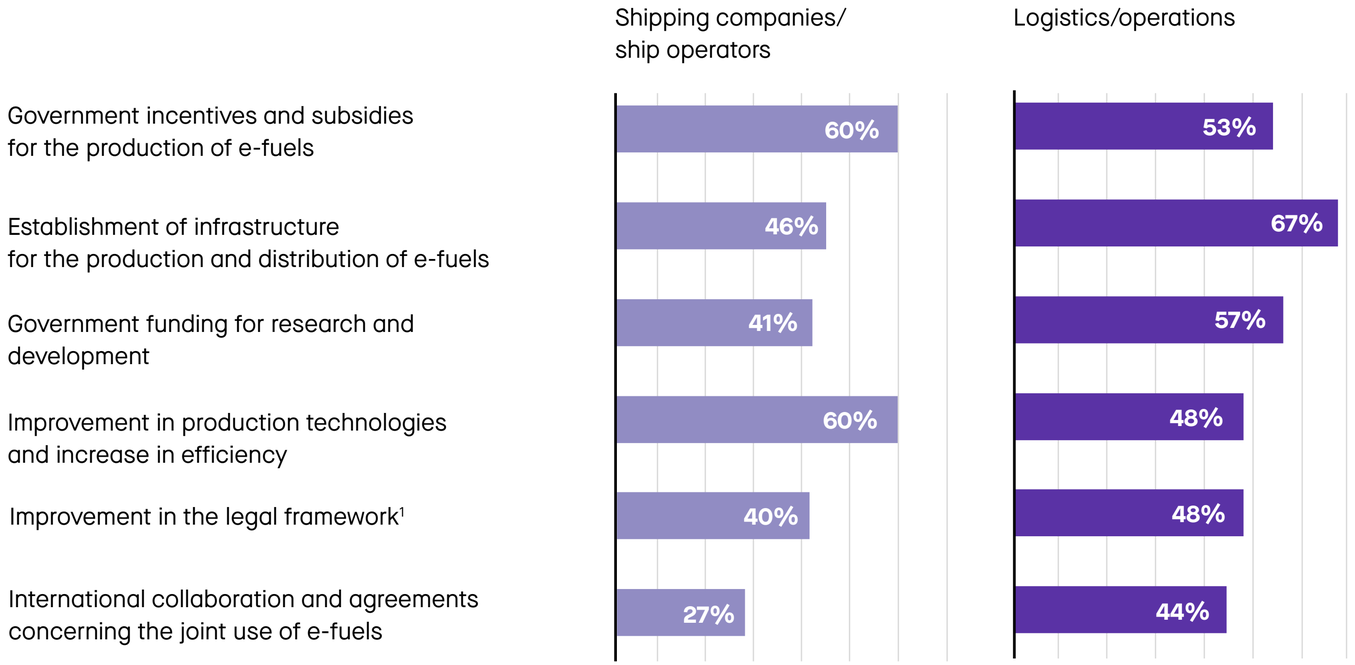
Question 13: What measures do you think could improve the availability of e-fuels?

Basis: all respondents, N = 200 (multiple responses)

1) e.g. higher emissions levy/tax on fossil fuels (level playing field approach), quotas

Availability of e-fuels

Measures to improve the availability of e-fuels



When it comes to improving the availability of e-fuels, shipping companies are primarily in favour of government incentives and subsidies for the production of e-fuels and improved production technologies.

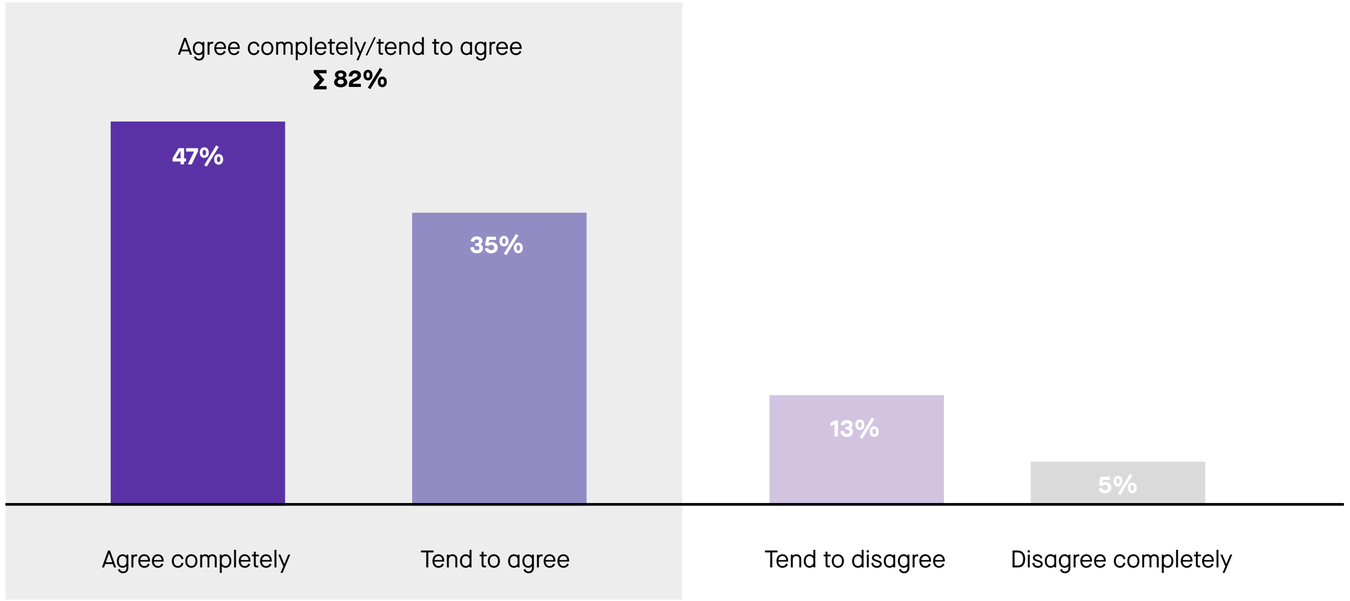
Logistics companies in the maritime industry are more aware of problems with infrastructure and are calling for the corresponding measures.

Question 13: What measures do you think could improve the availability of e-fuels?
Basis: shipping companies/ship operators, N = 70, and logistics companies, N = 88 (multiple responses)[1] e.g. higher emissions levy/tax on fossil fuels (level playing field approach), quotas

Implementation of e-fuels in the shipping industry

Technical complexity of implementation

Implementation of e-fuels in shipping is complex



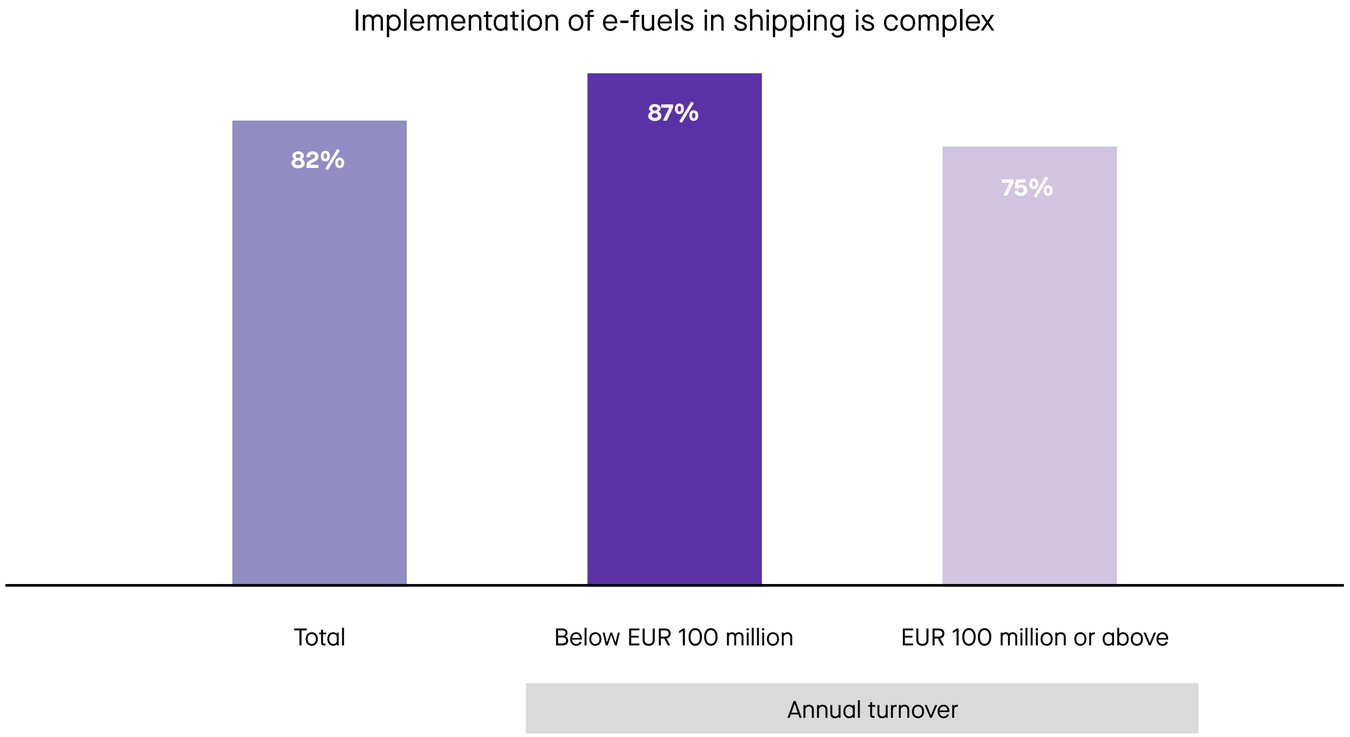
The implementation of e-fuels in shipping is considered to be technically complex by the vast majority.

Question 1: To what extent do you agree with the following statement regarding e-fuels in the shipping industry?

Basis: all respondents, N = 200 (response scale)

Implementation of e-fuels in the shipping industry

Technical complexity of implementation



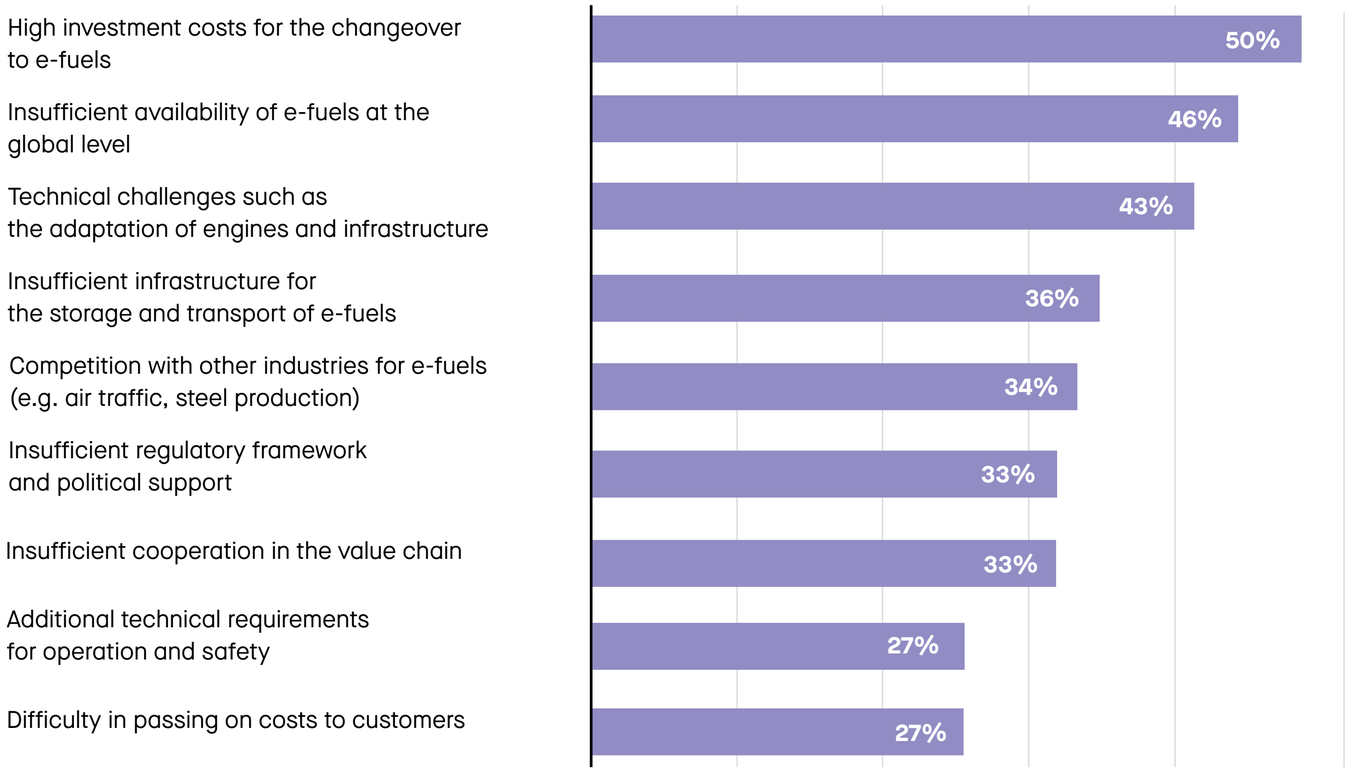
Companies with a higher annual turnover see the technical complexity as less problematic.

Question 1: To what extent do you agree with the following statement regarding e-fuels in the shipping industry?

Basis: all respondents, N = 113 and 87 respectively (response scale: agree completely/tend to agree/tend to disagree/completely disagree; shown here: top 2

Implementation of e-fuels in the shipping

Obstacles to the implementation of e-fuels



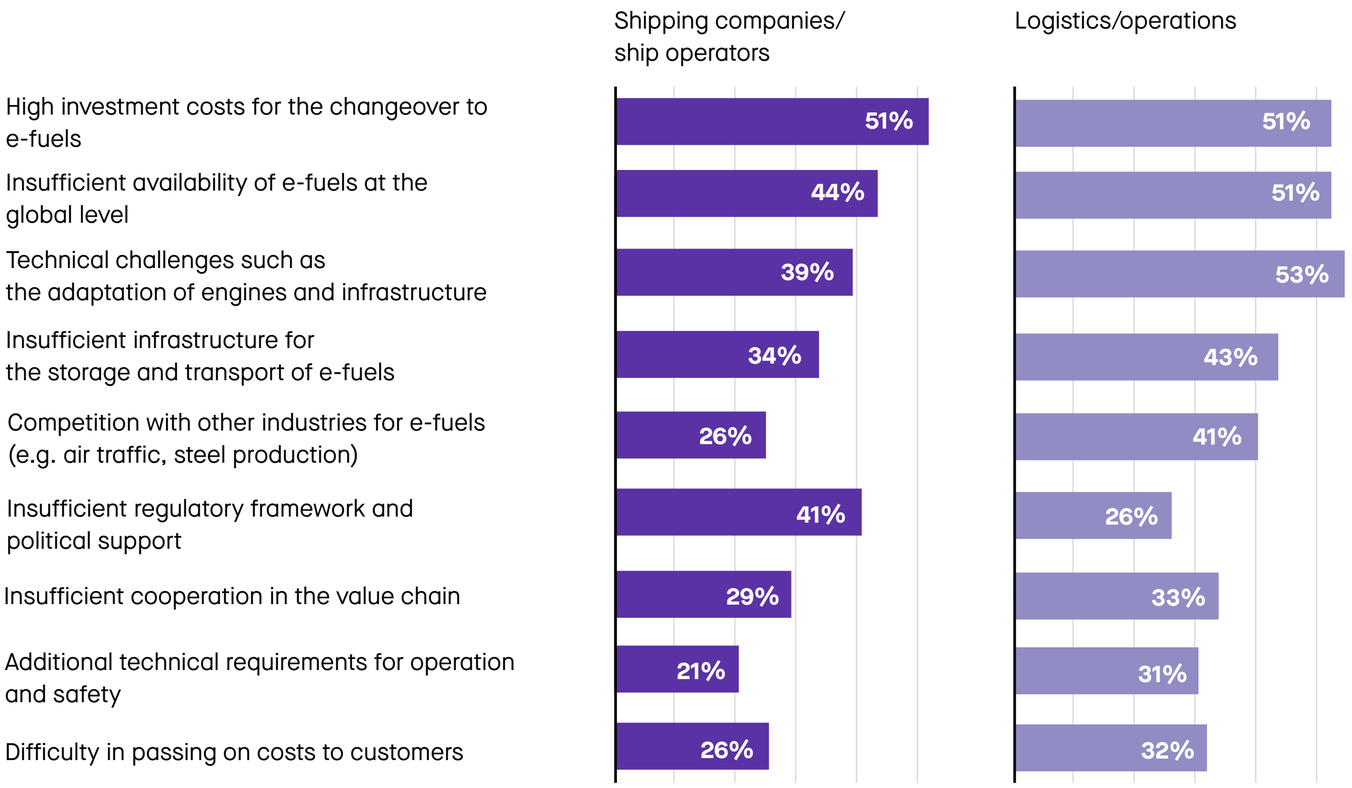
High conversion costs, lack of availability and infrastructure problems are most frequently cited as obstacles to the implementation of e-fuels in the shipping industry.

Question 14: What do you see as obstacles to the implementation of e-fuels in the shipping industry?

Basis: all respondents, N = 200 (multiple responses)

Implementation of e-fuels in the shipping industry

Obstacles to the implementation of e-fuels



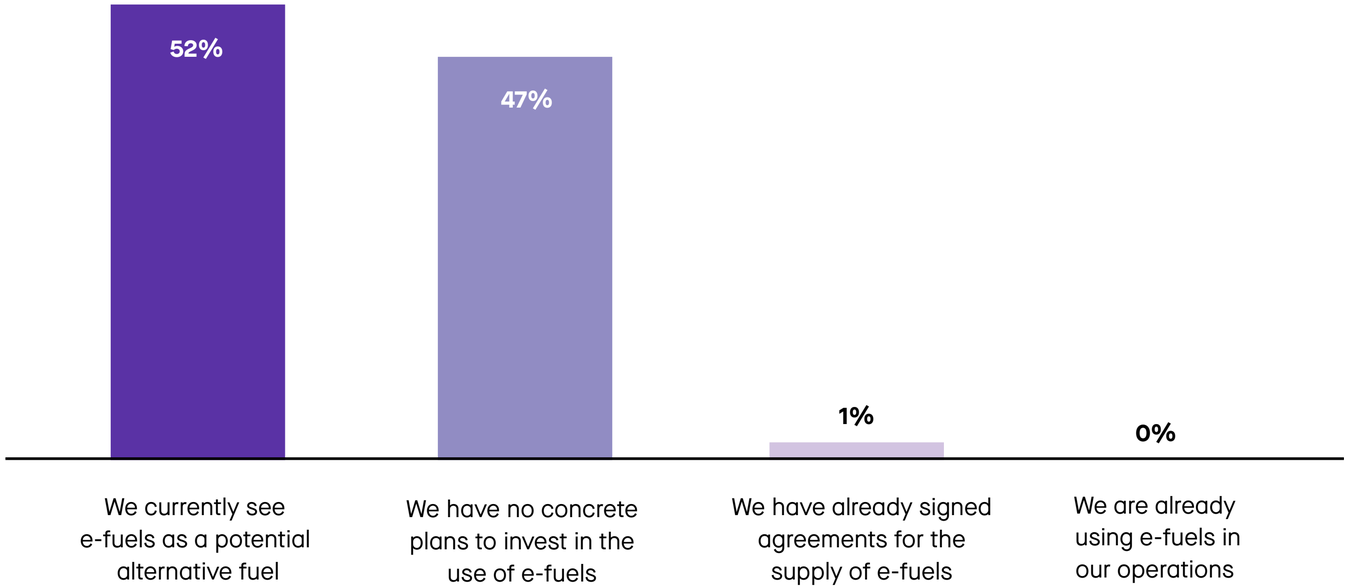
Shipping companies complain more often than average about insufficient regulatory framework conditions and the lack of political support for the implementation of e-fuels.

Question 14: What do you see as obstacles to the implementation of e-fuels in the shipping industry?

Basis: shipping companies/ship operators, N = 70, and logistics companies, N = 88 (multiple responses)

Use of e-fuels by shipping companies

Obstacles to the implementation of e-fuels



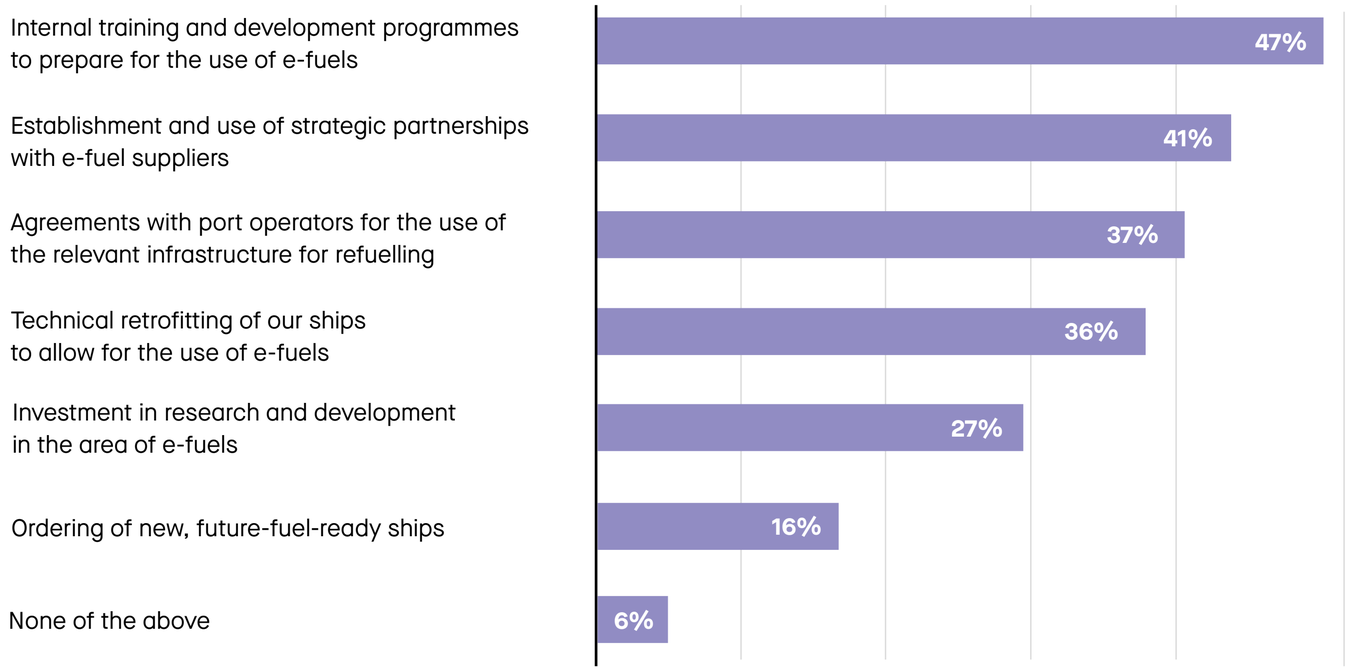
Just under half of the shipping companies and ship operators surveyed currently already have concrete plans to invest in the use of e-fuels.

Question 3: To what extent is your company already involved in the area of e-fuels?

Basis: shipping company/ship operator, N = 70 (single response)

Use of e-fuels by shipping companies

Concrete steps to prepare for the use of e-fuels



Shipping companies and ship operators are currently focussing primarily on internal training to prepare for the use of e-fuels.

More than four out of ten of the shipping companies and ship operators surveyed are seeking strategic partnerships with e-fuel suppliers.

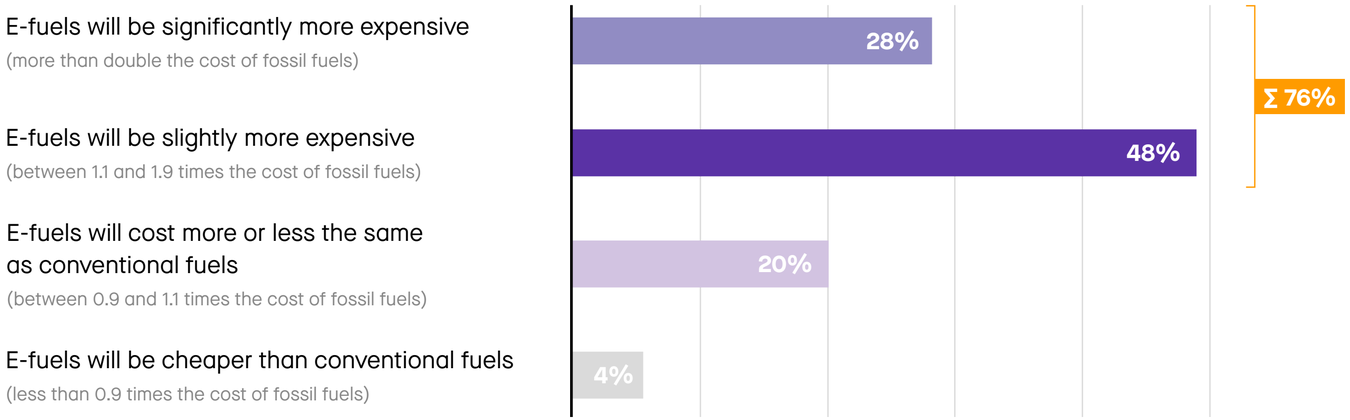
One-third are planning the appropriate technical retrofitting of their ships.

Question 15: What concrete steps are you already taking to prepare for the use of e-fuels?

Basis: shipping company/ship operator, N = 70 (multiple responses)

Development of the cost of e-fuels

Expected development of cost in comparison with conventional fuels



Three-quarters of the companies surveyed in the maritime industry anticipate higher costs for e-fuels compared to conventional fuels over the next ten years.

Question 11: How do you assess the long-term development (until 2035) of the cost of e-fuels compared to conventional fuels (including funding)?

Basis: all respondents, N = 200 (single response)

Development of the cost of e-fuels

Expected development of costs in comparison with conventional fuels

		Sector within the maritime industry			Annual turnover	
	Total	Shipping company/ ship operator	Logistics/ operations	Other sector*	Below EUR 100 million	EUR 100 million or above
Basis	200	70	88	42	113	87
E-fuels will be significantly more expensive (more than double the cost of fossil fuels)	**28%**	24%	**23%**	**43%**	30%	24%
E-fuels will be slightly more expensive (between 1.1 and 1.9 times the cost of fossil fuels)	**48%**	53%	46%	45%	**57%**	**37%**
E-fuels will cost more or less the same as conventional fuels (between 0.9 and 1.1 times the cost of fossil fuels)	**20%**	22%	24%	**12%**	**11%**	**33%**
E-fuels will be cheaper than conventional fuels (less than 0.9 times the cost of fossil fuels)	**4%**	1%	7%	0%	2%	6%

Min. 5 percentage points below the over all average

Min. 5 percentage points above the over all average

Companies with a higher annual turnover are more optimistic about the development of the cost of e-fuels compared to fossil fuels and are more likely to expect the prices to be the same.

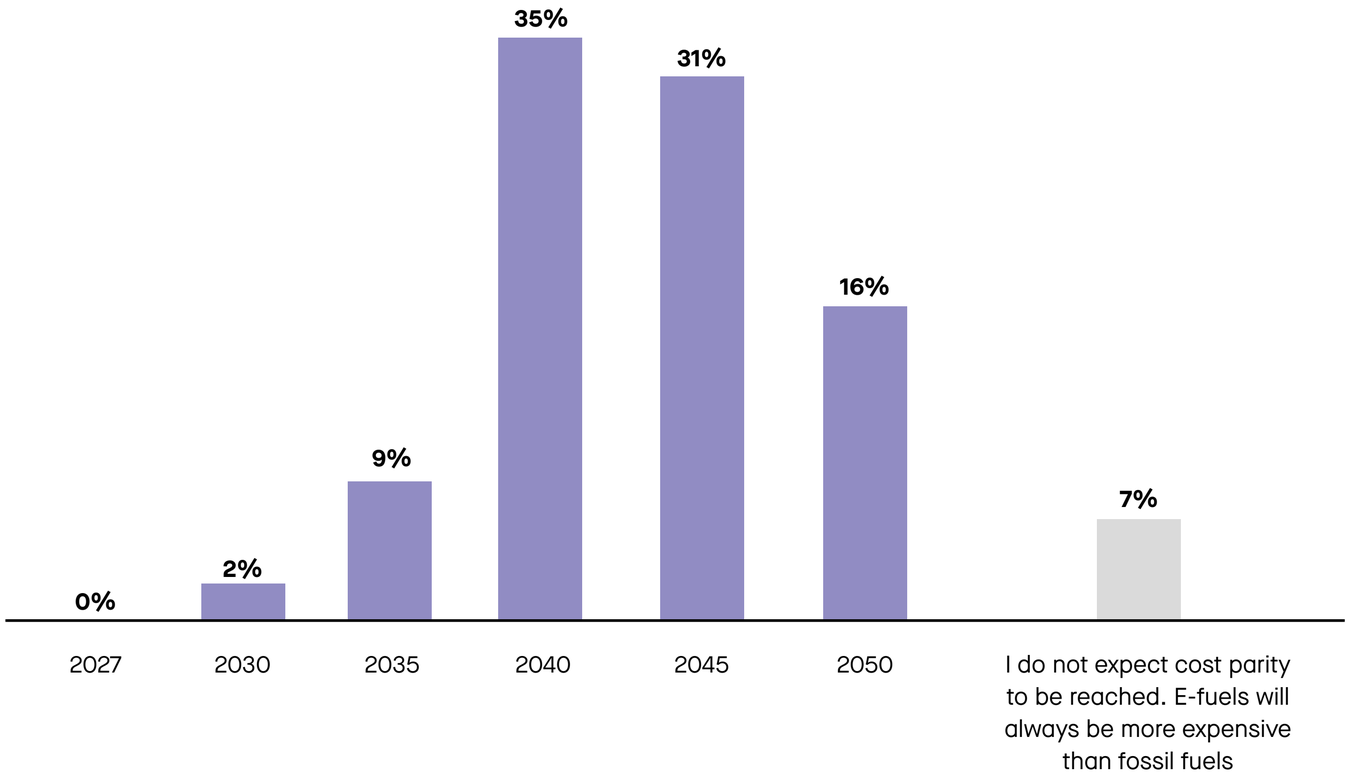
Question 11: How do you assess the long-term development (until 2035) of the cost of e-fuels compared to conventional fuels (including funding)?

Basis: all respondents, N = 200 (single response)

*Other sector = port operators, shipping financiers, ship classification societies

Development of the cost of e-fuels

Expected timing of cost parity between e-fuels and fossil fuels



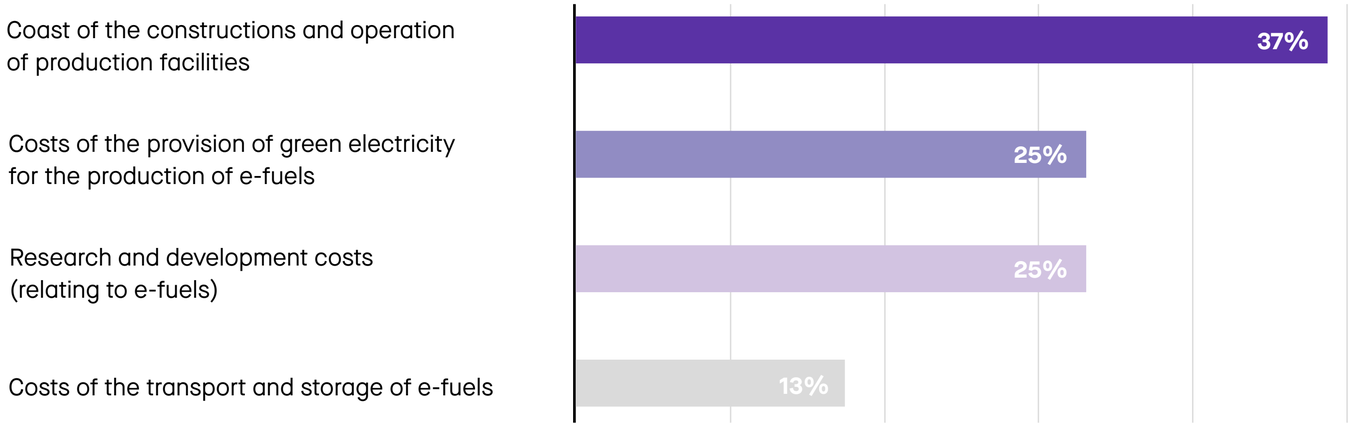
Cost parity between e-fuels and fossil fuels is not anticipated until 2040 at the earliest by almost half of the companies surveyed.

Question 10: When (i.e. in which year) do you expect cost parity between the use of e-fuels and fossil fuels to be reached (taking into account tax incentives or burdens)?

Basis: all respondents, N = 200 (single response)

Development of the cost of e-fuels

The biggest cost factor



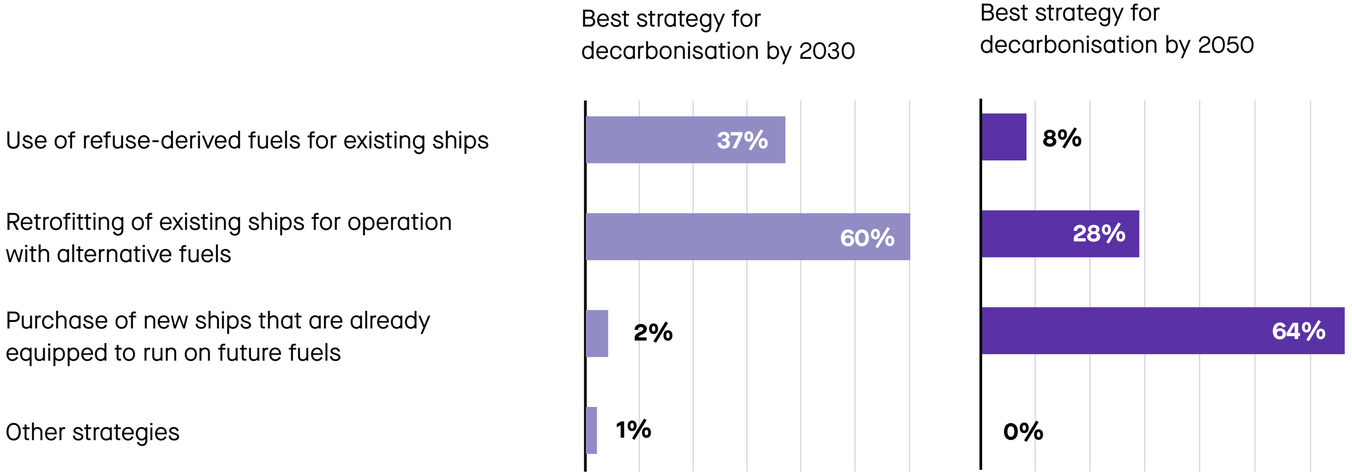
The high cost of e-fuels is most often attributed to the construction and operation of production facilities.

Question 12: What factors do you think have the greatest influence on the development of the cost of e-fuels?

Basis: all respondents, N = 200 (single response)

Strategies for decarbonisation in shipping

Most effective strategy to reduce CO_2



When it comes to moving forward with decarbonisation in the shipping industry in the medium term, the majority of the companies surveyed advocate retrofitting existing ships to use alternative fuels.

From a longer-term perspective, the purchase of new ships is seen as the best strategy.

Question 16/17: Which strategy do you consider to be the most effective way to decarbonise shipping by 2030 (target of cutting CO2 emissions by at least 40%)? Which strategy do you consider to be the most effective way to decarbonise shipping by 2050 (target of cutting total emissions by at least 50%)?

Basis: all respondents, N = 200 (single response)

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Country-specific trends

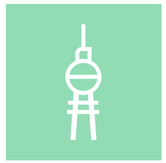
Country-specific trends

Summary

In a country comparison with Belgium, Spain and Germany, the **Netherlands**, in particular, considers that e-fuels will play a relevant role in the global shipping industry (page 33) in the medium term. In turn, Dutch companies also anticipate that e-fuels will become essential in the global shipping industry much sooner (page 34). To improve the availability of e-fuels, decision-makers from the Netherlands would tend to focus more often on better infrastructure for the production and distribution of e-fuels (page 36).

As in the Netherlands, e-fuels are also seen as playing a key role in reducing emissions in **Spain** (page 31), and the significance of e-fuels for the global shipping industry up to 2030 is also viewed accordingly (page 33). In addition to e-fuels, both Spanish and Dutch companies see biofuels in particular as an alternative to marine diesel (page 32). Compared to fossil fuels, e-fuels tend to be more expensive for companies based in Spain than in Germany or the Netherlands, for example (page 39).

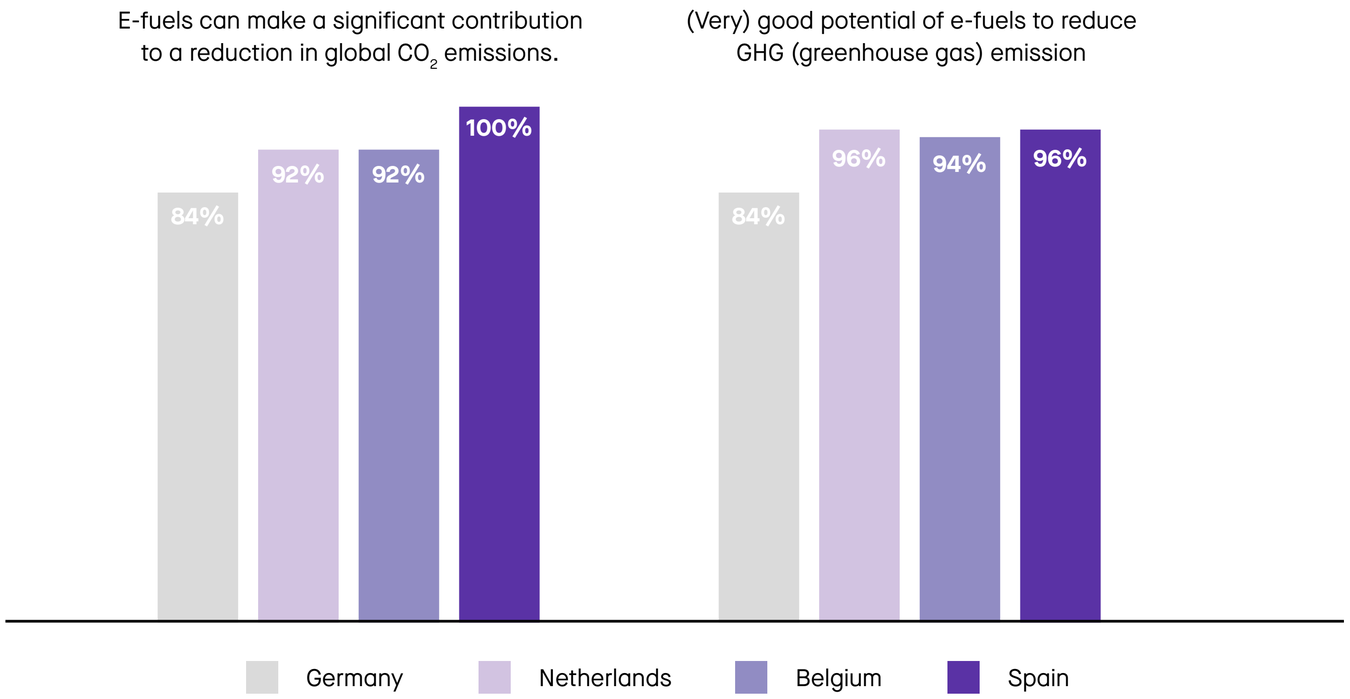
In **Belgium**, too, the maritime industry tends to assume that e-fuels will be significantly more expensive than conventional fuels up to 2035 (page 39). As in the Netherlands and Spain, Belgium also considers that e-fuels have high potential to reduce emissions (page 31). However, e-fuels are seen as being less significant for the global shipping industry here than in Spain or the Netherlands (page 33). In Belgium, the issue of the availability of e-fuels through to 2030 is seen as somewhat more problematic. This is also named most frequently as a barrier to the implementation of e-fuels (page 38).



Germany attributes the least importance to e-fuels in a country comparison, both in terms of their significance for reducing emissions (page 31) and for the global shipping industry (page 33). Like Belgium, Germany more often sees liquefied natural gas as a (further) meaningful alternative to conventional marine diesel (page 32). Technical complexity in the implementation of e-fuels is seen as less problematic in Germany (page 37), where the high investment costs are a more relevant issue (page 38). Germany is also pushing harder than the other countries in the survey for improvement in the legal framework (page 36).

Acceptance of e-fuels in shipping

Image of e-fuels



Especially in the Netherlands, Belgium and Spain, e-fuels are seen as very important for reducing emissions.

Companies in Germany are somewhat more reserved in their assessment.

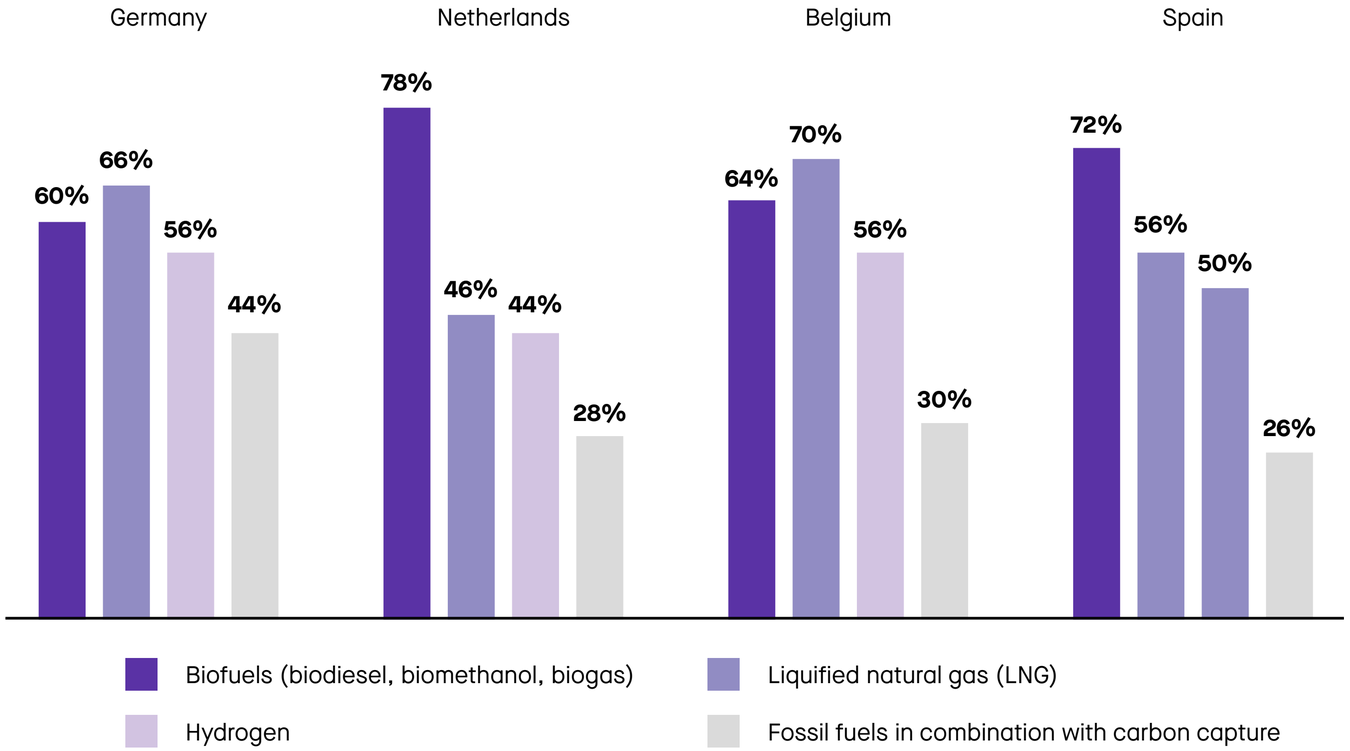
Question 1: To what extent do you agree with the statement that e-fuels can make a significant contribution to a reduction in global CO_2 emissions? (response scale: agree completely/tend to agree/tend to disagree/completely disagree; shown here: top 2

Question 2: How do you assess the potential of e-fuels to reduce GHG emissions in shipping? (response scale: very good/good/poor/very poor; shown here: top 2)

Basis: all respondents, N = 50 per region

Acceptance of e-fuels in shipping

Meaningful alternative fuels (other than e-fuels)



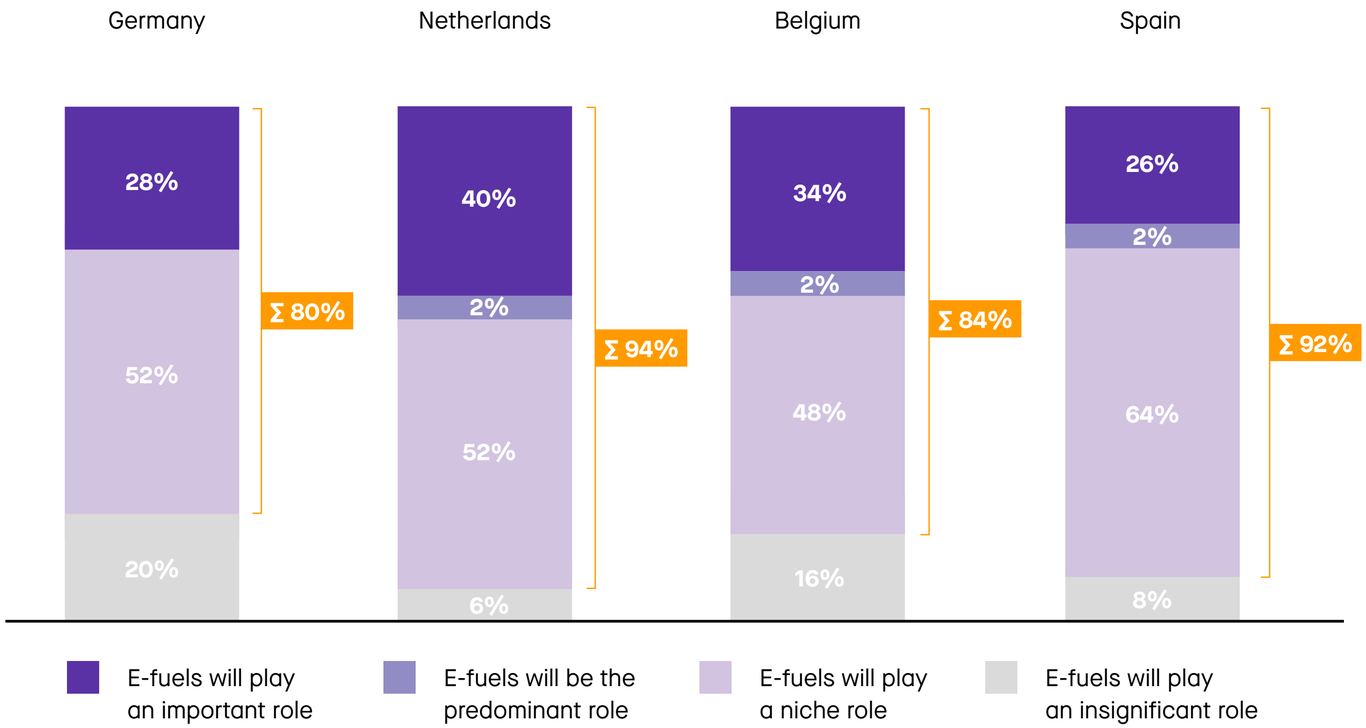
In the Netherlands and Spain, biofuels in particular are seen as a supplement or alternative to the marine diesel predominantly used.

In Germany and Belgium, liquefied natural gas is mentioned most frequently.

Question 4: What alternative fuels other than e-fuels do you see as a meaningful supplement or alternative to the marine diesel predominantly in use at present?
Basis: all respondents, N = 50 per region (multiple responses)

Acceptance of e-fuels in shipping

Role of e-fuels by 2030



E-fuels are expected to play an important role in the global shipping industry in the medium term, especially in the Netherlands.

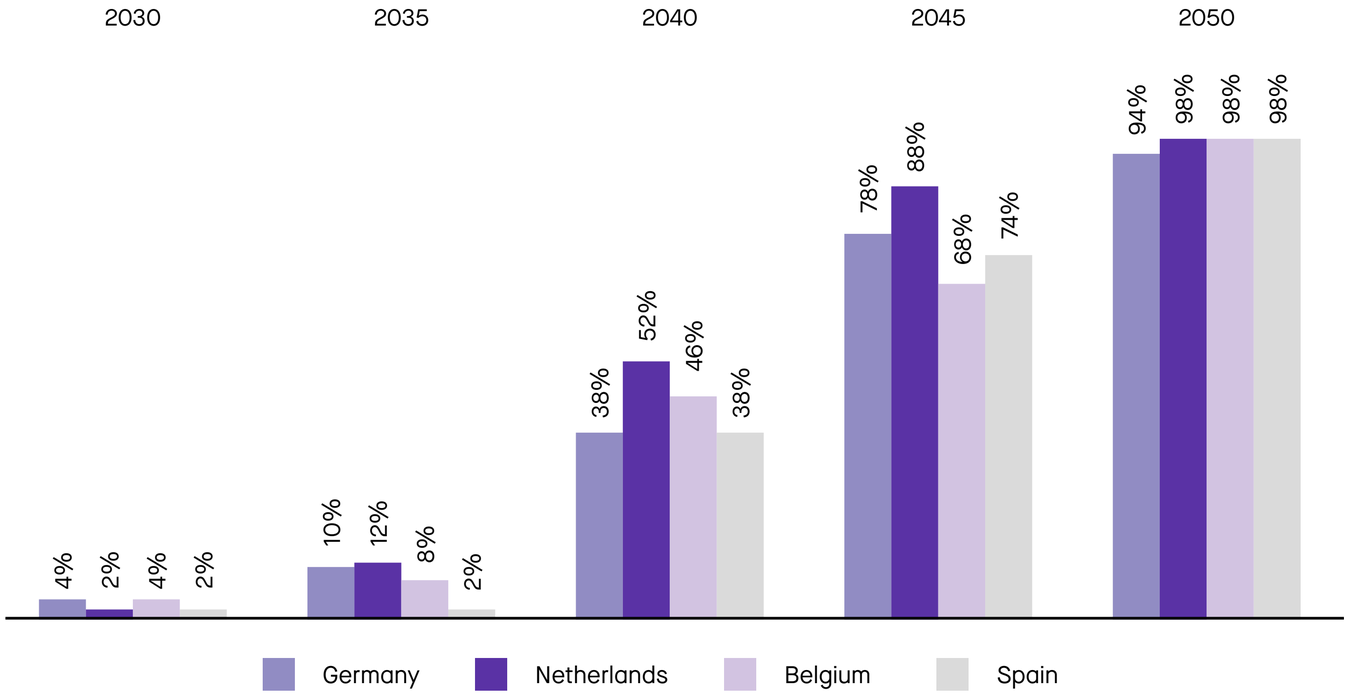
The assessment in Germany is more reserved.

Question 5: How do you see the role of e-fuels in the global shipping industry by 2030?

Basis: all respondents, N = 50 per region (multiple responses)

Acceptance of e-fuels in shipping

The point at which e-fuels become essential



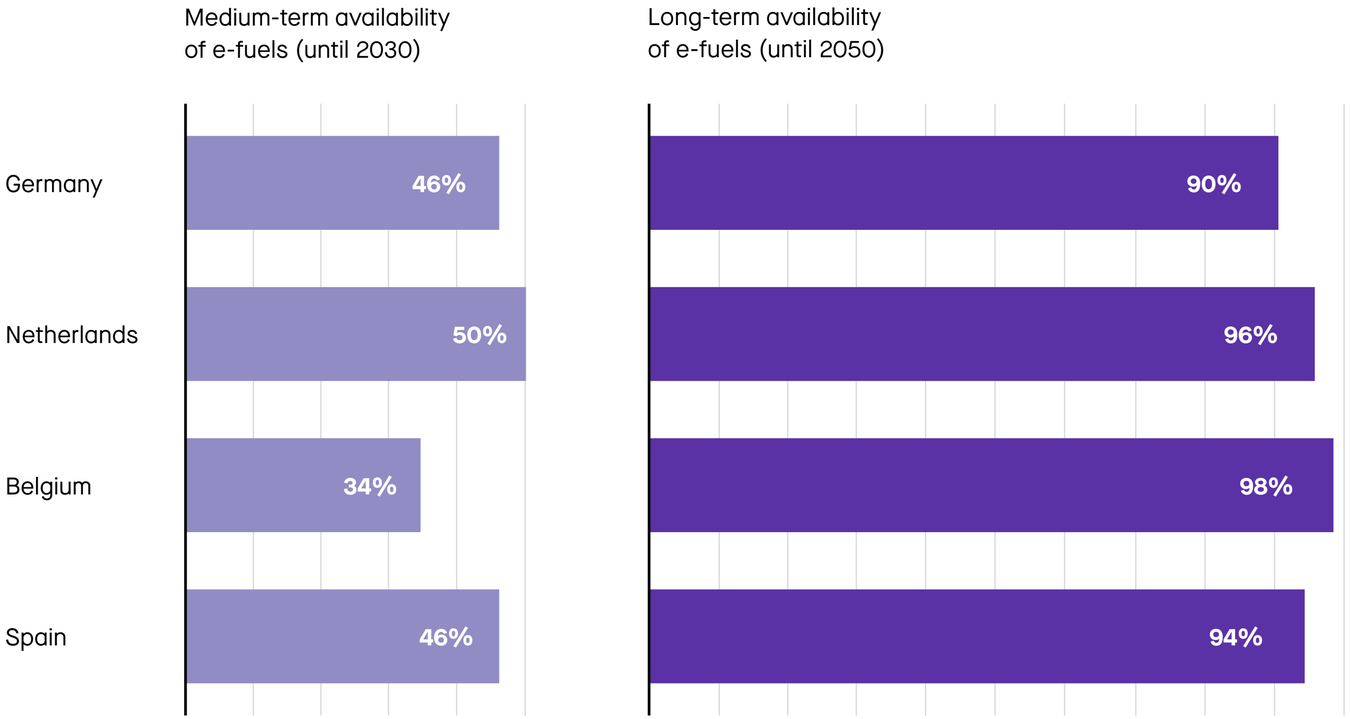
E-fuels are expected to become essential much sooner in the Netherlands.

Question 6: When will the use of e-fuels become essential?

Basis: all respondents, N = 200 (single response, cumulative values, missing values from 100% = ‘none of the above’)

Availability of e-fuels

Assessment of the availability of e-fuels



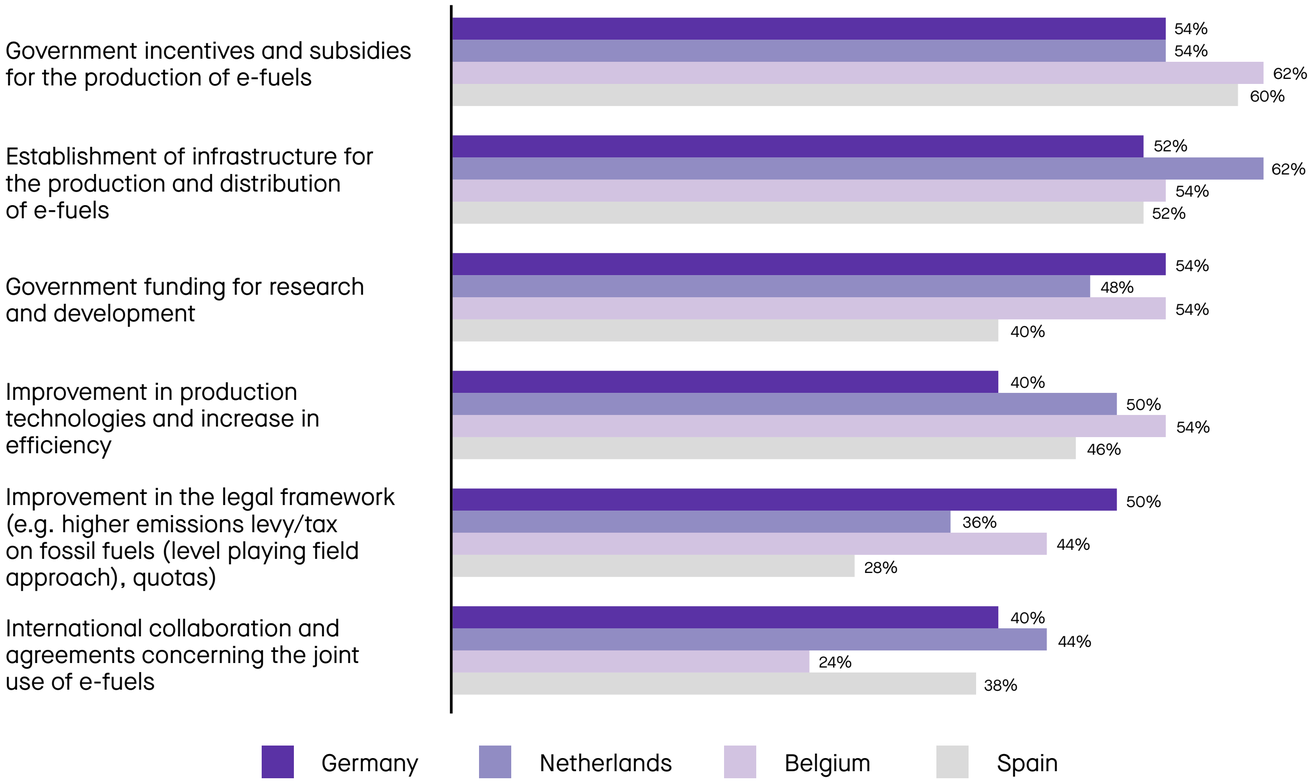
Only one-third of Belgian companies see e-fuels as being available by 2030. The rate is higher in the other countries.

Question 7/8: How do you assess the medium-term availability (until 2030) of e-fuels for shipping? How do you assess the long-term availability (until 2050) of e-fuels for shipping? How would you assess the availability of e-fuels for your company in particular?

Basis: all respondents, N = 50 per region (response scale: very good/good/poor/very poor; shown here: top 2 (very) good

Availability of e-fuels

Measures to improve the availability of e-fuels



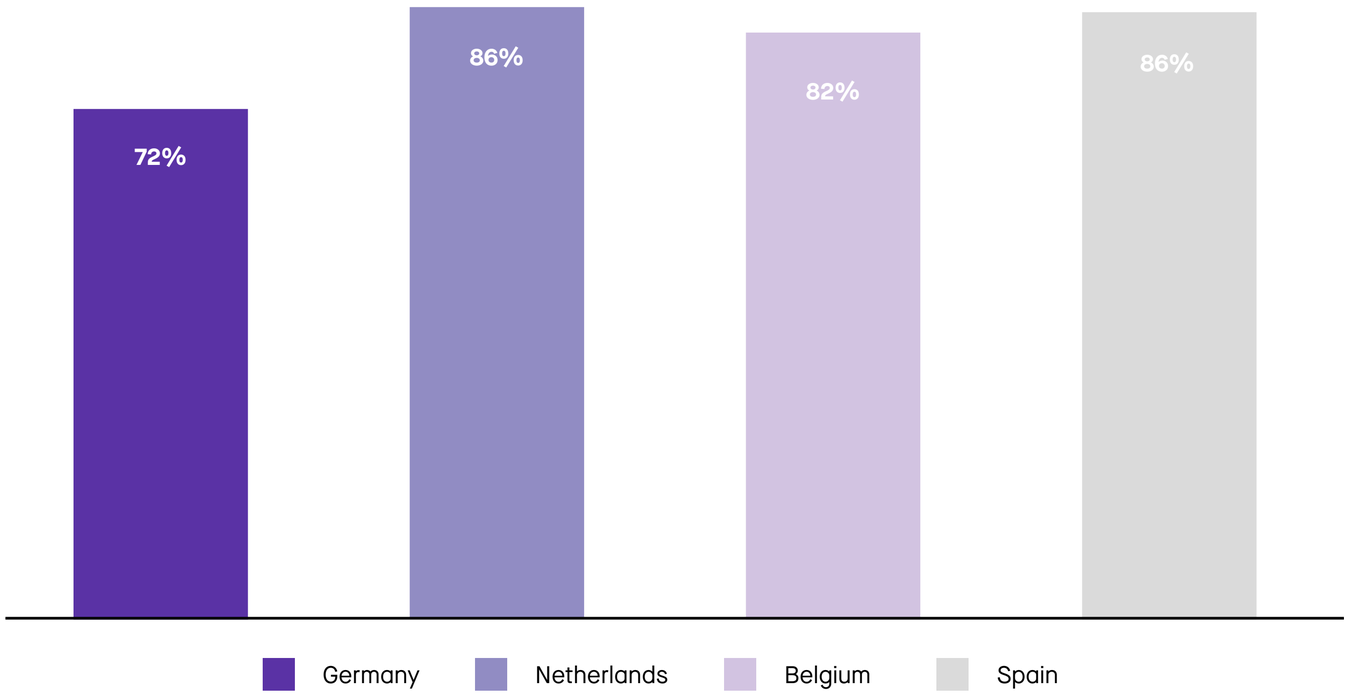
While better infrastructure for the production and distribution of e-fuels is called for in the Netherlands in order to improve the availability of e-fuels, an improved legal framework is a particular priority in Germany.

Question 13: What measures do you think could improve the availability of e-fuels?

Basis: all respondents, N = 50 per region (multiple responses)

Implementation of e-fuels in the shipping

Technical complexity of implementation



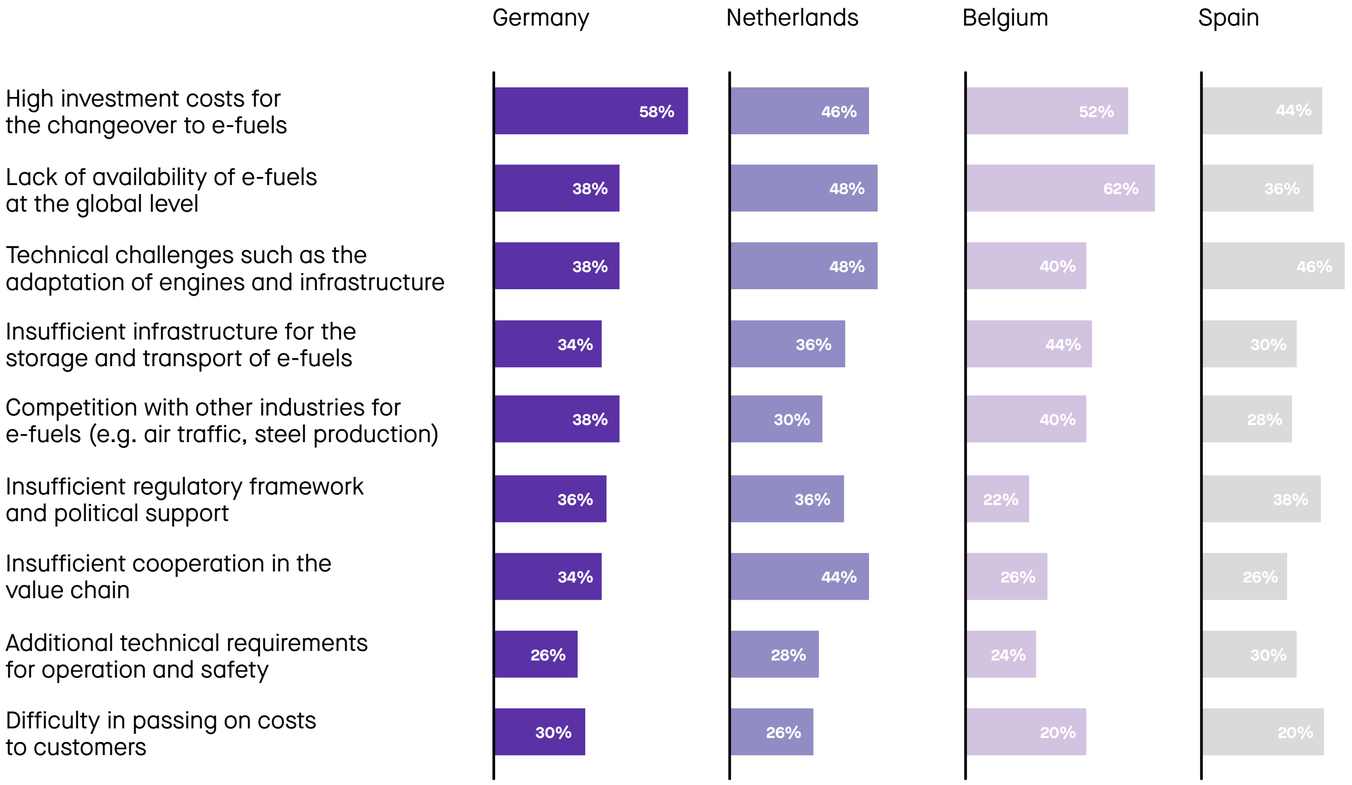
In Germany, technical complexity is viewed as less problematic, compared to other countries.

Question 1: To what extent do you agree with the following statement regarding e-fuels in the shipping industry?

Basis: all respondents, N = 50 per region (response scale: very good/good/poor/very poor; shown here: top 2

Implementation of e-fuels in the shipping industry

Obstacles to the implementation of e-fuels



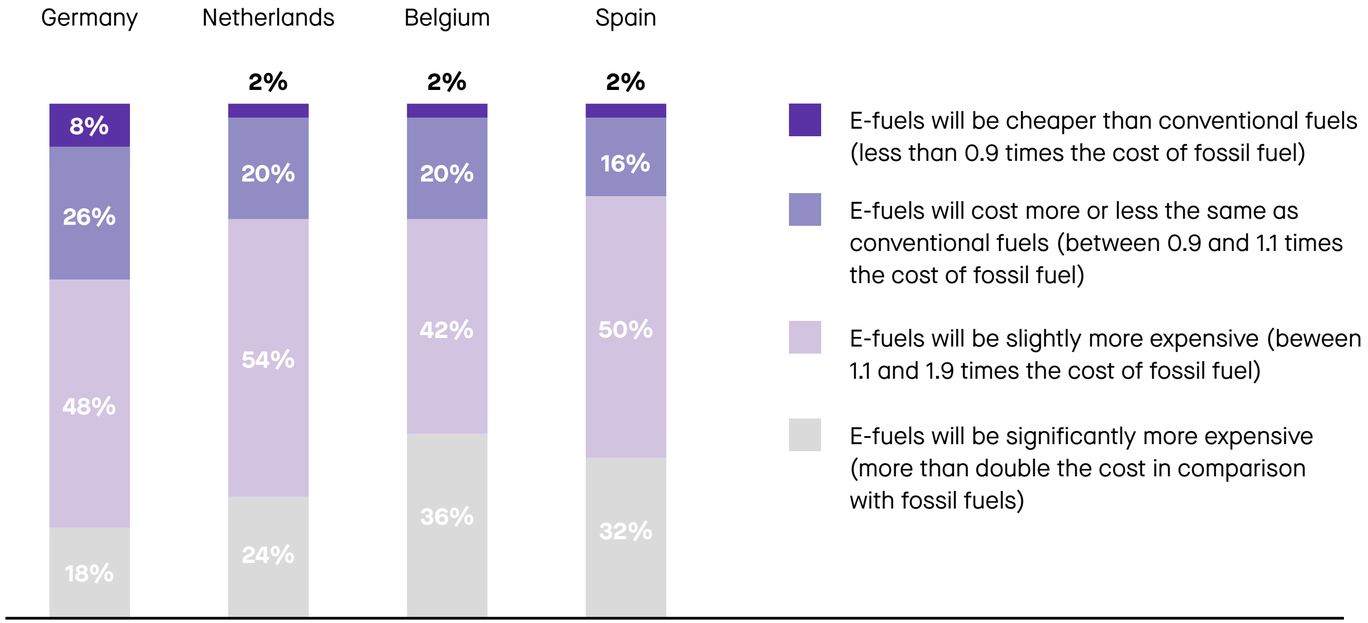
While the high investment costs are most often seen as a barrier to implementation in Germany, it is more the lack of availability of e-fuels on a global scale for the Belgians.

Question 14: What do you see as obstacles to the implementation of e-fuels in the shipping industry?

Basis: all respondents, N = 50 per region (multiple responses)

Development of the cost of e-fuels

Expected development of cost



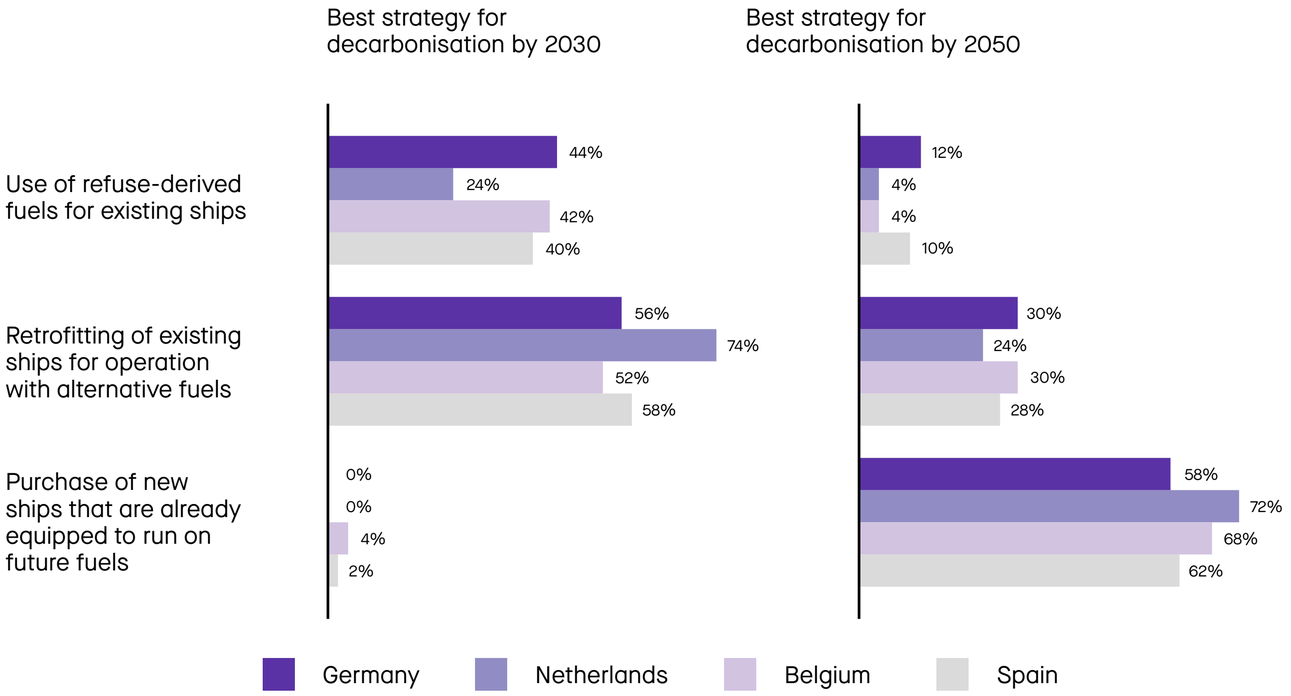
In Belgium, Spain and the Netherlands in particular, companies assume that the costs of e-fuels will continue to be higher than the costs of conventional fuels in the long term.

Question 11: How do you assess the long-term development (until 2035) of the cost of e-fuels compared to conventional fuels (including funding)?

Basis: all respondents, N = 50 per region (multiple responses)

Strategies for decarbonisation in shipping

Most effective strategy to reduce CO_2 emissions by 40% and 50% respectively



In a country comparison, the Netherlands are particularly keen on retrofitting existing ships in the medium term, while the use of refuse-derived fuels for existing ships is seen much less often as being strategically meaningful.

Question 16/17: Which strategy do you consider to be the most effective way to decarbonise shipping by 2030 (target of cutting CO_2 emissions by at least 40%)? Which strategy do you consider to be the most effective way to decarbonise shipping by 2050 (target of cutting total emissions by at least 50%)?

Basis: all respondents, N = 50 per region (multiple responses; not shown: other strategies)

04

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About the study

E-fuels in the shipping industry

Survey approach

Target group

Decision-makers or relevant contact persons on the topic of e-fuels in companies with at least 50 employees from the maritime industry (shipping companies, logistics companies in the shipping sector, shipping financiers, port operators, ship classification societies).

Survey methodology

Telephone survey (CATI)

Regions

Germany, Netherlands, Belgium, Spain

Sample sizes

N = 200 overall, per region N = 50

Executing Market Research Institute

mo‘web

Survey period

August/September 2023

E-fuels in the shipping industry

Statistics

Region	Total
Germany	25%
Netherlands	25%
Belgium	25%
Spain	25%

Basis: all respondents (N = 200)

Sector	Total
Logistics/operations in the shipping segment	44%
Shipping company/ship operator	35%
Port operator	11%
Shipping finance	6%
Ship classification society	4%

Company’s annual turnover	Total
Below EUR 10 million	-
From EUR 10 million up to EUR 50 million	23%
From EUR 50 million up to EUR 100 million	33%
From EUR 100 million up to EUR 500 million	27%
From EUR 500 million up to EUR 1 billion	13%
More than EUR 1 billion	4%

Number of employees	Total
50 to 249 employees	29%
250 to 499 employees	30%
500 to 999 employees	25%
1,000 to 4,999 employees	13%
5,000 to 9,999 employees	3%
10,000 employees and above	-

Position in the company	Total
Company management	33%
Board of Directors	16%
Executive Board	17%
Middle management	19%
Specialist with project responsibility	15%

Area responsibilities*	Total
Operation and maintenance	50%
Strategy and planning	48%
Fuel procurement and management	42%
Sustainability/environmental management	40%
Regulation and compliance	32%
Research and development	19%

*Multiple responses possible

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