



HSB
NORDBANK

EXPERT MARKET SURVEY SHIPPING

EXPERT MARKET SURVEY: ECO-SHIPPING

November 2013

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Introduction

Shipping is widely regarded as the backbone of the global trade flows, as around 90 percent of international commerce involves a passage by sea. But both national and international shipping companies are experiencing increasing pressures as a result of the shipping crisis which has already lasted for some years – above all caused by the tremendous increase of capacity and sharp rise in the price of fuel. The drastic decline in charter rates is a clear demonstration of this. Furthermore, the shipping industry is coping with new innovations and more stringent regulatory environment imposed by the International Maritime Organisation (IMO).

In view of the sharp drop in charter rates, shipping companies find themselves obliged to take measures for increased efficiency – so as to continue to operate economically in spite of rising costs, above all those associated with the higher price of bunkering.

Even though, when we compare all methods of transport, the environmental balance per ton transported is still most favourable in the shipping sector, shipping nonetheless causes emissions of more than a billion tons of carbon dioxide (CO₂) every year. This makes it responsible for more than three percent of all global CO₂ emissions. To this we can add more than twelve million tons of sulphur oxide and over 20 million tons of nitrogen oxide. Along with soot particles, sulphur oxide and nitrogen oxides, ship's exhausts also contain heavy metals, ash and sediment.

According to IMO forecasts, CO₂ emissions from world shipping could double by the year 2050 – in a worst case scenario, they could even be multiplied threefold. In order to counter these developments, the IMO has introduced regulations to bring about step-by-step reductions in the emissions caused by ship's exhausts, including nitrogen oxides (NO_x), sulphur oxides (SO_x) and carbon dioxide (CO₂). Further and more stringent requirements are in the pipeline and should be introduced in 2015.

With a view to learning how national and international shipping companies are preparing to cope with the IMO's new emission standards as well as with rising fuel costs, HSH Nordbank has drawn up the present Expert Market Survey on 'Eco-shipping'. 'Eco' in this context does not just stand for ecological shipping, but also takes into account economic aspects.

To this end, HSH Nordbank conducted a survey of national and international shipping companies in the last quarter of 2013. The evaluation of the responses from around 60 shipping companies taking part yields a barometric reading of the present state of an industry which is actively endeavouring to meet the challenge by measures designed to boost efficiency and by building new modern ships.

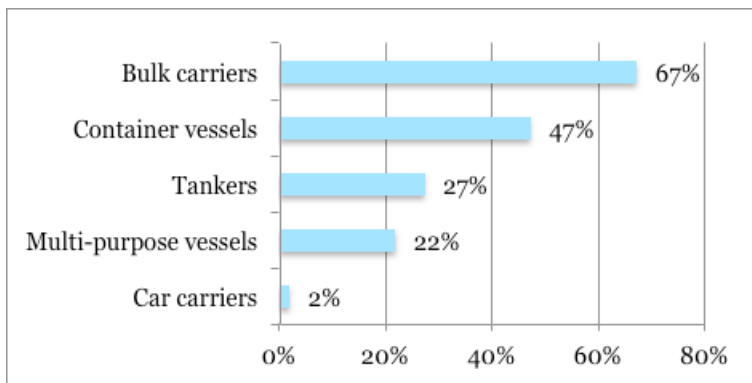
Methodology

The Shipping Division of HSH Nordbank interviewed national and international shipping companies in an anonymous customer survey which covered the following thematic areas: 'IMO emission requirements', 'Efficiency-boosting measures in operational fleets', 'Efficiency-boosting measures in new ships' and 'Costs and finance'. The survey was for the most part addressed to the managers and owners of shipping companies that operate bulk carriers, container ships, tankers, multi-purpose vessels and car carriers.

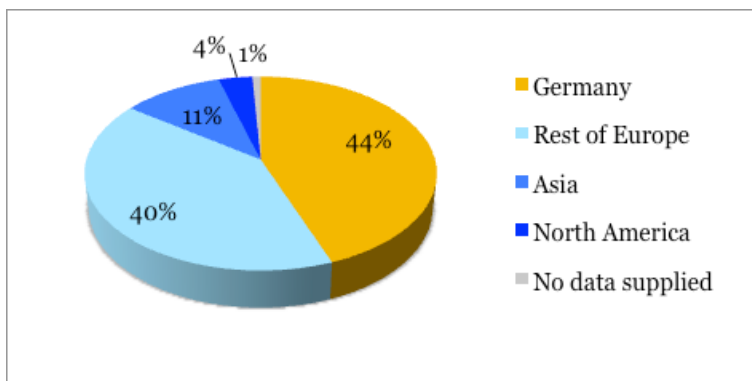
Around 60 companies took part in the survey. Out of these, 44 percent are based in Germany, another 40 percent of the shipping companies come from other parts of Europe (the majority of them from Greece). 11 percent are Asian shipping companies, 4 percent come from North America, and just one declined to provide data on its corporate headquarters.

The survey was carried out by means of a personal or written approach from the Relationship Managers of HSH Nordbank. All the companies taking part are customers of the core bank.

Question 1: Our shipping company operates the following (multiple choices allowed):



Question 2: Our corporate head office is situated in:



RESULTS

Thematic area 1: IMO emission requirements

As a globalised industry, shipping needs to have dependable international emission standards. Practically 90 percent of the shipping companies are in agreement on this point. This result of the survey shows that shipping companies want a level playing field, with international standards that can be relied upon – above all with regard to their investments.

The IMO requirements have particular impact on the Emission Control Areas (ECAs). These special zones are subject to restricted SO_x and NO_x particle emission requirements. At present the ECAs include the North Sea and the Baltic and almost the whole of the North American coastline. Further ECAs are in the pipeline for the Mediterranean region and the seas around Japan.

The third level of IMO emission requirements (IMO Tier III) – the ‘IMO MARPOL 73/78 Annex VI Emission Standards’ – is scheduled to be introduced in the year 2016, and will be so stringent that shipping will be compelled to seek improvements and innovative technical solutions. IMO Tier III envisages a further reduction of NO_x emissions in ECAs to a level 80 percent below that set by Tier I.

What is more, from 2015 the permissible sulphur content in marine fuels will be reduced from 1 percent to 0.1 percent. In parts of the world outside the ECAs a concentration of 3.5 percent sulphur in fuels has been permitted since 1 January 2012, but with effect from 1 January 2020 the IMO will be reducing the permitted maximum value to just 0.5 percent.

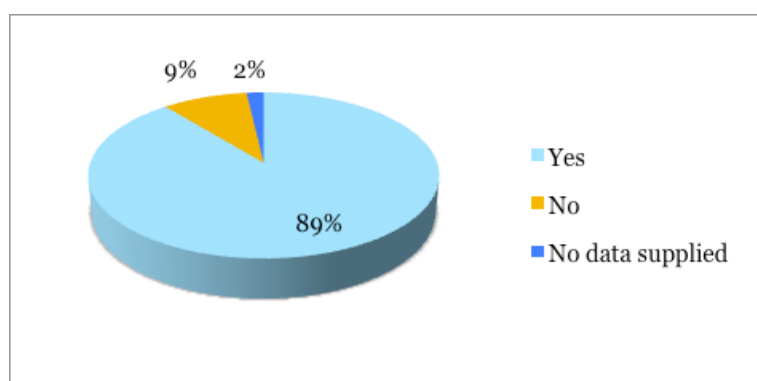
Already since 1 July 2010 ports of the European Union have been subject to the requirement that only fuels with a sulphur component of 0.1 percent or less may be used. In accordance with EU requirements it is sufficient if ships switch over to low-sulphur fuel only after putting in to port.

In addition, all future vessels must be designed in accordance with energy-saving requirements. To this end, the IMO introduced an Energy Efficiency Design Index (EEDI) for new ships on 1 January 2013. This is a mandatory standard. Ship designers have been given wide latitude of discretion in deciding how to achieve the required reductions.

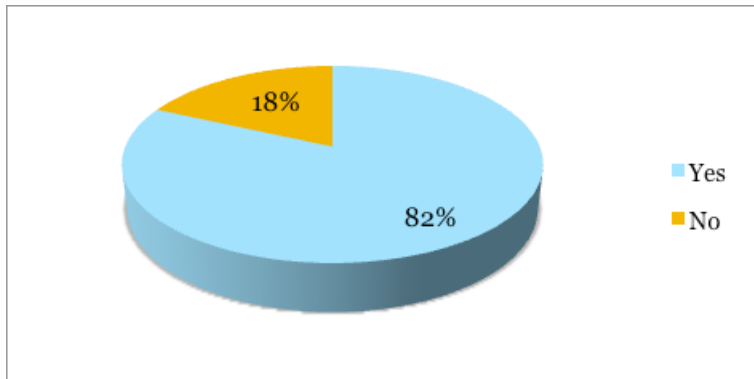
The great majority of the shipping companies (82 percent) feel that they have been punctually informed about the new IMO emission requirements and that the information has been adequate (85 percent).

On the other hand, 87 percent feel that they have not been given sufficient political support for the implementation of the new requirements, and/or take the view that politicians have not been sufficiently involved with maritime industry in this connection.

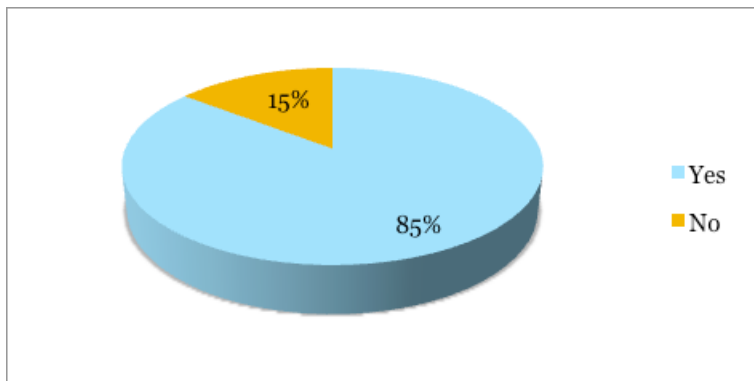
Question 3: As a globalised industry, does shipping require *reliable* international emission requirements?



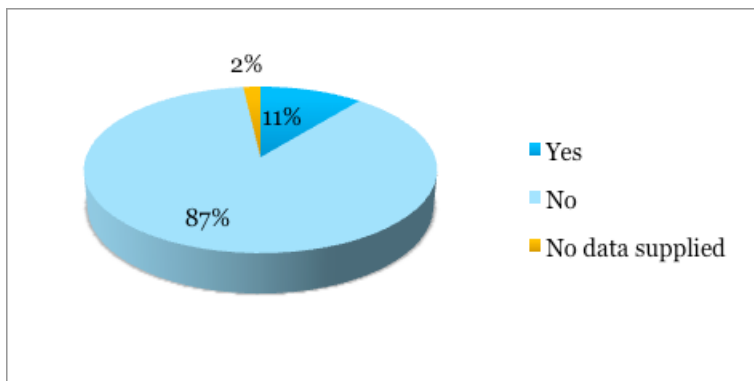
Question 4: Do you feel that you have been *punctually* informed about the new IMO emission standards?



Question 5: Do you feel that you have been *adequately* informed about the new IMO emission standards?

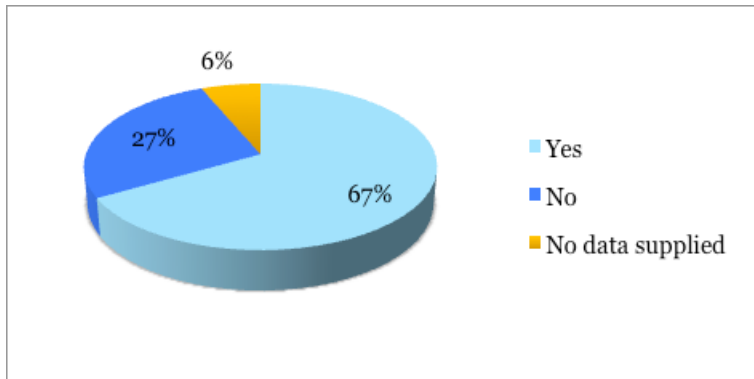


Question 6: Do you feel that you have been adequately supported by the politicians for the implementation of the new standards? Have politicians been sufficiently involved with maritime industry in this connection?

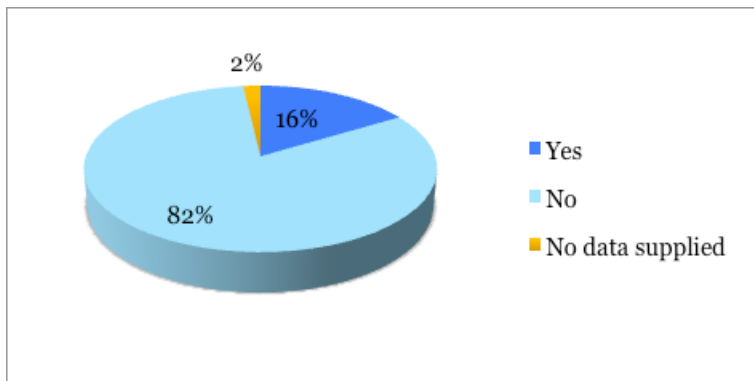


More than two thirds of the shipping companies had already made a start at the time of the survey with equipping their fleets to meet the new IMO emission standards. 82 percent of those taking part in the survey do not think there is any risk that they will be too late in getting their fleet fit for the new requirements.

Question 7: Have you already started at the present to prepare your fleet for the more stringent IMO emission requirements?



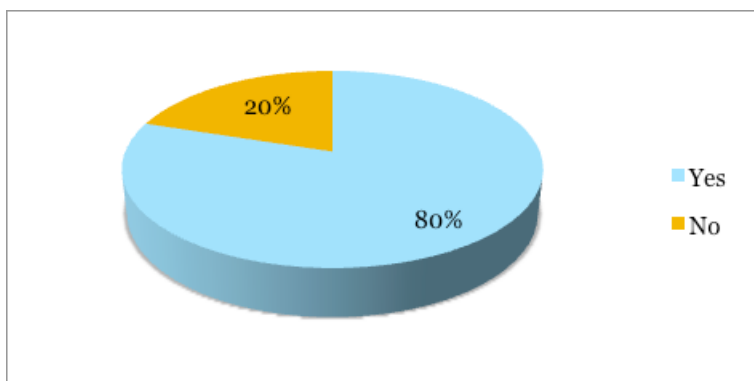
Question 8: Do you see any risk that you will be too late in getting your fleet ready to meet the new IMO standards?



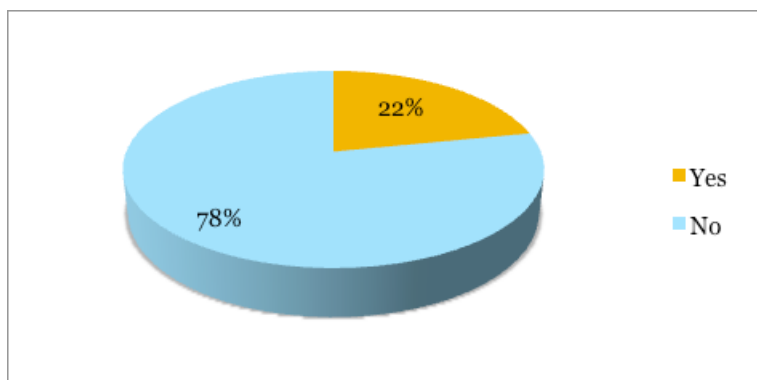
It has recently been announced that the IMO may possibly postpone the introduction of lower nitrogen oxide limiting values for five years. This means that Tier III would only become mandatory in 2021, rather than in 2016.

According to the survey results, 80 percent of the shipping companies would welcome the postponement of the introduction of lower limiting values to 2021. 78 percent moreover take the view that such a step would not damage the credibility of the IMO. Hardly any of the survey respondents – by contrast with industry – see the postponement as presenting a risk either to investments already made, to innovations or to jobs in their company.

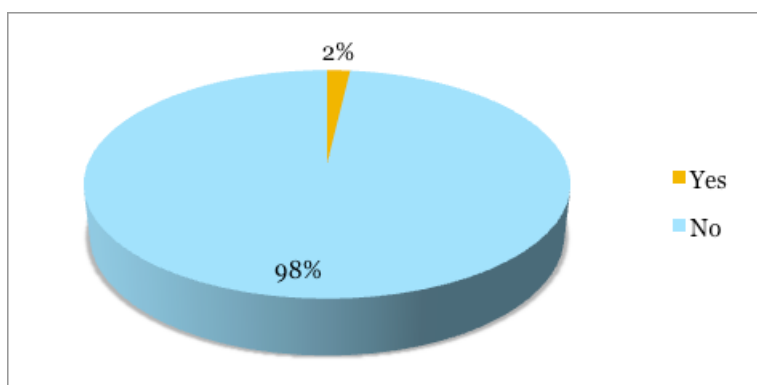
Question 9: Would you welcome the postponement of the introduction of lower limiting values to 2021?



Question 10: Does the possibility of postponement damage the credibility of the IMO?



Question 11: Would the postponement present a risk to investments already made, innovations or possibly even jobs at your shipping company?



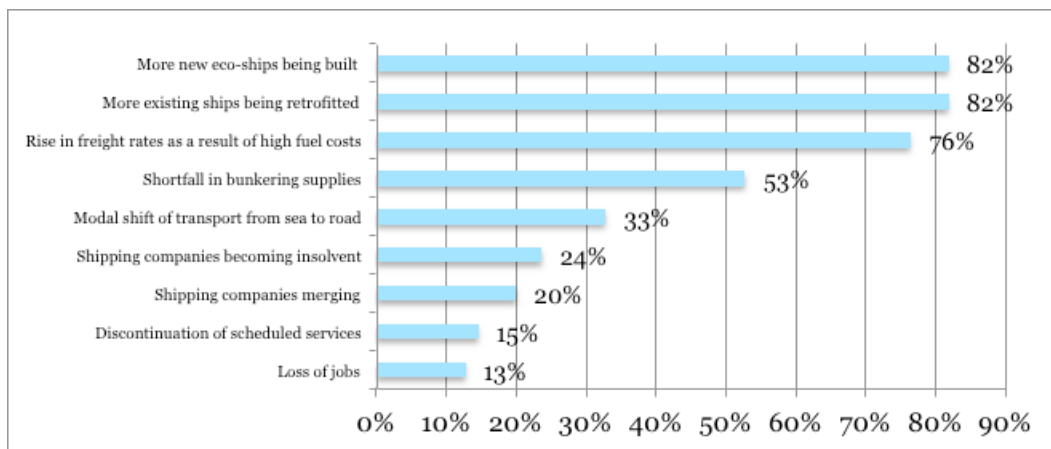
If the IMO emission requirements come into force as planned, 82 percent of the shipping companies expect that increasing numbers of new ships coming on the market will be eco-ships. Eco-ships are classes of vessel, the entire planning and design of which has been based on the most up-to-date energy-efficient and environmentally friendly standards. Consequently it can be anticipated that the more stringent IMO requirements will lead to new orders, which will exacerbate the problem of excess capacity in shipping still further.

An equally important part will be played by retrofitting – the adaptation of vessels of the operational fleet to incorporate more energy-efficient technology. 76 percent of the shipping companies expect to see a rise in freight rates (the price of the transport of individual container boxes) as a result of higher fuel costs. The shipping companies are thus assuming that they will be able to pass on the higher costs to the shipper.

A good half of the shipping companies expect to see a shortfall in the supply of fuel in connection with Marine Diesel Oil (MDO) and Marine Gas Oil (MGO). These fuels are of better quality and are more environmentally friendly than the heavy oil fuel traditionally used.

Almost a quarter of the shipping companies sees a potential increase in insolvencies or consolidation in the shipping industry – this as a result of changing conditions on the market, which could make it impossible for companies to continue to operate independently or economically. Only a few shipping companies, on the other hand, anticipate a scenario involving the discontinuation of scheduled services or the loss of jobs.

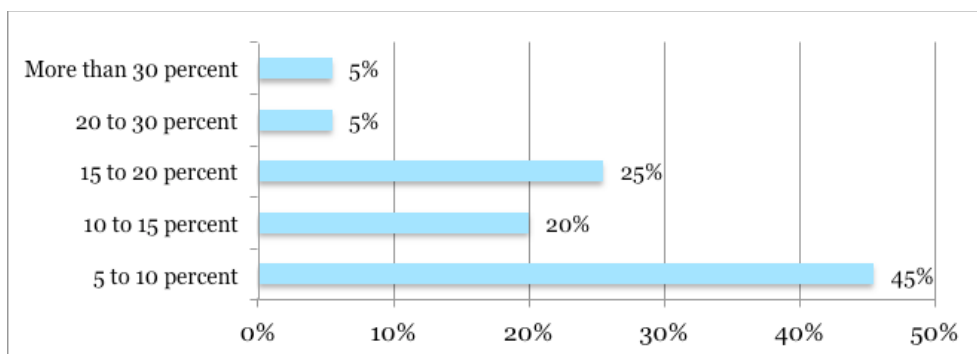
Question 12: What scenario do you expect to see in the shipping industry if the new IMO emission requirements come into force as planned (multiple choices allowed)?



In the ECAs, the new emission requirements, together with planned retrofitting measures and higher obligations to provide evidence of emission levels, will lead to a rise in ship operating costs (OPEX). The OPEX heading includes both fixtures and fittings and maintenance and repair costs, as well as the cost of mandatory documentation (but not fuel costs, port fees or goods handling charges).

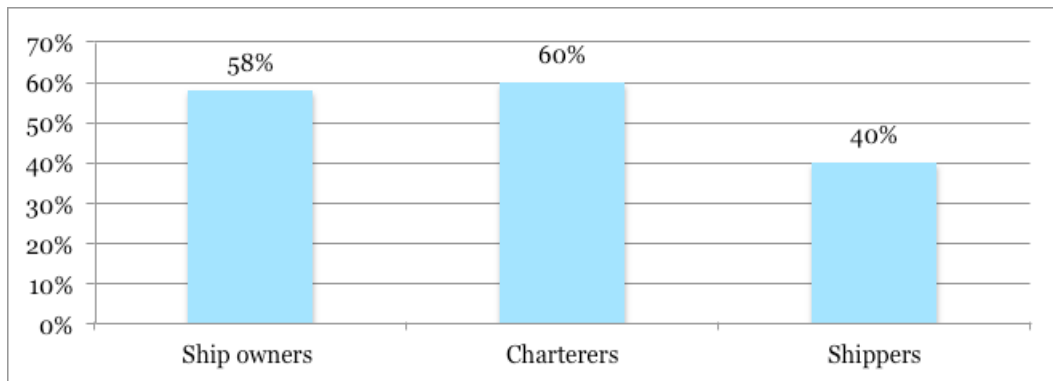
Almost half the shipping companies expect OPEX levels to rise by between 5 and 10 percent, in relation to their entire fleet. A fifth anticipate a rise of 10 to 15 percent, and a quarter of the companies are actually bracing themselves to meet a 15 to 20 percent increase in operating expenses.

Question 13: The new emission requirements for the ECAs will lead to a not inconsiderable increase in ship's operating costs (OPEX). How high do you think the OPEX increase is likely to be, in relation to your entire fleet?



There is no general agreement, however, on the question who will be obliged to bear the rise in OPEX costs. We find the presumption that, based on the conditions of chartering in the spot and time charter markets and the terms of existing charter agreements, either the shipowner or the charterer will be obliged to assume the costs – this at least is the view of 60 percent of the companies taking part. Only 40 percent are of the opinion that the rise in costs can be passed on to the shipper.

Question 14: Who, in your opinion, will be obliged to bear the increased costs (multiple choices allowed)?



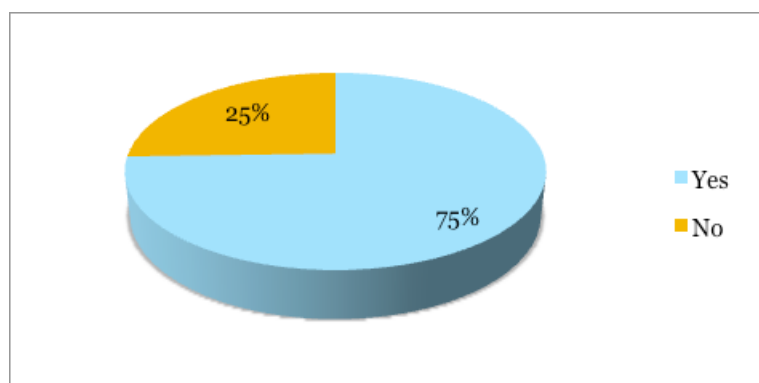
Thematic area 2: Efficiency-boosting measures in the operational fleet

In order to cope with significantly higher fuel prices and more stringent environmental requirements, three quarters of the shipping companies are already investing today in appropriate improvements. These basically fall into three categories.

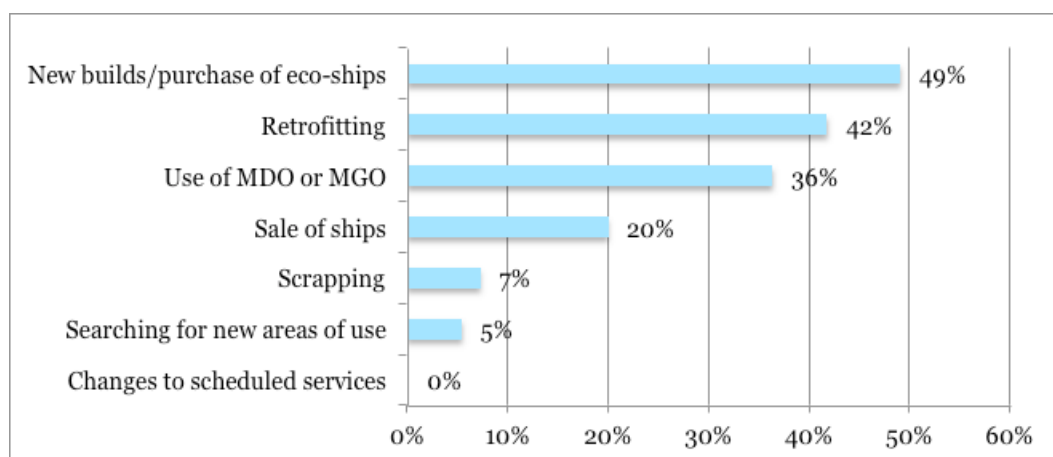
Almost half of the survey participants (49 percent) acquire new eco-ships. 42 percent are engaged in retrofitting to boost the efficiency of their operational fleet, and 36 percent are fuelling their ships with Marine Diesel Oil (MDO) and/or Marine Gas Oil (MGO), at least in the ECAs.

Further measures in this connection include the sale (20 percent) or scrapping (7 percent) of old ships, and the search for new areas of use (5 percent). These ships are evidently no longer suitable for retrofitting, in view of their inadequate size or their age, and so can no longer be used economically. None of the shipping companies is so far planning to make changes to its regular scheduled services.

Question 15: Are you already investing in appropriate measures with a view to meeting significantly higher fuel costs and/or more stringent environmental requirements?



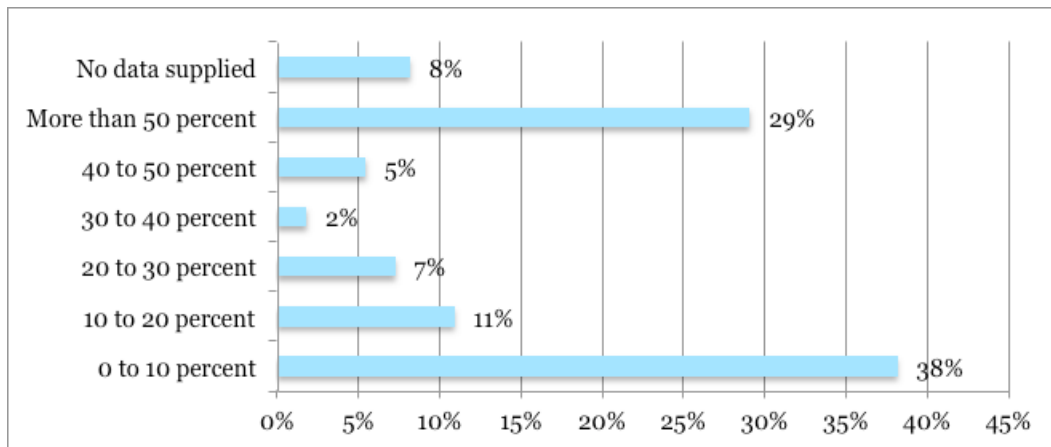
Question 16: If yes, what measures are you taking with the aim of meeting the new IMO emission requirements and the associated sharp rise in fuel costs (multiple choices allowed)?



The decision as to whether appropriate retrofitting measures are economically viable or not will always be dependent on the age and size of the ship, as well the question how advanced it is in technological terms. Almost a third of the shipping companies are retrofitting more than half of their entire fleet. 38 percent however state that they are not modifying any of their existing ships in the interest of increased efficiency, or that they are modifying only ten percent or less of their fleet.

It may be presumed in such cases that in view of the age or inadequate size of the ships, retrofitting is no longer an economical option, or that the ships will be operating outside ECA waters at all times.

Question 17: How many ships of your fleet are being retrofitted?



In connection with retrofitting measures, a third of the shipping companies indicate optimisation and modification of the rudder and propeller as being one of the most important energy-boosting improvements. But another fifth of the companies see modifications affecting the bow and/or the hull as being equally important.

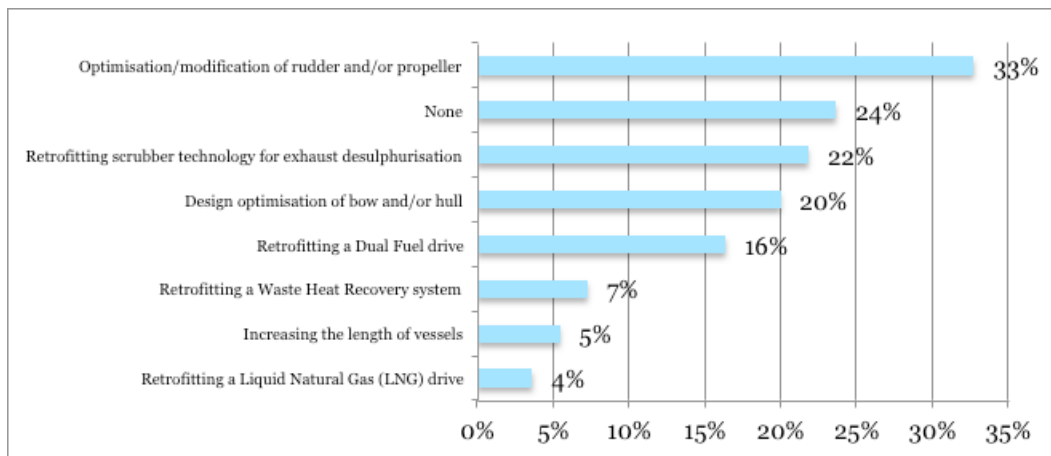
22 percent are investing in retrofitting with scrubber technology, which gives a basis for the subsequent desulphurisation of engine exhaust. Here a distinction is made between ‘wet’ and ‘dry’ desulphurisation. Dry desulphurisation systems incorporate the sulphur compounds in a calcium substrate, which gives rise to plaster. Wet desulphurisation systems, known as ‘gas washers’, use salt water or fresh water with caustic soda lye for the purpose.

Another solution is the use of Liquid Natural Gas (LNG). Cooled to below 160 degrees Celsius, natural gas hardly gives rise to any sulphur emissions and generates no fine dust in the combustion process. Nitrogen oxides are also reduced through the use of LNG, by contrast with diesel, by around 90 percent. Retrofitting with a pure LNG drive, however, is a measure contemplated by only 4 percent of the shipping companies. Reasons for this include the lack of storage capacity hitherto and the absence of an appropriate LNG infrastructure. Consequently shipping companies tend to prefer a Dual Fuel drive (16 percent) which can be operated with either gas or heavy oil at discretion.

Extending the length of ships is seen as relevant by only 5 percent of the shipping companies. Retrofitting with a Waste Heat Recovery system is being considered by 7 percent. This involves steam turbines generating electricity from the hot exhaust gas of the engine. This can be used either directly on board, to drive the air conditioning system for instance, or can feed an electrical engine which augments the diesel engine’s propulsion power.

Further measures that shipping companies say they are planning or have already introduced in their fleets include Super Slow Steaming and reducing the output of the main engine. This means that some shipping companies will be cutting back the speed of their ships further. Another measure referred to is painting ships with high performance antifouling paint. An antifouling coating below the waterline reduces friction notably and has a positive effect on the water resistance of the vessel. The coating prevents the accumulation of barnacles or mussels on the hull which check the ship’s progress. Based on silicon, these paints offer an exceedingly low surface roughness of up to 65 micrometres (in comparison with traditional values of 150 to 200 micrometres).

Question 18: What retrofitting measures are you planning for your fleet or are you implementing already (multiple choices allowed)?

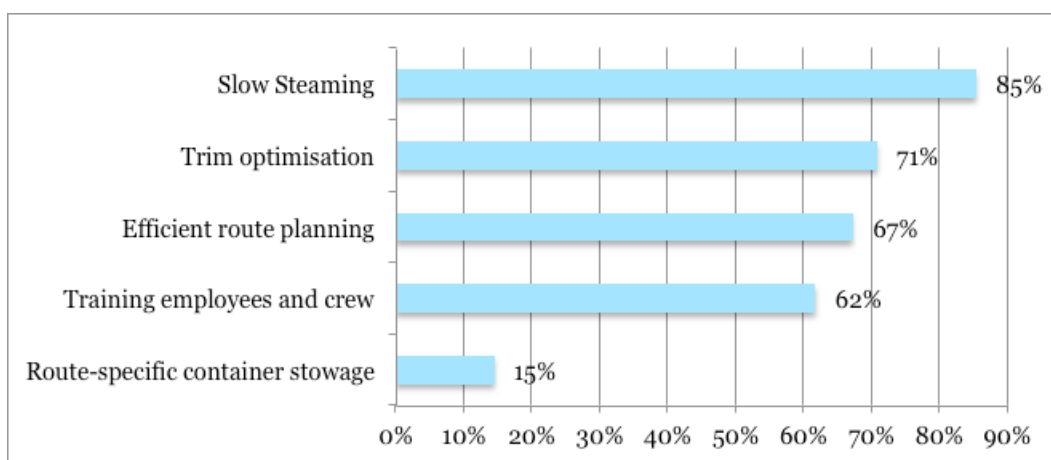


Along with retrofitting, for 85 percent of the shipping companies, Slow Steaming continues to be the main factor with a view to increasing the efficiency of their ships. Slow Steaming reduces the speed of vessels often significantly below the regular high levels of the past. The disadvantage, of course, is that the slower the vessels travel, the longer shippers have to wait for their goods to arrive.

While wind and sea motion often present enormous hindrances to marine travel, shipping companies can also make intelligent use of the weather with a view to cutting fuel costs. The choice of the most efficient route, with the help of software tools and weather forecasts, is already something that 67 percent of the shipping companies take for granted. Trimming – optimising the vessel’s position in the water by the intelligent stowage of cargo – is another useful resource and can likewise result in savings. 71 percent of the survey participants are optimising the trim of their ships. This involves using computer applications to determine the ideally dynamic trim, based on the draught and speed of each category of vessel.

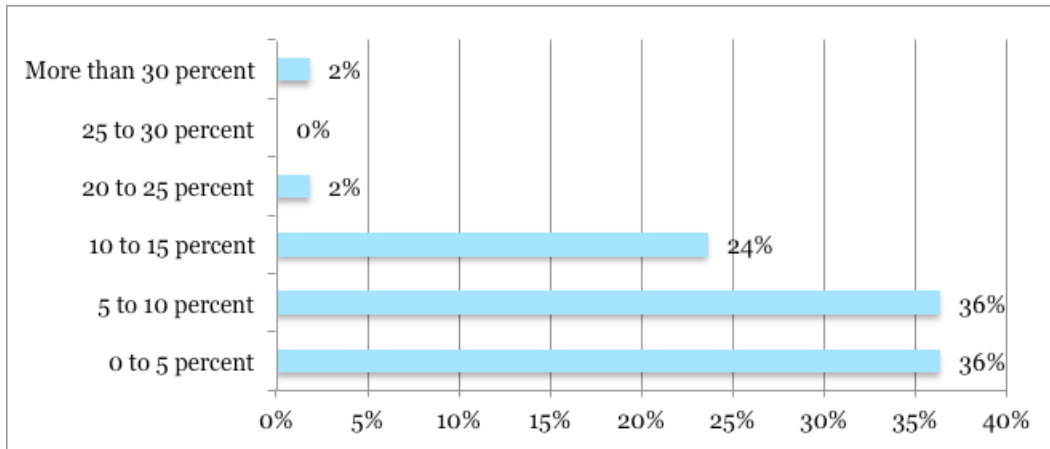
62 percent of the shipping companies, moreover, are training their employees and crew in efficient ship operation. In addition, some shipping companies further report that they regularly clean not only the hull but the propellers of their ships as well.

Question 19: What other measures are you taking to increase the efficiency of your ships (multiple choices allowed)?



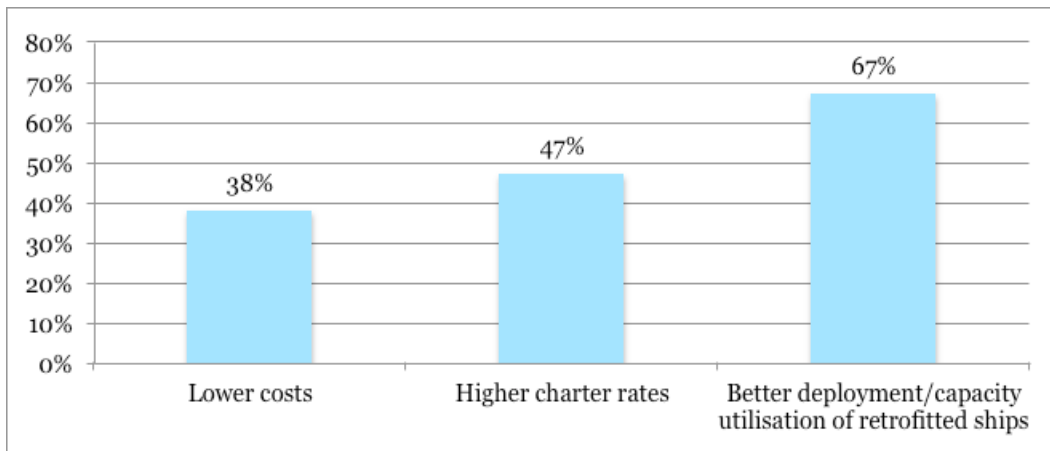
Over a third of all shipping companies expect an up to 5 percent efficiency improvement as a result of retrofitting. An equal proportion thinks an improvement of between 5 and 10 percent is a possibility. 24 percent take the view that retrofitting measures can increase the efficiency of their vessels by as much as 10 to 15 percent.

Question 20: How high do you estimate the efficiency gains as a result of retrofitting?



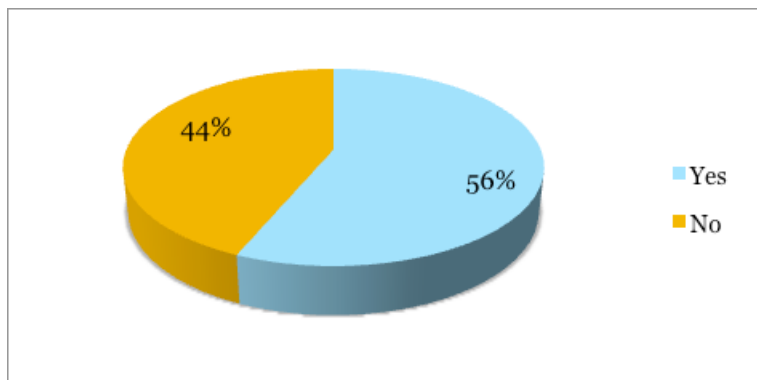
Two thirds of the shipping companies (67 percent) expect their investments in retrofitting measures to lead above all to more efficient deployment and better capacity utilisation of the retrofitted vessels. Almost half (47 percent) of the shipping companies are of the opinion that higher charter rates can be achieved as a result. Only a third of the companies see the reduction of their own costs as the most important factor in connection with retrofitting measures.

Question 21: What expectations do you have in connection with investments in measures for improved efficiency (multiple choices allowed)?



The IMO's Energy Efficiency Design Index (EEDI) introduced on 1 January 2013 is mandatory for new ships, and it can also be applied to ships that are already in operation. The EEDI states the level of CO₂ emissions per ton of cargo and nautical mile travelled for new ships. An algorithm makes it possible to compute the energy efficiency of a ship in relation to its size. At fixed time intervals, the EEDI will be adjusted to technological progress in the shipbuilding industry. This should lead to CO₂ levels that are 20 to 30 percent lower in new ships within a period of twelve years (source: the German Federal Ministry of Transport, Building and Municipal Development). Moreover, the stepwise lowering of EEDI levels should work in favour of the ongoing refinement of ship's components. At all events, 56 percent of the shipping companies have already worked out the EEDI for some ships of their fleet.

Question 22: Have you already drawn up an Energy Efficiency Design Index (EEDI) for ships of your fleet?

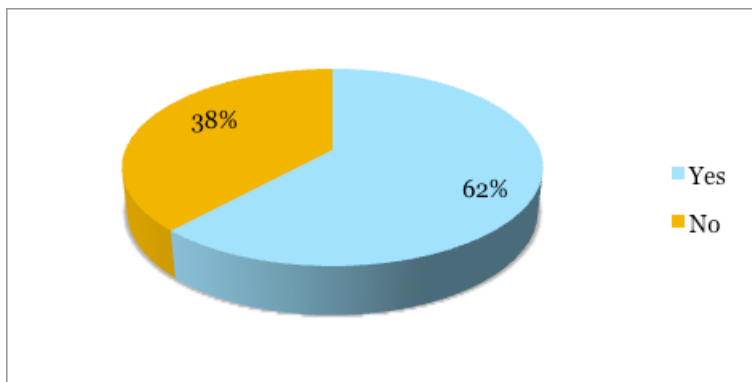


Thematic area 3: measures to improve efficiency in new ships

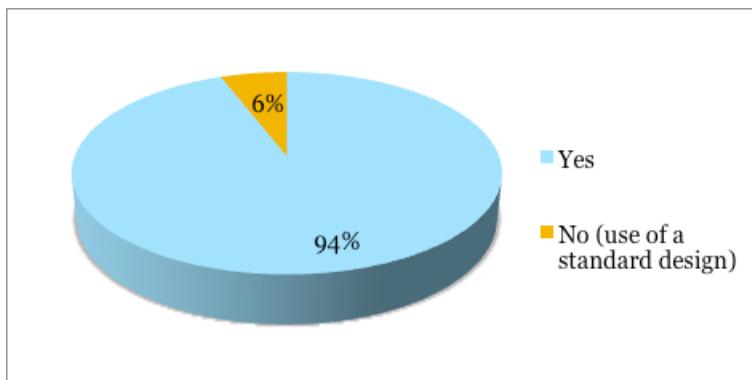
All current orders of new ships are aimed at enabling a company to operate on the market with the greatest possible efficiency. So optimised solutions will always be ordered in relation to the area of use envisaged in the given case. Then too, compliance with foreseeable environmental standards is another consideration.

At the time of this survey, 62 percent of the shipping companies had already ordered new ships or were planning to place orders in the course of the year 2014. Of these 62 percent, almost all (94 percent) say that their new ships will incorporate features designed to improve efficiency. Only 6 percent are continuing to use a standard design.

Question 23: At the time of this survey, have you already ordered any new ships, or are you planning to place orders for new ships in the course of the coming year (2014)?



Question 24: If yes, will they be built to an innovative and efficiency-boosting design?



New ship's designs or eco-ships will be characterised above all by an optimised hull form, say 62 percent of the shipping companies. Most ship's hulls have been designed in the past for travel on calm seas. On many routes, however, considerable sea motion is often the rule, so that ships are compelled to use much more fuel. In the new eco-ships, these aspects have already been taken into account in the design, making it possible for the ships to travel with significantly greater efficiency. In some cases the new ships are notably slimmer and more streamlined above water, and the bulbous bow does not extend so far towards the water surface. In addition, different loading conditions are now increasingly being taken into account. In this area many international shipyards, shipping companies, naval architects and engineering companies are working in conjunction with research centres, like the Hamburgische Schiffbau-Versuchsanstalt [Hamburg Shipbuilding Test Institute] for instance.

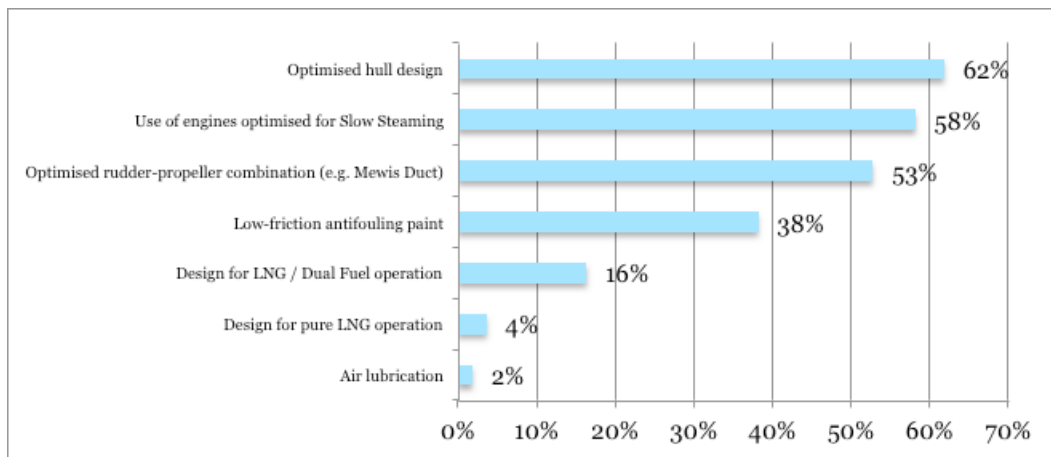
Further potential savings are likewise offered by an optimised propeller and rudder combination, which more than half of the shipping companies are realising in their new ships. In future the hull, rudder and propeller will add up to an optimised unit. For example, the hull may be extended to a point where the propeller is located. This will be continued into the rudder, where it takes on a

curved pear-shaped form. As a result the entire unit is more streamlined, giving rise to fewer eddies, and the ship moves forward through the water with greater efficiency.

58 percent of the shipping companies moreover say they will be using engines optimised for Slow Steaming operation. 38 percent of the companies state that their new ships will be given a coat of special low-friction antifouling paint.

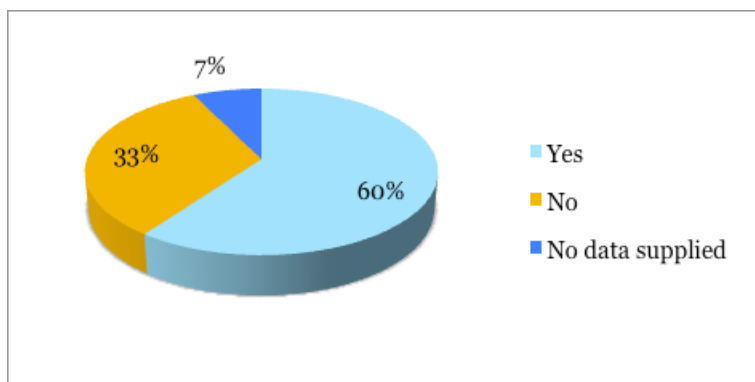
In new vessels as well, only 4 percent of the shipping companies are opting for a pure LNG drive. On the other hand, 16 percent are designing their engines with Dual Fuel operation in mind.

Question 25: If yes, what efficiency-boosting measures are involved (multiple choices allowed)?

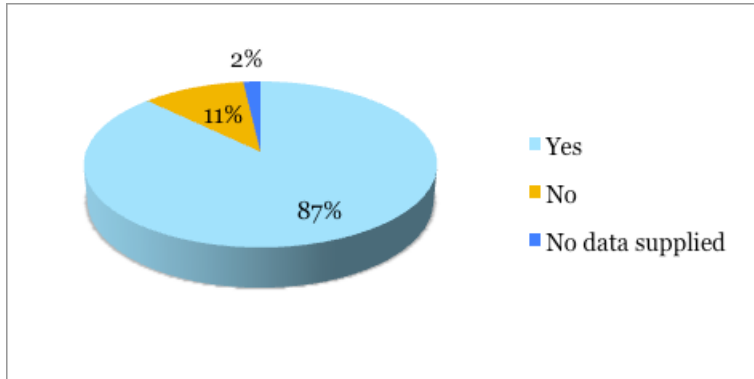


60 percent of the shipping companies are of the opinion that the latest generation of eco-ships – the most modern and most efficient new ships, that is to say – presents a threat to the competitiveness of existing fleets. Almost 90 percent actually suggest that in future there may be a split market, with different charter rates for eco-ships and standard vessels.

Question 26: Do you see the competitiveness of your existing fleet as being threatened by a new generation of eco-ships?



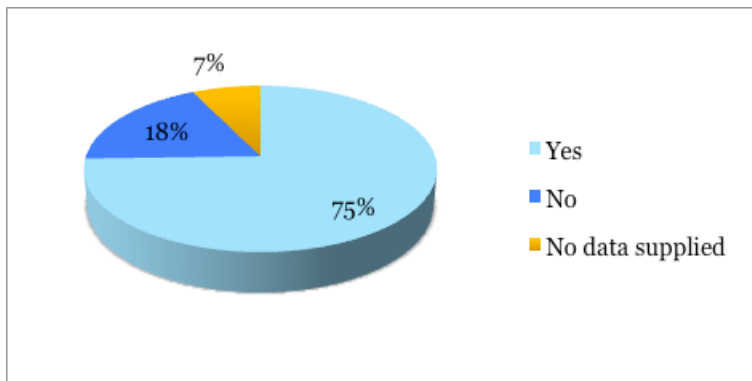
Question 27: In your opinion, are we likely to see a split market with different charter rates for standard designs and eco-designs?



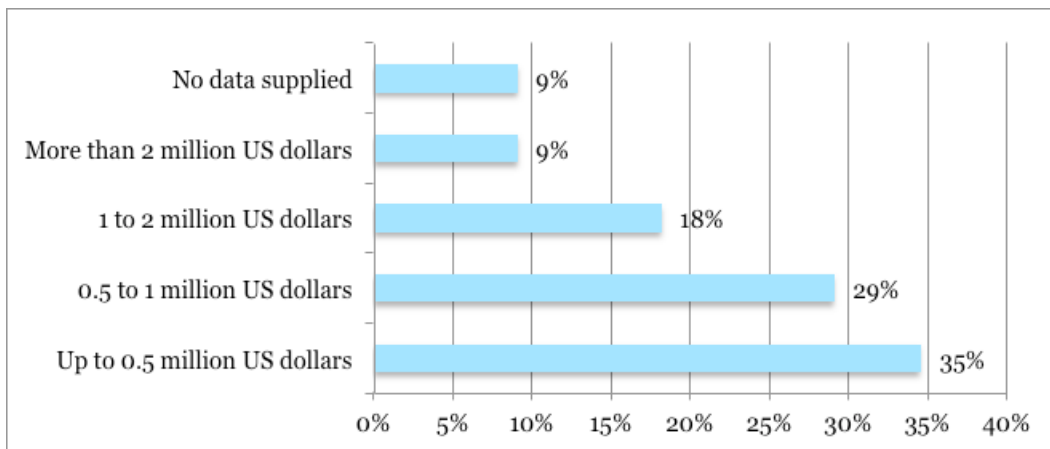
Thematic area 4: Costs and finance

75 percent of the shipping companies have already informed themselves of the cost of retrofitting measures. Investments in retrofitting are relatively manageable: 35 percent of the shipping companies are prepared to invest up to half a million US dollars per vessel in measures of this kind. Close to a third of the shipping companies are prepared to invest between half a million and one million US dollars. Here it must be borne in mind that retrofitting investments make better economic sense with large, more recently built vessels than with models that are smaller and older.

Question 28: Have you already informed yourself of the cost of retrofitting measures?

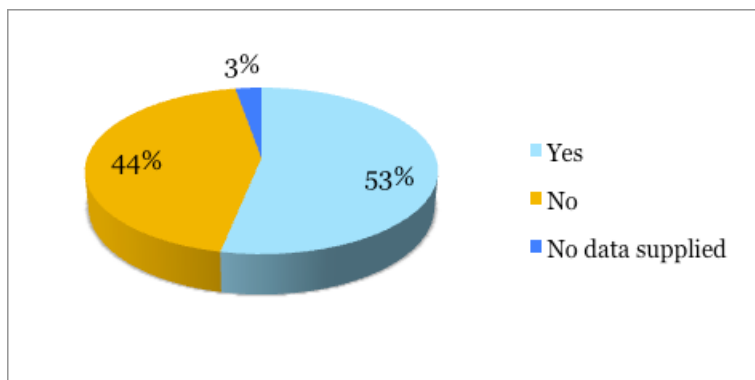


Question 29: If yes, how much are you prepared to invest in retrofitting on average per vessel?

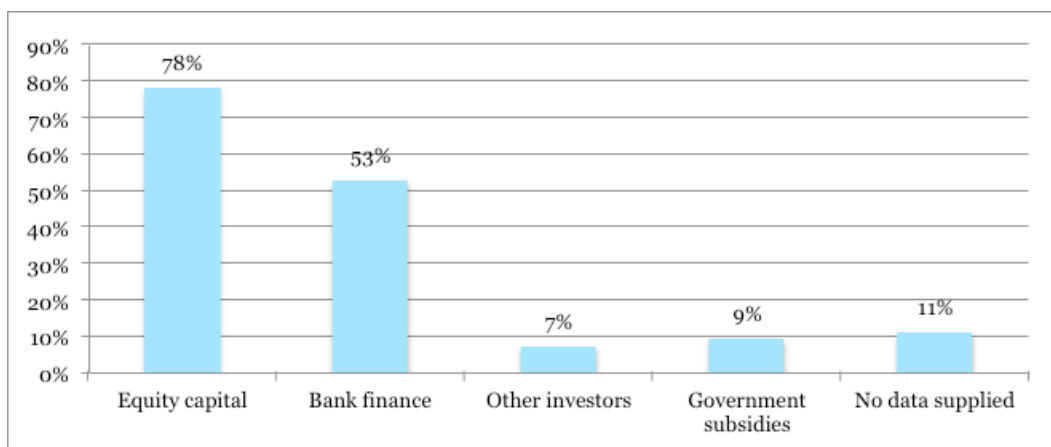


At the same time, more than half of the shipping companies think that retrofitting measures and the purchase of new eco-ships will be difficult on the financial side. 78 percent of survey participants are financing measures designed to boost the efficiency of their vessels with equity capital, while somewhat over half (53 percent) are relying (perhaps additionally) on finance from the banks.

Question 30: Do you anticipate financial difficulties in connection with retrofitting measures or the purchase of new eco-ships?

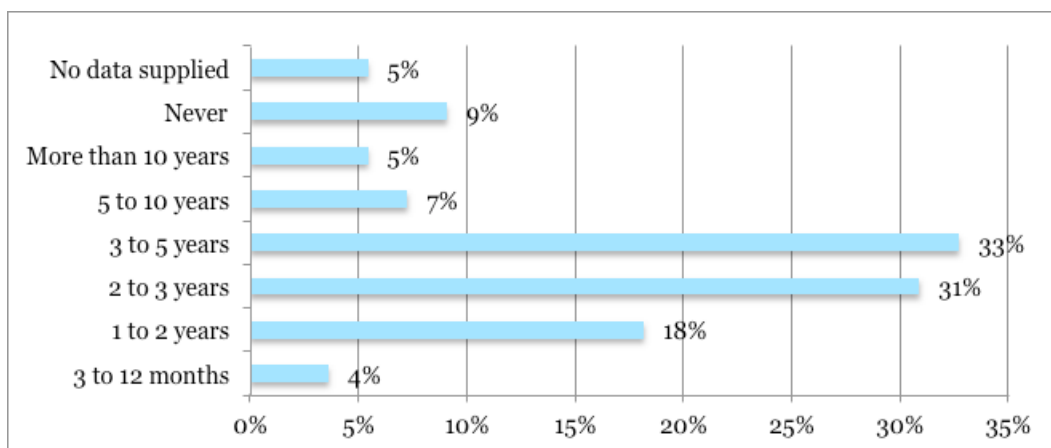


Question 31: How are you financing measures designed to boost the efficiency of your ships (multiple choices allowed)?



Taken all in all, more than 80 percent of the shipping companies expect their investments in retrofitting measures to pay off pretty quickly – over a period of one to five years. Although multiple choices were not provided for this question, some of the shipping companies did put a tick against different time scales. We conclude from this that different payback periods are being imagined for the different measures envisaged. As a result, the total comes to more than 100 percent.

Question 32: How long, in your view, will it take you to recover the costs?



Summary

The results presented here of the first Eco-shipping Expert Market Survey by HSH Nordbank are clear and unambiguous: as a globalised industry, shipping needs dependable international emission regulations – practically 90 percent of the shipping companies are in agreement on that point.

What is more, in response to the new IMO emission regulations shipping companies are rethinking their strategy. In spite of persisting overcapacity and the associated, scarcely adequate freight and charter rates, shipping companies are developing new fleets with modern eco-ships. At the same time they are retrofitting part of their existing fleet for more efficient and environmentally friendly operation.

Overall three quarters of the shipping companies are already investing in measures designed to meet the significantly higher price of fuel and more stringent environmental standards.

Thus at the time of this survey 62 percent of the shipping companies had already ordered new vessels or were planning to order them in the course of 2014. Of these 62 percent almost all (94 percent) say that their new vessels will be designed at the shipyard with improved efficiency in mind. Only 6 percent of the shipping companies are ordering ships of standard design.

The new generation of eco-ships will threaten the competitiveness of the existing fleet. 60 percent of the companies taking part agree on this point. Almost 90 percent even believe that the future holds a divided market, with different charter rates for standard designs and eco-designs. This means that in future it will be increasingly unprofitable to operate ships of the older standard design. In comparison with modern eco-design ships they will achieve lower takings from charter hire, while still being subject to higher operating costs.

In addition, 42 percent of the shipping companies state that they are retrofitting their operational fleet in the interest of greater efficiency. 30 percent of the shipping companies say that they are retrofitting more than half of their entire fleet. 38 percent, however, are only modernising up to 10 percent of their own fleet. As a general principle, retrofitting measures make more sense in economic terms for big, more modern ships than for smaller and older ones.

A third of the shipping companies reports that they see the optimisation and modification of the rudder and propeller as one of the most important efficiency-boosting measures in connection with a retrofitting makeover. But a fifth of the companies see other modifications, involving the optimisation of the bow and/or hull, as being equally important. At all events, 22 percent put their faith in retrofitting with scrubber technology, which provides a basis for the subsequent desulphurisation of engine exhaust gases.

35 percent of the shipping companies are prepared to invest up to half a million US dollars on average per vessel in retrofitting. Close to a third of the companies anticipate costs ranging between half a million and a million US dollars. Over 80 percent of the shipping companies expect that their investments in retrofitting will be recovered quickly, in a period of one to five years.

Taken all in all, the international shipping sector is thus looking to a remarkable innovative boost by means of eco-ships and retrofitting in spite of the still difficult underlying conditions.

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