Driving Change:

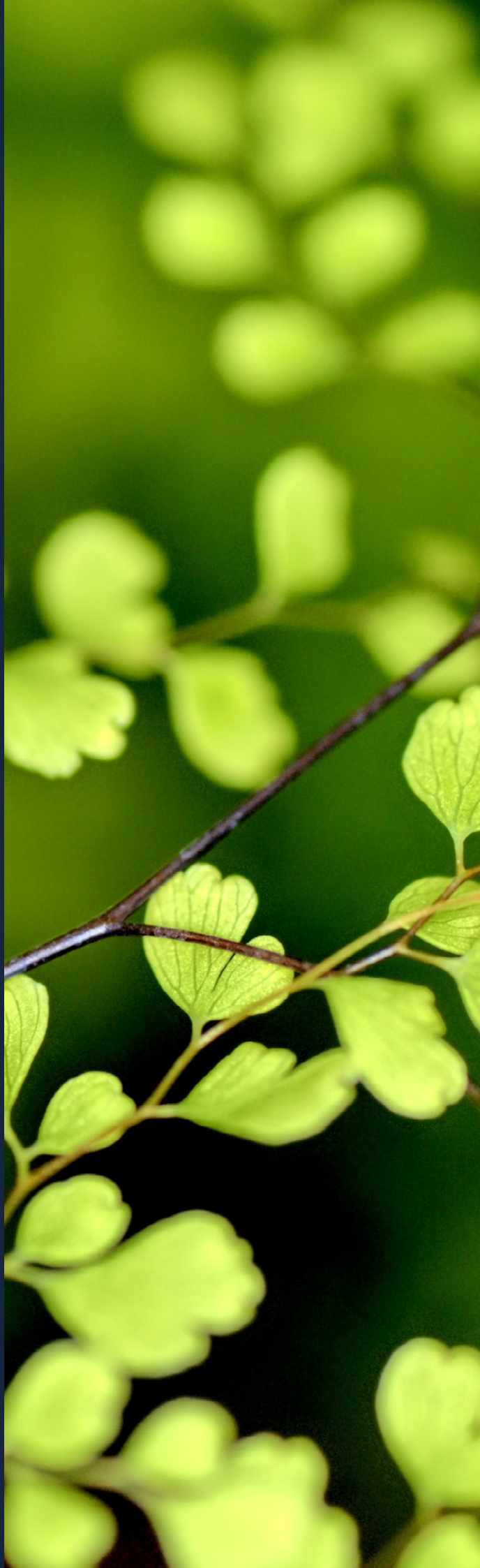
The Decarbonisation of European Transport

DLA PIPER

PROVIDER
UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY

Inframation

Contents



Methodology

In the third quarter of 2021, Acuris Studios, on behalf of DLA Piper, surveyed 100 senior executives of organisations based in Europe that have invested in European decarbonisation projects and/or technologies related to aviation, rail or shipping in the past 24 months.

Fifty respondents were from the industry, including airlines, airports, rail operators and shipping ports/ freeports and shipping operators; and 50 respondents were investors, including specialist infrastructure/ transport funds, sovereign wealth funds, private equity, pension funds, sponsors/developers, bank lenders, lessors, export credit agencies and private credit funds. Respondents answered questions on the decarbonisation of European aviation (34), rail (33) or shipping (33).

The survey included a combination of qualitative and quantitative questions, and all interviews were conducted over the telephone by appointment. Results were analysed and collated by Acuris Studios, and all responses are anonymised and presented in aggregate.

50 / 50

50 respondents were from the industry and 50 respondents were investors.

Foreword

Transport is the bedrock of modern economies. It is also a major source of carbon dioxide emissions. To put this in context, nearly a quarter of Europe's CO2 emissions – more than a billion tonnes a year – are generated by transport, according to European Union research. And transport emissions, unlike those from other sectors, are rising rather than falling.

The purpose of this study is to examine decarbonisation strategies in three key transportation subsectors: aviation, rail and shipping. We explore how corporates and investors plan to cut emissions, their ambitions and investment plans, and the impact of government policy and new technologies. We also examine the steps they are considering as they look to optimise their investments and minimise risks.

Key findings

- **Decarbonisation high on the agenda:** 79% of respondents say that decarbonisation is a primary driver of their organisation's investment strategy.
- **Capital allocation rises:** 34% of corporates and 66% of investors expect to devote at least EUR1 billion to decarbonisation projects and technologies over the next 24 months, versus 20% of corporates and 48% of investors over the past 24 months.
- **Investment increases:** The majority of respondents across all subsectors anticipate significant increases (between 50% and 200%) in their investment in decarbonisation over the next five years compared to the past five years.
- **Ambitious plans:** More than half of corporates (across all three subsectors) say that their organisation plans to cut net carbon emissions by at least 40% by 2030 compared with current levels.

Martin Nelson-Jones
Partner, Global Chair of Infrastructure, Construction and Transport
T: +44 207 796 6704
M: +44 773 829 5601
martin.nelson-jones@dlapiper.com

Breathe easy: The drivers and challenges of decarbonisation

"Cut emissions now" is the message from the EU. Our survey reveals that those in the sector are hearing this loud and clear, but there are still obstacles to overcome

Decarbonisation is the systematic elimination of carbon dioxide emissions. And, for transportation businesses, it is no longer simply an aspiration. In the EU, decarbonisation is a legal requirement under the European Climate Law, which entered into force in July 2021.

While there is a large – even bewildering – amount of guidance and legislation linked to decarbonisation, all of it is designed with a single purpose: to ensure the EU is climate neutral by 2050.

Transportation is one of the biggest sources of CO2 emissions. Unlike other sectors of the economy, it has – so far – largely escaped regulatory measures to curb emissions. But that is about to change. Under its "Fit for 55" climate package, the EU is now targeting an emissions reduction of at least 55% by 2030 compared to 1990 levels.

Achieving the new target will mean a major revision of transport-related legislation. This will include an expansion of the EU's Emissions Trading System (EU ETS). The proposals are ambitious: these include bringing shipping into the EU ETS for the first time, along with an end to the tax exemption for aviation fuel.

With rules yet to be finalised, those in the shipping industry, for example, are not setting sail just yet.

"Meeting the International Maritime Organisation (IMO) emission targets for shipping is a tough challenge, with the shipping industry facing significant re-investment costs to make the shift to carbon neutrality," says David Manson, DLA Piper Partner, Manchester.

"Operators on the one hand recognise the benefits of the transformational change but with respect to their existing fleet mindful of the risk of creating a whole generation of stranded assets with the cost of "retrofits" to existing assets also a factor. Many in the industry seem to be adopting a "wait-and-see" approach until there is greater clarity on the regulatory landscape."

As well as targeting the biggest emitters, there is a growing regulatory focus on encouraging investment in clean technology. The EU's Sustainable Finance Disclosure Regulation (SFDR), which came into force in March 2021, is an example. This is designed to steer capital towards sustainable investments while combating "greenwashing."

Against this rapidly evolving regulatory background, our study shows that decarbonisation is now a number-one investment driver for aviation, rail and shipping corporates, and for investors in those subsectors.

▼ 55%

"Fit for 55" climate package, the EU is now targeting an emissions reduction of at least 55% by 2030 compared to 1990 levels.

Driving change

Large majorities of respondents from aviation (82%), rail (79%) and shipping (85%) agree that decarbonisation is a primary driver of their organisation's investment strategy. Aviation – arguably the toughest subsector to decarbonise – stands out as having the highest proportion of respondents saying that they strongly agree that decarbonisation is a primary driver (59%), versus 49% each for rail and shipping.

Respondents are backing up their words with capital. Our survey shows that many have already made significant investments in decarbonisation. To put this in context, 20% of corporates and 48% of investors have allocated EUR1 billion or more to decarbonisation projects and technologies over the past 24 months.

Looking ahead, large-scale investment is set to grow even further: 34% of corporates and 66% of investors are looking to allocate at least EUR1 billion to decarbonisation over the next 24 months.

And there is a broad range of investors who see transport as an attractive asset, particularly in a world transformed by COVID-19.

"Private capital funds (infrastructure funds) and institutional investors (pension funds and insurance companies) have been, and are likely to continue to be, the types of investors with appetite for transport assets."

Mafalda Ferreira, DLA Piper Partner, Lisbon

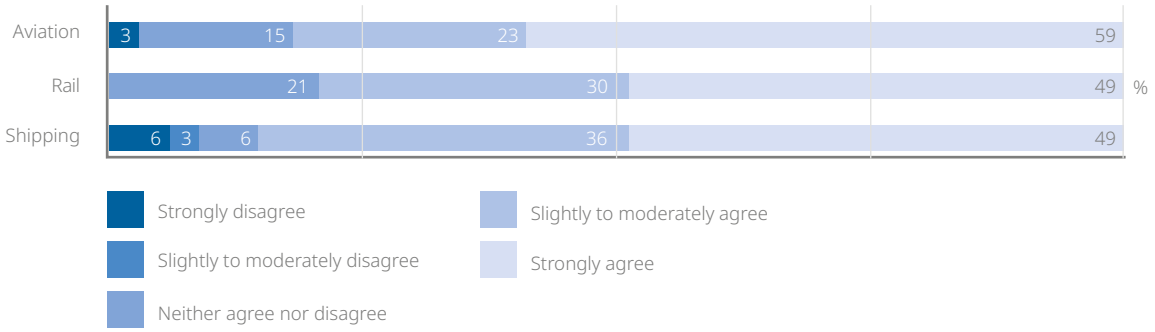
"Investment strategy has changed very recently," continues Ferreira. "Due to the global health crisis, investment managers think differently about risks and the focus is to understand if the asset is essential for people and for the economy and how it fits within public policy. New technologies have contributed to include assets such as motorway service stations, electronic toll (demand) systems providers, and facilities management companies, within the spectrum of infrastructure asset class in the transport sector."

"The call to decarbonise the industry will doubtless come at some significant cost, with a diverse range of approaches to reaching that objective. The way in which such significant capex is financed is clearly a topic in itself and the traditional asset ownership models may require evolution and adaption."

David Manson, DLA Piper Partner, Manchester

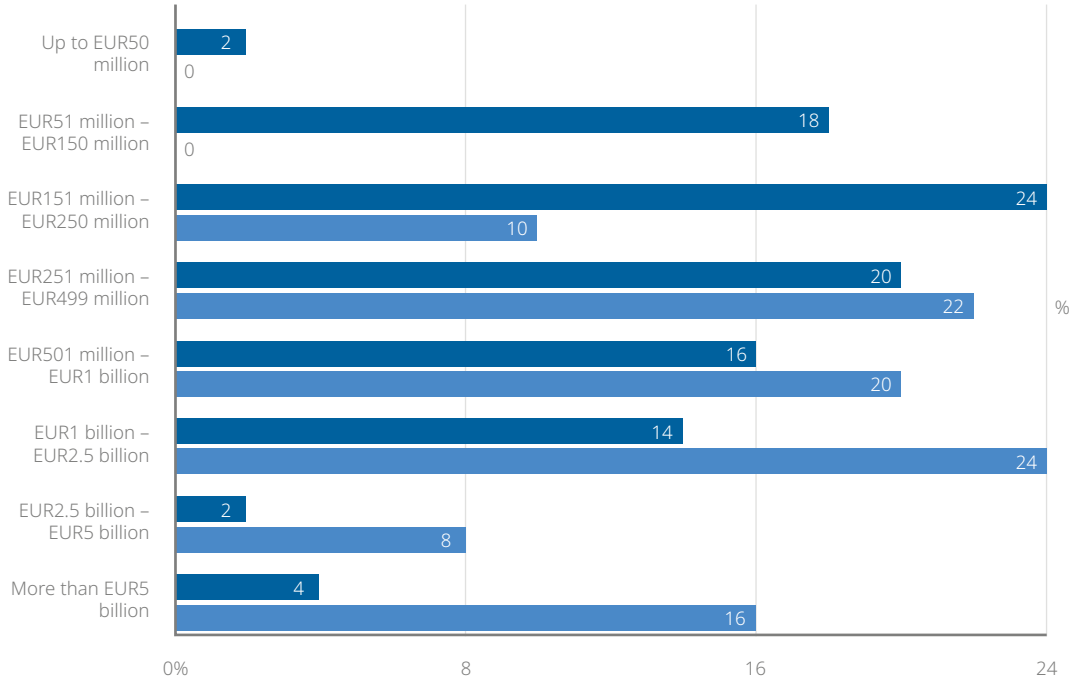
[All] Do you agree that decarbonisation is a primary driver of your organisation's investment strategy?

Fig 1.



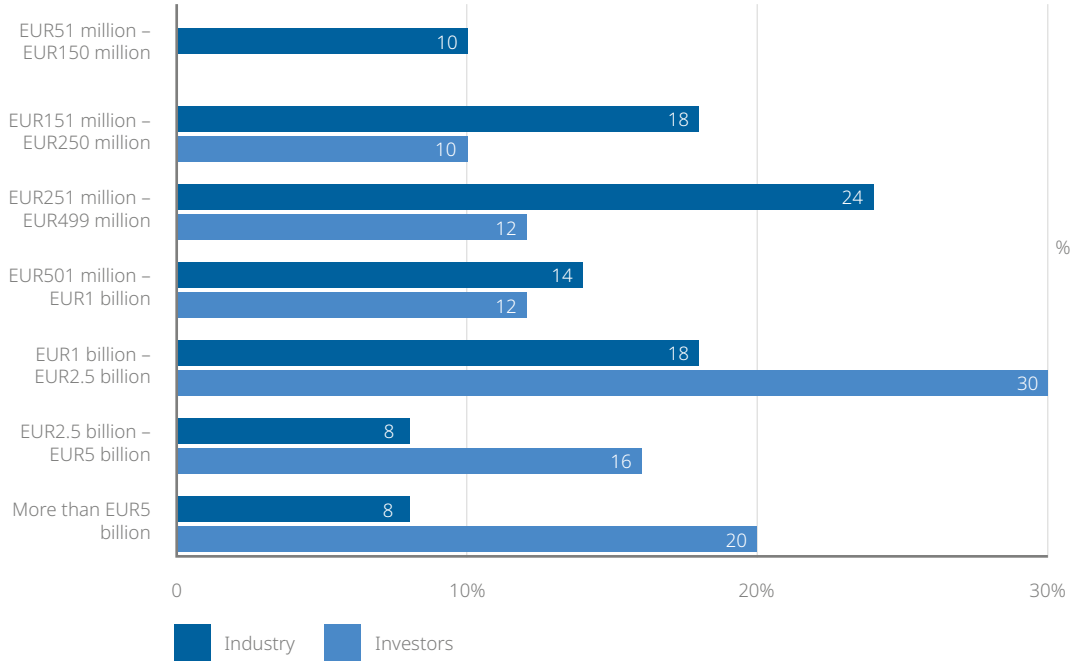
[All] What approximate value of investment did your organisation allocate to decarbonisation projects and technologies in Europe over the past 24 months?

Fig 2a.



[All] What approximate value of investment do you expect your organisation to allocate to decarbonisation projects and technologies in Europe over the next 24 months?

Fig 2b.



PUSH AND PULL

As our research reveals, corporates and investors are ploughing increasing amounts of capital into their decarbonisation efforts.

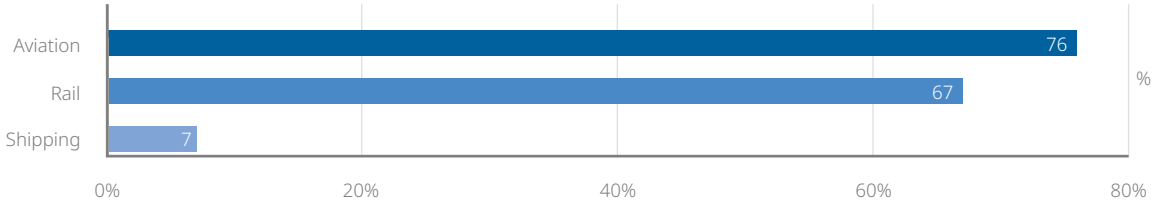
Regulatory factors are a key driver – they are inescapable – but other factors are also in play. To put this in context: even if regulatory "push" factors (such as the SFDR) were stripped out, more than two-thirds of respondents believe their organisations would still be directing just as much investment towards decarbonisation.

"Investments would be the same because investor sentiment is closely attached to decarbonisation. After COVID-19, there has been great acknowledgement of the environmental impact of investment decisions."

Managing Director of a UK-based investor

[All] Do you believe your organisation would be directing as much investment towards decarbonisation as it plans to if political obligations (e.g. EU Sustainable Finance Disclosure Regulation) weren't a factor? [Yes]

Fig 4a.



Positive "pull" factors play an important part in steering corporates towards green investments – particularly in the case of aviation. Asked to identify the top drivers for investing in greener technologies over traditional ones, 71% of aviation companies highlight the long-term economic benefits (such as lower running costs) as a top investment driver. In short, decarbonisation isn't just about compliance, it's also about saving money.

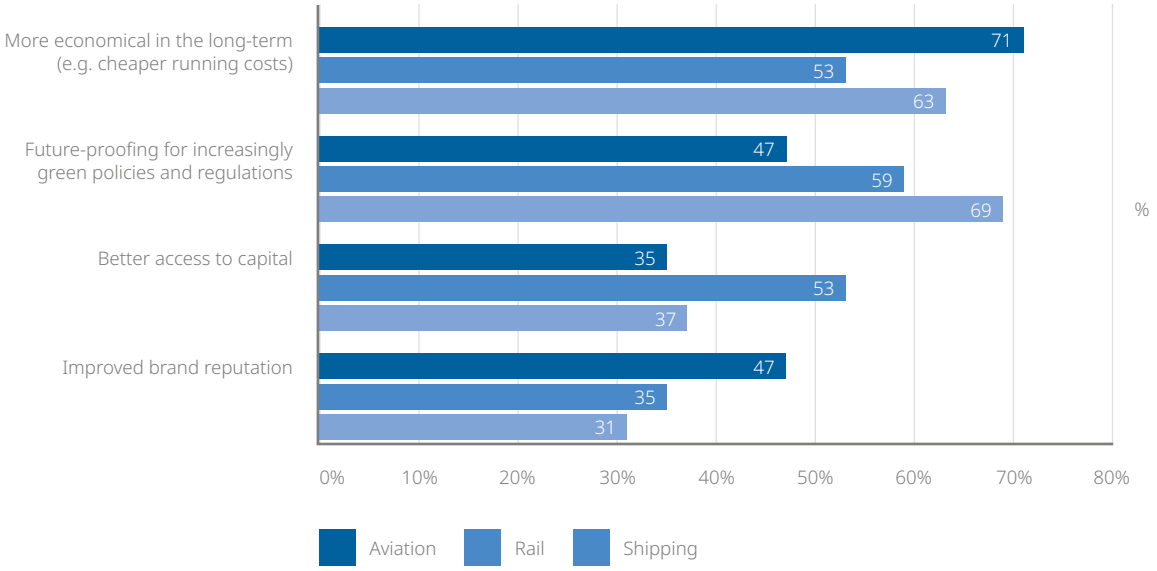
Shipping and rail industry respondents largely agree, although higher proportions of these two groups see futureproofing for increasingly green policies and regulations as a main driver for investing in greener technologies (69% and 59% respectively).

"Futureproofing is necessary because policies and regulations are changing due to environmental threats. Green technologies are economical when we look at the numbers from a long-term perspective."

CEO of a France-based shipping corporate

[Industry respondents only] Which of the following would you say are the top drivers for investment in greener technologies over traditional? [Select top two]

Fig 8.



Focusing on investors only, better access to capital is the top driver for investment in greener technologies over traditional ones, cited by 77% of shipping investors and 71% of aviation investors. This suggests that policy initiatives such as the EU's SFDR are having the desired effect.

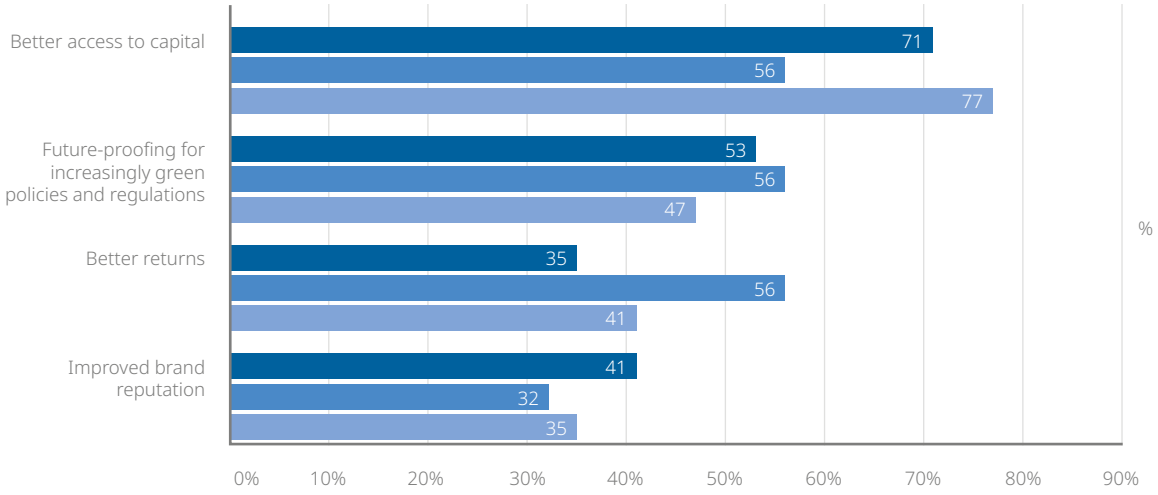
"Adopting greener technologies is a systematic way of ensuring the capital requirements are always met," says the head of a Netherlands-based investor. "Banks and other investment firms will provide funds for new initiatives if the ESG (environmental, social and governance) targets are in line with market expectations."

Interestingly, better returns are ranked relatively low. Only 41% of shipping investors and just 35% of aviation investors see better returns as a top driver. This is not to say that green investments mean poor returns – a point stressed by the managing director of a Germany-based investor:

"We associate greener technology investments with higher returns. Many countries are supporting green initiatives and the scale of greener investments will increase continuously."

[Investor respondents only] Which of the following would you say are the top drivers for investment in greener technology over traditional? [Select top two]

Fig 9.



DATA WITH DESTINY

ESG data has been key to making smart financial decisions in recent years, according to the majority of respondents.

"Most of the decisions we take are related to ESG factors rather than political obligations."

Director of a Denmark-based investor

Aviation respondents are the greatest advocates of ESG, with 59% of both corporates and investors saying they strongly agree that ESG has made a difference. Shipping and rail corporates and investors are more circumspect. Indeed, 45% of those in shipping and 36% in rail say they do not necessarily agree that ESG data has been key to their organisation making smart financial decisions in recent years.

However, both industries will be unable to hold back the tide of ESG for much longer.

"The often government-procured nature of passenger rail delivery in particular may mean that ESG data may be less directly relevant to investment decisions in rail than the aviation sector. But we would expect ESG concerns to be an increasing driver in the policy decisions and procurements that will drive future rail investment."

Robert Smith, DLA Piper Partner, Leeds

"The rail sector throughout the EU tends to be increasingly electrified and accounts for only a small proportion of greenhouse gas emissions within the EU transport sector overall."

Daniel Colgan, DLA Piper Partner, Brussels

"It is crucial that this positive trend is pursued further and that the necessary resources are committed that will be required to enable rail to continue to be best in class," continues Colgan.

In part, this is likely to reflect the fact that neither rail nor shipping has had the ESG spotlight turned on it to the same extent as aviation. Given the relatively low tonne-kilometre emissions of both shipping and rail, this is perhaps not surprising. However, all transport sectors are now expected to account for their environmental performance – and to take steps to improve it.

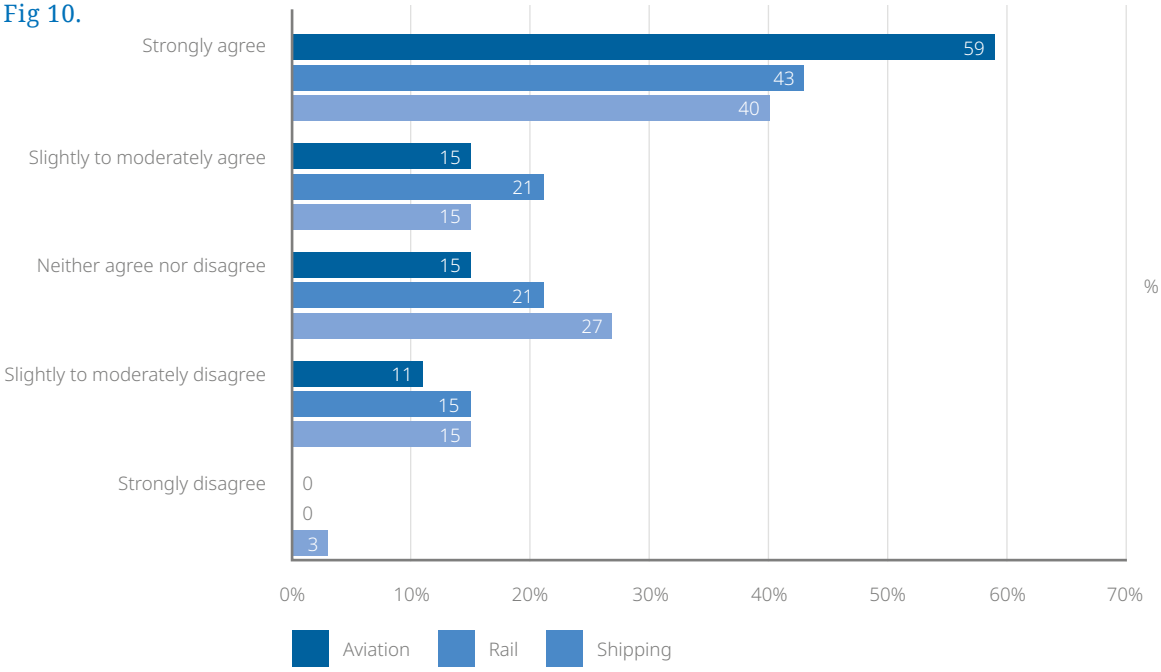
Despite its efficiency, rail is lagging in this respect with only 41% of corporates having already established an energy management system that is certified in accordance with the international energy management systems standard, ISO 50001. By contrast, 56% of shipping corporates and 71% of aviation corporates have already taken this step.

41%

of corporates having already established an energy management system that is certified in accordance with the international energy management systems standard, ISO 50001.

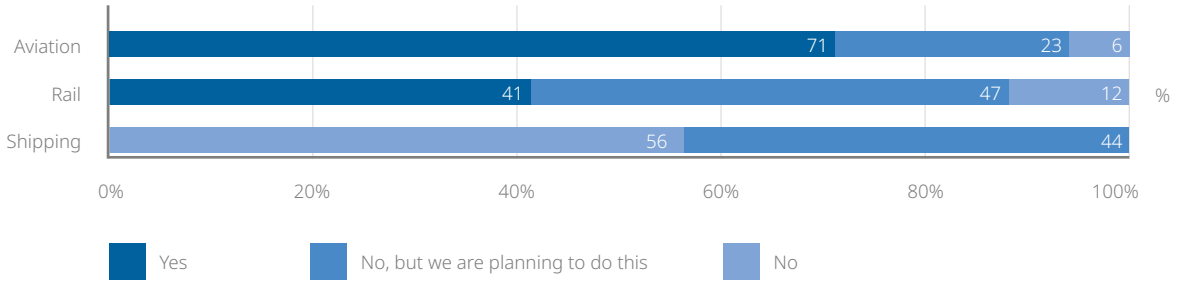
[All] To what extent do you agree that your organisation's ESG data has been key to making smart financial decisions in recent years

Fig 10.



[Industry respondents only] Has your organisation established an energy management system that is certified according to the ISO 50001 standard?

Fig 15.



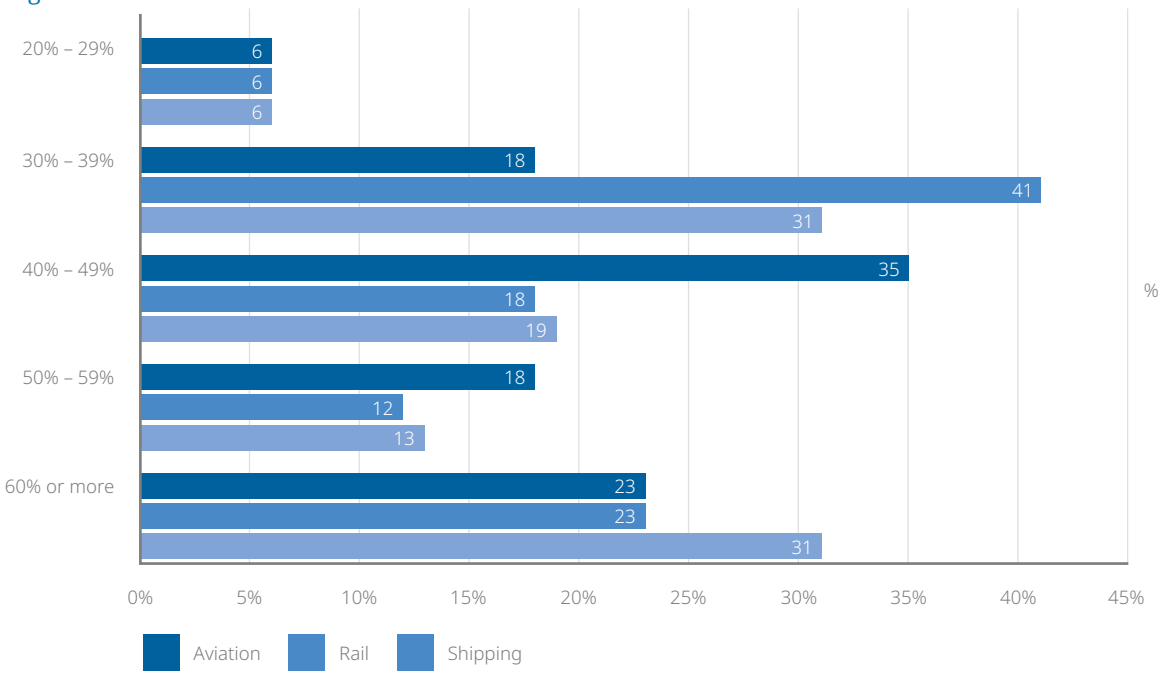
Carbon emissions

Corporate respondents have big ambitions when it comes to curbing their CO2 emissions. More than half say their organisation plans at least a 40% decrease in net carbon emissions by 2030 compared to current levels.

Shipping stands out as the most ambitious subsector, with almost a third (31%) of respondents saying their organisation expects to reduce emissions by 60% or more over this time period.

[Industry respondents only] By how much does your organisation plan to decrease its net carbon emissions by 2030 compared to current levels?

Fig 6.



However, respondents are split as to whether they will meet their carbon reduction targets. Those in the aviation subsector are the most optimistic, with 62% expecting their 2030 carbon reduction targets will be met and only 9% saying that they will be far from meeting them.

Rail and shipping respondents are less bullish. Just over half (52%) from these subsectors expect to meet their target, although the proportion of shipping respondents who expect to easily surpass their targets (22%) is notably higher than that for rail (just 6%). At the same time, shipping respondents were more likely than any other group to say that they will be far from meeting their targets (18%).

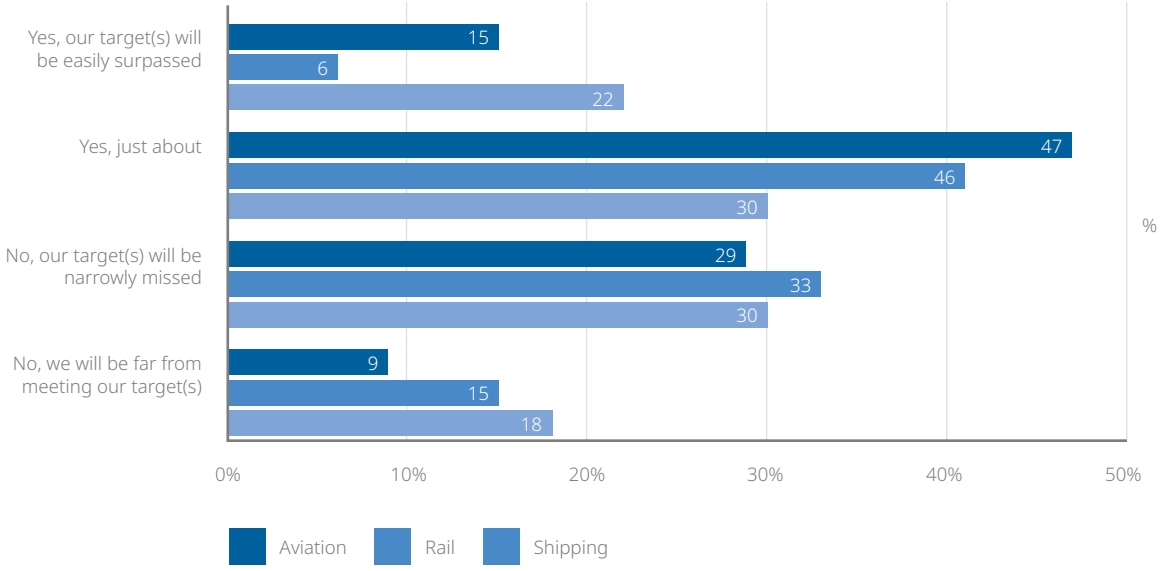
Many respondents point to pandemic-related factors as hindering their pursuit of carbon reduction targets. Reasons include reduced profitability, cash flow problems, border closures and staff shortages – all of which impede respondents' ability to pursue projects.

"Our targets were very ambitious to begin with. But recent market uncertainties have been difficult to deal with and we have fallen behind a lot. We were expecting to resume some efforts, but this has not taken place."

Head of M&A of an Italy-based rail corporate

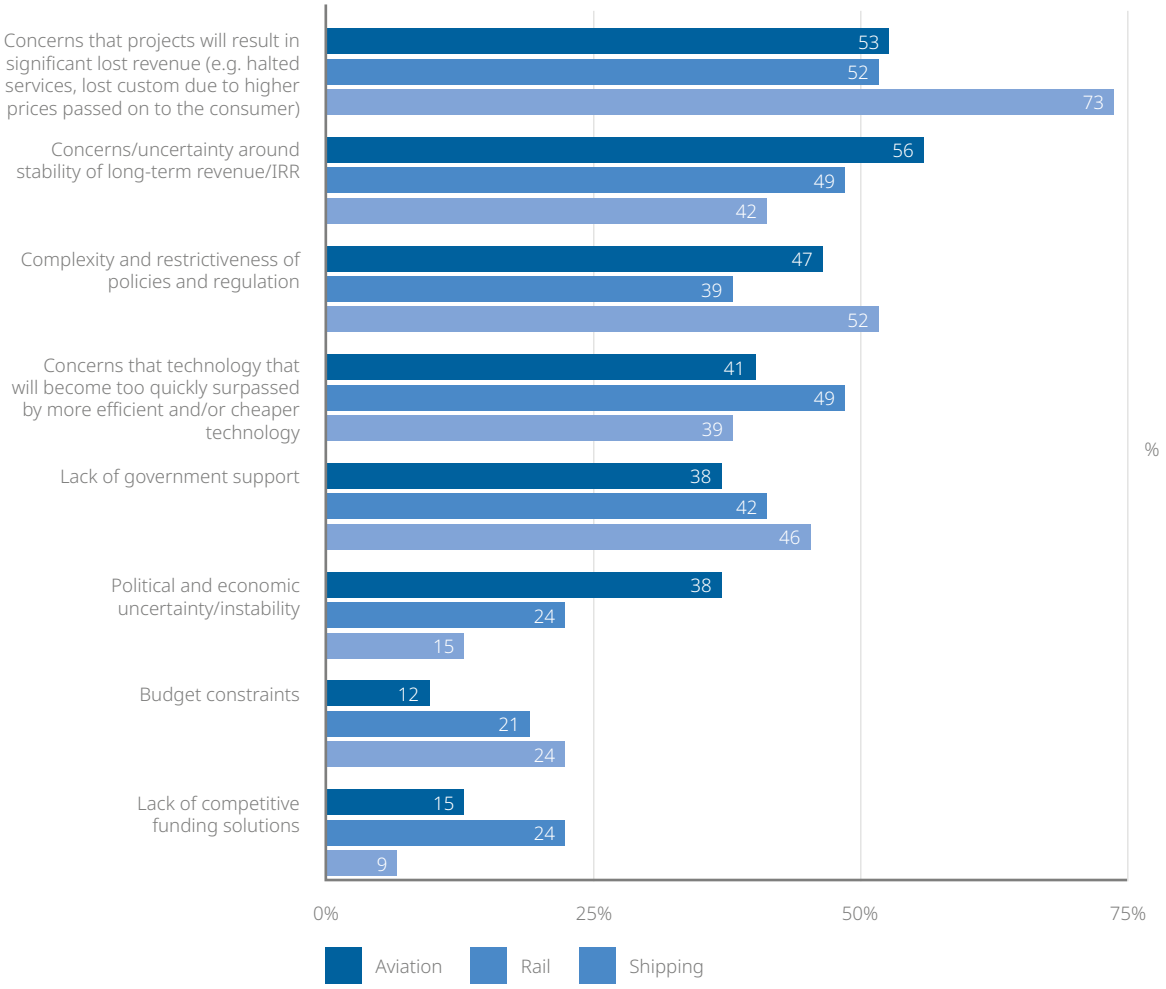
[All] Do you believe your organisation will meet its carbon reduction targets?

Fig 7a.



[All] What do you consider to be the biggest obstacles to investing in decarbonisation projects and technologies in Europe for your organisation? (Select top three)

Fig 11.



EMISSION CRITICAL

Fear of lost revenue (from issues such as halted services and lost custom from higher consumer prices) is seen as a major obstacle when it comes to investing in decarbonisation projects and technologies. This is a particular concern for shipping respondents and is highlighted by nearly three-quarters of them. Revenue loss is also seen as the top investment obstacle by rail respondents (53%).

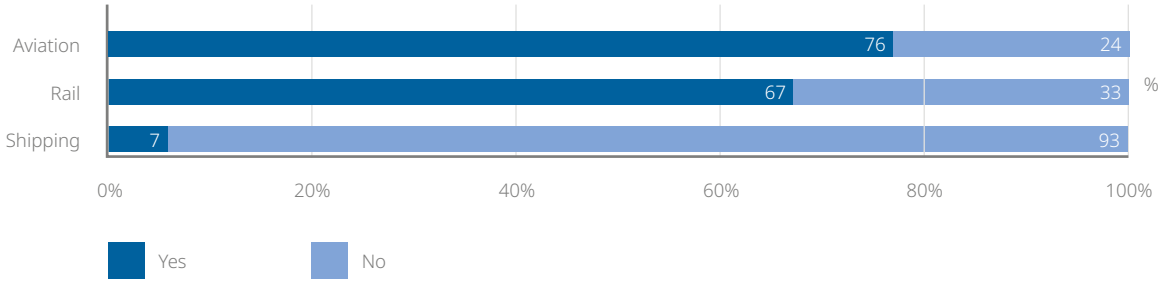
Uncertainty around the stability of long-term revenue/IRR is also flagged as a major investment obstacle in relation to decarbonisation projects. This is a particular concern for aviation respondents, mentioned by 56%.

In tandem with this, regulatory factors are highlighted as a potential investment blocker – notably by shipping respondents, with more than half (52%) pointing towards the complexity and restrictiveness of green policies and regulations as the biggest investment obstacle.

Rapid technological obsolescence is a key issue for rail respondents (48% are concerned that technology will too quickly be surpassed). Rail is an interesting case in this respect. Railways already depend heavily on control system upgrades (rather than new vehicles or novel fuels) to achieve carbon reduction goals. That dependency is likely to grow. Examples of the technologies involved include traffic management, driver advisory systems, moving-block signalling and autonomous trains. All promise significant carbon reductions. The challenge is that all these technologies are in a state of flux.

[All] During the past ten years, do you believe your organisation has suffered financially from a decarbonisation-related investment that later proved to be ill-judged?

Fig 12a.



DECARBONISATION DILEMMAS

All long-term investments come with an element of risk. But decarbonisation-related investments in the transport sector present particular challenges. History shows that decarbonisation targets are apt to be revised. What would happen to the value of your investment (and to your competitive position) if the emissions target you are working to is subsequently increased or brought forward – or even shelved?

In the rail industry, for example, while the use of overhead electrification brings benefits beyond simply meeting emissions targets, there are other aspects which may cause more issues.

"There is potentially more complexity in decarbonising other assets including replacing diesel trains on branch lines and de-carbonising the construction processes for rail systems. Changes in targets here may add unnecessary cost into processes which already take a number of years to complete."

Robert Smith, DLA Piper Partner, Leeds

The longevity of transport assets amplifies these risks. Aircraft have a lifespan of around 20 years, while ships typically last from 25 to 30 years. Meanwhile, a train built today could still be in service in 2061.

In short, transport assets have a lifespan that typically extends far beyond the range of current policy horizons. Managing this situation is complex, given that an investment decision made today is likely to lock in a predetermined level of emissions for decades.

Getting investment decisions wrong is an area of real concern for respondents. Indeed, our survey shows that a surprisingly high proportion says that their businesses have already suffered due to poor decarbonisation investments. Half of aviation respondents and a third of rail and shipping respondents say their organisation suffered financially from a decarbonisation-related investment that later proved to be ill-judged.

Delving into the detail, issues include delays in getting projects started; technologies failing to live up to expectations; problems with ESG compliance;

an unacceptably long interval between making the investment and seeing results; and underestimating the extent of the investment required, resulting in the need to raise more capital.

Respondents report that the root causes of these problems include a lack of research, critical information being held back, COVID-19 impacts on the due diligence process and failure to conduct adequate due diligence.

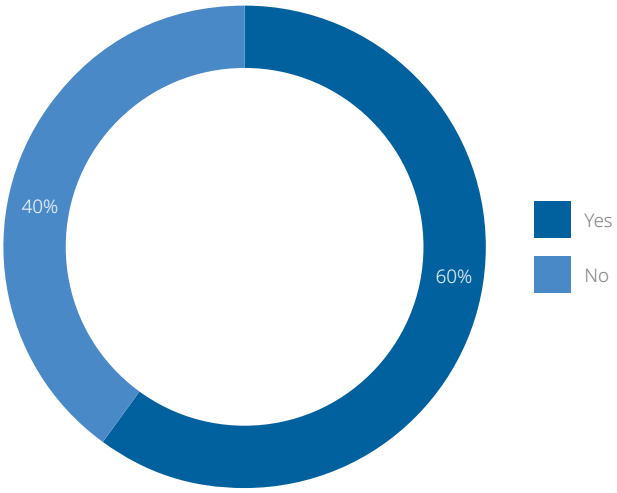
Significantly, a majority of executives say that mistakes made by their organisation were avoidable. Sixty percent of the respondents that suffered financially believe that with better preparation, the error could have been avoided.

"We could have used external help in answering some of the critical questions. These were related to the decarbonisation strategy and the scientific findings. We should have involved more experts."

Head of Finance of a Spain-based aviation corporate

If yes, do you believe the error could have been avoided (e.g. with more thorough due diligence and/or research)?

Fig 12b.



The COVID effect

The pandemic has had a significant impact on respondents' decarbonisation plans. When passenger and freight volumes plummeted in 2020, many respondents were faced with a stark choice: pursue decarbonisation or put projects on hold and divert all available resources to saving the business.

"Global markets were disrupted because of COVID-19 and decarbonisation efforts took a back seat. We had to focus solely on stabilising current operations," says the CFO of a Iceland-based shipping corporate.

Rail respondents report the biggest hit, with 39% (both industry and investors) saying that COVID-19 led to a delay or cancellation of a previously-planned decarbonisation purchase or project. A smaller proportion of those in aviation (29%) and shipping (21%) say the same.

"Decarbonisation is a long process in the rail sector," says the CFO of a Portugal-based railway company. "Purchases were delayed because cash flow was affected in the midst of the crisis. This was a completely unexpected situation."

Investors, meanwhile, were often unable to get out and see targets because of COVID-19 restrictions – choking off capital for new projects.

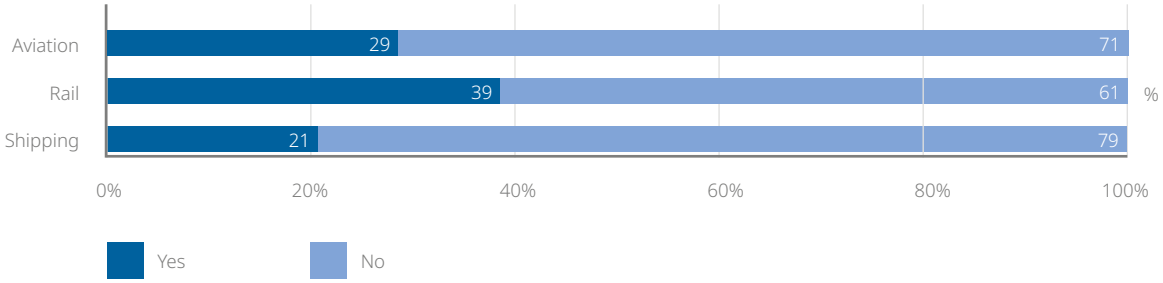
"Given the travel restrictions, the investment was cancelled because we could not evaluate the location and the prospects," says the CEO of a UK-based investment firm.

"Respondents will be aware of the need to avoid overreacting to potentially short-term interruption in energy markets. Particularly where there are likely to be a variety of contributing factors causing the disruption. Nevertheless, stakeholders will be taking note of the knock-on effect on energy markets as industry moves away from carbon-intensive power sources."

Tony Payne, DLA Piper Partner, London

[All] Has COVID-19 led to a delay or cancellation in a previously planned decarbonisation purchase or project at your organisation?

Fig 13a.



OPPORTUNITY FROM CRISIS

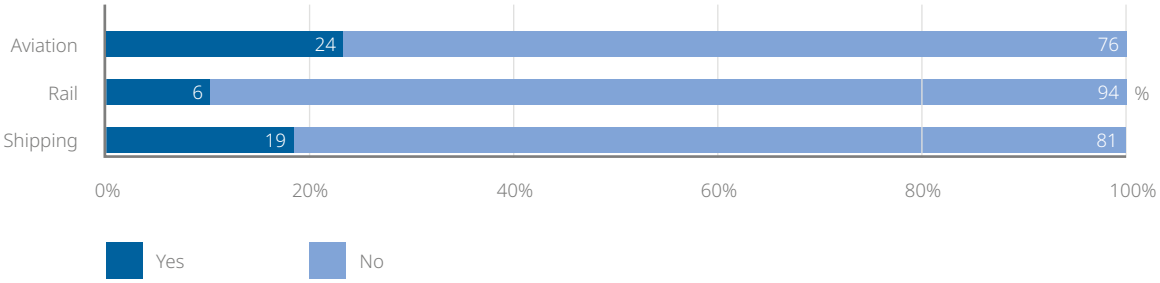
Setbacks aside, COVID-19 has also created opportunities. For example, some infrastructure owners (particularly in the rail subsector) took advantage of lower traffic levels during lockdown to upgrade their networks. COVID-19 has also provided an opportunity to clear out old technology. Indeed, almost a quarter of aviation corporate respondents say that COVID-19 led to an acceleration in the divestment and/or disposal of older, less green technologies at their organisation.

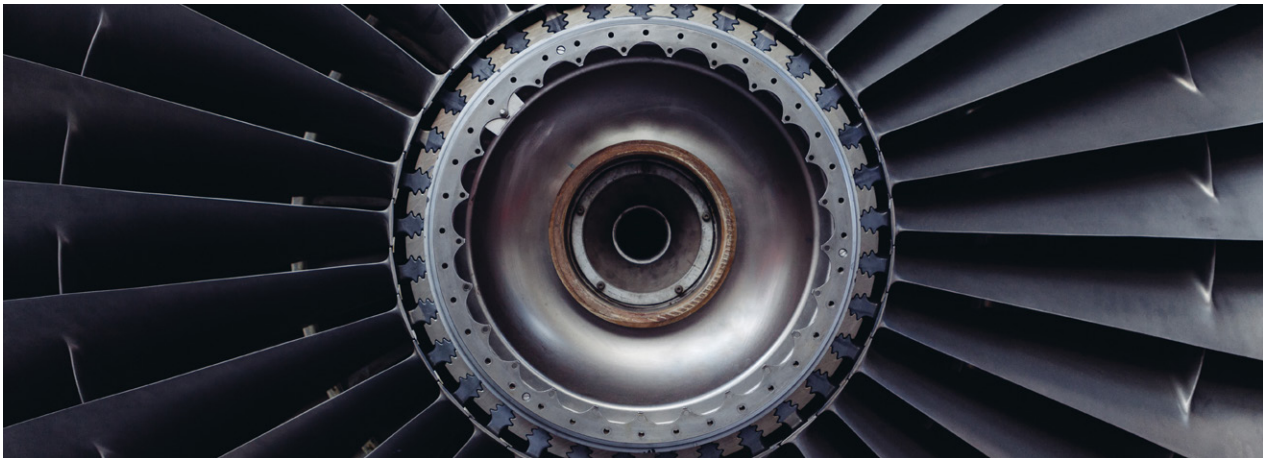
"COVID-19 has changed our perspective about decarbonisation. Processes that are not green will be replaced soon. Thanks to the pandemic, we have realised the importance of doing this quickly."

Head of Finance of a Spain-based aviation corporate

[Industry respondents only] Has COVID-19 led to an acceleration in the divestment and/or disposal of older, less green technologies at your organisation?

Fig 14.





POLICY PREDICAMENTS

Turning to the question of support from national governments, many respondents remain to be convinced about the effectiveness of policy measures. While more than two-thirds of corporate respondents agree that what their government is doing is right and effective in assisting decarbonisation of the transport sector, 50% of investors disagree. The majority of these (42%) see their government making little difference to the decarbonisation of the transport sector.

A key criticism of national governments is that there is a gap between targets (easy to set) and policy support (which is not always forthcoming).

"The government has not provided practical solutions for decarbonisation. The targets seem very ambitious – yet the authorities themselves are not completely aware about how to achieve them."

Head of M&A of an Italy-based railway company

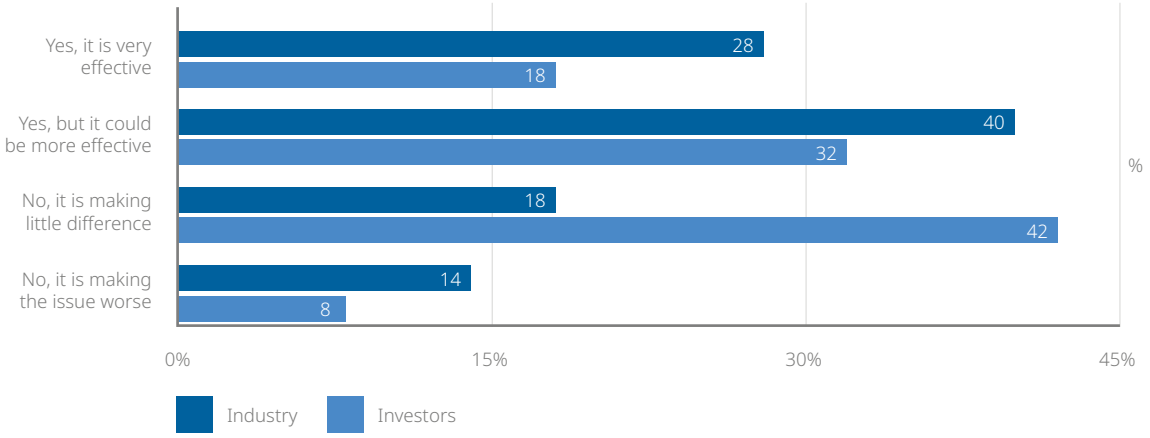
There is also a widespread view that governments should increase investment in decarbonisation, offer subsidies and provide more financial support.

"Even if companies start complying with government regulations, this would make little difference unless the government is ready to invest in decarbonisation schemes."

Head of Strategy of a Czech Republic-based aviation corporate

[All] Do you agree that what the Government is doing is right and effective in assisting decarbonisation in the transport sector?

Fig 16.




Way out
Bank

Sector watch

In this section, we take a deep dive into how three of the major transportation subsectors – aviation, rail and shipping – are dealing with the issue of decarbonisation

Aviation, rail and shipping respondents are united in their ambition to decarbonise their industries. But the way in which each sector is looking to deliver decarbonisation is different. One reason for this is that each subsector faces radically different technical challenges. Another is that regulatory requirements differ between subsectors.

A key factor here is the proposed expansion of the EU's Emissions Trading System (EU ETS). This will expose aviation and shipping to carbon pricing for the first time. By contrast, rail (a low emitter) will remain outside the EU ETS.

The prospect of tighter regulation is having an impact on investment plans – particularly those of aviation and shipping corporates, who expect to substantially increase their investment in decarbonisation projects in the next five years.

Regulatory pressures are not the only investment driver. There are market forces in play as well – notably carbon prices. These have risen sharply in the past year. To put this in context, the EU ETS carbon price reached EUR60/tonne for the first time in August 2021 – a near doubling since January – while the UK Emissions Trading Scheme carbon price climbed to its highest ever level (GBP64.75/tonne) in September 2021.

Critically, our survey reveals that most respondents are sensitive to a carbon price that is considerably lower than this. Indeed, a majority of respondents (across all three sectors) say they require a minimum price of EUR50/tonne or less to impact on their investment strategies. This threshold has now been decisively exceeded – suggesting that for more than 75% of respondents (were they to be within the EU ETS), it would now be cheaper to invest in decarbonisation than to purchase emissions allowances.

75%

of respondents suggest (were they to be within the EU ETS), it would now be cheaper to invest in decarbonisation than to purchase emissions allowances.

Aviation: Taking off

Reducing aviation's reliance on fossil fuels is a top priority for both corporates and investors. This is a huge task. Aviation is a major emitter (it accounts for 13.9% of Europe's transport CO2), and aviation emissions have historically risen faster than those in other transport subsectors.

Decarbonising aviation is technically challenging because aircraft require fuels with a high energy density – such as kerosene – to minimise weight onboard. Alternative fuels, such as fossil-free kerosene, are therefore a major area of focus for respondents as they look to transform their industry.

CHANGE IS IN THE AIR

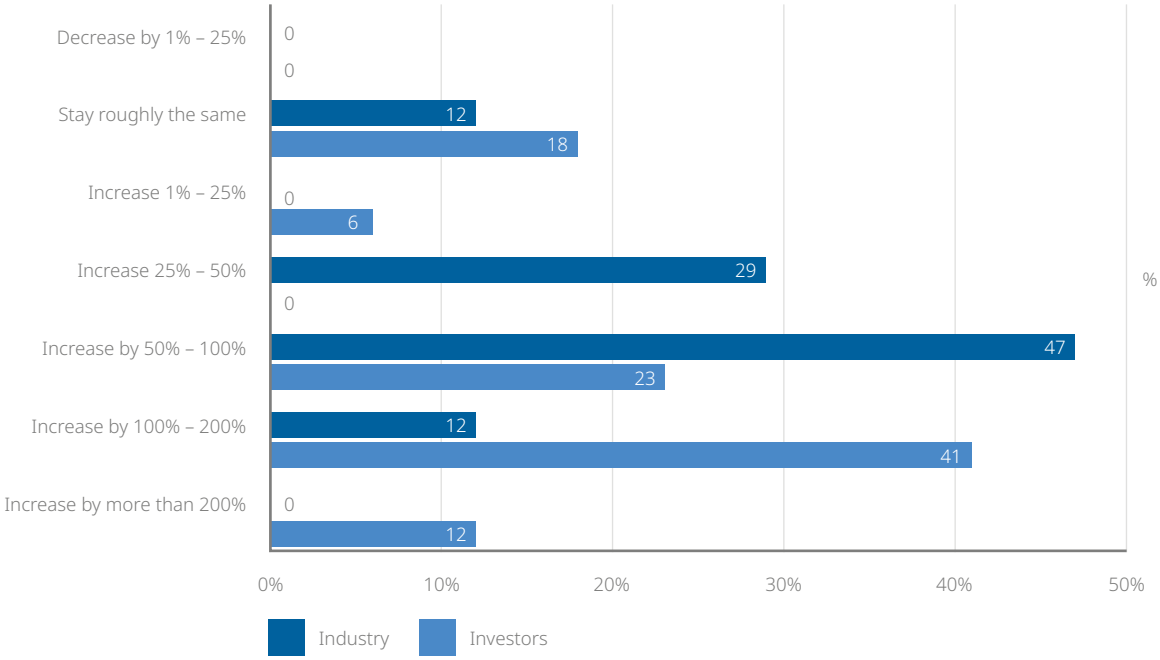
Aviation investors are ambitious. More than half (53%) expect to increase their investment in decarbonisation projects by 100% or more over the next five years versus the previous five years, with 12% envisaging an increase of more than 200%. Meanwhile, most aviation corporates (59%) are looking to increase investment by 50% or more.

53%

of respondents expect to increase their investment in decarbonisation projects by 100%.

[All aviation respondents] How do you expect your organisation's overall value of investment in decarbonisation projects and technologies over the next five years will compare to that of the previous five years?

Fig 3.



Aviation executives are more likely to have a road map than their peers in other subsectors. Road maps serve a number of purposes: objectives mentioned by respondents include monitoring progress, researching new types of aircraft and new fuels, and keeping track of emissions. In some cases, dedicated teams are responsible for tracking adherence to the road map.

Our survey shows that more than four-fifths of corporate players and 71% of investors have a long-term road map in place for their organisation to reach net zero emissions by 2050.

"Aviation is a highly regulated sector and change does not always happen quickly. The proposed technical advancements necessary for decarbonisation (sustainable aviation fuel, electrification, modernisation of airspace management) will require significant regulatory development. Accordingly, a roadmap must build in adequate time for ongoing engagement with key regulators around the world."

Tony Payne, DLA Piper Partner, London

[All aviation respondents] Do you have a long-term road map in place to reach net zero emissions by 2050?

Fig 21 & 22.

**Investors were asked specifically about their aviation investments's carbon emissions*

PROPULSION POSSIBILITIES

Sustainable aviation fuel (SAF), electric vertical take-off and landing (eVTOL), and hydrogen-powered aircraft are among the technologies expected to transform aviation in the years ahead. Our study shows that 50% or more of aviation respondents have already invested in each of these technologies.

SAF is at the top of the list from an investment perspective. This is a synthetic version of kerosene derived from non-fossil feedstocks, such as plant materials. While SAF is already being used, it currently accounts for less than 1% of jet fuel consumed in Europe. Fifty nine percent of respondents have invested in SAF.

"The main decarbonisation technology we're seeing is SAF. The use of SAF is critical for the aviation sector, and to enable this we need government support. If a country implements a carbon tax or charge on aviation flights or passengers (which is not the optimal solution but an easy one), the product of such taxes or charges must be allocated by the government to the sector to make SAF an affordable and attractive alternative."

Antonio Portugal, DLA Piper Partner, Lisbon

eVTOL aircraft are also seen as promising. These are small battery-powered electric aircraft with multiple motors and propellers. In the context of civil aviation, these have the potential to provide air taxi services and therefore to create an entirely new market in short-range urban air mobility. Fifty six percent of respondents have already invested in eVTOL technology.

Hydrogen-powered aircraft have so far been a slightly less popular target for investment: 50% of respondents have already invested in hydrogen, lower than both SAF and eVTOL. This is likely to reflect the fact that viable hydrogen propulsion technology, and reliable supplies of green hydrogen, are several years away.

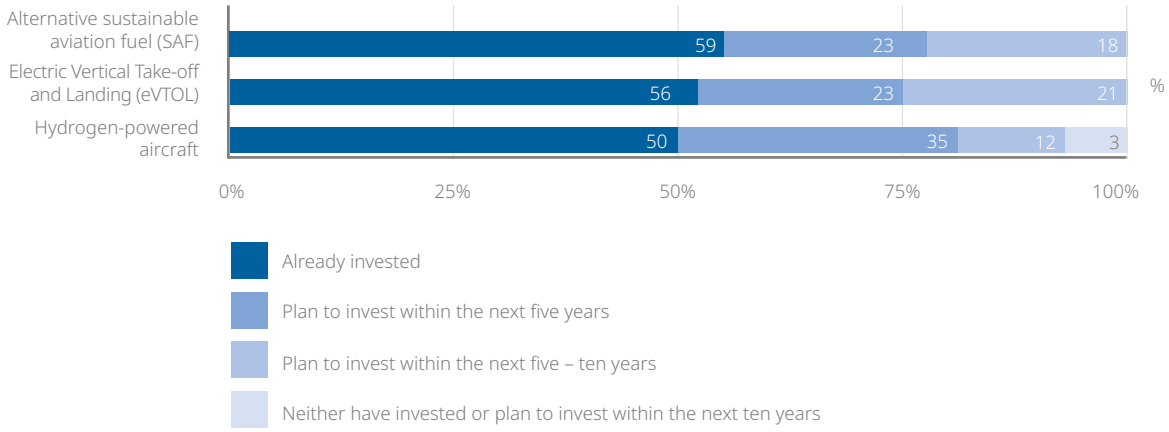
Nevertheless, respondents see hydrogen as bankable: indeed, 35% are looking to invest in hydrogen-powered aircraft within the next five years – a greater proportion than for SAF and eVTOL (each 23%). As with SAF, a likely attraction of hydrogen is the promise that it will be exempt from taxation – provided that it is green hydrogen from renewable sources.

New fuels aside, a number of respondents point to the benefits of using ultralight materials in future aeroplane construction. And interestingly, several speculate on the potential of autonomous – pilotless – aircraft, including the head of strategy at a Denmark-based investor:

"The aviation industry will have new types of aircraft in the next 10 years. These will be operated remotely and this may also be true for passenger aircraft."

[All aviation respondents] Has your organisation already invested or does it plan to invest in the following technologies and/or associated infrastructures (including R&D) within the next 10 years?

Fig 18.



Focusing specifically on aviation corporates, our study shows that a large majority have already taken concrete measures to push ahead with decarbonisation. Most commonly, they have increased investment in R&D for future technologies such as hydrogen-powered aircraft.

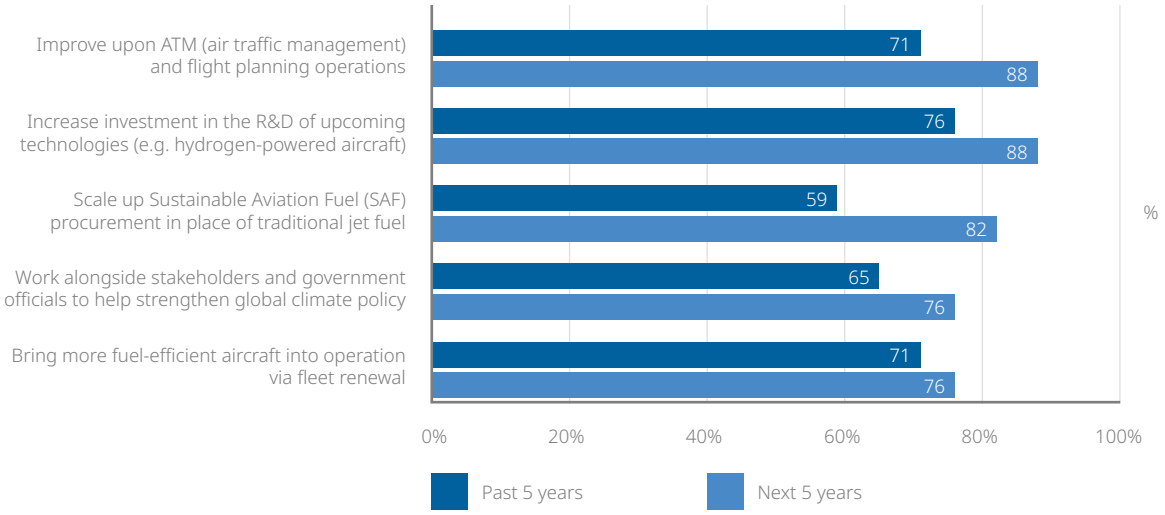
Looking forward, 88% of corporates expect to increase their investment in R&D over the next five years, while the same proportion are looking to improve on air traffic management and flight planning to assist with decarbonisation.

75%

of corporates expect to increase their investment in R&D over the next five years.

[All aviation respondents] Which of the following has your organisation done over the past five years and which does it plan to do over the next five years to assist with decarbonisation? [Select all that apply]

Fig 19.



AIRPORT UPGRADES

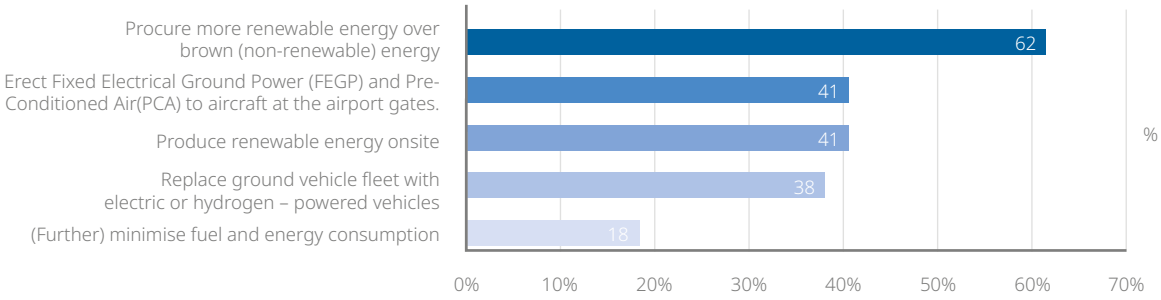
Most aviation-related emissions are generated by aircraft while in flight. However, there are a number of measures that can be taken on the ground to reduce carbon impacts. Airports have a critical role to play here.

Increasing the procurement of renewable energy rather than brown (non-renewable) energy is the most commonly highlighted measure airports could take, cited by 62%.

Respondents also point to on-site renewable energy production (mentioned by 41%), and the provision of Fixed Electrical Ground Power (FEGP) and Pre-Conditioned Air (PCA) to aircraft at the airport gates (also cited by 41%). FEGP and PCA eliminate the need to run the aircraft's kerosene-powered onboard auxiliary power unit (APU), which accounts for about 1% of overall fuel consumption.

[All aviation respondents] Which of these actions that airports could take do you think would be most impactful with regard to decarbonisation in the aviation industry? [Select top two]

Fig 20.



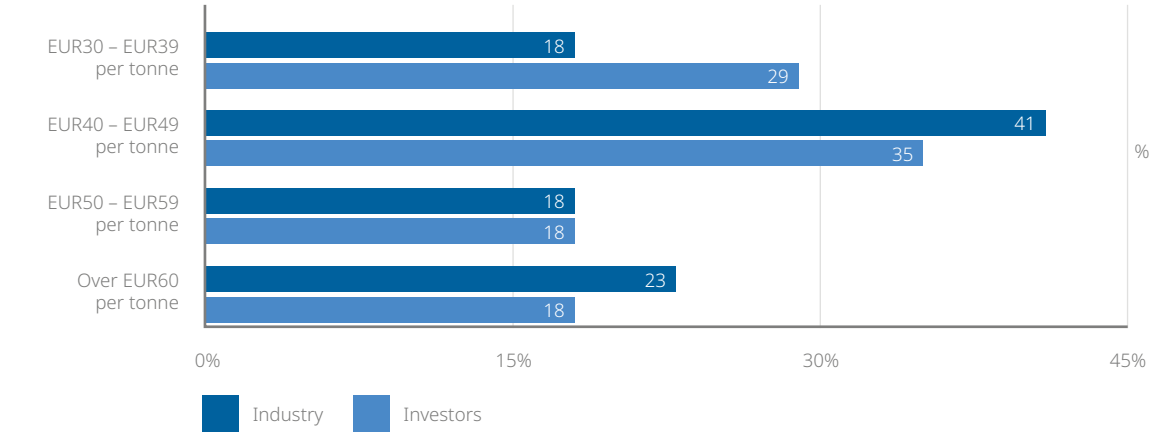
TIPPING POINT

A carbon price of EUR40-49/tonne (inclusive of both the Emissions Trading System price and any national floor price) would be enough to significantly impact their organisation's investment strategies in Europe for the largest proportion of aviation respondents (41% of corporates and 35% of investors). Meanwhile, a further 18% and 29% respectively say that a carbon price of just EUR30-39/tonne would have this effect.

A key point is that airlines currently have only limited exposure to carbon pricing – the bulk of emissions are covered by free carbon allowances. Given that the number of allowances that airlines are required to buy is currently small, this finding underlines the notable sensitivity of airline operations to even a relatively low carbon price.

[All aviation respondents] What is the minimum price carbon needs to be (inclusive of both the Emission Trade Scheme price and any national floor price) to impact your organisation's investment strategies significantly in Europe?*

Fig 23 & 24.



Rail: On the right tracks

Rail has the lowest emissions of the three subsectors covered in this study. This is because most rail traffic (80%) is powered by electricity. Rail's indirect emissions are accounted for in the power generation sector. Total rail emissions account for less than 1% of Europe's total transport sector CO2.

Despite rail's impressive track record (rail is unique in the transport sector because emissions have decreased since 1990), one of the biggest challenges for the industry is making sure that emissions do not rise if policy measures to stimulate rail traffic result in greater utilisation of secondary lines. Many of these lines are not electrified and depend on diesel-powered trains.

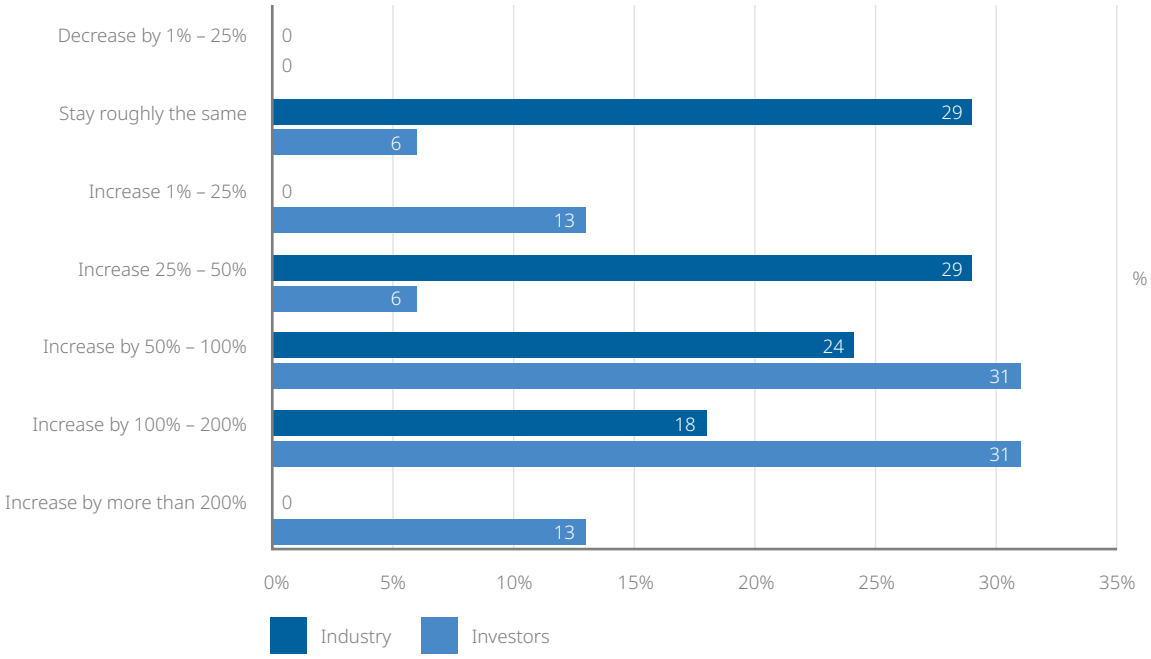
MIND THE (EXPECTATIONS) GAP

Our study reveals a significant divergence between rail corporates and rail investors when it comes to investment expectations over the next five years.

Most rail investors (75%) expect that the overall value of their investment in decarbonisation will increase by at least 50% over the coming five years compared to the previous five. In contrast, just 42% of corporates expect the same. Indeed, 29% of corporates expect investment to stay roughly the same – a higher percentage than for either aviation or shipping.

[All rail respondents] How do you expect your organisation's overall value of investment in decarbonisation projects and technologies over the next five years will compare to that of the previous five years?

Fig 3.



The gap between industry corporates and investors is also apparent when it comes to long-term plans to cut emissions. Again, it is investors rather than corporates who are setting the pace.

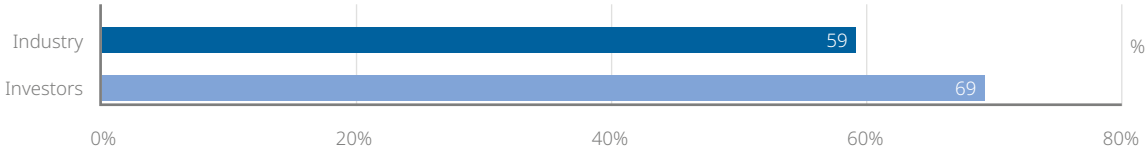
While 69% of investors have a road map for their investments to reach net zero by 2050, only 59% of corporates say the same – a lower proportion than for aviation and shipping.

"For rail, a clear industry roadmap is important because, while the decarbonisation agenda can be met to an extent by individual asset owners and operators, the delivery and continued availability of compatible shared infrastructure (including electrification of networks, and bespoke infrastructure such as hydrogen fuelling facilities at depots) will often be essential to maximising the value in new or upgraded assets, and also in allowing investments to be made earlier, accelerating decarbonisation."

Robert Smith, DLA Piper Partner, Leeds

[All Rail respondents] Do you have a long-term road map in place to reach net zero emissions by 2050?

Fig 30 & 31.



ACTION STATIONS

Electric trains are already energy efficient. Railway stations are less so and there is room for improvement. Energy-efficient lighting, better building insulation and better control systems for energy-intensive assets such as ventilation, air conditioning, lifts and escalators are all part of the equation.

Rail investors and corporates are alive to these opportunities. Our study shows that 73% of respondents have already invested in zero-carbon railway stations. Just over half have also invested in electric trains powered by overhead lines, although given that most of Europe's railways are already electric, this is to be expected.

More significantly, nearly half (49%) have already invested in alternative electric propulsion (batteries and/or hybrid). Meanwhile, 57% are looking to overhead electrification over the next decade. This would be a key evolution, because 45% of the European network (mostly secondary lines) still depends on diesel.

"Given the prevalence of rail being electrified throughout the EU, there has been a focus on shifting the mix in favour of renewable sources, and some rail operators have been very successful in this respect. Increases in operational efficiencies and smarter timetabling are also relevant factors, as is the move away from diesel."

Daniel Colgan, DLA Piper Partner, Brussels

Staying with trains, less than a third of respondents have so far invested in hydrogen. However, 61% expect to do so over the next decade. Hydrogen-powered trains (some are already in revenue service) are attractive because trackside electrification infrastructure is not needed.

"We have seen an increase in the use of hybrid technologies over the last five years in the UK to limit diesel use to those lines which have not been electrified. The potential to move to alternative hybrid technologies such as battery and hydrogen for secondary lines provides an opportunity to further decarbonise the network."

Robert Smith, DLA Piper Partner, Leeds

NEW RAILWAYS?

While much of the focus is on boosting the efficiency of existing infrastructure, several respondents have an eye to rail expansion. EU decarbonisation policies could tilt the playing field in rail's favour, allowing rail operators to pick up traffic displaced from other modes of transport (modal shift). This could make building new lines a necessity.

"Railways will reach new places and connectivity for the population will be much better."

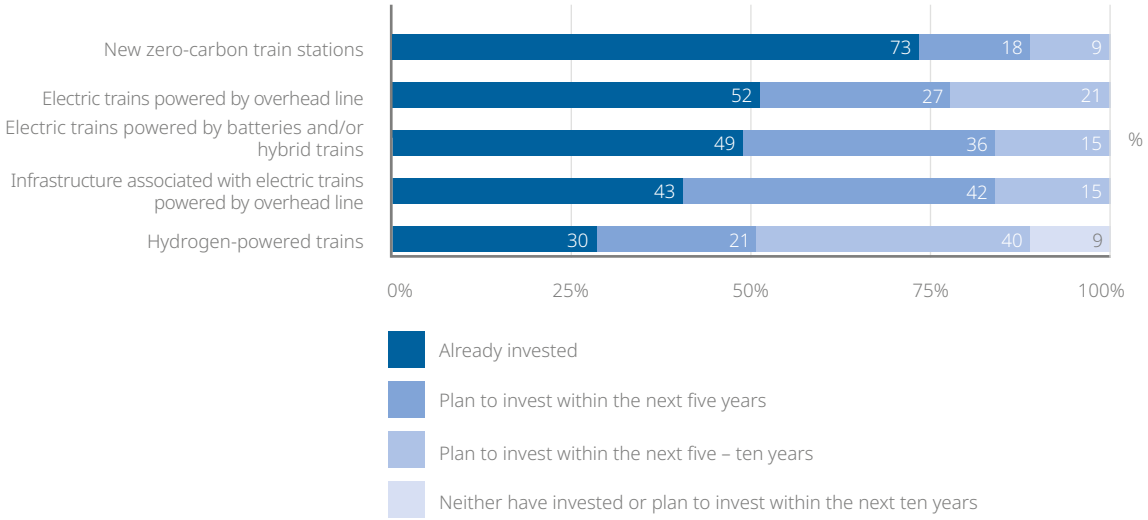
M&A Director of a French rail company

"Rail freight also has growth potential," thinks the MD of a Netherlands-based investor:

"Transferring goods from remote regions will be simpler if new routes are created. Governments in many regions are making an effort to improve connectivity."

[All rail respondents] Has your organisation already invested or does it plan to invest in the following (including R&D) within the next ten years?:

Fig 27.

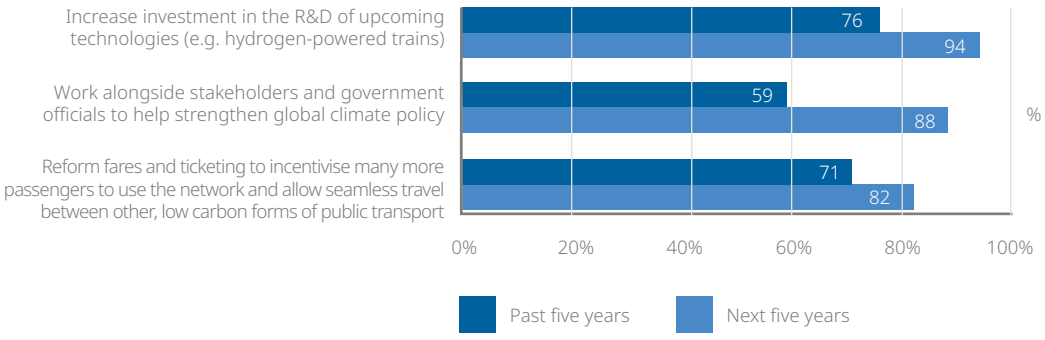


Better physical infrastructure and trains are only one part of the story. Our study shows that rail corporates are also accelerating efforts to get involved with policymaking: 88% expect to work alongside stakeholders and government officials to help strengthen global climate policy over the next five years, up 59% over the past five.

Corporates are also looking to fare reform (cited by 82%) to boost decarbonisation. The objective is to get more people onto trains, thereby reducing reliance on more polluting modes of transport. Enablers include hands-free ticketing and Mobility as a Service (MaaS). The aim is to make it easy to mix and match different types of transport in a single "multi-modal" journey from door to door.

[Rail industry respondents only] Which of the following has your organisation done over the past five years and which does it plan to do over the next five years to assist with decarbonisation? [Select all that apply]

Fig 28.



POLICY PERSPECTIVES

When asked about government action on decarbonisation, 40% think that the biggest impact would be investing in zero-carbon infrastructure while liaising with rail companies to help them make informed decisions. Meanwhile, 39% say that government incentives for rail freight would make the most difference.

Several respondents think governments should do more to encourage the use of public transport – including multi-modal journeys.

"Transport companies could collaborate more and share resources. This can only happen when the government is willing to play a part."

M&A Director of a France-based corporate

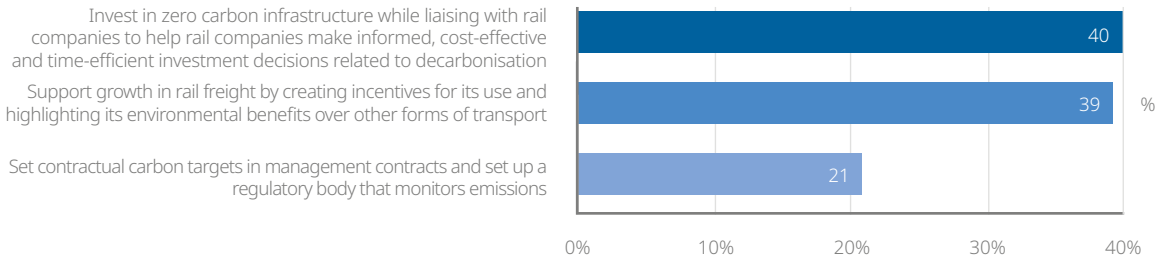
Removing investment barriers is something else governments should think about.

"Even smaller projects require a considerable investor contribution. Successful decarbonisation depends on government policies not being restrictive."

CFO of a UK-based rail corporate

[All rail respondents] Which of these actions that governments could take do you think would be most impactful with regard to decarbonisation in the rail industry? [Select one]

Fig 29.



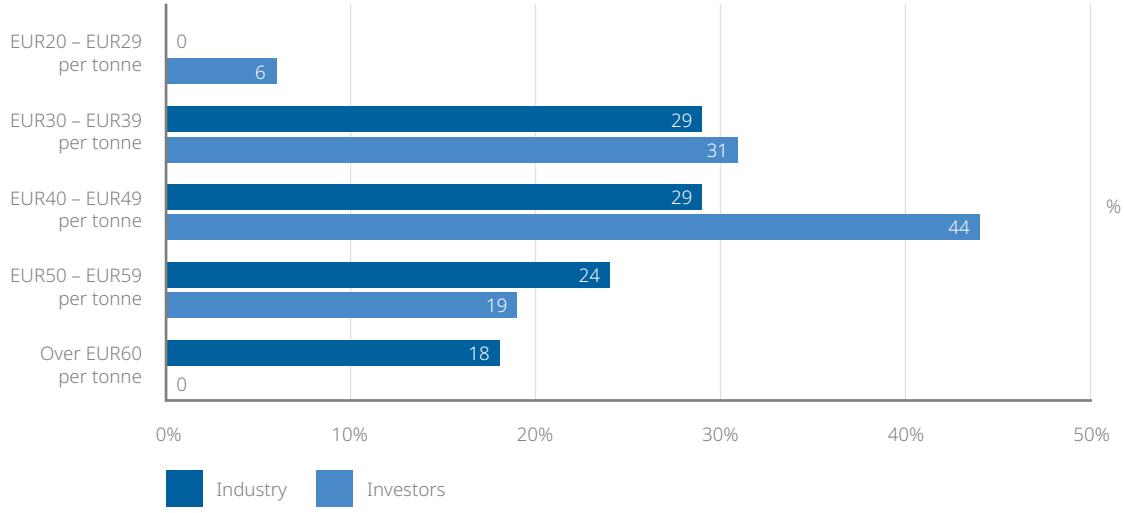
CARBON IN QUESTION

Given that rail is not directly part of the EU ETS (and there are no plans to include it), the responses provided about carbon pricing are to a certain extent theoretical. But they can nonetheless be taken as a proxy for the wider cost of energy (i.e. electricity and diesel). Seen in this light, the data suggests that rail is highly sensitive to energy prices.

To put this in context, most rail corporates point to either EUR30 – 39/tonne or EUR40 – 49/tonne as being the minimum carbon prices required to drive a change in investment strategy. Interestingly, this is a rather lower threshold than it is for aviation corporates, a large share of whom (41%) see the tipping point as being EUR40 – 49/tonne.

[All rail respondents] What is the minimum price carbon needs to be (inclusive of both the Emission Trade Scheme price and any national floor price) to impact your organisation's investment strategies significantly in Europe?

Fig 32 & 33.



Shipping: Setting sail

The shipping subsector is a significant CO2 emitter and accounts for approximately 13% of Europe's overall transport emissions. As with aviation, carbon emissions from ships are on an upward trajectory and the primary concern is that this will continue unless mitigation measures are put in place.

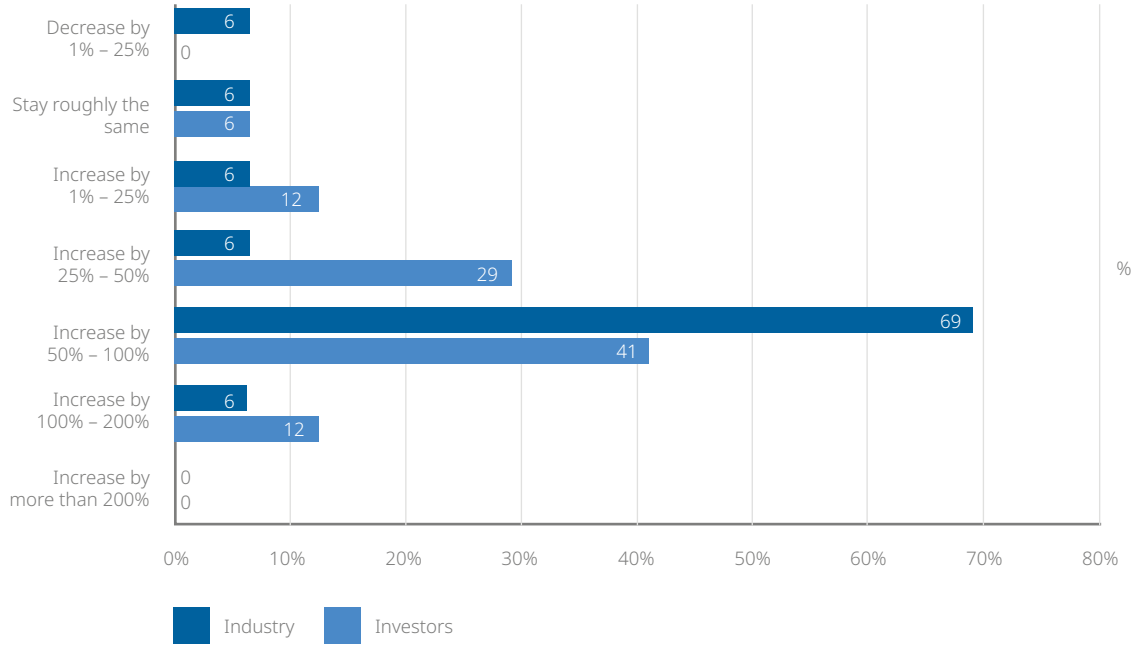
As well as investing in new low and zero-carbon fuels (such as ammonia, biofuels and hydrogen), shipping operators and investors are looking to digital technologies that allow them to boost the energy efficiency of their existing operations.

INVESTMENT INTENTIONS

Shipping corporates stand out when it comes to their investment plans. Three-quarters expect that the overall value of their investment in decarbonisation will increase by at least 50% over the next five years compared to the previous five. This is a higher proportion than for either aviation or rail. Shipping investors, in contrast, are less bullish. Just over half (53%) expect to increase investment by 50% or more. This is a smaller proportion than for aviation and rail.

[All shipping respondents] How do you expect your organisation's overall value of investment in decarbonisation projects and technologies over the next 5 years will compare to that of the previous 5 years?

Fig 3c.



Corporates are also ahead of investors when it comes to investment planning. To put this in context, 75% of shipping companies have a long-term road map in place to reach net zero emissions by 2050, compared with 59% of shipping investors.

SEA POWER

Shipping currently relies almost entirely on fossil fuels, but alternative fuels and technologies are a major focus for respondents. Our survey shows that a majority have already invested in ammonia and/or biofuels (61%). Meanwhile, almost half (49%) have invested in electric and/or hybrid vessels.

Respondents are less convinced about hydrogen-powered vessels, cited by 40%. Aside from the investment required to develop new propulsion systems, this could also reflect concerns about the likely cost and availability of hydrogen at ports around the world.

This is a key concern for shipping operators – as indeed are vulnerabilities in fuel supply chains. The natural gas price surge of 2021 underlines the risks. A proportion of both 'grey' and 'blue' hydrogen, and ammonia, are derived from natural gas.

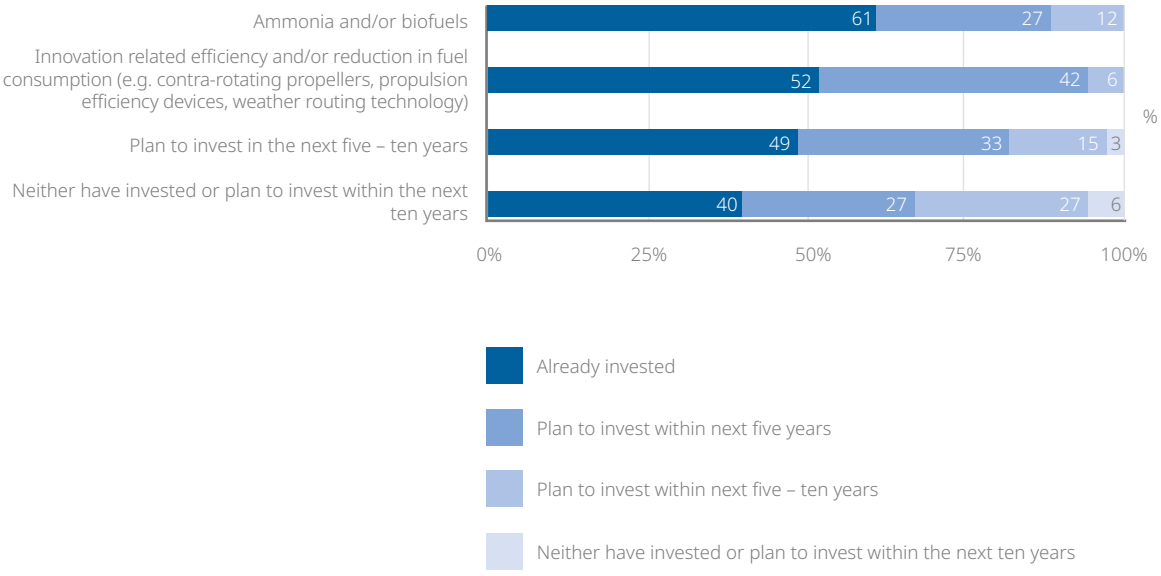
Beyond fuels, respondents are keen on innovations that boost energy efficiency. Among these are contra-rotating propellers, propulsion efficiency devices and weather routing technology. More than half have already invested in such innovations and 42% plan to do so in the next decade.

"Onboard devices will predict the weather and provide clear-cut guidelines for the crew. Although this technology is already present, it will be streamlined in the next ten years and it will become more accurate."

CEO of a France-based corporate

[All Shipping respondents] Has your organisation already invested or does it plan to invest in the following (including R&D) within the next ten years? [Already invested/Plan to invest within the next five years/Plan to invest in the next five – ten years/Neither have invested or plan to invest within the next ten years]

Fig 36.



RIPE FOR AUTOMATION?

Comments by shipping respondents reveal a high level of expectation around technological innovation over the next decade – both onboard and at ports.

Onboard, respondents anticipate greater use of sensor technology on cargo ships, the use of lighter packaging materials to reduce onboard weight, and digital technologies to boost energy efficiency.

Self-sailing technology is another area of interest. Autonomous vessels – drone ships – would enable driverless maritime transport. As well as reducing operating costs, automated ocean-going vessels promise to boost energy efficiency.

"Drones will be used extensively in the shipping industry in the next ten years. Currently, use case scenarios are being researched."

Head of M&A of a Denmark-based corporate

As well as focusing on ships, respondents point to technologies designed to improve port performance. These include cargo track and trace, automatic weighing and loading, and greater connectivity between transfer points.

Against this background, respondents forecast a growing need for digital skills.

"Predictive analytics, predictive maintenance and automation will become familiar. The demand for talented professionals will increase."

Head of Investment of a Netherlands-based investor

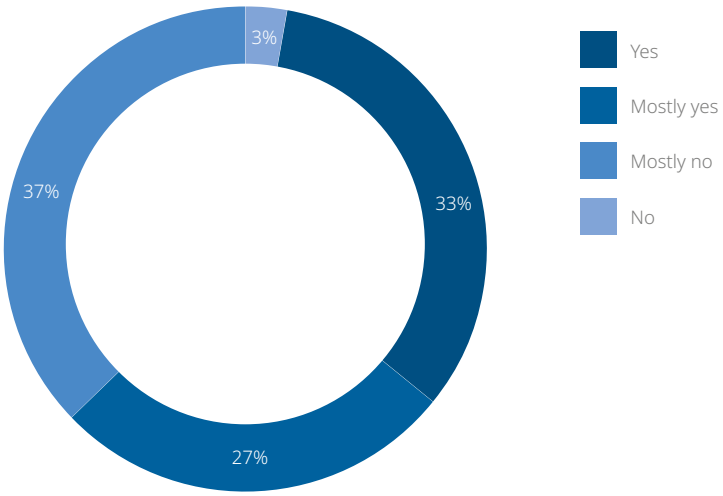
DECARBONISATION FRAMEWORKS

Current decarbonisation goals for shipping are set out by the International Maritime Organization (IMO), the industry's governing body. At the heart of the IMO's strategy is a reduction of at least 50% in greenhouse gas (GHG) emissions by 2050 compared to 2008.

Sixty percent of respondents either agree or mostly agree that the IMO guidelines are clear and targeted enough to support the shipping industry in understanding how best to place investment for decarbonisation.

[All Shipping respondents] Do you think the International Maritime Organization's guidelines are clear and targeted enough to support the shipping industry in understanding how best to place investment for decarbonisation?

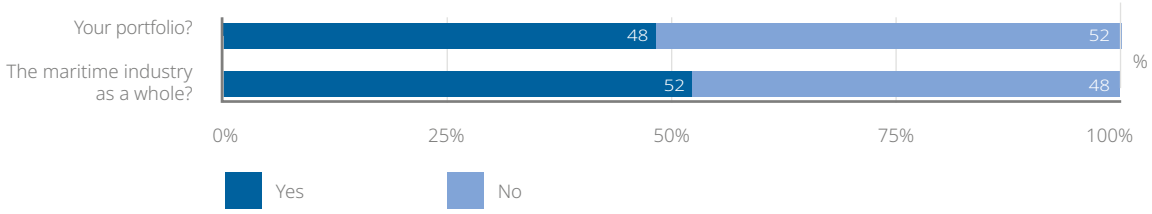
Fig 38.



Delving further into the detail, less than half of shipping respondents (48%) believe that the IMO's 50% target for GHG emissions by 2050 is achievable and realistic for either their portfolios or for the industry as a whole.

[All Shipping respondents] Do you believe that the International Maritime Organization's target to reduce shipping's total annual greenhouse gas emissions by at least 50% by 2050 is achievable and realistic for...

Fig 39.

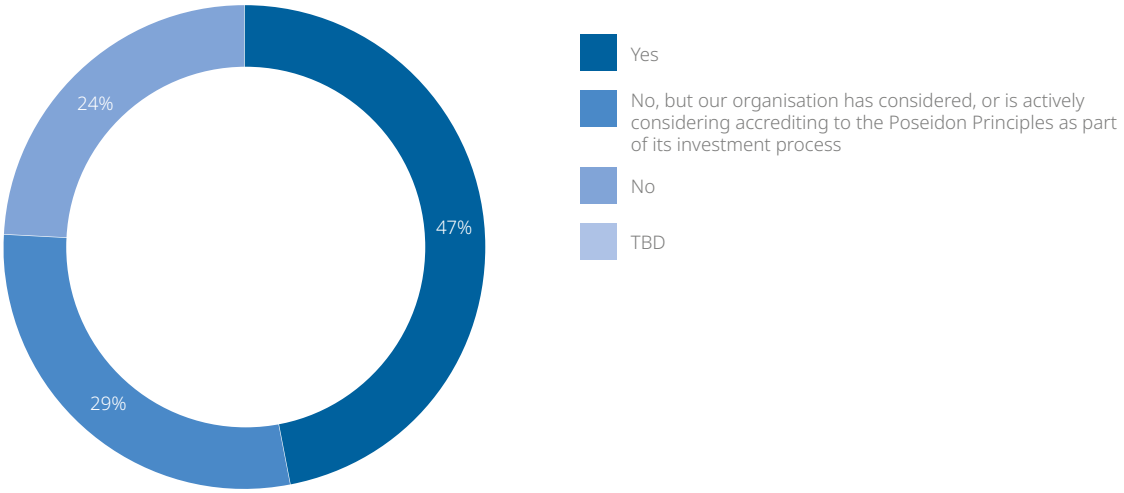


While the IMO strategy targets shipping emissions, newer guidance – the Poseidon Principles – is designed to encourage the decarbonisation of investors' shipping portfolios. Launched in 2019, the Poseidon Principles are intended to reinforce existing IMO guidelines.

Nearly half (47%) of shipping investors say their organisation is a signatory to the Poseidon Principles, while a further 29% say it has otherwise either considered or is actively considering acceding to the Poseidon Principles as part of its investment process.

[Investors in shipping only] Is your organisation considered a signatory to the Poseidon Principles?

Fig 42.



CARBON PRICING IS COMING

Shipping is currently exempt from carbon pricing. However, this will change if proposals to include maritime transport within the EU ETS become a reality.

Our findings suggest that shipping companies are more sensitive to carbon pricing than either aviation or rail corporates. Even a relatively low carbon price is likely to make shipping corporates change tack.

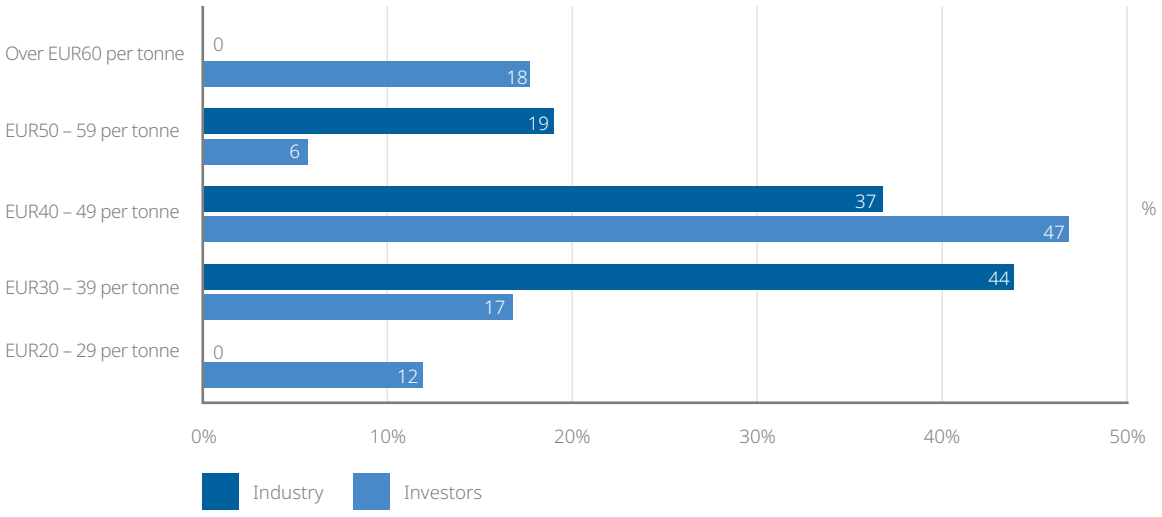
To put this in perspective, if shipping is included in the EU ETS, 44% of corporates say that a carbon price of EUR30 – 39/tonne (inclusive of both the ETS price and any national floor price) would be enough to impact their organisation's investment strategies significantly. The threshold is somewhat higher for investors, with 47% saying that a higher carbon price of EUR40 – 49/tonne would need to be reached to have an impact on investment.

47%

of investors saying that a higher carbon price of EUR40-49/tonne would need to be reached to have an impact on investment.

[All shipping respondents] If shipping is included in the European Trading Scheme from 2023 as proposed, what is the minimum price carbon would need to be (inclusive of both the Emission Trade Scheme price and any national floor price) to impact you significantly?

Fig 43 & 44.



Conclusion: For a cleaner future

Decarbonisation is now a primary investment strategy driver for aviation, rail and shipping businesses. And as this study reveals, the pace of investment is accelerating. Over the next two years, more than a third of corporates and two-thirds of investors are looking to allocate EUR1 billion or more to decarbonisation efforts – proportions that are significantly higher compared with the past two years.

The benefits of decarbonisation – lower emissions, regulatory compliance and potentially lower operating costs – are clear. But there are risks too. Tighter regulatory deadlines mean that both corporates and investors are under pressure to make investment decisions more quickly. There are also questions around the maturity of the technology and how easily it can be deployed. Overarching all of this are concerns about the complexity of the regulatory environment.

Here are some steps that both corporates and investors can take to optimise their investments and minimise risks:

- **Establish an emissions baseline**. Identifying current emissions provides a yardstick against which future improvements can be measured. It also makes it possible to identify quick wins and early-stage gains.
- **Identify opportunities early**. Taking early advantage of new shared infrastructure (such as upgraded rail lines, or facilities for hydrogen storage or battery charging) may allow maximisation of the benefits of an investment and allow you to gain market advantage.
- **Create a road map**. This acts as a focal point for all your decarbonisation initiatives and provides a timetable for action.

  "We have a target year for decarbonising different processes within the organisation – we have to meet these targets to achieve our 2050 goals."

  CEO of a Denmark-based corporate

- **Focus on due diligence**. Failure of technology to meet expectations, implementation problems and unforeseen environmental impacts are among the concerns reported by respondents. In many cases, problems can be avoided with effective due diligence.
- **Get expert advice**. Law and guidance around decarbonisation is changing all the time, so it can pay to take professional advice.

  "Smaller companies do not have the internal expertise to guide their efforts. There is a vague idea about the climate and energy framework and most of the objectives are not widely understood."

  Head of Finance of a German-based corporate

- **Communicate your goals**. Decarbonisation is an opportunity to forge stronger relationships with passengers, freight customers and stakeholders. Actively communicating what your business expects to deliver in terms of improved environmental performance can help your organisation to build ridership, reputation and revenue.

EUR1 billion

to be allocated by more than a third of corporates and two-thirds of investors, to decarbonisation efforts.

38

Spotlight Interviews

easyJet

"Sound environmental performance tends to go hand-in-hand with sound economic performance."

EasyJet plc is a low-cost European point-to-point airline. It flies on more of Europe's most popular routes than any other airline and carried more than 96 million passengers in 2019 – more than 16 million travelling for business. The airline has over 300 aircraft on nearly 1000 routes to more than 150 airports across 35 countries. Jane Ashton, the company's Sustainability Director, discusses aviation, modernisation and decarbonisation.

Jane Ashton
Sustainability Director

HOW IMPORTANT IS FLEET MODERNISATION FOR EASYJET?

Fleet modernisation is integral to our investment strategy and decarbonisation is a key part of that. We have one of the youngest fleets in Europe with an increasing proportion of Airbus NEO family aircraft. These are 15% more efficient than the aircraft they replace, so our carbon efficiency is very good. Sound environmental performance tends to go hand-in-hand with sound economic performance.

"EasyJet is committed to achieving zero emissions flying across Europe and we want to lead the decarbonisation of aviation."

BOTH THE EU AND THE UK ARE PUSHING AHEAD WITH DECARBONISATION POLICIES, INCLUDING AN EXTENSION OF CARBON PRICING. WHAT DOES THIS MEAN FOR EASYJET?

EasyJet is committed to achieving zero emissions flying across Europe and we want to lead the decarbonisation of aviation – for example, we were the first airline to call for the EU's Emissions Trading System to be applied to aviation.

But incentives are also important, because they will help short-haul aviation to develop and operate zero emissions aircraft. One of the partnerships we have is with Airbus, helping them to shape their hydrogen propulsion aircraft which we're aiming to put into service from 2035.

ARE YOU CONFIDENT THAT HYDROGEN WILL BE ROLLED OUT BY 2035?

It will be progressive. At the moment, the use of sustainable aviation fuel (SAF) is coming into force in the EU and this is likely to be replicated in the UK. However, there are still some CO2 emissions with SAF, as well as non-CO2 impacts. By contrast, hydrogen has the potential to be completely emissions free.

We see SAF as an interim measure, in as far as we believe there will be hydrogen alternatives within the next 15-20 years for short haul aviation. At the moment, we're calling for the development of green hydrogen and for hydrogen infrastructure on the ground. It won't happen overnight, but the fleet replacement won't happen overnight either.

Meanwhile, one of the things that differentiates easyJet is that we are currently the only major European airline to offset 100% of our carbon emissions, both from the fuel used on all our flights and from our ground operations.

COULD SMARTER AIR TRAFFIC MANAGEMENT HELP TO REDUCE EMISSIONS?

There are definitely changes that can be made and we have been very vocal about these. The Single European Sky framework is targeting a reduction of emissions of up to 10% through better airspace management. Our own internal analysis shows that the potential reduction is even more than 10%. So yes, air traffic management is essential if the industry is going to drive towards net zero and is something that could and should be done now.

WHAT CAN GOVERNMENTS DO TO HELP AVIATION GET TO NET ZERO?

Supporting green hydrogen is key. This means ensuring that sufficient hydrogen is produced and channelled to the aviation industry. In addition, we have called for incentives and lower airspace and airport charges for next-generation aircraft. Smarter taxes are also important. For instance, air passenger duty effectively penalises fuel-efficient planes with a high load factor relative to inefficient aircraft with a low load factor. Taxes should incentivise improved carbon performance.

DO YOU THINK CUSTOMER EXPECTATIONS AROUND DECARBONISATION ARE CHANGING?

Public concern about climate change really increased during the COVID crisis, reflected in our customer appreciation of our carbon offsetting programme – customers who are aware of this, have both higher satisfaction with easyJet as well as higher propensity to select easyJet for their next flight. There are both public and investor expectations around decarbonisation that need to be addressed and so mapping our trajectory to net zero is a very live piece of work for us. We're working closely with our strategy colleagues on this, confident that it will make business sense not only economically but also from a consumer perspective.

IS IT POSSIBLE TO BE A LOW-COST CARRIER IN A ZERO-CARBON WORLD?

Carbon pricing will make flying more expensive, so migrating our operations towards – ultimately – zero-carbon operations make business sense. Better environmental performance is also a quality attribute – there's a big difference in carbon efficiency between flying on a so-called low-cost airline such as easyJet versus a traditional legacy airline. That difference is clear from the carbon emission factors reported annually by each airline. So, carbon-efficient flight is a definite advantage for easyJet from a cost perspective.

DO YOU SEE EASYJET AS A ZERO-CARBON DISRUPTOR?

Absolutely. EasyJet has often been a disruptor of the industry thanks to our business model. We were the first airline to call for carbon pricing and the first worldwide to offset all our carbon emissions from the fuel used for all our flights. We're now engaged in partnerships to realise zero-carbon aviation. We absolutely see ourselves as zero-carbon disruptors.

The Global Infrastructure Investor Association

"The growing focus on hydrogen...means that politicians have had to get off the fence."

The Global Infrastructure Investor Association (GIIA) represents the world's leading institutional investors and advisers. The association was formed in 2016 and its members have an estimated USD200 billion of new capital ready to invest in infrastructure at any given point in time. Transport decarbonisation is an increasing focus, explains Jon Phillips, the GIIA's Director of Corporate Affairs.

Jon Phillips
Director of Corporate Affairs

WHAT TRENDS ARE YOU SEEING IN TERMS OF TRANSPORT DECARBONISATION IN EUROPE?

Transport decarbonisation is a key investment driver and the amount of capital our members are dedicating to it is increasing. Hydrogen is one area where we are seeing a lot of interest. Our members currently own and manage hydrogen infrastructure with a value of USD4 billion.

"Hydrogen is one area where we are seeing a lot of interest. Our members currently own and manage hydrogen infrastructure with a value of USD4 billion."

WHERE DO YOU SEE THE POTENTIAL TRANSPORT APPLICATIONS OF HYDROGEN?

There is a growing consensus that hydrogen is best suited to decarbonise industrial and transport applications where direct electrification with renewable energy is not feasible. There continues to be a debate about the point at which hydrogen-based solutions become preferable to electrification. But there are some applications where electrification is clearly a lot more challenging.

Among these are aviation and long-distance sea transport. Low-carbon hydrogen and its derivatives are the preferred solutions – examples include sustainable aviation fuel (SAF) and fuels for maritime transport.

There are other applications for hydrogen as a decarbonisation enabler where direct electrification is technically possible, but where the best solution depends on local conditions. Examples include small vessels – ferries, tugs and barges – and rail. The case for these tends to be nuanced and generally more complex.

COULD HYDROGEN BE THE NEW JET FUEL OR DIESEL OIL?

It's early days. But there are already pilot projects underway. While these are small in terms of the overall scale of the market, there are already trains and ferries running on hydrogen. However, hydrogen propulsion for commercial airlines is some way off yet.

WHICH PARTICULAR PARTS OF THE HYDROGEN ECOSYSTEM ARE MOST INTERESTING FOR INSTITUTIONAL INVESTORS?

Distribution is definitely a strong contender. The conversations we've been having with our members show there is a lot of interest in gas pipeline networks. These have the potential to provide an efficient means of delivering large quantities of low-carbon hydrogen, and they will play an important role as markets develop. I think investors are keen to explore how these existing assets can transition and adapt for hydrogen going forward – midstream oil and gas is obviously a huge area of infrastructure.

THE EU AND A NUMBER OF NATIONAL GOVERNMENTS HAVE NOW PUBLISHED HYDROGEN STRATEGIES. DO YOU THINK THAT THIS IS HELPING TO ENCOURAGE INVESTMENT?

Yes, absolutely. Politicians don't like being put on the spot to predict the technologies of the future because it doesn't always work out well for them. But I think the growing focus on hydrogen as part of the future energy mix means that politicians have had to get off the fence.

Long-term investment in infrastructure depends on there being a clear policy framework. Political and regulatory backing reduces risk and expands the pool of potential institutional capital available for investment. You have to provide investors with clarity in order for them to look at new areas such as hydrogen.

The combination of private capital and government funding will play a decisive role in delivering change.

CAN TRANSPORT CORPORATES GO IT ALONE WHEN IT COMES TO INVESTING IN LOW-CARBON TECHNOLOGIES?

Decarbonisation typically implies system-wide change. So there is an important role for the wider investor community – not just corporates. For example, the aviation sector needs there to have a breakthrough in sustainable fuels and this requires the involvement of multiple stakeholders: engine manufacturers, fuel suppliers, airports and the airlines themselves. So it's a combination of all those stakeholders joining forces to drive through the technological breakthroughs that are going to be necessary for that sector.

ASIDE FROM THE OBVIOUS ENVIRONMENTAL FACTORS, WHAT ARE THE OTHER BENEFITS OF DECARBONISATION?

Decarbonisation can certainly deliver benefits in terms of improved efficiency. But I think it's more about getting ahead of the game in terms of avoiding the punitive effects of emissions trading and other regulatory measures further down the line. Those are the strongest drivers.

I think there are also reputational factors in play. The aviation sector, for example, has long understood the need to improve its environmental credentials and reduce its dependence on carbon. I don't think public opinion would support the growth of aviation capacity increases if there wasn't a demonstrable commitment to tackling questions of sustainability. And I think for the majority of our members, sustainability is an overriding driver.

John Laing Group

"I suspect COP26 will add pace to regulation, encouraging greater alignment between cost and value."

John Laing Group is a global infrastructure investor with a focus on transport, social and environmental projects. The company is extensively involved in the rail sector, with major investments in rolling stock, commuter rail and light rail. Christopher Reeves, the group's ESG Director, talks change challenges and coordination.

Christopher Reeves
ESG Director

WHAT ROLE DO YOU SEE RAIL PLAYING IN TRANSPORT DECARBONISATION?

Rail transport is one of the key places to enable the reduction of transport emissions – particularly when it comes to freight. The advantage with rail is that it is typically much more energy efficient than road transport, I would expect to see more people looking to put freight onto trains. You can get this efficiency gain without changing very much to do with the rail network. You will probably see the mix of transport changing.

"Decarbonisation leads to greater efficiency and operational improvement. The challenge is the opex/capex balance – at what point do you shift away from carbon?"

WHERE DO YOU EXPECT TO SEE THE MOST INVESTMENT IN THE COMING DECADE – GREENFIELD OR BROWNFIELD?

Europe has a mature rail system, so the focus is on upgrading brownfield networks. There is a time horizon conversation to have here around what's practical and pragmatic – particularly regarding the longevity of rail infrastructure, because a significant amount of infrastructure that is going to exist in 2050 is already here. The focus is going to be on improving things like signalling, rolling stock and electrification of existing lines.

WHICH TECHNOLOGIES DO YOU THINK WILL BE MOST IMPORTANT FOR RAIL DECARBONISATION?

I think you will see electrification first. But you've also got a very live conversation around hydrogen propulsion. Although hydrogen needs a lot of supporting infrastructure, it is a good solution for parts of the network that are not electrified. You could have a hydrogen solution that fits very happily into that space as part of an overall plan. As with aviation, shipping and roads, there is a fit-for-purpose conversation to be had here – there is no one-size-fits-all solution.

COULD PUBLIC-PRIVATE PARTNERSHIPS (PPPS) PLAY A BIGGER PART IN DELIVERING RAIL DECARBONISATION?

The challenge with the PPP structure as it stands is the question of alignment between strategy and procurement policies. If you are looking at decarbonisation objectives, you don't often hear procurement teams saying: 'if you can deliver a carbon benefit, we'll add that as a value enhancement'. Cost versus value is quite a tough one in the procurement space at the moment.

I think this will change. I suspect COP26 will add pace to regulation encouraging greater alignment between cost and value, and you also have mechanisms coming into play such as the TCFD [Task Force on Climate-Related Financial Disclosures]. On top of this, you have climate stress testing for financial institutions, which will in turn drive credit and other financing instruments. There is also the wider fact that 80% of global GDP is now aligned to net zero. Climate and financing objectives are going to become much more closely aligned as far as public procurement is concerned.

CAN DECARBONISATION DELIVER GOOD RETURNS?

Yes. Decarbonisation leads to greater efficiency and operational improvement. The challenge is the opex/capex balance – at what point do you shift away from carbon? A lot of people will be saying: do we want to be the leaders playing an almost VC role in this investment space? Or do we want to be a fast follower?

Large OEMs have the capacity and budgets to lead in this space. We've seen that with Alstom and their hydrogen passenger train. Decarbonisation has driven that, and that is getting a lot of traction. The challenge for rail operators is that there is inertia in the system – today's rolling stock will still be there years from now.

WHAT DO RAILWAYS NEED TO DO TO GET TO NET ZERO?

Coordination is essential. At the level of the railway itself, you need to work with partners around the system. There's no point just focusing on one element – you need to look at rolling stock, the network itself, stations and the energy supply. You need a certain amount of structure to do that and the metrics are quite vague at the moment. There is also a need for greater coordination between rail and other modes of transport.

Overarching all of this is the relationship between rail and the wider energy system. This is an interesting one, because the energy mix is changing and you have battery storage and hydrogen coming in. If a country-level target is net zero, you need to start looking at the energy system as a whole – and that means coordinating decisions about energy use at asset level.