

The Growing Importance of the "E" in ESG

Jeremy Taylor, Managing Director, Co-Chief Executive Officer, Lazard Asset Management Limited (London)

Nathan Cockrell, Managing Director, Co-Director of Research and Research Analyst

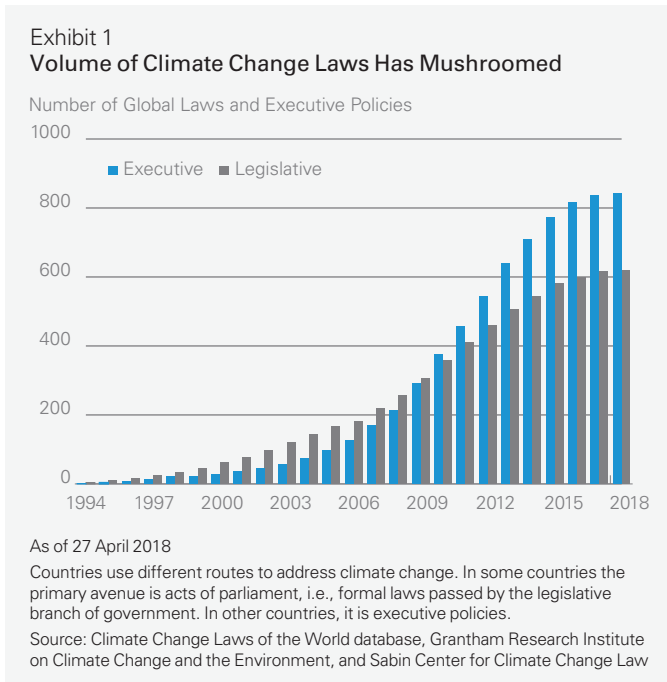
Alistair Godrich, Senior Vice President, Research Analyst

Neil Millar, Senior Vice President, Research Analyst

Growing environmental concerns, and the concerted effort to tackle them on a global scale, are generating large-scale changes across multiple industries. The ability to more precisely identify how environmental regulations are driving industry changes, and having a deeper understanding of their impact on related companies and sectors, could offer investors a structural advantage. We believe that active, bottom-up fundamental managers are better able to anticipate the risks and opportunities created by structural shifts compared to other approaches that rely on static assessments, owing to a thorough appraisal of financial statements and regular engagement with company management to generate unique insights into how different businesses are developing.

Environmental Regulation Is Escalating

Stringent regulations that focus on environmental disclosures, limits, and targets have grown over the past two decades. In early 2017, over 1,400 climate laws were in existence worldwide compared to approximately 60 laws and policies in 1997¹, the year in which the Kyoto Protocol was formally adopted. This equates to a doubling in the volume of climate laws globally every four to five years¹ (Exhibit 1).



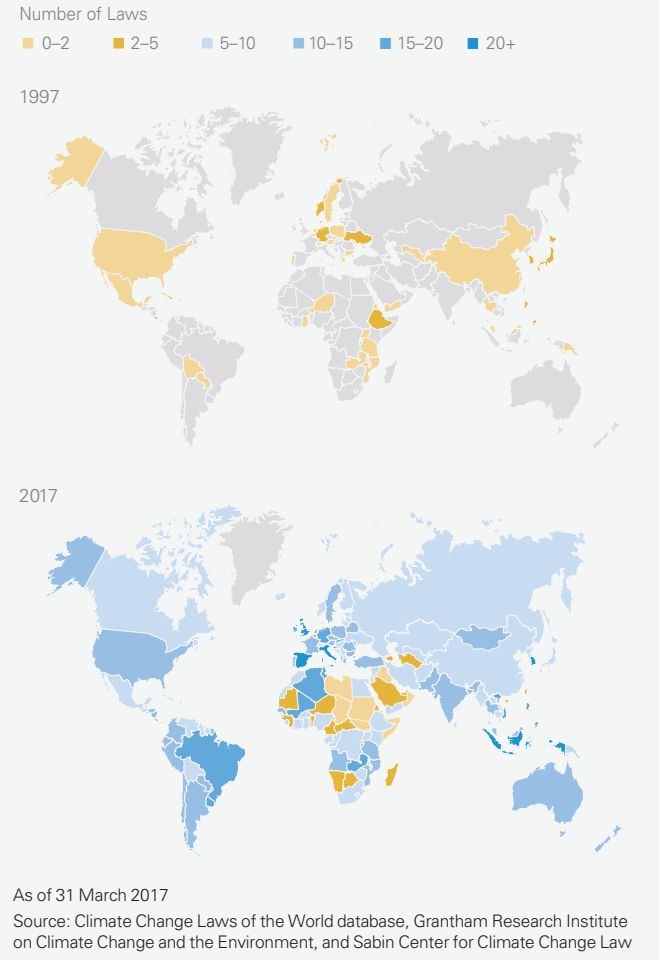
This growth demonstrates that almost every country globally is seeking to address climate change in one way or another (Exhibit 2). Research shows that in 2017, 164 countries—which together account for nearly 95% of global greenhouse gas emissions—had in place laws and policies designed to address climate change, up from 99 countries in 2015¹. The Paris Agreement, adopted in December 2015, has been an important driver of this global effort.

Implications for Investors

As public concern about climate change has deepened and the bank of related legislation grown, global investors have worked hard to determine the impact of environmental considerations on their investment allocations given that it affects almost every aspect of a portfolio, from return expectations to sources of risk.

At the heart of global efforts has been a pledge to reduce greenhouse gas emissions, which have rapidly accelerated due to more than 150 years of industrial activity. The latest step in these efforts to strengthen the global response has been The Paris Agreement. The main aim of the accord is to keep the rise in global temperature well below 2 degrees Celsius this century, and to make efforts to limit the temperature increase even further to 1.5 degrees Celsius above pre-industrial levels. Landmark agreements such as this have put pressure on companies to

Exhibit 2
Global Push to Tackle Climate Change Has Intensified



regularly report their emissions and implementation efforts. This is altering company behaviour and competitive dynamics, creating new challenges, but also unlocking new opportunities for future growth.

We focus on three industries that we believe aptly illustrate the impact of global low-carbon goals on business models, namely the automotive, shipping, and oil refining industries.

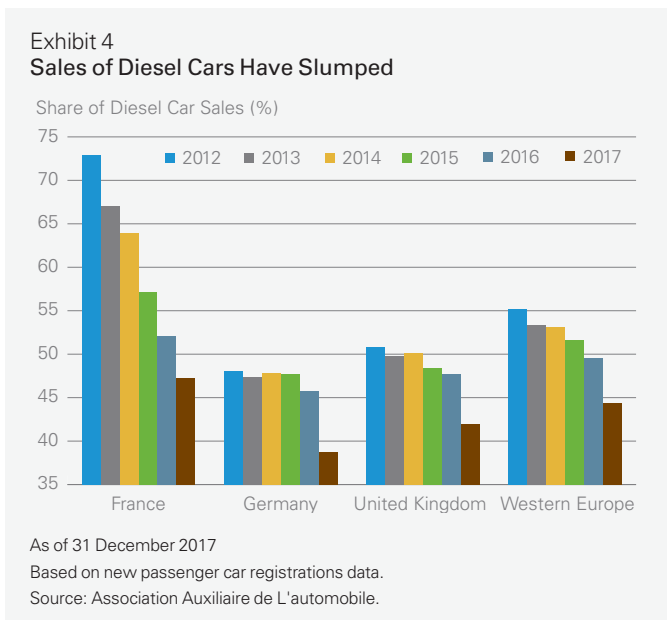
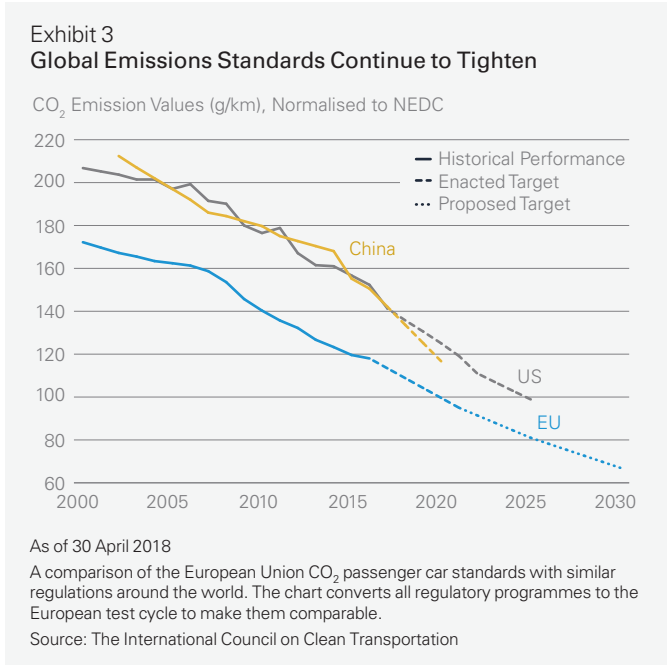
How Emissions Regulations Are Redefining Industries

Automotive

Electric vehicles are expected to become much more popular in the coming years due to tightening emissions standards (Exhibit 3) and negative scrutiny of diesel engines in the wake of emissions scandals.

This tightening of emissions regulations has historically been manageable for automakers, as they have adapted by reducing the weight of the vehicles they produce and installing more fuel-efficient engines in a bid to improve fuel economy and reduce emissions. The emissions standards that have been set for 2020 and beyond are pushing combustion engine vehicles close to their technical limits.

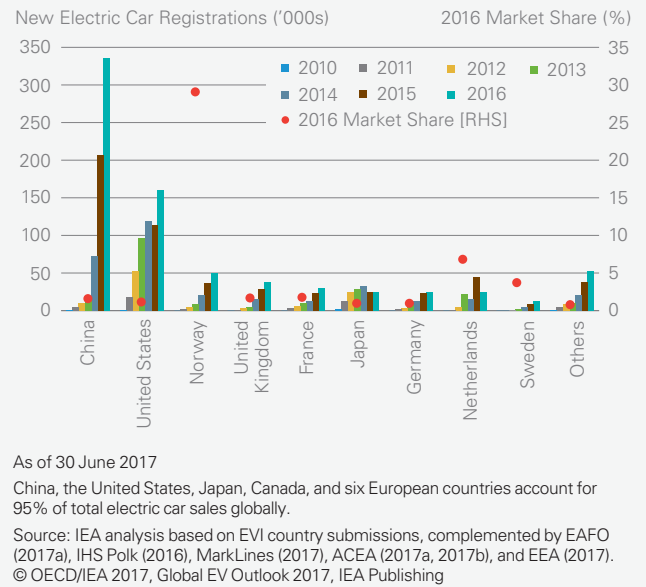
Tighter emissions regulations and scandals that have included German carmaker Volkswagen cheating on emissions tests have raised regulatory risks. This has coincided with a rapid decline in sales of diesel cars across Europe (Exhibit 4) and accelerated automakers' efforts to reorient production to electric vehicles.



Volkswagen is aiming for 20%–25% of the cars they sell by 2025 to be electric. The company recently unveiled plans to launch 50 new electric vehicles by then and announced it was aiming to invest €34 billion in e-mobility and autonomous driving technology between 2018 and 2022. Despite being at a very nascent stage, annual sales of electric vehicles are accelerating across most major global economies (Exhibit 5).

Diesel car sales in Europe have been lower than expected amid a growing crackdown on air pollution at the regional level,

Exhibit 5
Sales of Electric Vehicles Are Accelerating Worldwide



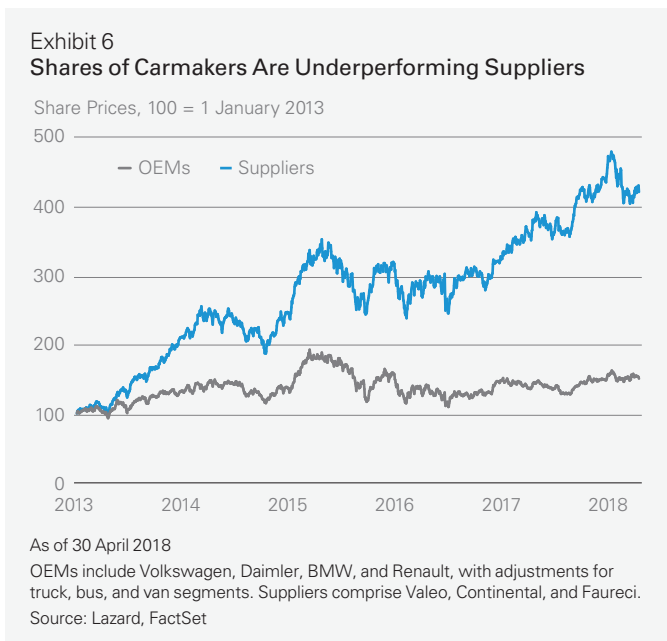
heaping pressure on carmakers to sell more electric vehicles in order to meet tighter emissions regulations. A number of national governments and cities have clamped down on diesel cars, creating uncertainty among car buyers over whether they will be able to drive their diesel car into a major city in the future and the level of taxation that might apply to their vehicle.

A German federal court ruling earlier this year paved the way for German cities to ban diesel vehicles, with immediate effect, in a bid to cut emissions in areas where air pollution exceeds legal limits. Paris has announced plans to phase out diesel cars by 2025 while Madrid, Athens, and Mexico City have made similar pledges. Other cities have introduced levies aimed at owners of diesel cars, including emissions surcharges and higher taxes. Alternative strategies include Rome's "eco-days" policy, which bans most vehicles from the city on Sundays—except hybrid and electric vehicles.

Falling lithium-ion battery prices globally have also meant that electric vehicles have become more economical on a total cost-of-ownership basis, which includes the purchase price plus the costs of running the vehicle. We expect that batteries for electric vehicles will eventually cost the same as traditional internal combustion engines. At that point, the mass appeal of electric vehicles would likely strengthen considerably while automakers' profitability could also rise. Estimates suggest that purchase prices of electric vehicles and conventional cars will converge once the cost of electric battery systems fall below \$100/kilowatt-hour, a tipping point we believe could be reached by 2020.

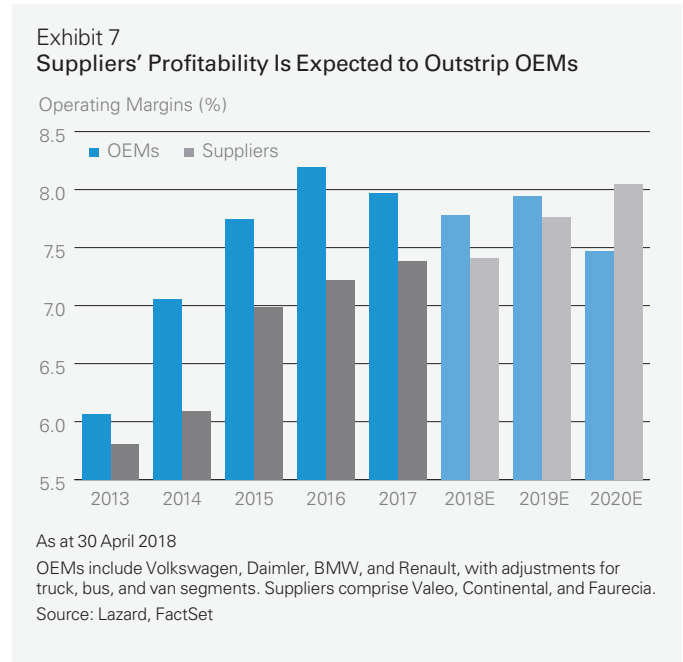
We believe that the second-order effects created by the electric vehicle revolution is becoming an increasingly important area to watch in the auto industry, particularly in terms of the impact it is having on suppliers. The debate often centres on the impact of electric cars on automakers, including Volkswagen, BMW, and Tesla, but there are supply-related companies that have seen

tremendous sales growth in recent years. Carmakers have started to invest additional resources into research and development focused on the production of electric vehicles, as companies have moved to meet stricter environmental regulations and defend market share against relative newcomer Tesla. Automakers are vying to be the global leader in electric vehicles and have started to outsource the manufacture of a greater number of components to their supply base in a bid to support this ambition. As focus has shifted, the value in the industry has moved from carmakers (also referred to as original equipment manufacturers, or OEMs) to suppliers of core components and software/service providers, as these companies have rapidly innovated in the areas of technology and safety. The shift in value in the supply chain has been reflected in stock prices (Exhibit 6).



Elements of design and production have been outsourced to suppliers such as Valeo, Continental, Faurecia, and Hella within Europe, for instance. The increasing level of sophistication in the technology used has meant that some parts have started to account for a greater proportion of a car's overall value, creating economic moats for those companies that manufacture or supply them. Anything suppliers are able to do to reduce carbon dioxide emissions will likely be rewarded by higher price-per-unit of production, which should translate into sales and margin expansion (Exhibit 7), and ultimately greater long-term profitability. Auto suppliers are forecast to continue to improve their margins over the next few years while expectations are that OEMs will struggle, as they have to continue to invest in electrification.

Emissions regulations are affecting OEMs and suppliers differently. While they pose challenges for OEMs broadly, they are proving to be a tailwind for suppliers. However, this does not mean that investors should simply favour the stocks of suppliers over OEMs. In some cases, OEMs have de-rated significantly to the point where environmental risks are being factored their share price.



As a group, automakers tend to fare better than suppliers in terms of their impact on the environment, as some suppliers tend to screen as "dirty" owing to the raw materials used and production methods employed. Suppliers that might rank lower in terms of their environmental impact include tyre manufacturers, lithium-ion battery makers, and the miners that supply the raw materials. However, applying this broad-brush approach when allocating assets could result in opportunities being overlooked.

The rise of electric vehicles is also creating second-order effects in the utilities sector, and opening up opportunities in grid stability as the load of charging electric vehicles puts pressure on maintaining the electricity network. In addition, the fall in the price of batteries—which has helped to make electric vehicles more economically viable—has prompted utilities to rethink power management. Some utilities companies have started to install batteries alongside their renewable assets, allowing solar and wind energy projects to run even when these renewable sources are lacking, further reducing the reliance on traditional power generation assets, such as coal or gas.

These opportunities, in conjunction with a shift towards renewable energy, aided by government policy, are leading to significant changes in the business models of utilities companies. German energy giant Eon recently agreed to buy Innogy from RWE in a deal that involves a series of asset swaps, as it looks to increase investment in power networks. RWE, Innogy's controlling stakeholder, will absorb the renewables businesses of both Eon and Innogy.

Other utilities have followed suit. Engie, a French utility company, recently divested its coal power stations in Australia and the United Kingdom as part of broader efforts to scale back its coal and nuclear power generation operations and shift towards renewables. This follows its decision in 2017 to sell its oil and gas exploration and production assets. Enel, an Italian

utility, has purchased the listed minority shareholdings of its renewable business and focused further on grid and renewable power investment.

Shipping

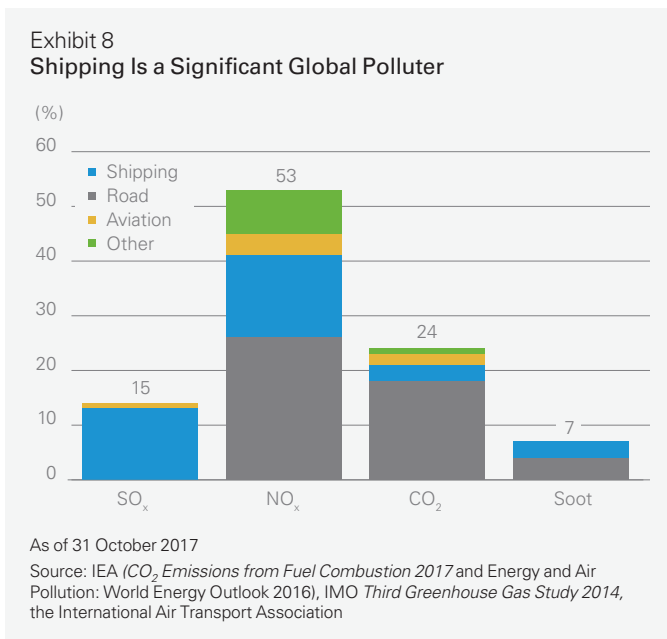
Shipping is one of the highest polluting industries in the transport sector, owing to the type of fuel it uses, but its scrapping and recycling practices have also raised concerns about their environmental and social impact.

Regulations have been introduced to either prohibit or restrict the use of certain hazardous materials on ships, while the ship recycling regulation introduced in 2013 by the European Commission has sought to reduce the negative impacts arising from the recycling of large ships of EU member states.

While efforts to reduce the harmful impacts of recycling and scrapping practices are not yet coordinated on a global scale, the direction of travel is clear when viewed in the context of the industry's efforts to curb other activities with a negative environmental impact, particularly those around emissions.

The industry is a heavy user of bunker fuel, the most polluting diesel fuel available. Bunker fuel is inexpensive, viscous, and has a high sulphur content. It is the residual oil left over from the refining process of crude oil following the extraction of gasoline, diesel, and other light hydrocarbons—fuels used by lighter vehicles and the aviation industry.

Regulators have been looking at ways to minimise the industry's environmental impact by reducing emissions from shipping as part of efforts to move the industry away from fossil fuels. Shipping currently accounts for 13% of annual sulphur oxide emissions globally and 15% of global nitrogen oxide emissions (Exhibit 8) and these levels are projected to grow over the coming decades. If left unchecked, the shipping sector could account for a growing share of global emissions relative to other industries.



While the industry currently remains outside the scope of the Paris Agreement, industry regulators are making efforts to align with global efforts on climate change, having recently announced a commitment to reduce greenhouse gas emissions by at least 50% by 2050.

However, the imminent, and arguably most clearly defined, targets are those that have been set by the International Maritime Organization (IMO) on sulphur emissions, which are due to come into effect on 1 January 2020. The shipping industry will have to comply with a lower sulphur content limit on the fuel that it uses, from 3.5% currently to 0.5%. This regulation will impact the whole industry, given that the fuel it currently uses would cease to be compliant once the rules come into effect in less than two years' time.

In order to comply with these new regulations, shipping companies could:

- Switch to compliant low-sulphur fuel oil
- Install exhaust cleaners, also known as scrubbers, to fleets in order to remove the excess sulphur from the fuel
- Switch to alternative fuels, such as liquefied natural gas (either by retrofitting existing fleet or ordering new vessels)

Each of these options has different cost implications for the shipping companies and it remains unclear just how much of it can be passed along to clients (Exhibit 9).

Exhibit 9 Potential Cost Implications

| Option | Incremental Cost ^a | Financial Impact |
|---------------------------|---|--|
| Low-sulphur fuel | 100% increase in fuel cost at 2017 average oil price ^c | 0%–15% increase in the cost base ^b |
| Installation of scrubbers | \$5m–\$10m per vessel | +15%–30% cumulative incremental capital intensity ^d |
| LNG vessel (retrofitting) | \$15m–\$25m per vessel | +40%–80% cumulative incremental capital intensity ^d |
| LNG vessel (new order) | \$160m–\$170m per vessel | +15%–20% annual incremental capital expenditure ^e |

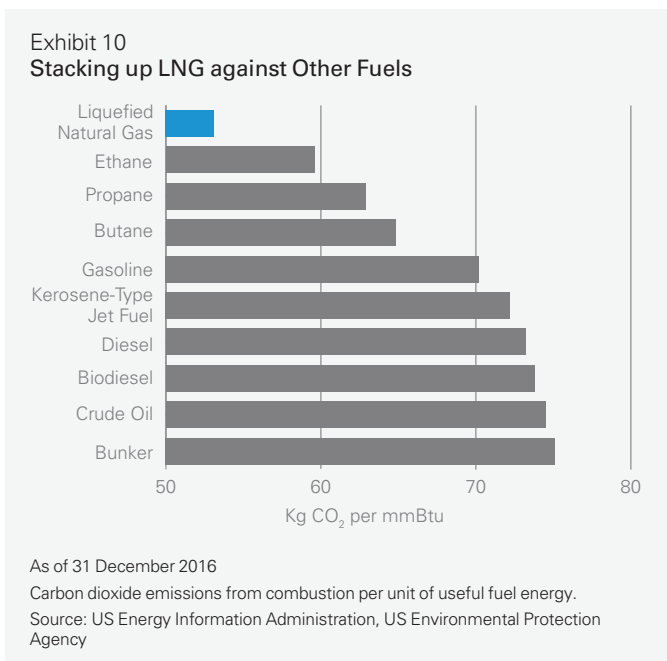
As of 31 March 2018

- a Either in operating expenses or in capital expenditures
- b Assuming 0%–100% of the increase is passed through to customers
- c Maersk average bunker price was c. \$300/tonne in 2017 (with Brent averaging \$54 in 2017) and average spread between high-sulphur and low-sulphur fuel over 2005–2015 was c. \$300/tonne
- d Capital intensity measured as capital expenditure/sales
- e LNG vessels are c. 15%–20% more expensive than traditional bunker fuel-run vessels, which cost c. \$130m–\$140m per vessel

Source: Lazard

Switching to compliant low-sulphur fuels is likely to be the shipping industry's preferred option, as we anticipate it would likely be the easiest cost to pass on to customers. Scrubbers—which have long been used to clean emissions from oil- and coal-based power plants—can be retrofitted to shipping fleets. Adding scrubbers to existing fleets incurs a different set of costs, as it not only includes the installation cost of the system but also the loss of earnings that arise during fitting. The process for fitting scrubbers typically lasts longer than the usual dry-docking for a ship when the vessel is out of service for approximately 10–14 days for servicing and repairs.

The cleaning process of the scrubbers also generates sludge and creates further considerations around the safe disposal of this hazardous waste. While the scrubbers installed on fleets must meet certain regulatory standards, controls around the disposal of the waste generated by them are looser and potentially open to abuse. Switching to liquefied natural gas (LNG) from bunker fuel is the most environmentally friendly option given greenhouse gas emissions from this form of fuel are far lower than alternative sources (Exhibit 10). As such, LNG-fuelled engines would be compliant without the need for scrubbers. While we believe that interest will grow in LNG as the shipping industry's primary fuel source, we have yet to reach a tipping point in terms of there being sufficient competitive advantages to do so before 2020.



At present, fuel costs represent around 15% of total costs for a shipping company, so the change in regulation is likely to have a material financial impact, particularly as the scale of the reduction limits the scope for companies to phase in measures (Exhibit 11). The key issues around switching to low-sulphur fuels will likely centre on the supply dynamics of this fuel source and the feasibility of equipping fleets by 2020.

Exhibit 11
Sulphur Caps Have Been Cut Dramatically

| Sulphur Limits in Fuel Oil (% m/m) | Implementation Date | Reduction in Sulphur Limit (%) |
|------------------------------------|---------------------|--------------------------------|
| 4.5 | 19 May 2005 | – |
| 3.5 | 1 January 2012 | 22.2 |
| 0.5 | 1 January 2020 | 85.7 |

As of 28 October 2016
Sulphur limits expressed in terms of percent by mass.
Source: International Maritime Organization

Freight rates are currently historically low and transportation costs only account for a marginal percentage of the total costs of the goods shipped (less than 5%). Under current conditions, the cost increase of switching to low-sulphur fuels could be passed through to customers relatively easily. However, the shipping industry is highly cyclical in nature and a key determinant in whether or not shipping companies will be able to pass on such costs in the future will largely rest on the supply/demand balance at that point in time. The biggest impact to the industry could hinge on scrapping rates. Older, less fuel-efficient vessels will become even less attractive in this new regulatory environment and, as such, some may be scrapped. Panamax vessels, ships that are able to travel through the Panama Canal, are among the oldest vessels today, accounting for 14% of the global fleet. The scrapping of these vessels would be positive for the supply/demand dynamics in shipping and, by extension, boost industry profitability, should all other factors remain equal.

Much like with the automotive industry, second-order effects are occurring. Structural changes in the shipping sector are creating some interesting opportunities in other industries, particularly refiners.

Oil Companies and Refiners

The impact of the IMO regulations on oil companies and refiners will be difficult to anticipate precisely and is likely to be very complex. However, there are some important observations that can be made ahead of the introduction of the 2020 sulphur regulations:

- Greater demand for low-sulphur products will boost the margins of refineries with the complexity to take advantage of this transition
- The price divergence across different types of crude oil products is likely to widen, exacerbating existing price differentials
- These shifts will likely introduce supernormal profits for a short period, but they are expected to be eroded over time

The shipping industry currently consumes approximately 4 million barrels of fuel per day. The IMO regulation is expected to shift this demand dramatically toward low-sulphur fuels when the new regulations come into force in 2020.

At an industry level, this will cause an immediate supply shock to refiners. A refiner's capacity will be an important determinant in gauging the scale of the impact it faces. Each refinery has the capacity to process certain types of crude oil and the capacity to produce a certain product slate from that crude. The more "complex" or sophisticated the refinery, the greater its ability to process low quality crude oil into higher quality products.

The quality of the crude oil depends on its sulphur content and its density. The lower the sulphur content and density, the easier it usually is to refine into high value products. These characteristics influence what the refining industry is willing to pay for different crude oil streams. For instance, at current levels, high sulphur and high-density crude oil from the Canadian oil sands trades at a \$15–\$25 discount per barrel compared to lighter crude oil originating from Texas.

Refineries that have a limited capacity to handle heavier crude oil will have to pay more, all else being equal, for lighter crude oil streams to satisfy growing demand from the shipping industry. Complex refineries will be able to buy cheaper, lower quality crude oil, as they have the capacity to process it.

The degree of sophistication of each refinery determines its processing capacity, while its ability to vary its production of output—or its product slate—is often limited. To cope with shifts in the shipping industry, refineries could:

1. Switch to lighter crude oil streams, which would yield a lower proportion of high-sulphur products
2. Invest in order to adjust the refining complexity
3. Deploy capital towards turning high-sulphur fuel oil into other products, such as asphalt and petroleum coke, for use in other industries, including construction

Higher margins could tempt refiners into deploying more capital in order to adjust their refining complexity. However, to justify this level of investment, higher margins would need to persist, as would the wider price differential between heavy and light crude oil streams. In reality, this is unlikely to be the case.

Increasing a refinery's complexity is immensely costly and takes about five years to plan and execute. Given the lengthy implementation, plans are often delayed or in some cases scrapped. ExxonMobil's new coker at Antwerp is expected to be fully operational this year following a lengthy delay. Meanwhile, Marathon Petroleum Corp. decided a couple of years ago to pull the plug on its \$2 billion Garyville refinery upgrade project, which sought to increase capacity for the conversion of residual oil into low-sulphur diesel.

Complex refineries with the capacity to process heavier crude oil streams and convert them into high-value products are likely to prosper in light of the new IMO regulations. Listed refiners and those operated by oil majors tend to have the greatest complexity, as measured by the Nelson complexity scale.

Impact on Refining Margins

Listed refiners are likely to see margins expand initially. Having greater complexity will allow them to take advantage of discounted low quality crude and sell higher priced premium products. However, much will also depend on the price of the different crude streams at any given time.

Capacity could also be restricted if low-end, legacy capacity is retired. There is an abundance of legacy assets in Europe, Russia, Africa, and Latin America, that could affect overall production. The US refining industry has been set up to process heavier crude oil sourced in Canada, Mexico, and Venezuela, so it may find itself in a sweet spot.

Implications for Oil Producers

Heavy oil producers could suffer as demand for this crude stream falls. This could potentially disadvantage some of the heavier oil producers in Canada, Latin America, and the Middle East. OPEC produces a lot of heavy crude, which some of the Middle East members have been trying to mitigate by building complex refineries.

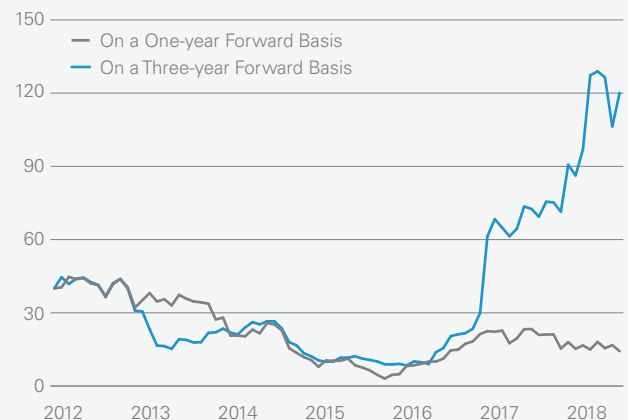
It is more difficult to anticipate the impact on shale oil producers. Shale oil has an incredibly low sulphur content and is lighter, but it is in some ways too light as many refineries struggle to process it.

This does not mean that crude streams will dictate the eventual success or failure of those companies that produce it. Indeed, crude streams can be blended before being sold, so crude oil that is denser and has a higher sulphur content may still have a place, although the direction of travel is clear. Demand for low-sulphur oil is set to increase as the shipping industry prepares to meet the new IMO regulations. The price differential between fuel with a 1.0% sulphur content and fuel with a 3.5% sulphur content has widened sharply on the forward market (Exhibit 12).

Exhibit 12
Demand for Low-Sulphur Fuels Is on the Rise

Price Spread

40 = 31 December 2011



As of 21 May 2018

Shows the difference in price between fuel with 1.0% sulphur content and fuel with 3.5% sulphur content.

Source: Bloomberg

Dealing with Regulatory Disruption

These sector case studies serve to illustrate the structural shifts and second-order effects that are being created by vast swathes of environmental regulation. Understanding the impact of these factors on a company's outlook and being able to anticipate them can be a challenge, even for well-informed investors.

While there is a growing acceptance that a company's ESG practices can affect its valuation and financial performance, tying the underlying factors together is rarely a straightforward process, as many factors relating to ESG are often subjective, and difficult to track and quantify. Furthermore, the impact of ESG factors is likely to differ across companies, sectors, and regions, and change over time.

Unsurprisingly, investors have increasingly relied on ESG ratings to provide useful insights and help guide security selection. While ESG ratings offer valuable inputs, we believe that in isolation they are insufficient to accomplish our objectives as they have some shortcomings that we believe can only be resolved through rigorous bottom-up fundamental analysis.

Frequent and thorough company engagement and the integration of meticulous ESG analysis into investment processes could potentially help investors sidestep the significant losses that tend to accompany ESG failings. We believe that bottom-up, active fundamental managers are better able to anticipate the risks and opportunities created by structural shifts compared to other approaches that rely on static and simplistic assessments of sustainability risks. This is because the information inputs used by active managers are often diverse, robust, and ultimately offer unique insights that enhance their predictive power.

This content represents the views of the author(s), and its conclusions may vary from those held elsewhere within Lazard Asset Management. Lazard is committed to giving our investment professionals the autonomy to develop their own investment views, which are informed by a robust exchange of ideas throughout the firm.

Notes

¹ Source: Climate Change Laws of the World database, Grantham Research Institute on Climate Change and the Environment, and Sabin Center for Climate Change Law

Important Information

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