

POLICING THE PLASTIC PRODUCERS THE DIRECTOR'S DUTY

WHY READ THIS REPORT?

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Few doubt that we have a global plastic pollution problem and the leading culprit is single-use plastic (SUP). The companies which make the polymers for single-use plastics are identifiable and the amount of waste generated by the plastics they produce can be estimated.

Directors of these companies have a duty to provide oversight and scrutiny. The Non-Executive Directors (NEDs), also known as Independent Directors, are best positioned to observe and challenge the executive team.

Assessing and questioning management on the risks and rewards faced by shareholders and, in an increasing number of instances a wider group of stakeholders, is their obligation.

For the top 20 SUP feedstock producers, as identified in the recent Minderoo report [The Plastic Waste Makers Index](#), we provide a [Director's 'Cheat Sheet'](#) comprising questions that they should be asking their management teams.

The trends evident in the financial data coupled with the increasing environmental exposure of these companies should be raising major concerns; many of these boardrooms should be filled with unease. If they are not, investors and other stakeholders should ask why not?



EXECUTIVE SUMMARY

The Plastic Waste Makers Indexⁱ, a report released by the Minderoo Foundation in the second quarter of this year, identified the top 20 polymer producers¹ which are responsible for over half of the production of polymers which end up as single-use plastic (SUP)² waste globally. An estimated 130 million metric tons of SUP were thrown away in 2019 of which 35% was burned, 31% buried and 19% dumped on land or into the oceans. The balance was recycled. Expansion plans for the production of polymers used in SUP applications suggest global capacity will rise by over 30% in the next five years.ⁱⁱ

Polymers, the building blocks of plastics, are manufactured by two main groups. We have divided them into the oil & gas companies and purer chemical giants. For some, plastic production is one of their smaller divisions.

All of these producers have a board of directors. These directors have a duty to the company to act with care and loyalty, including good faith, oversight and disclosure. Traditionally, this obligation was solely to the corporation's shareholders, but now many interpret this more widely to include all the company's key stakeholders. Best positioned to challenge management on such issues are the independent/non-executive directors.

In this paper we examine readily available information and suggest the issues that directors should be addressing at board meetings – [see The Director's Cheat Sheet](#). We focus on independent/non-executive directors in particular as they are expected to be objective when evaluating management performance, especially where the interests of management, the company and its shareholders may be different.

The environmental impacts of the production facilities and products are not limited to SUP pollution. Issues such as toxic waste, carbon emissions and associated health concerns should be on their meeting agendas. In some instances, implied financial valuations hint that externalities may be being priced in by investors.

Directors need to understand why these companies' profit margins peaked five years ago, why return on capital declined over the last decade while financial gearing headed in the opposite direction, why free cash flow has plummeted and why annual capex is below depreciation. Has the industry itself become cautious about investing?

Perhaps the increase in plastic production is viewed by many management teams as a 'potential life raft to help stay afloat'.ⁱⁱⁱ Directors should question their management teams as to whether this is a wise strategy. Is it time for directors to require a reallocation of capital by either exiting plastic production or implementing a credible transition strategy? If they don't reorientate the company, it looks as if investors will strand their assets.

1 In this paper we examine the following polymers: High-density polyethylene (HDPE), Low-density polyethylene (LDPE), Linear low-density polyethylene (LLDPE), Polyethylene terephthalate (PET) and Polypropylene (PP).

2 In this paper we define single-use plastics as disposable plastics which includes items used once before being discarded. This will include items such as grocery bags, straws, bottles, cups, cutlery, containers and food packaging.



WHY FOCUS ON DIRECTORS?

A board of directors is required

Every publicly traded company is legally required to install a board of directors. These boards, which comprise a group of individuals who are elected by shareholders, have two types of director.

1. Executive directors are involved in the day-to-day management of the company but have the added responsibility of ensuring that 'the information laid before the board by management is an accurate reflection of their understanding of the affairs of the company'.^{iv}
2. Non-executive directors (NEDs), also called independent directors, are not full-time employees of the company, are not part of the company's executive team and are not involved with the day-to-day operations of the company.

Focusing on the independent directors

In this research we focus on the latter group. The independent board members are very important to shareholders and other company stakeholders. **They are expected to be objective when evaluating the executive's performance, especially where the interests of management, the company and its shareholders may be different (e.g. management remuneration, succession planning or take-over defence).**

Encouragingly, the OECD Corporate Governance Factbook 2021³, notes that: '*despite differences in board structure, almost all jurisdictions have introduced a requirement or recommendation with regard to a minimum number, or ratio, of independent directors. The recommendation for boards to be composed of at least 50% independent directors is the most prevalent voluntary standard*'.⁴

Furthermore, most countries have common rules on the definition of independence for these directorships. This covers seven main requirements⁴.

1. Not to be a member, or an immediate family member, of the management of the company;
2. Not to be an employee of the company or a company in the group;
3. Not to receive compensation from the company or its group other than directorship fees;
4. Not to have material business relations with the company or its group;
5. Not to have been an employee of the external auditor of the company or of a company in the group;
6. Not to exceed the maximum tenure as a board member;
7. Not to be, or represent, a significant shareholder.

3 <https://www.oecd.org/corporate/Corporate-Governance-Factbook.pdf> (p141)

4 <https://www.oecd.org/corporate/Corporate-Governance-Factbook.pdf> (p144)



These independence criteria are the reason why these NEDs are the focus of this report.

Although the responsibilities of directors do vary by country, the OECD provides a valuable high-level summary, stating: *'Together with guiding corporate strategy, the board is chiefly responsible for monitoring managerial performance and achieving an adequate return for shareholders, while preventing conflicts of interest and balancing competing demands on the corporation. In order for boards to effectively fulfil their responsibilities they must be able to exercise objective and independent judgement'*. However, it goes further and adds: *'Another important board responsibility is to oversee the risk management system and systems designed to ensure that the corporation obeys applicable laws, including tax, competition, labour, environmental, equal opportunity and health and safety laws'*.⁵

Their governance responsibilities

Although there are ongoing discussions about the exact boundaries of directors' accountability – is it just shareholders or a wider group of stakeholders?⁵ – governance responsibilities include duties such as providing managerial oversight (e.g. audit, remuneration, health and safety, risk etc.), and ensuring adequate returns for shareholders and it is the independent directors who should exercise true independence and objectivity. The G20/OECD Principles of Corporate Governance, which provides a corporate governance benchmark, states that *'corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders'*⁶.

Against this backdrop, Planet Tracker scrutinises the world's 20 largest plastic producers posing objective questions that Planet Tracker believes the independent directors should be asking at board meetings. A number of these may be challenging to the management team, but if directors are to fulfil their duties they should require clear answers. These are outlined in the [Director's 'Cheat Sheet'](#).

Please note: A list of the directors of these 20 companies can be found on the Planet Tracker website. [Please click here.](#) There is no public information for the directors of three state-owned enterprises (SOEs) based in China. These companies are Jiangsu Hailun Petrochemical (ranked 15th in the top 20), China Energy Investment Group (18th) and China Resources (20th).

For all other companies, the data source and date are shown together with the director's name, role – whether executive, including position if revealed, or independent/non-executive – date of joining the board and background.

5 The G20/OECD Principles note that the effectiveness and credibility of the entire corporate governance framework and company oversight depend to a large extent on institutional investors that can make informed use of their shareholder rights and effectively exercise their ownership functions in their investee companies. See <https://www.oecd.org/corporate/Corporate-Governance-Factbook.pdf> (p84)

6 https://read.oecd-ilibrary.org/governance/g20-oecd-principles-of-corporate-governance-2015_9789264236882-en#page11



The Plastic Producers - board disclosure varies enormously

We have examined the board structure of the 15 listed companies and also those of Borealis and INEOS and were able to note some interesting characteristics.

Most boards have one or two executives, but often excluding the Chief Financial Officer, and typically 8 to 10 non-executive directors. The two notable exceptions are INEOS, which has three executives who own all the shares and no NEDs, and Borealis which has a dual board structure.

Board disclosure varies enormously among these Plastic Producers. For some companies, usually the U.S. and European ones, with no strategic or significant family investors, board disclosure details are good. Information about the board members, such as when they were elected, their background and how they are compensated, is available. For others, especially if family-controlled, disclosure tends to be poor and it can be problematic to establish when each member joined, why they were chosen or how much they are compensated.

It is notable that most boards are staffed by professionals. Most NEDs come from related industries – oil & gas, chemicals – or professions such as accountancy, economics and law.

It is too early to determine whether major changes are underway. ExxonMobil, which now has three NEDs, who were nominated by an investor group and supported by a majority of shareholders against the wishes of the company, may be a forerunner of things to come, but it could be a one-off. Those companies with a dominant strategic/family shareholder will be able to remain more resistant to shareholder pressure.

Asking the right questions

Planet Tracker's 'Director's Cheat Sheet' lists the most significant issues that we believe NEDs should raise at board meetings. [A copy of the Director's Cheat Sheet can be downloaded here.](#) Bearing in mind that many of these directors will view the protection of shareholders as the primary concern, there is a financial bias to these questions, but they incorporate a wide range of issues from dividend payments and returns on invested capital to environmental risks and societal expectations.

This is not an exhaustive list and we are aware that directors have a responsibility across a wide range of issues ranging, for example, from understanding a company's culture to adhering to regulations (e.g. health & safety).

In order to limit the number of questions, we have focused on four main areas: strategy, risk mitigation, finance and investors. All are interconnected.

The four questions on **strategy** aim to understand where the company is heading. We start with plastics' position in the business lifecycle. Is it still growing or is it already in its sunset years? And looking forward, what scenarios has the management team examined; is it backing a linear or circular model for example?

Understanding the **risks** inherent in a business model is an important role of a director. In this industry regulation is on the rise - and so are societal expectations, although these can vary by region. How do these risks weigh up against the potential rewards? Is there evidence emerging that the much talked about economic 'externalities' – e.g., air or water pollution - are being priced in by capital markets?



Finances are highly dependent on the above factors. NEDs can observe years of deteriorating financial metrics: returns are down; free cash flow has plummeted; margins are weak and falling; investment in assets is not being rewarded. The long-term trends in these factors implies they cannot all be blamed on the COVID-19 pandemic; ROCE⁷ has fallen for the last decade on average. Is it time to reallocate capital?

And **investors** are interested in all of the above. Although they will want to understand the source of their future returns – are share buy-backs and rising dividend payments going to cease? – on other issues they are often aligned with other **stakeholders**. If these assets are heading towards stranding what is the board's response? How can stakeholders be encouraged to value these companies more highly?

These are challenging questions for which management teams should have well-prepared and considered answers. And if they do not, independent directors should require they be replaced.

'One of the fastest ways to find the solution to an issue or challenge you are facing is to ask the right questions.' (Robin Sharma)

7 Return on capital employed



THE DIRECTOR'S 'CHEAT SHEET'

Topic	Question*	Report Section reference	Page
Strategy	Where in the lifecycle is this industry – growth, maturity, decline? Plastic demand suggests growth; financial metrics suggest decline.	The plastics context	9-11, Appendix 2
	What does a circular strategy look like – e.g., timescale, investments, product demand?	Limited circularity	13, Appendix 2
	Would a circular economy strategy extend the company's business lifecycle?***	Limited circularity	13, Appendix 2
	International Energy Agency (IEA) data suggests that a Clean Technology Scenario is lower capex than business as usual (BAU). Is this true for our company?	The plastic journey	25-30, Appendix 2
Risk mitigation	Environmental regulation and societal expectations are rising. Is this reflected in rising compliance and legal expenses? Do we require provisions/contingent liabilities?	The plastic journey	25-30, Appendix 2
	If polymer production is less than 10% of corporate revenues, should we persist in investing?*** Is the risk/reward ratio adequate?	Summary Data	Appendix 4
Finances	Are investors placing a premium on our invested capital? If not, should alternatives such as shrinking our asset base be considered?	The financial reality – PP**** universe	14-16, Appendix 5
	With falling revenues, EBITDA & EBIT margins and ROCE, will this change in a post COVID-19 world? If so, how and why?*****	The financial reality – PP universe; the oil & gas companies	14-18, Appendix 5
	Have we run different scenarios such as a sustainable transition to a low carbon world to see how demand will be impacted? In that type of scenario, how would investors likely respond to our capex plans – would they give us a higher asset multiple?	The financial reality – PP universe; the chemical companies; the oil & gas companies	14-20, Appendix 5
	The recent collapse in the capex/depreciation ratio strongly implies nervousness about continued investment. How should we interpret this trend?	The financial reality – PP universe; the oil & gas companies	14-18, Appendix 5
Investors	If dividend and share buybacks become limited by falling free cash flow and rising debt levels how will investors react?	The financial reality – PP universe; the chemical companies; the oil & gas companies	14-20, Appendix 5
	Capital markets appear close to stranding corporate assets. How do we avoid this?	The financial reality – the oil & gas companies	17-18
	How do we encourage capital markets to apply a higher valuation on our capital employed?	The financial reality – PP universe; the chemical companies; the oil & gas companies	14-20, Appendix 5

* Note that not all questions apply to every company.

** The two leaders for circularity are Indorama Ventures and Far Eastern New Century.

*** Note that the following companies have less than 10% of their corporate 2019 revenue from SUPs: Jiangsu Hailun Petrochemical (2%), Saudi Aramco (3%), PetroChina (3%), TotalEnergies (3%), Sinopec (4%), ExxonMobil (5%), China Energy Investment (5%), PTT (5%), Reliance Industries (8%),

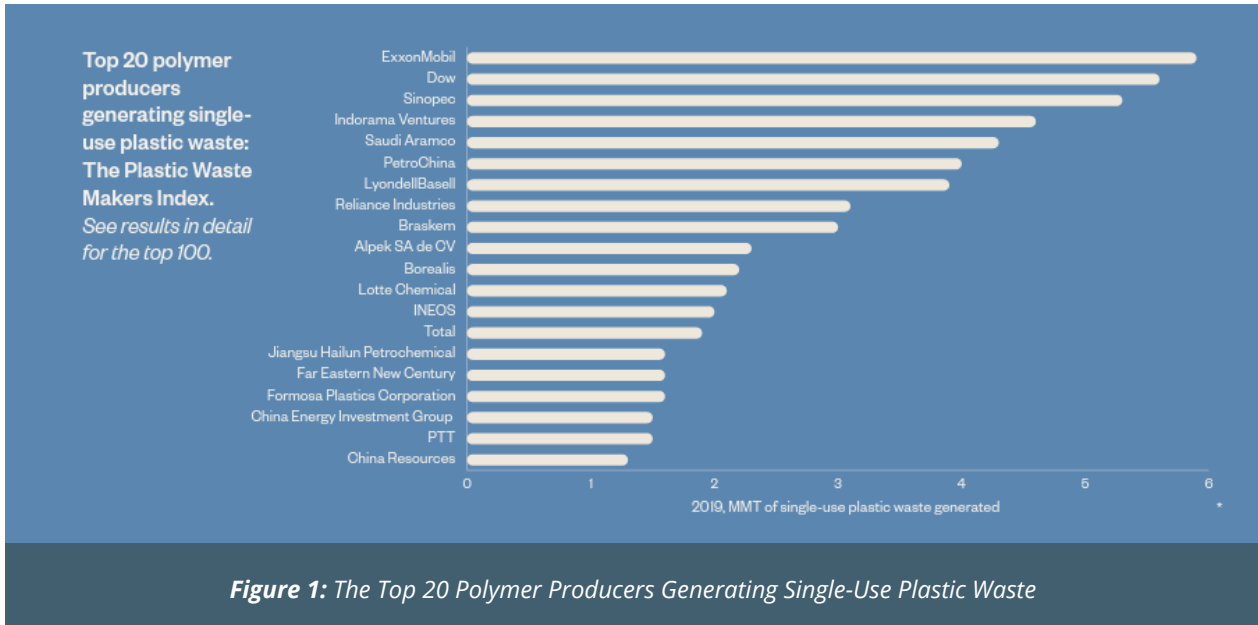
**** Plastic Producers

***** A sustained oil price bounce would help group cashflow and margins for the oil & gas subset.



THE PLASTIC PRODUCERS

The focus of this paper is on the largest global plastic producers, twenty polymer producers which account for over half of all single-use plastic waste generated globally. We have used the companies identified in The Minderoo Foundation’s report, ‘The Plastic Waste Makers Index’, released in May 2021 - see Figure 1.^{vi}



Source: The Minderoo Foundation, The Plastic Waste Makers Index (2021)^{vii} For the top 100 polymer producers please see the Minderoo report. Please note that Total has rebranded as TotalEnergies.

The view from the boardroom

In this paper, Planet Tracker examines the top twenty plastic makers from the perspective of a NED of one of these companies using readily accessible information. This includes publicly available research about the present state of the plastics industry, as well as a range of forecasts. We also examine high level financial issues which would be included in their Board papers and highlight the observations we believe the committed independent director should reasonably raise with the corporate executives. In truth, investors should also be asking the executive team similar questions but are only able to do this on quarterly public calls and the Annual General Meeting (AGM) or, for the largest shareholders only, in private one-on-ones.

As noted earlier, for three companies, we have been unable to gather the full financial picture as they are state-owned enterprises (SOEs) based in China and do not make financial statements publicly available. For all other companies, their reports and accounts have been analysed.



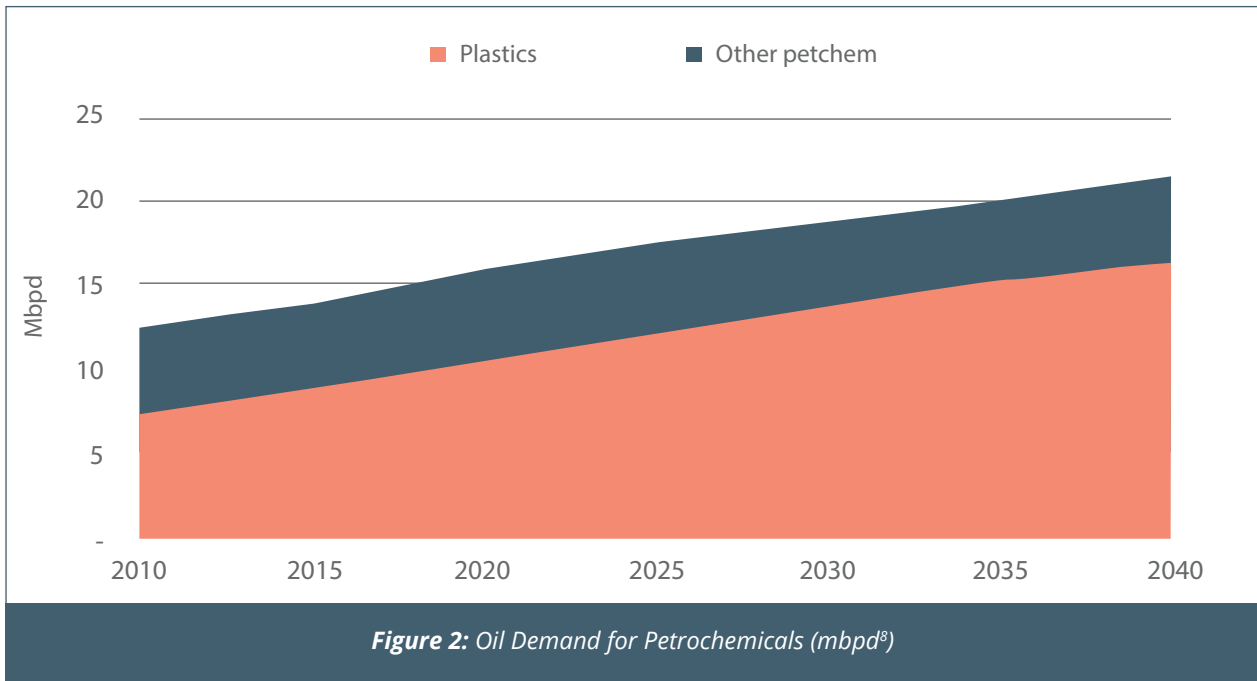
The plastics context

Planet Tracker has assumed that the independent directors of the plastic makers will have a thorough understanding of the industry in which these companies operate. We provide a more detailed analysis of the plastic industry in Appendix 2. Here we focus on the major issues only.

Understanding the plastics industry requires us to examine the petrochemical industry. At the forefront of petrochemical demand is plastic, the most familiar of its products. Plastic growth has comfortably outpaced other bulk material production such as aluminum, cement and steel.

Expectations are that this growth in plastic demand will continue as product demand remains strong and developed countries consume close to 20 times as much plastic as the developing countries on a per capita basis. This forecast does not assume tighter regulation and/or public resistance to plastic use, particularly SUP.

In turn, the oil and gas sector has been attracted by this plastic growth scenario which is often viewed as the largest driver of oil and gas consumption. Our colleagues at Carbon Tracker^{viii} point out that, although plastics currently make up only around 9% of oil demand measured in million barrels per day (mbpd), they are the largest component of oil demand growth in the coming two decades - see Figure 2.



Sources: BP, Carbon Tracker estimates

8 Million barrels per day

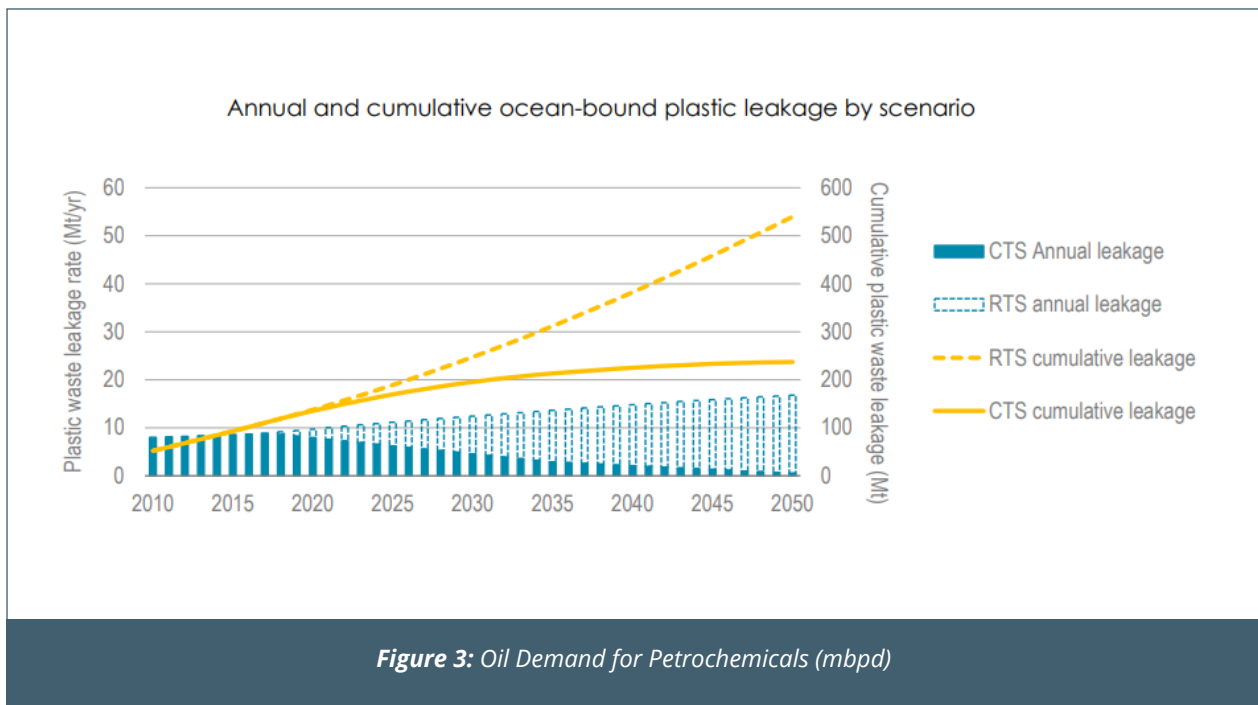


Growth and environmental consequences

But is this relentless growth in petrochemicals, and plastics in particular, along with the associated environmental problems, inevitable? The International Energy Agency (IEA) offers a different pathway, the Clean Technology Scenario (CTS)⁹.

The CTS uses the same tools and methodologies as those of the Rapid Transition Scenario (RTS)¹⁰ but with additional constraints like lower direct CO₂ emissions and the required mitigation of other environmental impacts, such as those related to air pollution and water and other aspects of the future energy system that are in line with those adopted in the IEA Sustainable Development Scenario. It assumes greater plastic recycling, which in turn reduces demand for virgin plastic. See Figure 3, which demonstrates the difference in ocean plastic pollution under these two scenarios.

Interestingly, cumulative investments required by 2050 for the production of primary chemicals in the CTS (USD 1.5 trillion) are marginally lower than in the RTS (USD 1.7 trillion). Note that further details are available in Appendix 2.



Source: IEA^x

Carbon Tracker^{11, x} examined the wider environmental impact of petrochemicals and plastic products beyond carbon emissions. It believes the oil sector should not rely on plastic to rescue its growth prospects and notes 'plastics impose a massive untaxed externality upon society of at least USD 1,000 per tonne (USD 350 billion a year) from carbon dioxide, health costs, collection costs and ocean pollution'.^{xi} We recognise that there is an untaxed externality on other (non-plastic) producers as well and therefore this does not just apply to plastic producers.

9 Further details on the IEA scenarios may be found in Appendix 2: The Plastic Journey

10 Further details on the IEA scenarios may be found in Appendix 2: The Plastic Journey

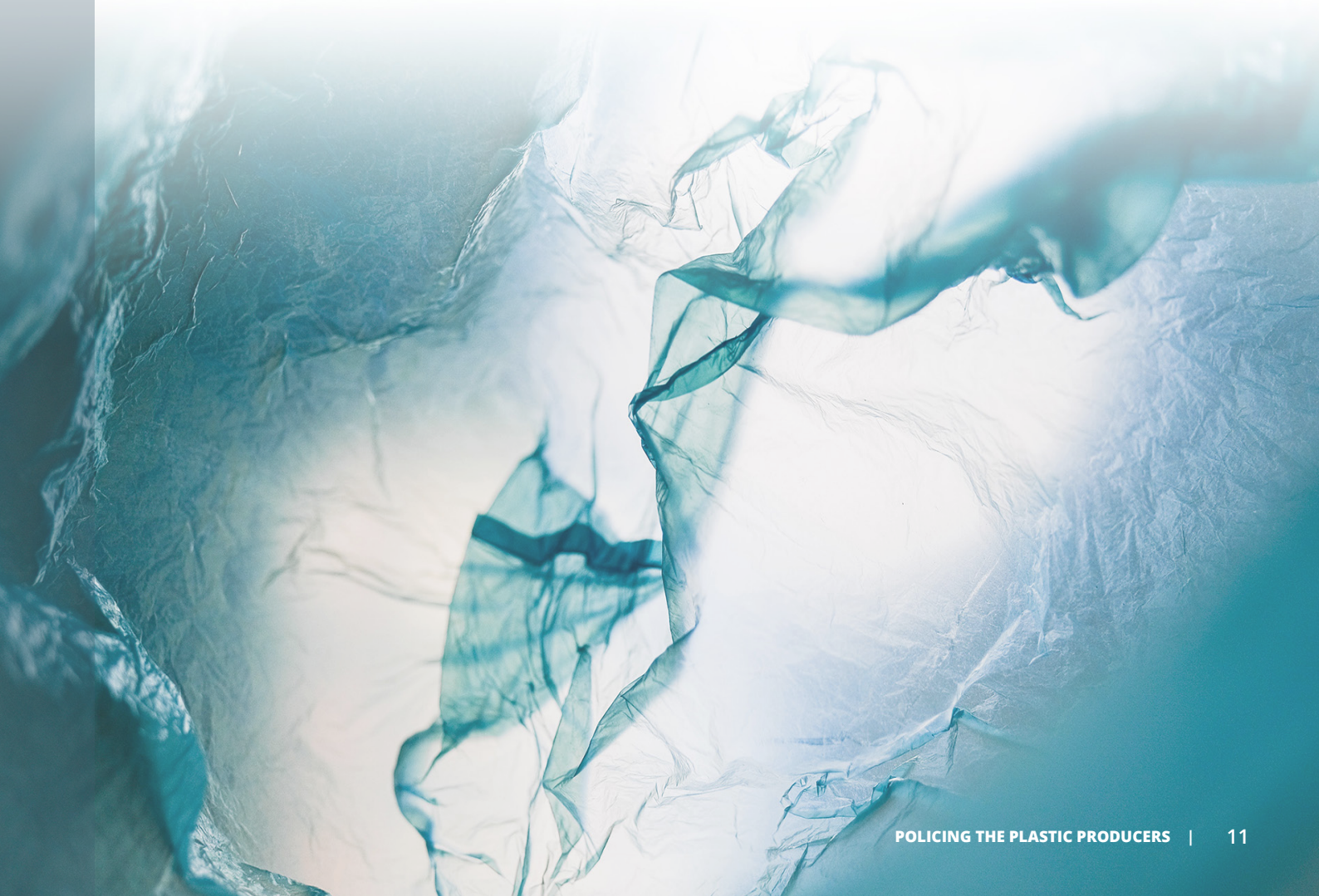
11 Carbon Tracker and Plastic Tracker are both Initiatives of the Investor Watch Group.



In a nutshell

If left unchecked, petrochemical growth looks significant, spearheaded by insatiable plastic demand. In turn, this has attracted the attention of a number of oil and gas companies.

However, there is a long-term risk to the financial markets that plastic demand will undershoot forecasts. It is well known that plastic facilities have significant emissions. Plastic waste is a global problem. Health hazards are increasingly highlighted by the mainstream media. Tightening regulation looks like a one-way bet. These 'externalities' need to be understood and accounted for in the boardroom. Independent directors will not be oblivious to this.





THE PLASTIC COMPETITORS

The make-up of the Top 20

Plastic production is concentrated with the top twenty plastic producers. Eleven of these companies are headquartered in Asia (five in China), four in Europe, three in North America and one apiece in Latin America and the Middle East. However, most of these producers own facilities in multiple countries^{xii} - see Appendix 4 for summary details.

This list comprises two main subsets. There are well-known **oil companies** such as ExxonMobil, PetroChina, Saudi Aramco, Sinopec and TotalEnergies. There are also the **chemical companies** such as Dow, Indorama, LyondellBasell, Braskem and INEOS. We discuss both subsets below.

There is a mix of ownership structures from private companies such as INEOS, to sovereign states such as the Kingdom of Saudi Arabia. The equity ownership of the top 200 polymer producers is shown in Figure 4.

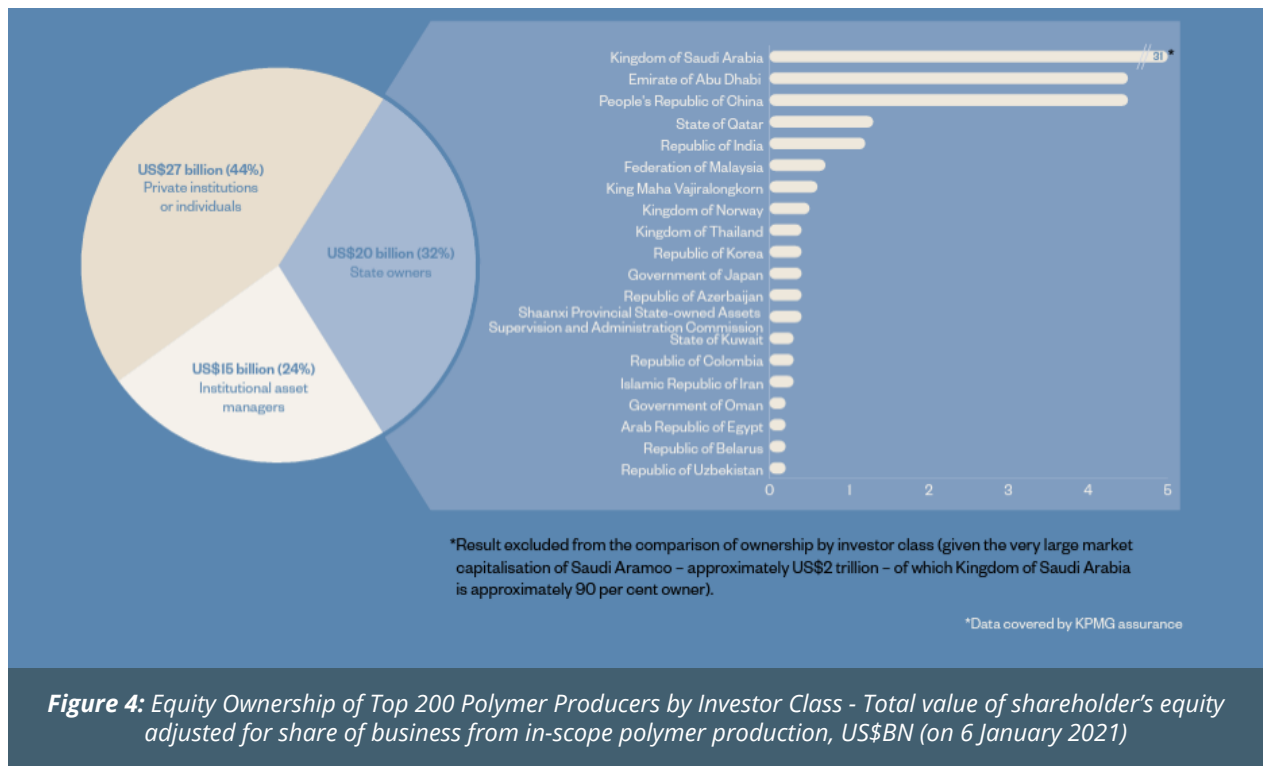


Figure 4: Equity Ownership of Top 200 Polymer Producers by Investor Class - Total value of shareholder's equity adjusted for share of business from in-scope polymer production, US\$BN (on 6 January 2021)

Source: The Mindereroo Foundation, The Plastic Waste Makers Index



Limited circularity

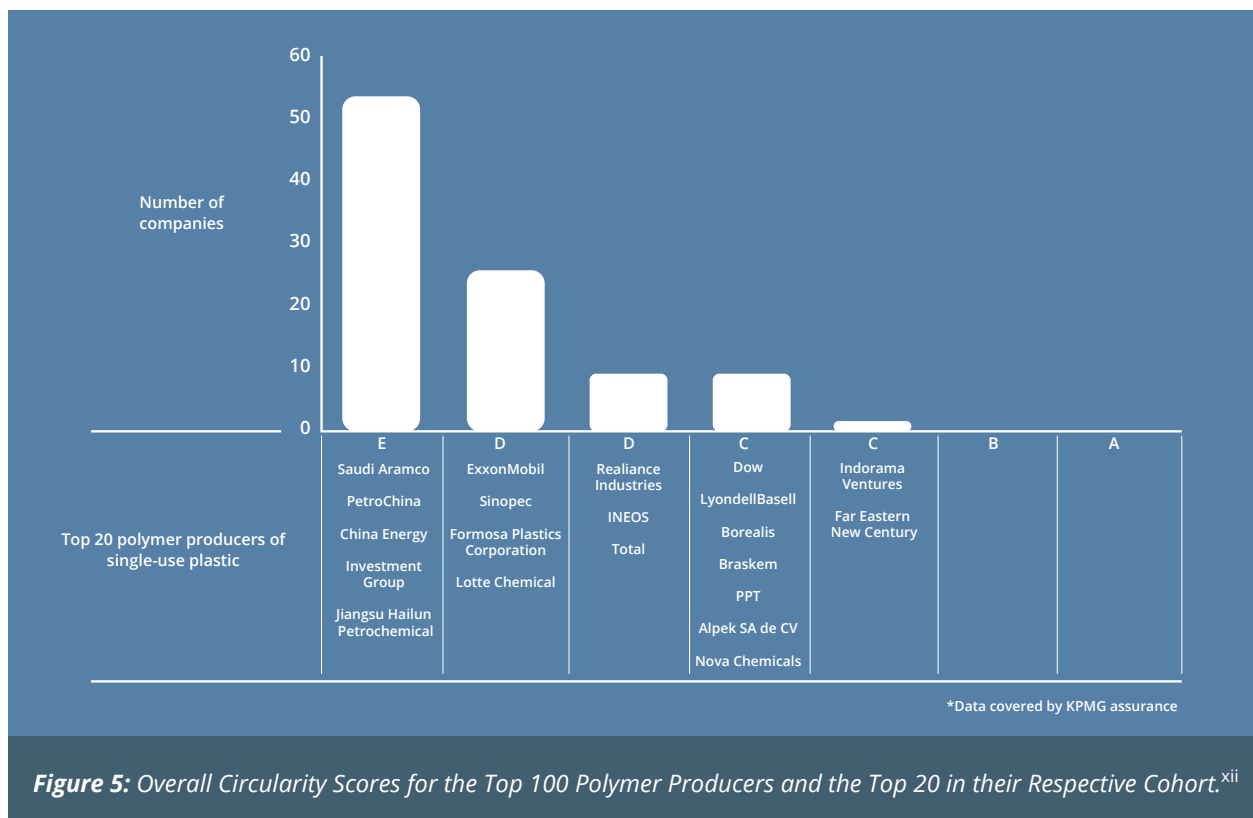
In terms of preparing for a transition towards circularity, there has been limited action by the industry. The Minderoo Foundation's depressing conclusion is that *'there has been a collective industry failure to transition away from fossil fuel-based feedstocks'*.

Their analysis shows that polymer producers remain almost exclusively reliant on virgin feedstocks with not a single company among the largest 100 polymer producers procuring more than two per cent of its feedstock from recycled or bio-based materials.

There are 54 companies that received an "E" grade for circularity¹² - the lowest grade possible - including four of the top 20 polymer producers: Saudi Aramco, PetroChina, China Energy Investment Group and Jiangsu Hailun Petrochemical. **These companies have made no progress towards circularity – i.e. they lack any policies, commitments or targets to replace fossil fuel feedstocks with sustainable alternatives.**

One grade above them, at "D minus", are a further 26 companies, including ExxonMobil and Formosa Plastics Corporation. This means that while there may be some policies or commitments to reduce fossil-fuel derived plastics, there are no clear targets or timelines – no evidence that the company has actioned the commitments.

The two leaders for circularity were Indorama Ventures and Far Eastern New Century, both scoring a "C" grade - see Figure 5.



Note: A score of 'A' implies a fully circular business model, whereas an 'E' score indicates a company has made no commitments or progress in reducing fossil-fuel derived plastic.

Source : The Minderoo Foundation, The Plastic Waste Makers Index (2021)

12 The methodology for the circularity assessment is available on pages 44-48 at: <https://cdn.minderoo.org/content/uploads/2021/05/15232634/20210513-pwmi-basis-of-preparation.pdf>
Please note that Total ahs rebranded as TotalEnergies



The financial reality

In this section we will examine the high-level financial position of these companies and determine whether investors are giving any clues as to how they view these corporates. We will look at the data in four different ways:

1. An overview of the plastic producers as a whole;
2. An examination the oil & gas companies;
3. An examination of the chemical companies;
4. A review of each company individually which is available in Appendix 3.

1. THE PLASTIC PRODUCERS' UNIVERSE

We examined the financial statements of the top 20 plastic producers globally. Unfortunately, for three of these companies - Jiangsu Hailun Petrochemical, China Energy Investment Group and China Resources - we were unable to gather all the suitable financial information as they are state-owned enterprises based in China and only release limited financial data publicly. Summary data for SUP production is available in Appendix 4.

The remaining 17 companies produced an estimated 106Mt of in-scope polymers in 2019, of which 54Mt were estimated for single-use applications. This is approximately half the total global output. The sheer size of Aramco distorts the aggregated data of these companies, so we have excluded it from the financial analysis. For example, in 2020, it produced free cash flow of USD 49 billion, or 76% of the whole peer group and 91% of the oil & gas sub-group. However, for reference, the financial charts which include Aramco are shown in Appendix 5.

An analysis of the financial metrics indicate that this an industry at a turning point - see Figure 9. We recognise that COVID-19 will likely have impacted the most recent results, so we focus on the longer-term trends.



Figure 6: Key Financial Data for the Plastic Producers Universe excluding Saudi Aramco

For Key Financial Data including Saudi Aramco please see Appendix 5.

Return on capital employed (ROCE)¹³ has collapsed reaching a low of 4.6% in 2020; it was almost four times greater than this back in 2011 at 18.3%. The earnings before interest, tax, depreciation and amortisation (EBITDA) show that margins peaked in 2016 while free cash flow has been declining since 2017, however we recognise that a rising oil price is likely to substantially boost free cash flow for those plastic producers with major exposure to the oil price.. If we examine dividend payments and share buybacks, we can see that the free cashflow¹⁴ has not covered these outgoings for the last two years. This will be of particular concern to investors who invest in the sector for its income benefits.

We stress the importance of not just focusing on the dividend yield, as in the US equity market since 1995, it is the buyback yield which has been higher than the dividend yield in most years.^{xiv}

13 ROCE = earnings before interest and tax over capital employed (total assets minus liabilities due within one year). It measures how efficiently a company is in using its capital to make profits.
 14 Free cashflow = the cash generated after deducting cash outflows to support operations (working capital) and expenditure on fixed assets. It measures the cash that is available to be distributed to investors in a discretionary way (e.g. paying dividends, repaying debt or further business expansion)



One could argue that debt levels could rise further to enable these payments to continue, but we should note that total net debt¹⁵ has been rising since 2017, as has net debt to EBITDA.¹⁶ Debt interest payments will be paid out of EBITDA so is an important indicator for lenders.

For an industry that is keen to satisfy rising demand for its plastic products, we can see a rising level of capital expenditure (capex) peaking at USD 152 billion in 2013 and again at USD 133 billion in 2019. However, in 2020, capex fell below depreciation for the first time; USD 103 billion versus USD 127 billion. As we stated earlier, we are cautious about drawing too much attention to a single year because of one-off effects, such as the pandemic, and we encourage readers to focus on the longer-term trends.

Depreciation was boosted by asset impairments (in effect accelerated depreciation for assets with a poor commercial outlook; we estimate this was about USD 30 billion) but the overall trend is clear. This is an industry that is losing its enthusiasm to invest. Median capex/depreciation has fallen from around 2.0x ten years ago to the 1.1-1.2x range today. This is a capital-intensive industry with significant regulatory pressure and long-lived assets. The collapse in the capex/depreciation ratio strongly implies that companies are increasingly nervous about their growth prospects and therefore the wisdom of continued heavy investment.

Finally, we examine how the capital markets value the industry by comparing the total capital employed¹⁷ with its enterprise value (EV)¹⁸. For much of the last 10 years the EV has hovered around the USD 1 trillion mark; it fell to a decade-low of USD 962 billion in 2020, excluding industry giant Saudi Aramco. Capital employed (CE) has risen for much of the last decade from USD 709 billion in 2011 to USD 1,056 billion in 2020. By comparing the two measures, we can observe that the median EV/CE multiple has declined from a peak of 1.3x in 2012-14 and was 1.0x in 2020.

This implies the capital markets are not attributing significant value to the future growth of this sector, despite alternative growth forecasts, and are simply valuing them at their book (accounting) value and amount of outstanding debt. If this ratio moved substantially below the 1.0 EV/CE level multiple, it suggests the capital markets may potentially view some of these assets as stranded.

It is interesting to note that the fall has been much more dramatic for the world's largest SUP maker, ExxonMobil, although we recognise that its core oil and gas business will exert the greatest influence on its market valuation. Its asset multiple (EV/CE) has fallen from 2.5x in 2011 to 1.0x in 2020.

15 Net debt = the total debts of a company after subtracting the most liquid assets (e.g. cash and short-term investments). It examines financial liquidity by measuring a company's ability to pay all its debts if there were now payable.

16 Debt interest payments will be paid out of EBITDA so is an important indicator for lenders.

17 Total capital employed = total assets minus current liabilities. It shows how a company is investing its cash.

18 Enterprise value = market capitalisation and total debt minus cash on the balance sheet. It tells the investor the total company's total value rather than just its equity valuation (i.e. market capitalisation).



2. THE OIL & GAS COMPANIES

This is a subset of seven oil & gas companies which produce annual reports: **ExxonMobil, PetroChina, Sinopec, Saudi Aramco, Reliance Industries, TotalEnergies and PTT**. These seven companies produced an estimated 54Mt of in-scope polymers in 2019 - 51% of the 17 members of the whole universe – of which 25Mt were for single-use applications – 46% of the plastic producers universe. Adding the three state-owned Chinese companies (Jiangsu Hailun Petrochemical, China Energy Investment and China Resources National) takes this to 61Mt and 29Mt respectively.

As with the top 20 plastic producers we have already examined, we have analysed the same high-level financial metrics of this particular subset - see Figure 7. Please note that the key financial data shown in Figure 7 excludes Saudi Aramco.



Figure 7: Key Financial Data for the Oil & Gas Companies excluding Saudi Aramco.



It provides a similar picture to the PWM universe. Total revenues peaked in 2013. The EBITDA margin peaked in 2015, a year earlier than for the complete plastic producers universe, while EBIT margins followed a similar track for both groups. ROCE reached a low of 3.2% last year, or less than one-sixth of the peak of 20.1% in 2011 and also less than the 5.0% achieved by the Specialty companies in that year.

Both sets of companies demonstrated rising net debt levels in the last few years although the net debt/EBITDA ratio remains at a lower median multiple of 1.8x times for the oil & gas subset when compared to the 2.2x for the whole PWM universe. The integrated companies tend to have more volatile cash flow and are therefore less able to support high financial gearing.

For data for the Oil & Gas Companies including Saudi Aramco please see Appendix 5.

Investors in this oil & gas subset will be watching the dividend and share buyback cover which stood at a median multiple of 0.7x in 2020 compared to the much higher 1.5x median multiple for the complete universe. A sustained cash flow recovery is needed to maintain these pay-outs to shareholders which is likely to be reliant on cash inflows from their oil operations on the back of an oil price recovery.

Free cash flow is volatile, especially for the oil & gas companies, but cover has been low for a number of years. We note that this oil & gas subset of companies has paid dividends and undertaken share buybacks in excess of free cashflow for a number of years in the past, from 2011 to 2015 inclusive. Over this period, the cumulative pay-out equalled USD 231 billion against a free cash flow of USD 95 billion. This compares to a dividend and buyback programme of USD 33 billion in 2020 alone, versus free cashflow of USD 5 billion in the same year, again excluding Saudi Aramco. It would appear ambitious for investors to anticipate a repeat of another five-year run of uncovered shareholder pay-outs especially as financial gearing is higher than at any time in the last decade, unless there is a sustained oil price recovery.

In 2020, annual depreciation rose above annual capex for the first time in the last decade. More interestingly, the capital markets valued the oil & gas companies on an EV basis at USD 771 billion in 2020, a 17% discount to the capital employed of USD 921 billion. The median EV/CE was 1.0x with a very wide range from 0.3x (Sinopec and PetroChina) to 1.5x (Reliance). Back in 2011, the only company with an asset multiple below 1.0x was Sinopec at 0.9x. This suggests that the market has become much more pessimistic about the future of the oil & gas companies over the last 10 years. It also suggests that investors want capex to fall substantially as future returns are expected to be inadequate.



3. THE CHEMICAL COMPANIES

This second subset of the plastic producers universe comprises 10 specialty chemical companies: **Dow, Indorama, LyondellBasell, Braskem, Alpek, Borealis, Lotte Chemical, INEOS, FENC and Formosa**. This group produced about 52Mt of in-scope polymers in 2019, of which 29Mt were for single use applications, 49% and 54% of the output of the whole plastic waste makers universe, respectively.

Again, we have analysed the same high-level financial metrics of this subset - see Figure 8.



Figure 8: Key Financial Data for the Chemical Companies



A familiar picture is emerging with peak revenues last seen in 2018 and declining EBIT and EBITDA margins. However, for these chemical companies we note that the EBIT margin has been declining since 2015. In comparison, for the oil & gas companies the EBIT decline commenced in 2018.

Furthermore, these chemical companies have seen their EBITDA margin decline from a higher absolute level of just above 18% (in 2016) to the 12% level, while the oil & gas corporates were close to maintaining their 15-16% EBITDA margin for five years before dipping to 14% in 2020. Unlike their oil & gas competitors, the chemical companies have not had their profits hit by major asset impairments.

Again, a collapse in the ROCE is evident, although it has been less dramatic than that of the oil & gas subset, declining from 13.6% in 2017 to just over one-third of this, at 5.0%, last year. So, although the ROCE of this chemical subset is higher than that of the oil & gas subset, the downward trajectory is cause for concern.

The rise in financial gearing¹⁹ is evident in this subset as debt has steadily risen since 2017, a trend that started one year earlier than the oil & gas grouping. Interestingly, a different picture emerges when we compare free cash flow and shareholder payments – share buybacks and dividends. In 2020, the chemical companies subset reduced their shareholder pay-outs by 58%, having been through two years (2018 & 2019) when free cashflow did not cover such payments. This allowed the pay-out cover multiple to recover above 1x to a median of 2.5x, its highest level this decade.

The picture is not as bleak on capex in relation to depreciation either. In 2020, we noted above that the oil & gas subset recorded a higher depreciation charge than annual capex; for the chemical companies this did not happen although the differential between the two variables has narrowed in the last three years. Median capex/depreciation was 1.2x in 2020, well below the peak of 1.9x in 2017.

Financial markets are still prepared to price in an expected return for this chemical subset, as the EV remains higher than the capital employed. The median EV/CE was 1.3x in 2020 versus 1.0x for the oil & gas subset.

19 Financial gearing examines the proportion of debt against the company's equity. A higher gearing ratio means the company as a higher ratio of debt to equity.



CONCLUSION

There is a global plastic pollution problem and SUP waste is at the forefront of this. The top 20 polymer producers are responsible for over half of this SUP waste globally. And the problem is likely to get worse as there remain plans for SUP production expansion in the next five years, although some have since been withdrawn.^{xv}

The polymers used in plastic production are manufactured by a variety of companies, ranging from oil & gas majors to purer chemical giants. For some, plastic production is only a small part of their revenue, under 10%.

All these plastic producers have a board of directors. These directors have a duty to provide oversight and direction, probing and challenging corporate management. For publicly listed companies, as a minimum they should do this on behalf of the corporation's shareholders, but for many this can be more widely interpreted to include all the company's stakeholders.

The environmental problems closely associated with this industry, whether these be SUP pollution, toxicity levels, carbon emissions or health concerns, should be on their meeting agendas. Furthermore, directors should be asking why the financial markets are only prepared to pay minimal returns in some instances, giving an enterprise value only marginally above the company's capital employed.

In this paper, we used readily available information and have proposed questions that directors should be asking at board meetings. We provide a Director's Cheat Sheet.

Evidently, many management teams are drawn to the idea of ongoing rapid growth in plastic demand and are undeterred by the associated risks. Directors should scrutinise whether their management teams have made the correct risk/reward assessment, whether there are alternative scenarios for the future of plastics and examine why the capital markets are pricing these companies at these valuation levels.

In turn, shareholders, who have the power to remove underperforming directors and elect their replacements, should be engaging with directors and determining whether investors' interests are being protected.



APPENDIX 1: CORPORATE GOVERNANCE

Directors should exercise independent judgment

The structure of corporate boards varies. They fall into two categories: the single tier executive board seen in the US and UK and the dual tier structure evident in the European Union and Asia²⁰. In this paper we will focus on the single tier executive board and the supervisory level in the dual structure²¹ which have similar duties. Every public company is legally required to install a board of directors.

On these boards, which comprise a group of individuals who are elected by shareholders, there are two types of director. Executive directors are involved in the day-to-day management of the company but have the added responsibility of ensuring that 'the information laid before the board by management is an accurate reflection of their understanding of the affairs of the company'.^{xvi} Non-executive directors, also called independent directors, do not have a material relationship with the company, are not part of the company's executive team and are not involved with the day-to-day operations of the company. In this research we will focus on the independent directors.

The director's remit

The duties of directors vary by country (and by state in the US) but generally directors are responsible for protecting shareholders' interests, establishing policies for management, oversight of the corporation or organization and making decisions about other important issues.

The OECD²² explains the directors' responsibilities as follows: *'Together with guiding corporate strategy, the board is chiefly responsible for monitoring managerial performance and achieving an adequate return for shareholders, while preventing conflicts of interest and balancing competing demands on the corporation. In order for boards to effectively fulfil their responsibilities they must be able to exercise objective and independent judgement'*. However, it goes further and adds, *'Another important board responsibility is to oversee the risk management system and systems designed to ensure that the corporation obeys applicable laws, including tax, competition, labour, environmental, equal opportunity, health and safety laws.'*^{xvii}

It is important for shareholders that the board should be able to exercise objective independent judgement on corporate affairs. How should this be achieved?

Again, the OECD provides an answer. *'In the first instance this will mean independence and objectivity with respect to management with important implications for the composition and structure of the board. Board independence in these circumstances usually requires that a sufficient number of board members will need to be independent of management'*.^{xviii}

The independent board members are very important to shareholders and other company stakeholders. They are able to be truly objective when evaluating the executive's performance, especially where the interests of management, the company and its shareholders may be different, such as with management remuneration, succession planning or take-over defences.

20 One-tier boards remain the preferred structure (22 jurisdictions) over two-tier boards (11) although 14 jurisdictions offered a choice according to the OECD Corporate Governance Factbook 2021 <https://www.oecd.org/corporate/Corporate-Governance-Factbook.pdf>

21 In a dual board framework, the executive board is made up of company insiders that are elected by employees and shareholders. In most cases, the executive board is headed up by the company CEO or a managing officer. The board is typically tasked with overseeing the daily business operations. However, the supervisory board concerns itself with a broader range of issues and acts like a typical UK/US board. The chair for the supervisory board varies but is always headed up by someone other than an executive officer.

22 The Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 38 member countries, founded in 1961 to stimulate economic progress and world trade.



Best practice requires companies to adopt the following requirements:

1. Boards should assign a sufficient number of non-executive board members capable of exercising independent judgement to tasks where there is a potential for conflict of interest – e.g. the integrity of financial and non-financial reporting, the nomination of board members and key executives and board remuneration.
2. Boards should set up specialised committees to support the full board in performing its functions, particularly in respect to audit, risk management and remuneration. Their mandate, composition and working procedures should be clearly defined and disclosed by the board. Isn't it time for boards to establish a specialised committee focused on sustainable issues?
3. Board members should be able to commit themselves effectively to their responsibilities.
4. Boards should regularly carry out evaluations to appraise their performance and assess whether they possess the right diversity.
5. In order to fulfil their responsibilities, board members should have access to accurate, relevant and timely information. For employee representatives, special training may be desirable.

Duties have expanded

Under some existing regulations, directors need to consider 'non-financial' data, which includes ESG, social responsibility or information on sustainability. We find the term non-financial misleading and unhelpful as the point is that failing to take into account sustainability requirements and expectations can lead to regulatory fines or lost opportunities. Unsustainable practices may lead to a higher cost of debt for example. All of these issues have financial implications.

Milton Friedman's view of directors' duties was very different.^{xix} He argued that 'the discussions of the social responsibilities of business are notable for their analytical looseness and lack of rigor... I share Adam Smith's scepticism about the benefits that can be expected from "those who affected to trade for the public good". He concluded that "There is one and only one social responsibility of business - to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game".

This has been the prevalent view since being written in 1970 and was reasserted by the non-profit lobbyist association, the Business Roundtable in 1997, when it stated: 'the principal objective of a business enterprise is to generate economic returns to its owners'.^{xx} The Business Roundtable is a Washington D.C. organisation founded in 1972, comprising over 200 CEOs of US companies.



However, in 2019, the Business Roundtable changed its tune and declared that ‘each of our stakeholders is essential. We commit to deliver value to all of them, for the future success of our companies, our communities and our country’.^{xxi} Stakeholders included customers, employees, suppliers, communities and shareholders. In August 2021, the Business Roundtable reaffirmed this belief and commented that the organisation’s CEOs have strongly demonstrated a commitment to the 2019 statement.^{xxii} We note of the 200 plus members of the Business Roundtable there are 8 CEOs of companies which are either listed as one of the top 20 plastic producers or are lenders or investors to this group of companies.

- Bank of America
- Blackrock
- BNY Mellon
- Citigroup
- Dow
- ExxonMobil
- JP Morgan
- Morgan Stanley

Figure 9: Business Roundtable CEOs of Plastic Producer companies or investors or banks in these plastic companies

Source: Business Roundtable, Planet Tracker

We stress that the OECD and Business Roundtable are not alone in advocating that executives should consider all stakeholders. For example, in the UK, the ICAEW²³ identify that one of the seven duties of a director is to have regard for ‘*the impact of the company’s operations on the community and the environment*’. It also lists the interests of the company’s employees and relationships with suppliers, customers and others.^{xxiii} In Singapore, ‘it is increasingly common for companies to report on their corporate social responsibility programmes, environmental awareness initiatives and commitment to ethical issues’.^{xxiv} There are many such examples.

The proof of the pudding is in the eating

In the vast majority of cases the duties of directors are explained. Their broad duties and responsibilities including those in independent, non-executive roles are available for public scrutiny. Large associations such as the Business Roundtable, have made public their intention to be mindful of all stakeholders, as are many other organisations and regulators.

In this paper we scrutinise the world’s 20 largest plastic producers from the viewpoint of an independent director. We suggest the questions they should be asking at board meetings and provide a Plastic Director’s Cheat Sheet.



APPENDIX 2: THE PLASTIC JOURNEY

It started with the best of intentions

Plastic, of which the vast majority is synthetic²⁴ rather than bio-based, is sourced from hydrocarbons derived from crude oil, natural gas and coal. Once these raw materials have been refined into monomers (e.g. ethylene, propylene and butylene) the polymerisation process takes place whereby the monomers are chemically bonded into chains (polymers) giving rise to such products as polyethylene, polystyrene and polyester. The plastic formulations can then be made into various blends through compounding and processing.

Plastics are undoubtedly very useful products. 'Natural plastics' used horn, tortoiseshell, amber and rubber as raw materials. Early synthetic polymers aimed to replace these natural products. In 1862, Alexander Parkes patented Parkesine, which was a substitute for ivory or tortoiseshell, although it was not a commercial success. In 1896, John Wesley Hyatt provided a substitute for the natural ivory used to make billiard balls. These products demonstrated humans' ability to create new materials rather than relying on nature and in turn preserving the Earth's natural capital. It was Leo Baekeland in 1907 who went on to create the first fully synthetic plastic – i.e., there was no molecule found in nature – with Bakelite – which was a substitute for the resin shellac, a natural electrical insulator.

However, if the original pioneers of plastic products were aiming to protect nature, they would be dismayed by the unintended consequences of today's plastic industry. Now plastic is associated with numerous environmental problems ranging from air, land, water and ocean pollution throughout its lifecycle giving rise to waste and human health issues - see Figure 10.

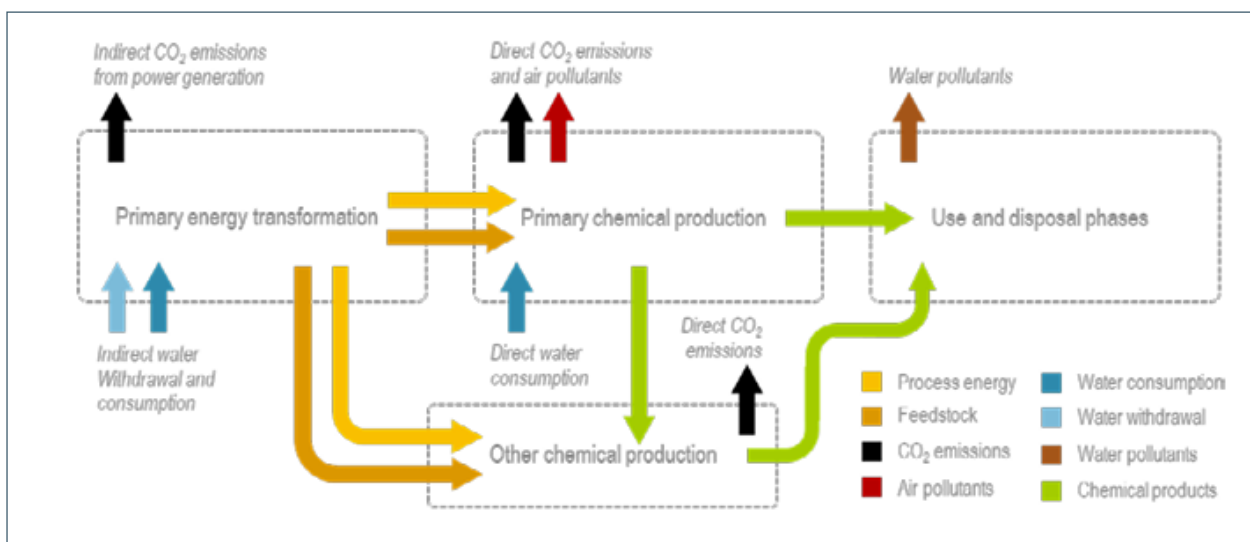


Figure 10: Environmental Considerations for the Chemical and Petrochemical Industries^{xxv}

Note: The environmental impacts indicated in the figure do not provide an exhaustive account of the environmental burdens associated with the chemical sector and its products, nor does the figure provide an account of the environmental benefits facilitated by chemical products, which are discussed later in this chapter.

Source: 'The Future of Petrochemicals', IEA

24

We define synthetic plastics as those which are industrially produced chemical substances. Naturally occurring polymers include tar, shellac, tortoiseshell, animal horn, cellulose, amber, and latex from tree sap.



Perhaps the plastic problem is best epitomized by single use plastics (SUP), the cheap plastic goods we use once and then throw away. SUPs 'account for over a third of plastics produced every year, with 98 per cent manufactured from fossil fuels'.^{xxxvi}

Today it starts with petrochemicals

Understanding the plastics industry, starts with the sector's feedstocks. This commences with the petrochemicals industry which turns oil and gas, and to a lesser extent coal, into many daily products – such as plastics, fertilisers, detergents etc. Plastic is then used in the production of packaging, clothing, parts for digital devices, clothing, cars etc. Petrochemical demand continues to grow. At the forefront of this is demand is plastics, probably the most familiar of petrochemical products.

Plastic growth 'has outpaced all other bulk materials (such as steel, aluminum or cement), nearly doubling since the start of the millennium'^{xxxvii} - see Figure 11.

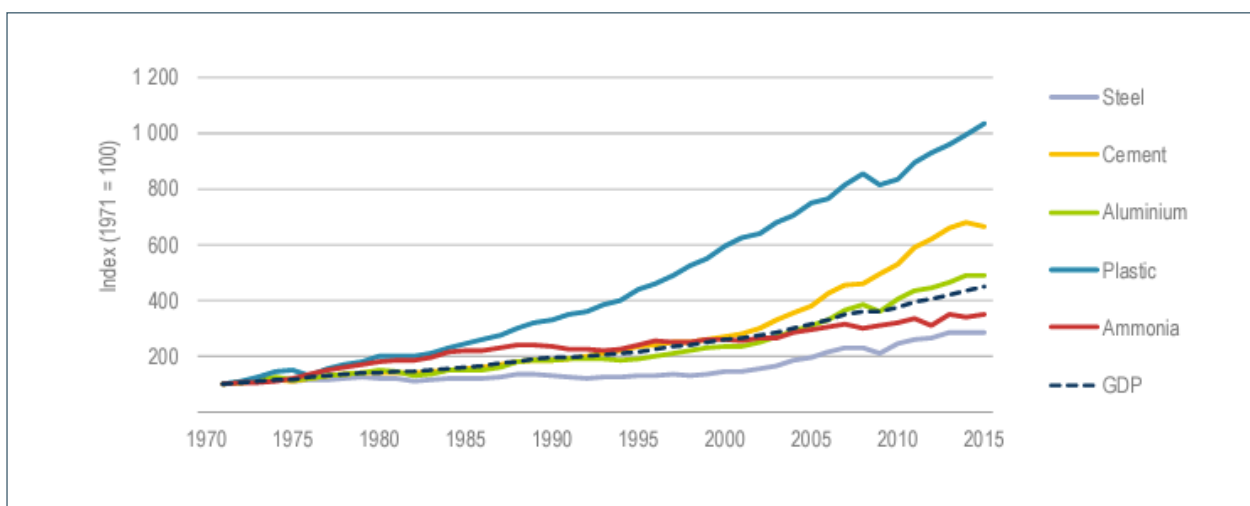


Figure 11: Production Growth for Selected Bulk Materials and GDP

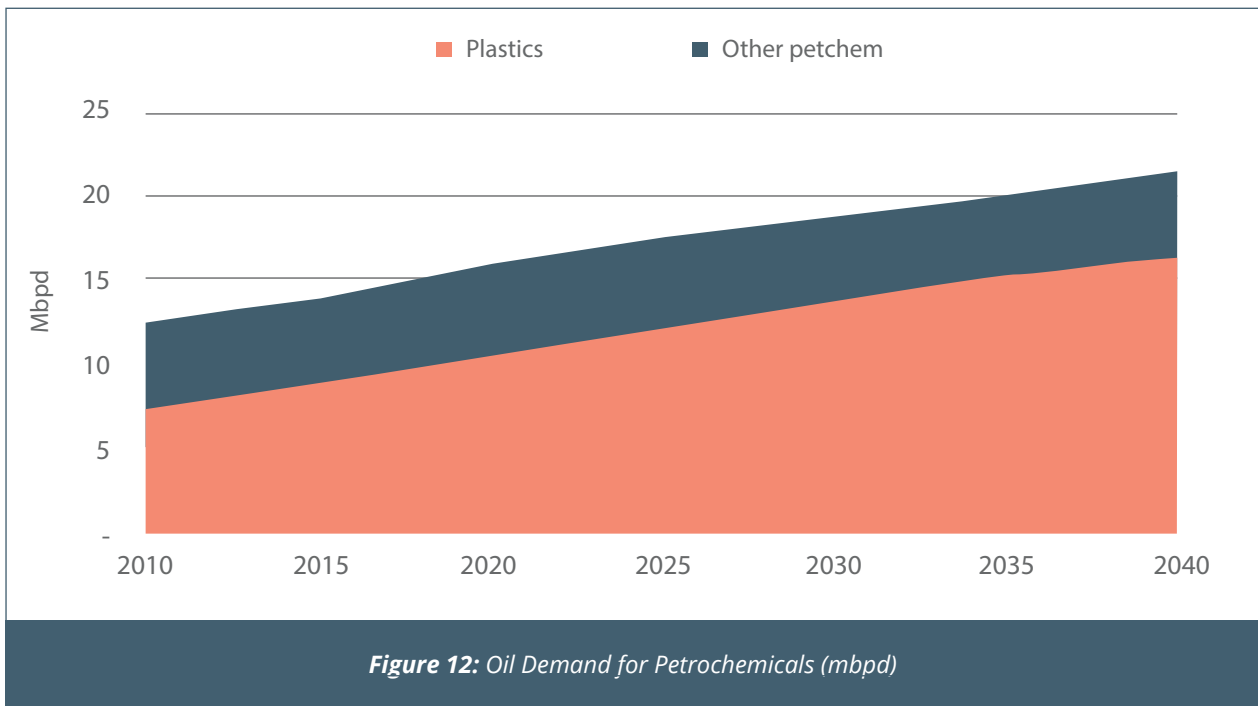
Notes: Outputs of different industrial sectors are displayed on an indexed basis which uses 1971 levels as reference. Aluminum refers to primary aluminum production only. Steel refers to crude steel production. Plastics includes a subset of the main thermoplastic resins.

Sources: Geyer, R., J.R. Jambeck and K.L. Law (2017), "Production, use, and fate of all plastics ever made", <https://doi.org/10.1126/sciadv.1700782>; Worldsteel (2017), Steel Statistical Yearbook 2017, www.worldsteel.org/en/dam/jcr:3e275c73-6f11-4e7f-a5d8-23d9bc5c508f/Steel+Statistical+Yearbook+2017.pdf; IMF (2018), World Economic Outlook Database, www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx; USGS (2018a), 2018 Minerals Yearbook: Aluminium, <https://minerals.usgs.gov/minerals/pubs/commodity/aluminum/myb1-2015-alumi.pdf>; USGS (2018b), 2018 Minerals Yearbook: Cement, <https://minerals.usgs.gov/minerals/pubs/commodity/cement/myb1-2014-cemen.pdf>; USGS (2018c), 2018 Minerals Yearbook: Nitrogen, <https://minerals.usgs.gov/minerals/pubs/commodity/nitrogen/myb1-2015-nitro.pdf>. Levi, P.G. and J.M. Cullen (2018), "Mapping global flows of chemicals: From fossil fuel feedstocks to chemical products", <https://doi.org/10.1021/acs.est.7b04573>.



If nothing changes, current growth rates could continue or increase. The U.S., Europe and other advanced economies currently use up to 20 times as much plastic as India, Indonesia, and other developing economies on a per capita basis, suggesting the huge potential for growth worldwide under the current trajectory. Plastics has become 'integral to modern societies'.^{xxviii}

In turn, petrochemical growth has become very important to the oil and gas industry. Petrochemicals are rapidly becoming the largest driver of global oil consumption^{xxix} and are forecast to account for more than one-third of the growth in oil demand to 2030, and nearly half to 2050, ahead of transportation uses such as trucks, aviation and shipping. Dominant sources of oil demand, notably passenger vehicles, will diminish in importance with improved fuel economy, alternative fuels and electric vehicles. Although currently plastics make up only around 9% of oil demand measured in mbpd²⁵, they are forecast to be the largest component of oil demand growth^{xxx} in the coming two decades - see Figure 12. We recognise that if plastic production was to cease an alternative would be needed and its environmental footprint compared to that of plastic.



Sources: BP, Carbon Tracker estimates

25 million barrels per day



The International Energy Agency (IEA) provides a future production scenario under what it terms its Reference Technology Scenario (RTS)²⁶. It envisages the rapid growth in these chemicals being driven by methanol – for use as a fuel additive and as an intermediate for producing high-value chemicals (HVCs). Demand for HVCs is forecast to grow by around 60% by 2050 (relative to 2017), the second-fastest rate among primary chemicals. About 55% of this growth materialises by 2030 and the driver for HVCs in the short term is expected to be plastics.

As various regions grow, both in population and in levels of wealth, plastic consumption is expected to show a robust rate of increase in the RTS, particularly for packaging and construction. Production volumes for a group of key thermoplastics (including polyethylene terephthalate (PET), high-density polyethylene (HDPE), polyvinyl chloride (PVC), low-density polyethylene (LDPE), polypropylene (PP) and polystyrene (PS)) grow from approximately 3350 Mt in 2017, to 5590 Mt in 2050 – an increase of nearly 70%.²⁷ This represents a global per capita production increase of nearly 30%, with global average per capita production of these plastics increasing from around 47 kilogrammes per capita (kg/capita) in 2017 to more than 60 kg/capita in 2050 – see Figure 13. In summary, production of key thermoplastics is forecast to grow by nearly 70% in the RTS between 2017 and 2050, with global average per capita demand increasing by just under 30%.

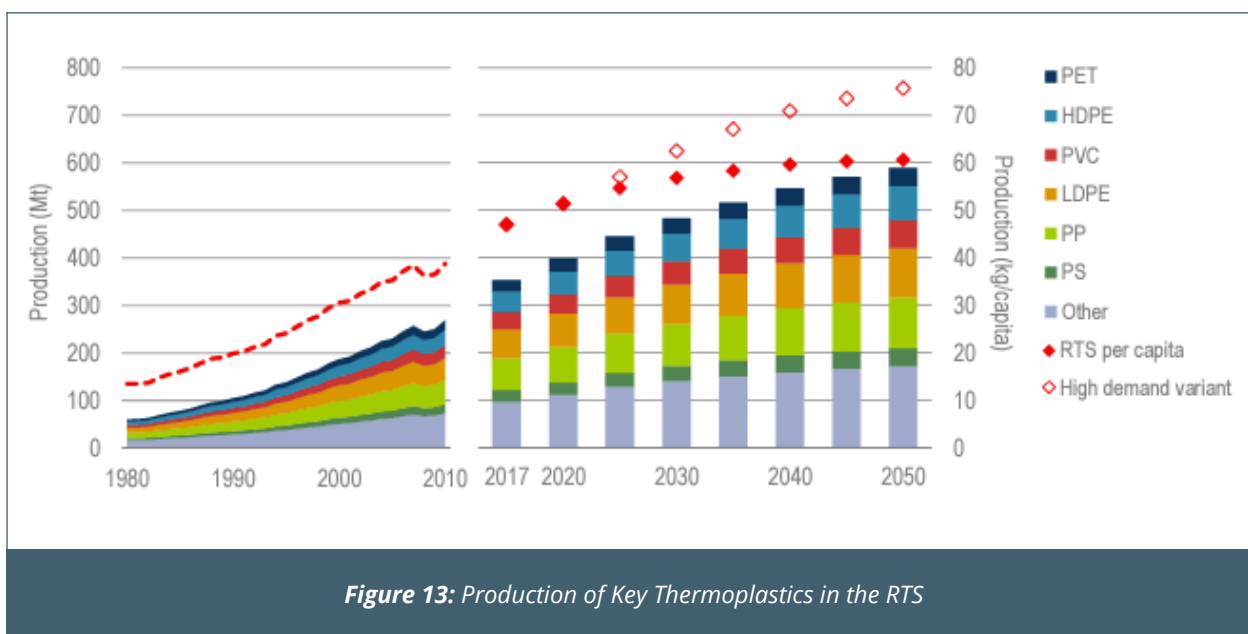


Figure 13: Production of Key Thermoplastics in the RTS

Notes: Other refers to a selection of other thermoplastics: acrylonitrile butadiene styrene, styrene acrylonitrile, polycarbonate and polymethyl methacrylate. Volumes of plastic production shown are independent of the level of recycling. The impact of recycling is registered in the lowering of demand for primary chemicals required to produce the plastic volumes shown above. The RTS high demand sensitivity variant is a separate scenario performed to explore the sensitivity of our results to higher than expected demand. Only the per capita demand figures are shown for the high demand sensitivity variant in Figure 4.2. Details of the high demand sensitivity variant analysis can be found in the online annex accompanying this publication.

Sources: Data consulted in making projections from Geyer, R., J.R. Jambeck and K.L. Law (2017), "Production, use, and fate of all plastics ever made", <https://doi.org/10.1126/sciadv.1700782>; Levi, P.G. and J.M. Cullen (2018), "Mapping global flows of chemicals: From fossil fuel feedstocks to chemical products", <https://doi.org/10.1021/acs.est.7b04573>; OECD (2018), Improving Markets for Recycled Plastics: Trends, Prospects and Policy Responses

26 The IEA's Reference Technology Scenario (RTS) is a projection of what might take place in the chemical sector between now and 2050. The modelling is based on cost-optimal decisions on the equipment and operation of the industry. It occurs within an energy price and chemical demand context informed by the range of existing and announced policies and by established behavioural and other exogenous considerations.

27 Resin quantities exclude fibre and additives. Also note that we have corrected the data from the original IEA paper which mentions 330Mt in 2017, not 3,350 as shown in this paper, which is a near 70% increase.



Inevitable growth?

But is this relentless growth in petrochemicals, and plastics in particular, along with the associated environmental problems, inevitable? The IEA offers a different pathway, the Clean Technology Scenario (CTS). The CTS uses the same tools and methodologies as those of the RTS but with additional constraints. Notably these include direct CO₂ emissions to be reduced by 45% by 2050 as well the required mitigation of other environmental impacts, such as those related to air pollution and water use and other aspects of the future energy system, that are in line with those adopted in the IEA Sustainable Development Scenario. It assumes greater plastic recycling, which in turn reduces demand for virgin plastic.

Interestingly, cumulative investments required by 2050 for the production of primary chemicals in the CTS (USD 1.5 trillion) are marginally lower than in the RTS (USD 1.7 trillion). The shift from coal to natural gas and avoided primary chemical production as a result of recycling, offsets the additional investments required for alternative carbon mitigation.

We can compare plastic growth forecasts by extrapolating recent growth rates against alternative pathways. The BP Energy Outlook (2020)^{xxxii} provides a variety of forecasts for the non-combusted use of fuels, which are predominantly used as feedstocks for petrochemicals, bitumen and fertilizers.

Although the BP report notes plastic is an important source of incremental demand for fossil fuels, it states that this is likely to be 'less than in the past 20 years as environmental pressures increase'.^{xxxiii} We note that BP focuses on carbon as the main environmental pressure. See Figure 14.

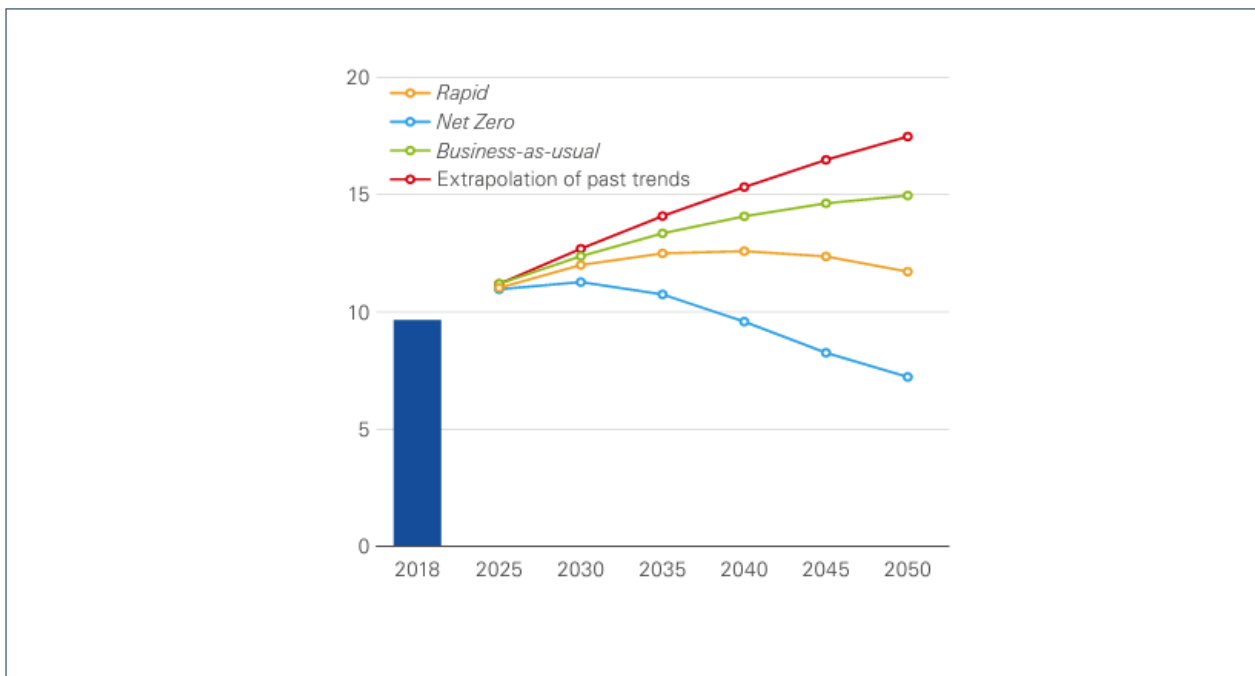


Figure 14: Oil Feedstock for Plastics and Fibres

Notes: The Rapid Transition Scenario (Rapid) posts a series of policy measures, led by a significant increase in carbon prices and supported by more-targeted sector specific measures, which cause carbon emissions from energy use to fall by around 70% by 2050. The Net Zero Scenario (Net Zero) assumes that the policy measures embodied in Rapid are both added to and reinforced by significant shifts in societal behaviour and preferences, which further accelerate the reduction in carbon emissions. Global carbon emissions from energy use fall by over 95% by 2050. The Business-as-usual Scenario (BAU) assumes that government policies, technologies and social preferences continue to evolve in a manner and speed seen over the recent past. A continuation of that progress, albeit relatively slow, means carbon emissions peak in the mid-2020s. Despite this peaking, little headway is made in terms of reducing carbon emissions from energy use, with emissions in 2050 less than 10% below 2018 levels.

Source: BP Energy Outlook 2020

Carbon Tracker^{28, xxxiii} examined the wider environmental impact of petrochemicals and plastic products beyond carbon emissions. It believes the oil sector should not rely on plastic to rescue its growth prospects and notes 'plastics impose a massive untaxed externality upon society of at least USD 1,000 per tonne (USD 350 billion a year) from carbon dioxide, health costs, collection costs and ocean pollution'.^{xxxiv}

In 'Breaking the Plastic Wave',^{xxxv} the lead co-authors The Pew Charitable Trust and SYSTEMIQ examined 'pathways towards stopping ocean plastic pollution'. Under the report's System Change Scenario, it projected an 80% reduction in plastic pollution by 2040. This could be achieved through a range of strategies, including reducing consumption, via elimination and reuse, and substituting plastic with alternatives, to recycling and improved waste disposal.





APPENDIX 3

THE FINANCIAL OVERVIEW OF THE PLASTIC PRODUCERS

ALPEK

Overview

Alpek is a listed Mexican chemical company. We have included this in the specialised chemical company subset. It claims to be the second largest PET producer globally. Alpek produced an estimated 2.5m tonnes of in-scope polymers in 2019 (#17 globally) of which 2.3m tonnes (#10) were for single-use applications. In-scope polymers are about 48% of group revenues. According to its annual report, Alpek produced 3.9m tonnes of polyester in 2020, which includes non-single-use applications.

Financial highlights

Along with the whole universe and its subset, it has demonstrated a steady rise in margins from earlier in the decade but suffered a notable hit in 2017 caused by a restructuring at one of Alpek's largest customers. In 2020, the company had both EBITDA and EBIT margins close to the universe as a whole. However, on capital employed and ROCE, Alpek does not conform with the typical profile of the plastic waste makers index universe. Its capital employed ROCE was a more respectable 11.3% in 2020, compared to 5.0% for the universe's (ex Aramco) median of 4.3%. Furthermore, it's net debt has fallen for the last three years – the opposite is true for the speciality chemical subset – and net debt/EBITDA has been relatively stable. Free cashflow has been lumpy over the last 10 years but it has a shareholder payout looks well covered, in stark contrast to the whole universe. Capex has remained above depreciation for four of the last five years while the EV has only fallen below capital employed in one year (2018). However, its asset multiple (EV/CE) remains low 1.0x which implies the financial markets remain concerned about its future profitability- see Figure 15.

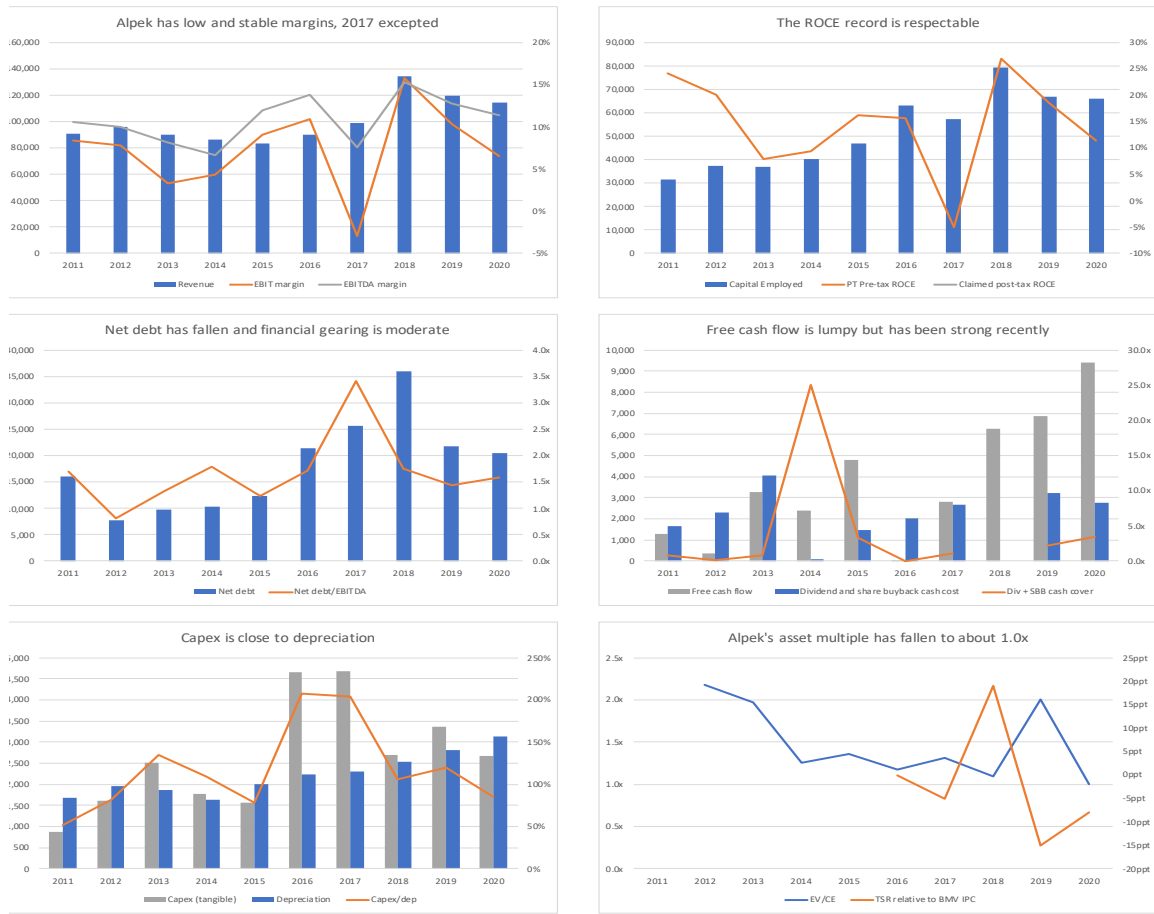


Figure 15: Key Financial Data for Alpek



BOREALIS

Overview

Borealis was formed in 1994 from a merger between Statoil and Neste. It has been based in Vienna since 2006. It has a strong presence in Central Europe and the Middle East. It is owned 75%/25% by OMV (listed Austrian Oil & Gas company) and Mubadala (the UAE sovereign wealth fund).

Borealis produced an estimated 5.0m tonnes of in-scope polymers in 2019 (#11 globally) of which 2.2m tonnes were for single-use applications. In-scope polymers are about 55% of group revenues.

Financial highlights

Borealis has demonstrated a flatter revenue profile than others in its speciality chemical subset although the EBIT margin has shown a market decline from a peak of 13.9% to 5.2% last year. It appears to be run as a private company, with most of its free cash flow being paid out as dividends. Net debt has been rising since 2016, when it totalled €661 million, and reached almost three times this level at €1,833 million last year. Note that cash flow in recent years has been very heavily dependent on dividends received from associates, which we think come from the Middle East. Borealis continues to invest organically in fixed assets but the ROCE^{xxxvi} trend is very poor. We recognise that Borealis claims a higher ROCE than we calculate, probably because of the successful associate investments.²⁹ Both ROCE numbers are displayed in Figure 16.

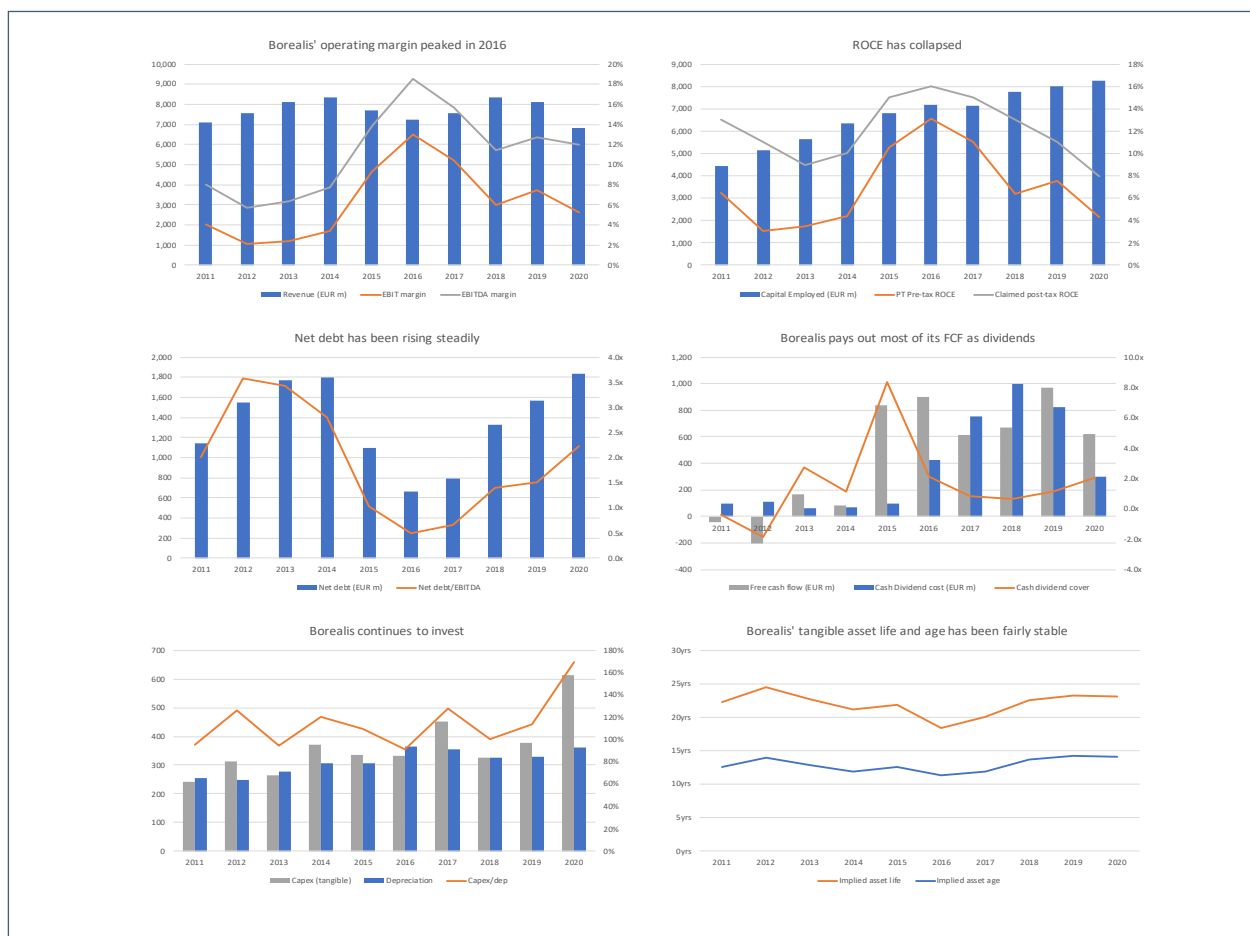


Figure 16: Key Financial Data for Borealis

29

An associate company is a company in which another company (Borealis in this instance) owns a significant portion of voting shares up to a maximum of 50% - i.e. can exert significant influence but is not a controlling stake - but the investor (e.g. Borealis) will not consolidate the associate's financial statements. The investing company will record the investee's profits or losses, as well as any dividends, in proportion to the percentage of their ownership (the equity method of accounting). The investor records their initial investment in the associate company stock as an asset at the historical cost.



BRASKEM

Overview

Braskem is a listed Brazilian specialty chemicals company. It produced an estimated 6.7m tonnes of in-scope polymers in 2019 (#7 globally) of which 3.0m tonnes (#9) were for single-use applications. In-scope polymers are about 60% of group revenues. Braskem is in effect controlled by Novonor (a Brazilian engineering company) and Petrobras (the national oil & gas company), which owned 38% and 36% respectively of the share capital at the end of 2020. Their share of voting rights was even higher at 50% and 47%, respectively. Braskem claims to be the largest producer of thermoplastic resin in the Americas.

Financial highlights

Braskem was profitable up to 2018 but the operating margin fell to minus 3.0% in 2019 and then to minus 10.3% in 2020. ROCE averaged a very respectable 25% from 2014 to 2018 but was minus 6.1% in 2019 and minus 25.0% in 2020, by far the worst result across the entire peer group. Free cash flow has been very volatile and Braskem did not pay a dividend in 2020 (i.e. for the 2019 financial year). Capex has been broadly in line with depreciation since 2016. The asset multiple of 1.5x for 2020 seems high given the poor recent financial track record but could be distorted by currency and inflation effects - see Figure 17.



Figure 17: Key Financial Data for Braskem



CHINA ENERGY INVESTMENT

Overview

China Energy Investment is a very large Chinese State-Owned-Enterprise (SOE). It has about 350,000 employees. It has 8 business segments including a Chemicals segment. The primary business of the Chemicals segment is coal-to-liquids. China Energy produced an estimated 3.4m tonnes of in-scope polymers in 2019 (#15 globally) of which 1.5m tonnes (#18) were for single-use applications.

Financial highlights

We have been able to locate some financial information for China Energy. On this basis, we estimate that about 5% of group revenues in 2019 came from SUP - see Figure 18.



Figure 18: Key Financial Data for China Energy Investment



CHINA RESOURCES

Overview

China Resources is a Chinese state owned enterprise (SOE). It is a diversified conglomerate with about 370,000 employees. It has 8 segments including one called 'Other Businesses', which included the chemicals business, China Resources Chemical Material Technology. This company mainly makes PET chips for bottling applications. It produced an estimated 1.4m tonnes of in-scope polymers in 2019 (#16 globally) of which 1.3m tonnes (#20) were for single-use applications. The website states that annual PET capacity is 1.6m tonnes. It also states that it has been certified as a supplier for Coca-Cola and Pepsi.

Financial highlights

We have been able to locate sales and EBIT for China Resources for 2017-2019. We have not been able to source further information. We estimate that about 13% of group revenues in 2019 came from SUP - see Figure 19.

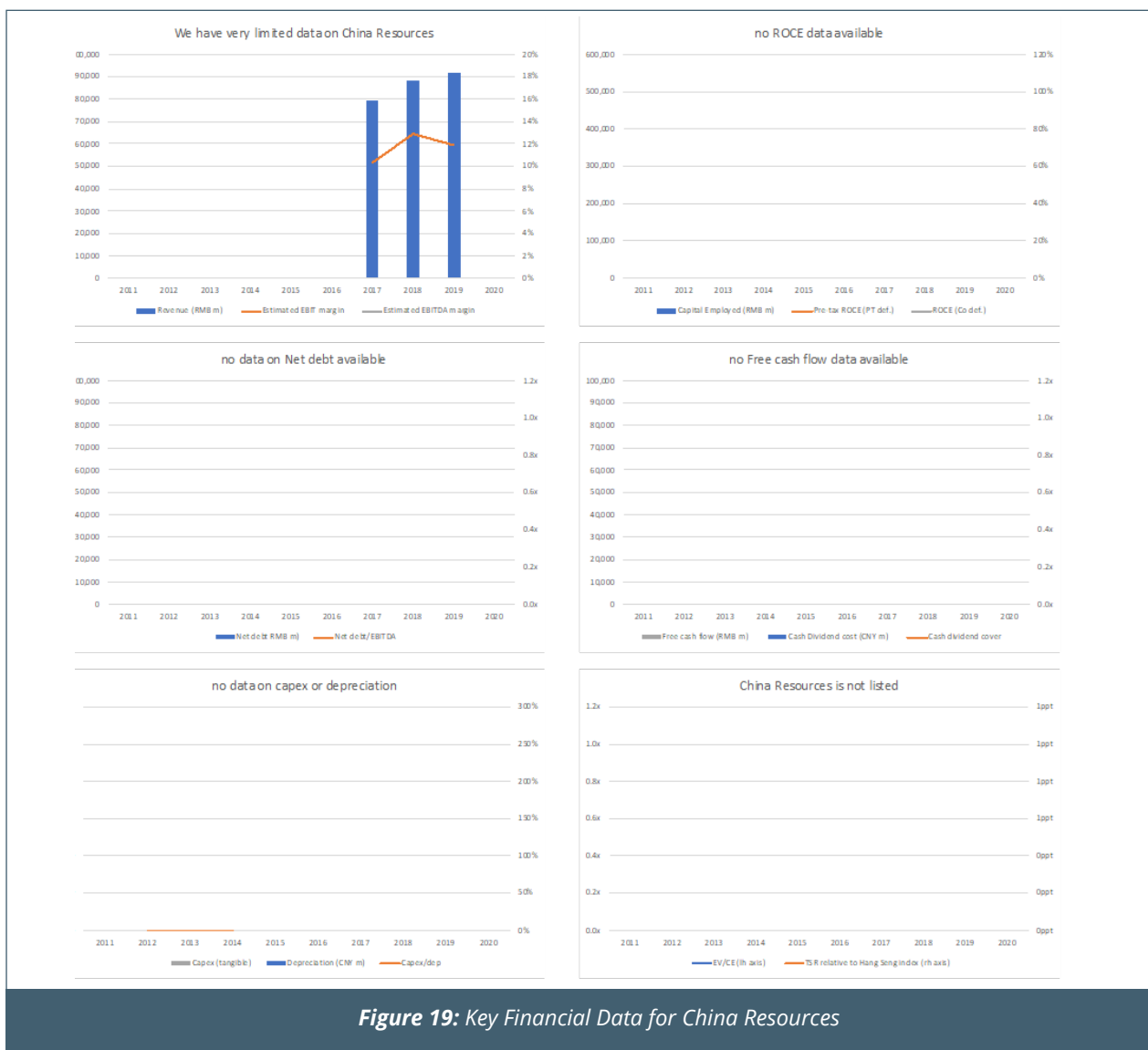


Figure 19: Key Financial Data for China Resources



DOW

Overview

Dow was demerged from DowDuPont in March 2019. It is headquartered in Michigan (US). The original Dow Chemical was found in 1897. Today Dow describes itself as materials science company focusing on packaging, infrastructure and consumer care. The words “plastic” and “polymer” are largely absent from the corporate website. Dow produced an estimated 9.3m tonnes of in-scope polymers in 2019 (#4 globally) of which 5.6m tonnes (#2) were for single-use applications. In-scope polymers are about 25% of group revenues.

Financial Highlights

The recent demerger means that we have a limited financial history and the separation process will most likely have distorted the asset valuations. Margins fell in 2019 and 2020 but ROCE was still 10.1% in 2020, well above the median of 5.0% for the specialty chemical grouping. Free cash flow has risen strongly in 2019 and 2020 but this may also be demerger related. The dividend and share buyback are well covered by free cash flow. The asset multiple was 2.9x in 2020, by far the highest in the entire peer group, but here again there are probably demerger effects at work - see Figure 20.

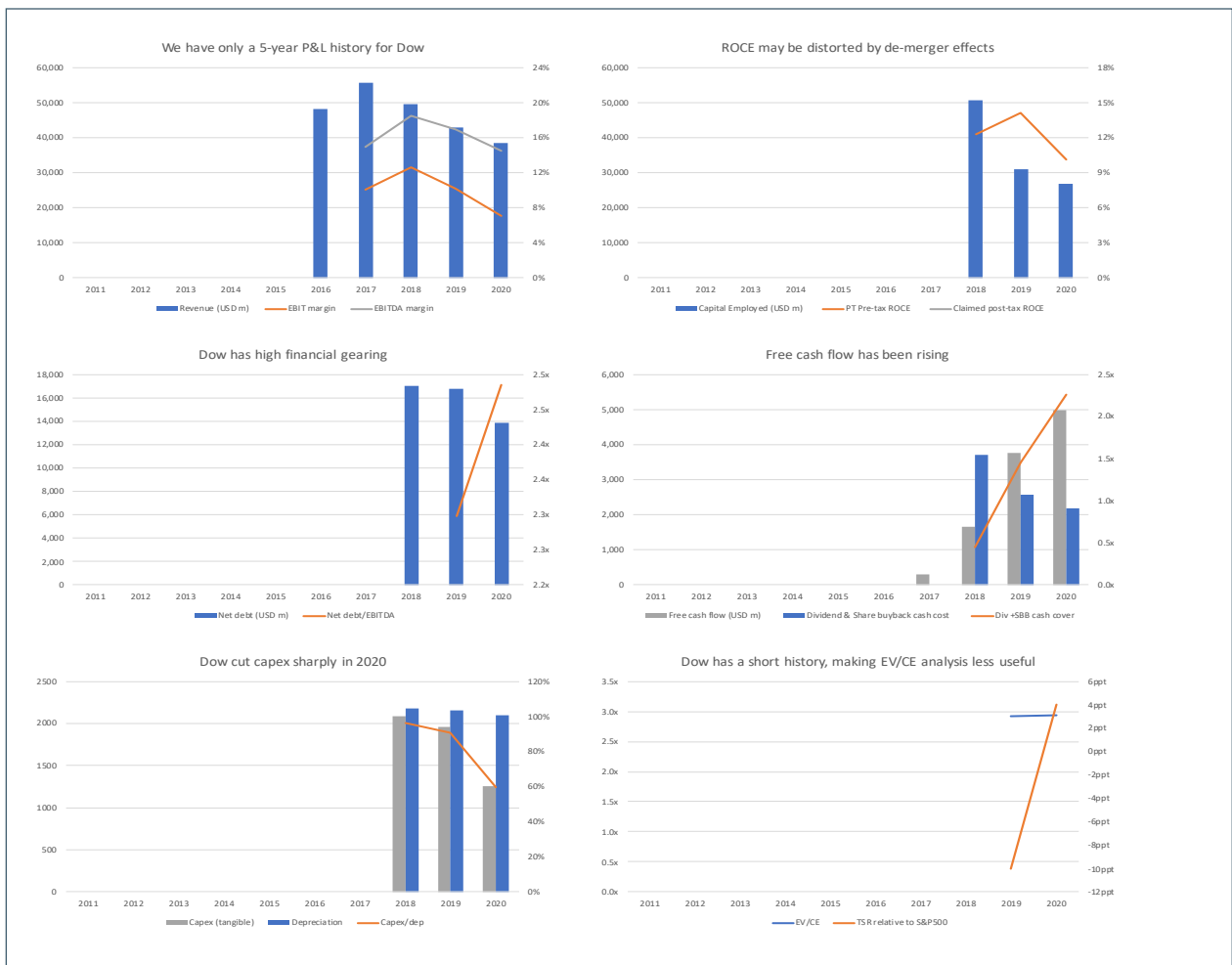


Figure 20: Key Financial Data for Dow



ExxonMobil

Overview

ExxonMobil is one of the largest oil & gas companies in the world. It was formed in 1911 from the break-up of Standard Oil. It is listed in the US and is headquartered in Texas (US). ExxonMobil produced an estimated 11.2m tonnes of in-scope polymers in 2019 (#2 globally) of which 5.9m tonnes (#1) were for single-use applications. In-scope polymers are about 5% of group revenues.

Financial highlights

ExxonMobil is a good example of the problems facing the oil & gas industry. Back in 2011-12, ROCE was 45-46% using Planet Tracker's methodology. This is high by any standards and was the highest of both the oil & gas peer group and the whole universe at the time. Only Saudi Aramco has ever been more profitable (65-85% in 2017-2019).

ExxonMobil's margins have declined substantially since 2011-2012, despite a small uptick in 2017-2018. ROCE was 8.4% in 2019 and it fell into loss in 2020, mainly because of asset write-downs. It has returned USD 202bn to shareholders over the last 10 years via dividends and share buybacks despite only generating USD 150bn in free cash flow. The result is that net debt has increased to USD 69bn at the end of 2020 and the current annual dividend payout of USD 14-15bn is no longer covered by free cash flow.

The asset multiple has unsurprisingly collapsed from 2.5x in 2011 to 1.0x in 2020, implying that the market does not ascribe any premium to further investment. Capex has already been cut to a level close to normalised depreciation and a dividend cut seems inevitable unless future returns and cash flow improve materially -- see Figure 21.



Figure 21: Key Financial Data for ExxonMobil



FAR EASTERN NEW CENTURY (FENC)

Overview

FENC is a listed Taiwanese company. It is a diversified conglomerate that is active in chemicals and property and also has a diverse investment portfolio. FENC produced an estimated 1.6m tonnes of in-scope polymers in 2019 (#19 globally) of which 1.6m tonnes (#15) were for single-use applications. In-scope polymers are about 24% of group revenues. FENC claims to be the world's largest supplier of polyester and the third largest maker of PET resin.

Financial highlights

FENC has a good margin record but a poor ROCE one. The EBITDA margin has been edging up from a low of 12.0% in 2012 to a respectable 20.0% in 2020. The operating margin though has gone from 8.1% to 7.5% over the same period and the very high depreciation and amortisation charge is a sign of heavy internal investment. Therefore, unsurprisingly, the ROCE has fallen from 9.3% in 2011 to 3.2% in 2020, below the 5.0% peer median. Free cash flow has been volatile but the dividend was covered in 2019 and 2020. The asset multiple has been stable at 0.7-0.8x over the last 7 years. This is low but may be distorted by the investment and property portfolio - see Figure 22.

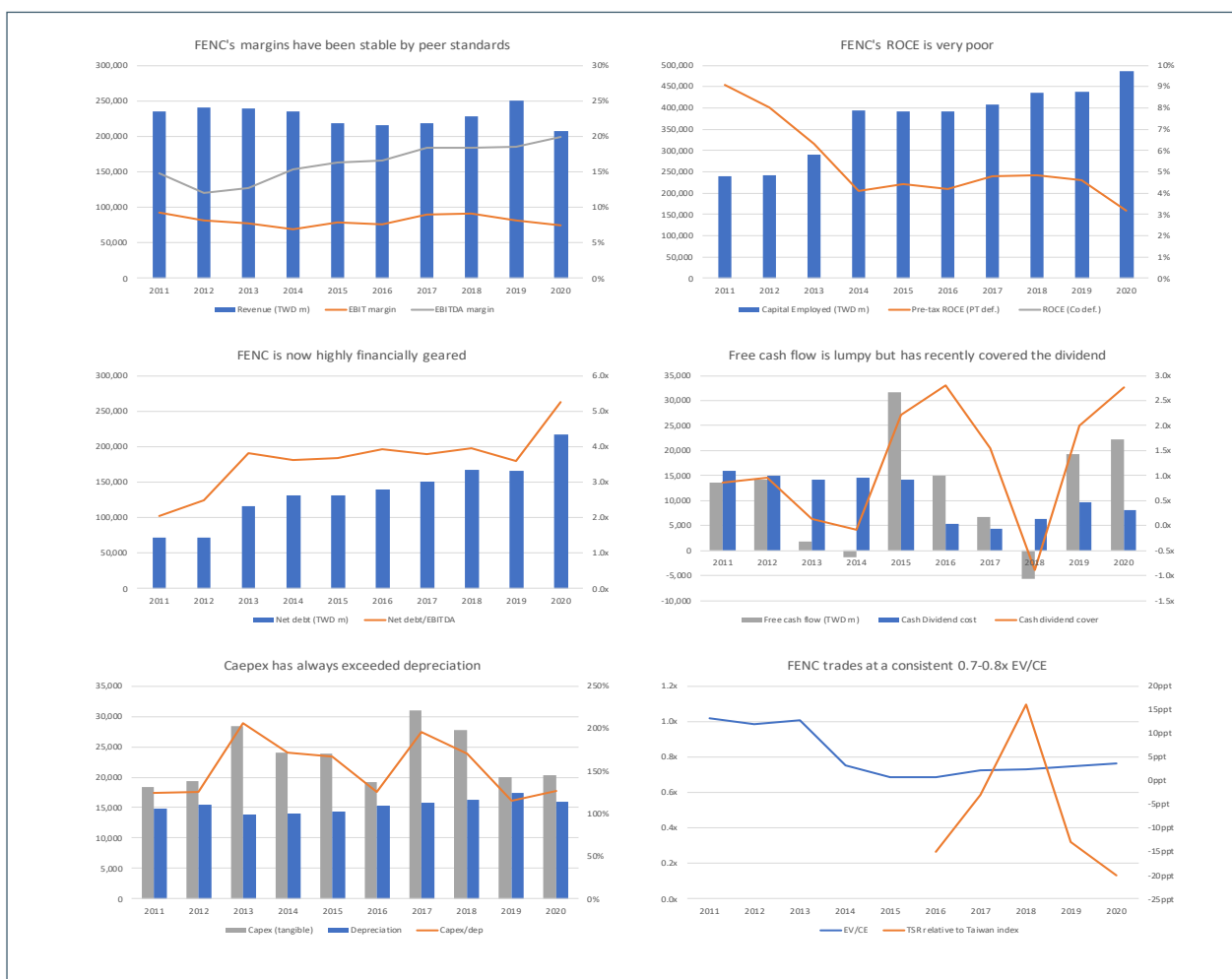


Figure 22: Key Financial Data for Far Eastern New Century (FENC)



FORMOSA PLASTICS

Overview

Formosa Plastics is a listed Taiwanese specialty chemicals company. Formosa produced an estimated 3.6m tonnes of in-scope polymers in 2019 (#14 globally) of which 1.6m tonnes (#15) were for single-use applications. In-scope polymers were about 62% of group revenues. According the 4Q FY2020 investor presentation, PP and PE (all types) were about 40% of revenue and 30% of operating profit. Formosa claims to be one of the largest producers of PVC powder in the world. Formosa Plastics is associated with the Formosa Plastics Group conglomerate, which has a web of cross-shareholdings.

Financial highlights

Formosa's operating margin and ROCE peaked in 2017 at 30.5% and 13.6% respectively but fell to 12.0% and 5.7% in 2020. Formosa's financial metrics are distorted by sizeable associate income, which has averaged 53% of EBIT since 2016. This increases the EBITDA and EBIT margins. Formosa also has material 'strategic' equity investments (totalling TWD 121bn or USD4.3bn at the end of FY20), including a 29% stake in the Formosa Petrochemical Corporation, which make it had to derive a robust ROCE ratio. The asset multiple has been stable at 1.6-1.8x since 2015 but this is likely also distorted by associates and investments -- see Figure 23.



Figure 23: Key Financial Data for Formosa



INDORAMA

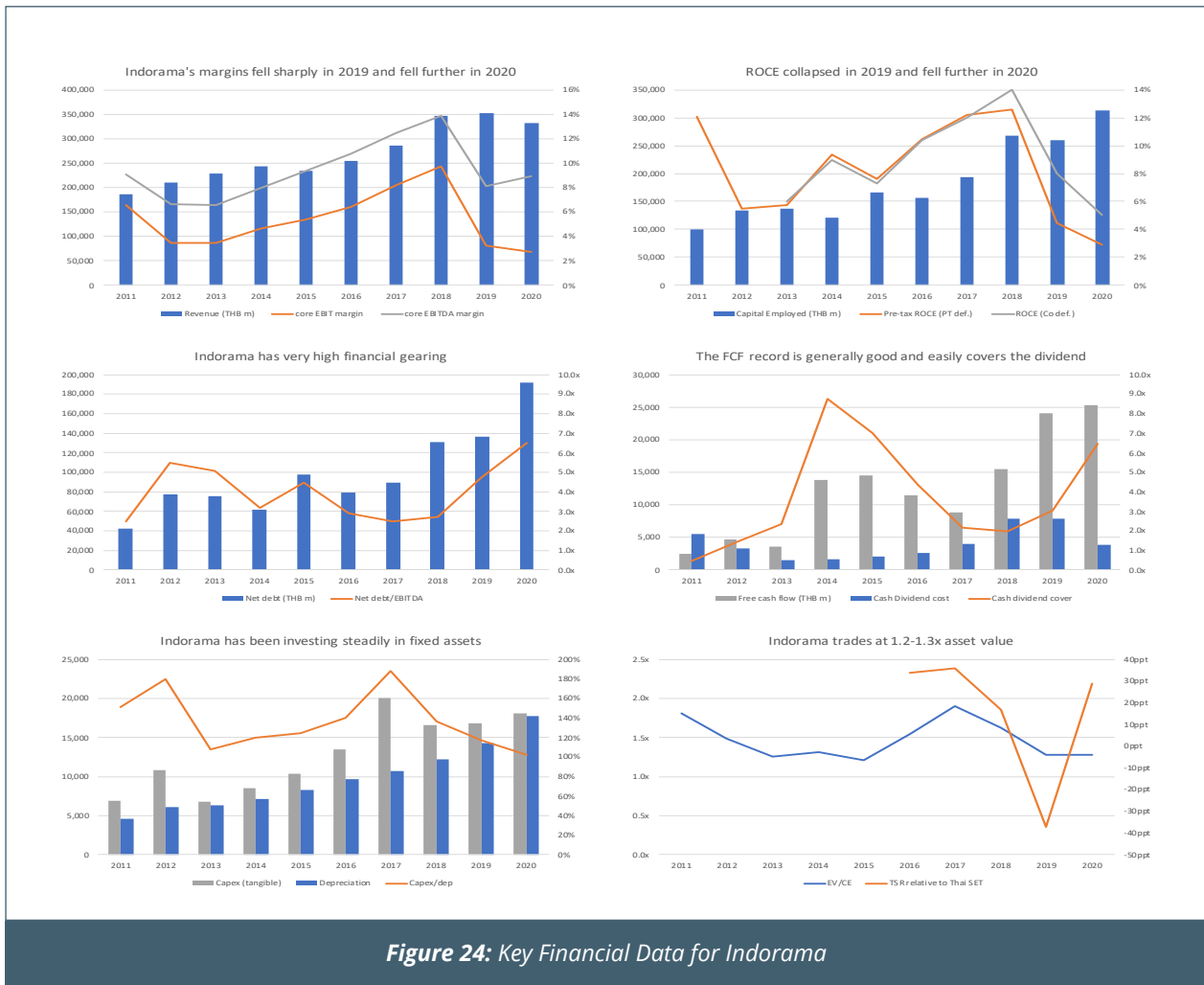
Overview

Indorama is a listed Thai company. It is 62% owned by the Lohia family through a holding company, Indorama Resources. It claims to make about 20% of all the PET resin used in the world. About 70% of group revenues and EBITDA come from 'combined PET', which includes out-of-scope polyester fibres.

According to the Minderoo report, Indorama produced 5.1m tonnes (#9 globally) of in-scope polymers in 2019, of which 4.6m tonnes (#4) were for single-use applications. According to the 2020 annual report, Indorama has PET capacity of 6m tonnes. We estimate that about 55% of revenues come from in-scope polymers, mainly PET resin.

Financial Overview

Indorama had a good financial record up to 2018 but the operating margin collapsed in 2019 and fell further in 2020. ROCE was on an upward trend from 2012, peaking at a respectable 12.6% in 2018. It fell to just 2.9% in 2020, below the specialty peer group median of 5.0x. Free cash flow has remained strong although Indorama has very high financial gearing on a net debt/EBITDA basis. Capex has been above depreciation every year since 2011, even including 2020. This is a business that continues to invest heavily in expansion. The average EV/CE of 1.3x in 2019 and 2020 suggests that the market expects an improvement in future profitability but is sceptical that the heavy investment is paying off - - see Figure 24.





INEOS

Overview

INEOS is a private European company which is registered in the Isle of Man (UK). It is owned by the three executive directors with its Chairman, James Ratcliffe, owning 62%. INEOS claims to be the largest maker of polyethylene in Europe and #5 in polypropylene. INEOS produced an estimated 4.8m tonnes of in-scope polymers in 2019 (#11 globally) of which 2.0m tonnes (#13) were for single-use applications. In-scope polymers are about 38% of group revenues.

Financial highlights

Despite being private, financial disclosure is good and INEOS publishes a detailed annual report every year. The EBITDA margin is high, about 14% in 2018-2020, but the operating margin was hit in 2019 and 2020 by asset impairments. On a normalised basis, the operating margin was probably about 10% in 2018-2020. ROCE was about 30% in 2013-2017 but was heavily impacted by impairments, particularly in 2020, when it was 8.5%, still above the 5.0% peer median. INEOS has been investing very heavily, with capex averaging 204% of depreciation over the last 5 years. Free cash flow has therefore been falling recently but the long-term record is good. INEOS paid out a large dividend of €2.1bn in 2019 but no dividend in 2020 - see Figure 25.

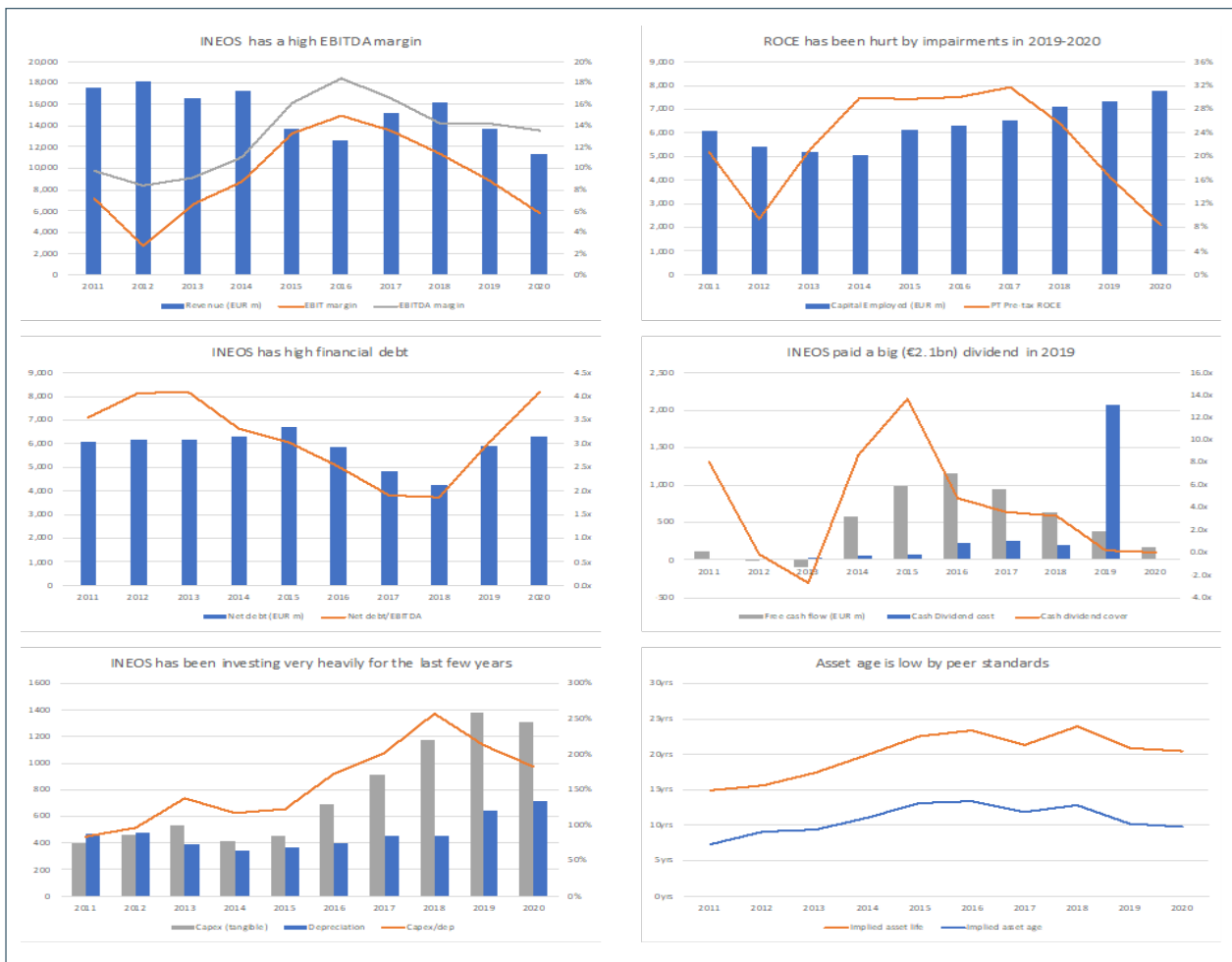


Figure 25: Key Financial Data for Ineos



JIANGSU HAILUN PETROCHEMICAL

Overview

Jiangsu Hailun Petrochemical is part of Sanfangxiang Group Co., Ltd, also known as the Sanfame Group, which is a private Chinese company. The Group describes itself as a “modern diversified holding group with the polyester industry as the core”. It makes PET resin as well as other polyester-based products. JHP produced an estimated 1.7m tonnes of in-scope polymers in 2019 (#18 globally) of which 1.6m tonnes (#15) were for single-use applications. The website says that the company has an annual capacity to make 1.5m tonnes of bottle-grade PET resin.

Financial highlights

According to the Sanfame website, revenues were CNY675bn in 2018 (about USD 100bn) with exports of USD 13bn. JHP does not make its financial information publicly available.

NO DATA AVAILABLE



LOTTE CHEMICAL

Overview

Lotte Chemical is a listed Korean company, 55% owned by the Lotte Corporation, a family-controlled conglomerate. The remainder is free-float. Lotte Chemical produced an estimated 4.1m tonnes of in-scope polymers in 2019 (#13 globally) of which 2.1m tonnes (#12) were for single-use applications. In-scope polymers are about 38% of group revenues.

Financial highlights

Lotte's operating margin peaked at a high 19.2% in 2016 but has fallen every year since, hitting just 2.9% in 2020. ROCE has also fallen from a peak of 25.4% in 2017 to 2.7% in 2020, well below the peer median of 5.0%. Free cash flow has been volatile and did not cover the dividend in 2018 and 2019; the 2020 payout was covered only because it was reduced. Capex was very high in 2016-2018, contributing to the collapse in ROCE in 2019 and 2020. The asset multiple has fallen from 1.5x in 2011 to 0.7x in 2020. This implies that the market is sceptical about a return to the previously high levels of profitability - see Figure 26.



Figure 26: Key Financial Data for Lotte



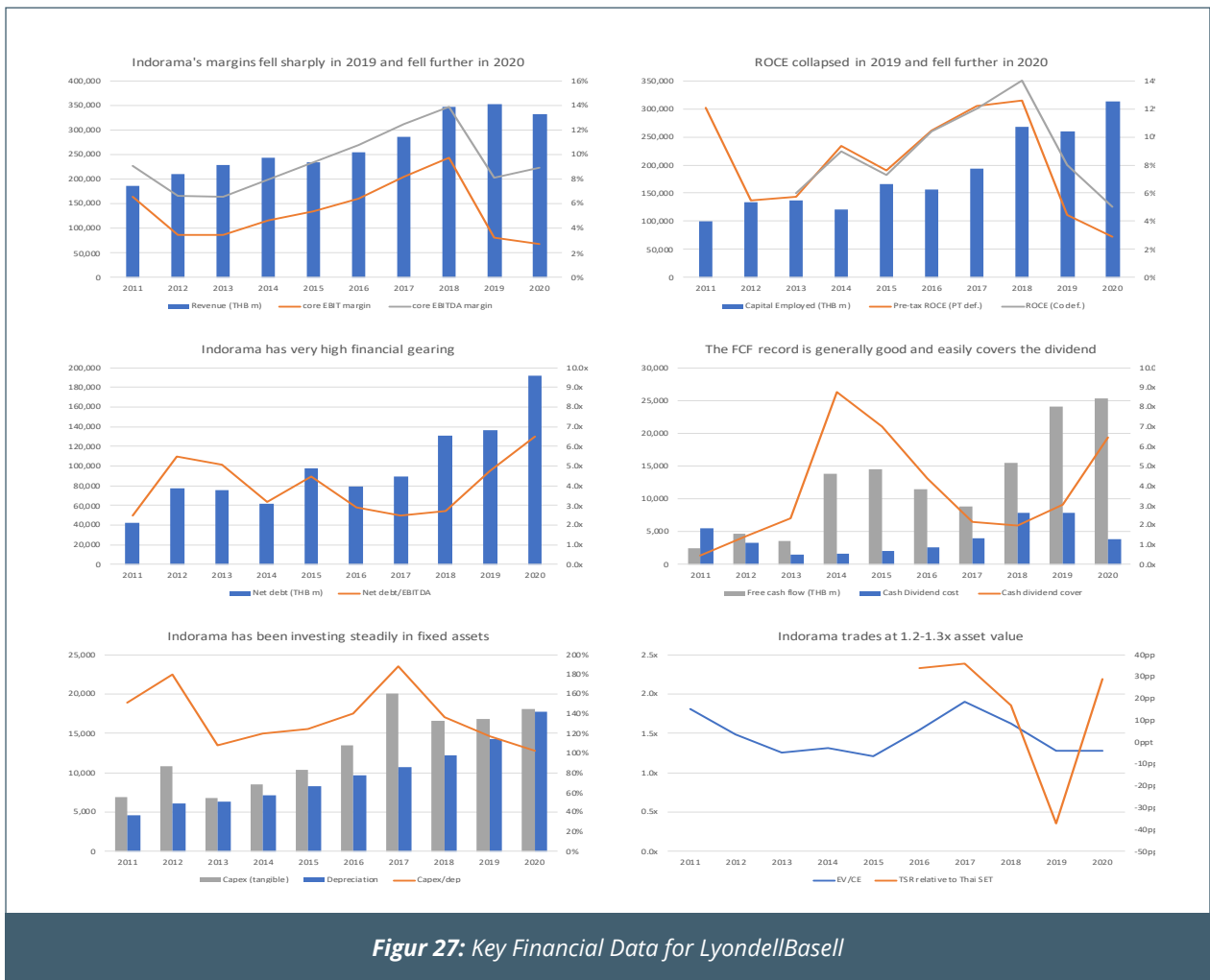
LyondellBasell

Overview

LyondellBasell is listed in the US but is incorporated in the Netherlands. It is a specialty chemicals company. LB produced an estimated 9.3m tonnes of in-scope polymers in 2019 (#4 globally) of which 3.9m tonnes (#7) were for single-use applications. We estimate that SUP plastics were 32% of revenues in 2019. LB claims it is a “leading” producer of polyethylene and is the world’s second largest maker of polypropylene. PE and PP were 37% of revenues in 2020, including non-SUP applications.

Financial highlights

LB’s operating margin peaked at a high 21.5% in 2015 and has fallen every year since. The margin was 6.8% in 2020. Capex has averaged 180% of depreciation since 2011 and been above depreciation in every year, including 2020. Falling margins and high investment means that ROCE has collapsed from a high of 51.4% in 2015 to 8.6% in 2020, which is still above the peer median of 5.0%. LB has paid out 120% of free cash flow as dividends and share buybacks since 2011 and the dividend/share buyback was only covered by free cash flow in 2020 because the payout was reduced sharply. Net debt has risen and LB now has high financial debt gearing. The high asset multiple of 2.0x in 2020 implies the the market expects future returns to improve materially - see Figure 27.



Figur 27: Key Financial Data for LyondellBasell



PETROCHINA

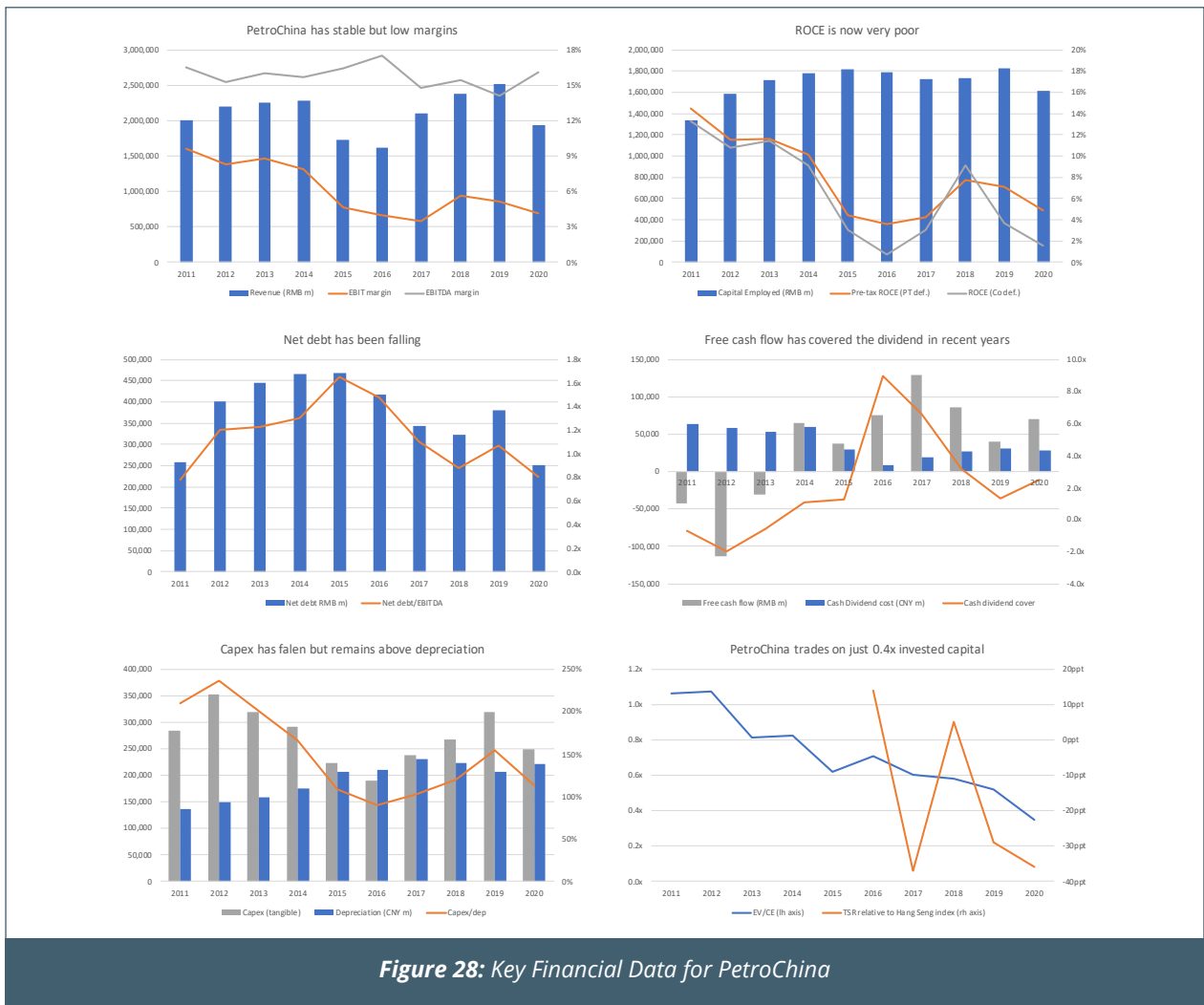
Overview

PetroChina is a listed integrated oil company. It is 80%-owned by the Chinese Government with the other 20% being free float. PetroChina produced an estimated 8.8m tonnes of in-scope polymers in 2019 (#6 globally) of which 4.0m tonnes (#6) were for single-use applications. In-scope polymers are about 3% of group revenues.

Financial highlights

PetroChina has had low but stable margins since 2015. The operating margin has averaged 4-5%, below the earlier 8-10% range in 2011-2014. Heavy investment in 2011-2014 has meant that ROCE collapsed from a respectable 10-14% in 201-2014 to just 4% in 2015-2017. It has since improved and 4.9% in 2020 was in-line with the peer median of 4.9%. Capex was reduced sharply in 2015 and free cash flow has covered the dividend every year since then.

The asset multiple trend is interesting as it has fallen steadily from 1.1x in 2011-2012 to just 0.3x in 2020. This is the joint lowest result together with Sinopec, which has also seen its multiple steadily contract over the last 10 years. This strongly suggests that the market has become steadily more disillusioned with both companies - see Figure 28.





PTT

Overview

PTT is a listed Thai company. It is 51% owned by the Thai government and is in effect the state oil & gas champion. PTT produced an estimated 3.1m tonnes of in-scope polymers in 2019 (#16 globally) of which 0.5m tonnes (#20) were for single-use applications. In-scope polymers are about 7% of group revenues.

Financial highlights

PTT's operating margin peaked at 11.8% in 2017 and fell to 5.8% in 2020. ROCE peaked at 17.0% in 2017 and was 5.8% in 2020, slightly above the peer median of 4.9%. The long-term free cash flow record is relatively good but free cashflow has fallen sharply since the 2017 peak. The 2020 dividend payment was covered by free cashflow, but only because the payout was reduced. Capex has been above depreciation in 2019 and 2020. The asset multiple has been very close to 1.0x for the last 4 years, implying that the market has little confidence that investments will deliver a worthwhile return, or that margins and ROCE can return to their former highs - see Figure 29.



Figure 29: Key Financial Data for PTT



RELIANCE INDUSTRIES

Overview

Reliance is an Indian, family-controlled, diversified conglomerate. It is one of the largest private (i.e. non-state controlled) companies in India. We have classified it within the oil & gas sub group of plastic companies, but it is also active in telecoms and media. Reliance produced an estimated 5.5m tonnes of in-scope polymers in 2019 (#8 globally) of which 3.1m tonnes (#8) were for single-use applications. In-scope polymers are about 8% of group revenues.

Financial highlights

Reliance has a good record of rising margins and a stable ROCE, 2020 excepted. The operating margin was 13.2% in 2020, not far off the record high of 14.5% in 2015. ROCE has been stable at 10-12% in recent years although it fell to 7.1% in 2020, still above the peer median of 5.0%. Free cash flow has been heavily impacted by capital expenditure in recent years and the overall FCF record is poor. Despite the respectable margin and ROCE record, the asset multiple has steadily fallen from 2.5x in 2011 to 1.5x in 2020. This implies that the market is confident that the recent heavy investments will pay off, although it should be noted that most of the investments are not in the polymer business - see Figure 30.



Figure 30: Key Financial Data for Reliance



SAUDI ARAMCO

Overview

Saudi Aramco floated in December 2019. The free float is tiny, less than 2%, with the rest being owned by the Saudi Government. It is the world's largest producer of crude oil and is by far the most profitable company in this plastics group, presumably because of very low input costs.

Saudi Aramco produced an estimated 9.5m tonnes of in-scope polymers in 2019 (#3 globally) of which 4.3m tonnes (#5) were for single-use applications. In-scope polymers are about 3% of group revenues.

Financial highlights

There is five years' financial history for Saudi Aramco. Its operating margin peaked at 59.8% in 2018, far in excess of all the peers and its ROCE peaked at 84% in the same year. Even in 2020, which was a very poor year for its plastic peers, its ROCE was 27.7%, more than 5 times the sub set median of 5.0%. Very high margins and ROCE imply high free cash flow and which is indeed the case. In 2020, it produced free cash flow of USD49bn, or 76% of the whole peer group and 91% of the sub-group. The inclusion of Saudi Aramco is a key reason we use medians; average metrics would be dominated by Saudi Aramco.

It is investing very heavily in fixed assets, both upstream and downstream, with capex averaging 2.5x depreciation since 2017. It traded at 1.6x invested capital in 2020, which is high by peer standards but low when compared to the very high ROCE. The obvious conclusion is that the market thinks that the high returns are unsustainable but the very low free float may raise concerns with potential investors - see Figure 31.



Figure 31: Key Financial Data for Saudi Aramco



SINOPEC

Overview

Sinopec is the short name for the China Petroleum & Chemical Corporation. It floated in October 2000. Sinopec is the 3rd largest chemical company in the world. It is 69% owned by the Chinese government via the Sinopec Group; the rest is free float.

Sinopec produced an estimated 11.6m tonnes of in-scope polymers in 2019 (#1 globally) of which 5.3m tonnes (#3) were for single-use applications. In-scope polymers are about 3% of group revenues.

Financial Highlights

Sinopec has produced a low but stable operating margin, 2020 excepted. Heavy investment has meant that ROCE has fallen from the peak of 15.8% in 2011 to 8-10% in 2016-2019 and just 1.5% in 2020. Free cash flow has been very volatile and has only been strong for three years (2016-2018). Free cash flow in 2019 and 2020 did not cover the dividend despite the reduced payout. The net debt level is however very low.

Sinopec trades at just 0.4x its capital employed, which implies that the market has a very low level of confidence in the financial outlook. It also probably implies that the market thinks the company is not run with shareholders' interests paramount - see Figure 32.



Figure 32: Key Financial Data for Sinopec



TotalEnergies

Overview

TotalEnergies (formerly Total) is a listed French integrated oil company. Total produced an estimated 4.5m tonnes of in-scope polymers in 2019 (#12 globally) of which 1.9m tonnes (#14) were for single-use applications. In-scope polymers are about 3% of group revenues. Total used to be the state-controlled national oil & gas champion but today it is almost 100% free float.

Financial highlights

Total's profitability has been sliding since the peak in 2011. The pre-tax ROCE margin has fallen from 15.2% to minus 4.5% in 2020 and ROCE has fallen from 31.2% to minus 3.7%. Unlike most peers, the loss in 2020 was only slightly exacerbated by asset impairments. The long-term free cash flow record is very poor but FCF was notably better in 2017-2019. FCF was also positive in 2020 despite the operating loss. Despite cutting capex to below depreciation, net debt reached a record €41bn at the end of 2020. The asset multiple has been very stable at about 1.2x over the last decade; it was 1.1x in 2020. This implies that the market has never been optimistic about future returns from investment, whether internal or external - see Figure 33.



Figure 33: Key Financial Data For TotalEnergies



APPENDIX 4

SUMMARY DATA OF THE PLASTIC PRODUCERS

Company (largest SUP waste producer first)	country	employees (2020)	2019 revenues (USD m)	In scope polymer production (m tonnes)	SUP waste contribution (m tonnes)	waste as % of prod.	total SUP revenue (USD m)	SUP revenues as % total revenue	Planned virgin capacity expansion 2020-2025	comment
ExxonMobil	US	72,000	255,995	11.2	5.9	53%	13,440	5%	+35%	
Dow	US	35,700	42,951	9.3	5.6	60%	11,160	26%		spun out of DowDupont in March 2019
Sinopec	China	384,000	384,258	11.6	5.3	46%	13,920	4%	+36%	
Indorama	Thailand	24,000	11,361	5.1	4.6	90%	6,120	54%		
Saudi Aramco	KSA	66,800	329,762	9.5	4.3	45%	11,400	3%	+15%	floated in December 2019
PetroChina	China	432,000	340,360	8.8	4.0	45%	10,560	3%	+38%	
LyondellBasell	US	19,000	34,727	9.3	3.9	42%	11,160	32%	+9%	
Reliance Industries	India	195,000	85,289	5.5	3.1	56%	6,600	8%		diversified conglomerate
Braskem	Brazil	8,000	13,264	6.7	3.0	45%	8,040	61%		
Alpek	Mexico	6,200	6,216	2.5	2.3	92%	3,000	48%		
Borealis	Austria	7,000	9,070	5.0	2.2	44%	6,000	66%	+17%	now 75% owned by OMW, which is listed. Annual report available.
Lotte Chemical	Korea	11,000	12,982	4.1	2.1	51%	4,920	38%		
INEOS	UK	7,700	15,345	4.8	2.0	42%	5,760	38%		private but annual report available
Total	France	105,000	176,249	4.5	1.9	42%	5,400	3%		
Jiangsu Hailun Petrochemical	China	na	97,685	1.7	1.6	94%	2,040	2%	+95%	private, minimal disclosure
Far Eastern New Century	Taiwan	30,500	8,092	1.6	1.6	100%	1,920	24%		diversified conglomerate
Formosa Plastics	Taiwan	10,000	6,724	3.6	1.6	44%	4,320	64%	+28%	
China Energy Investment	China	350,000	80,480	3.4	1.5	44%	4,080	5%		state-owned, minimal disclosure
China Resources National	China	370,000	13,264	1.4	1.3	93%	1,680	13%		state-owned, minimal disclosure
PTT	Thailand	28,000	71,501	3.1	0.5	16%	3,720	5%		state oil & gas champion
Total top 20 (where known)		3,017,593	1,804,145	112.7	58.3	52%	127,440	7%		
Total ex Aramco				103.2	54.0	52%	123,840			
Integrated/Diversified (all)				60.7	29.4	48%	72,840			
Integrated/Diversified (listed)				54.2	25.0	46%	65,040			
Integrated/Diversified (listed) ex Aramco				42.6	19.7	46%	51,120			
Specialty Chemicals (all)				52.0	28.9	56%	62,400			

Figure 34: Summary Data of the Plastic Makers

Notes:

1. Source: Minderoo (in-scope polymer production and SUP waste contribution), company reports and websites, FactSet.
2. SUP revenue estimate based on USD 1,200 per tonne.



APPENDIX 5

KEY FINANCIAL DATA FOR THE PLASTIC PRODUCERS UNIVERSE INCLUDING SAUDI ARAMCO

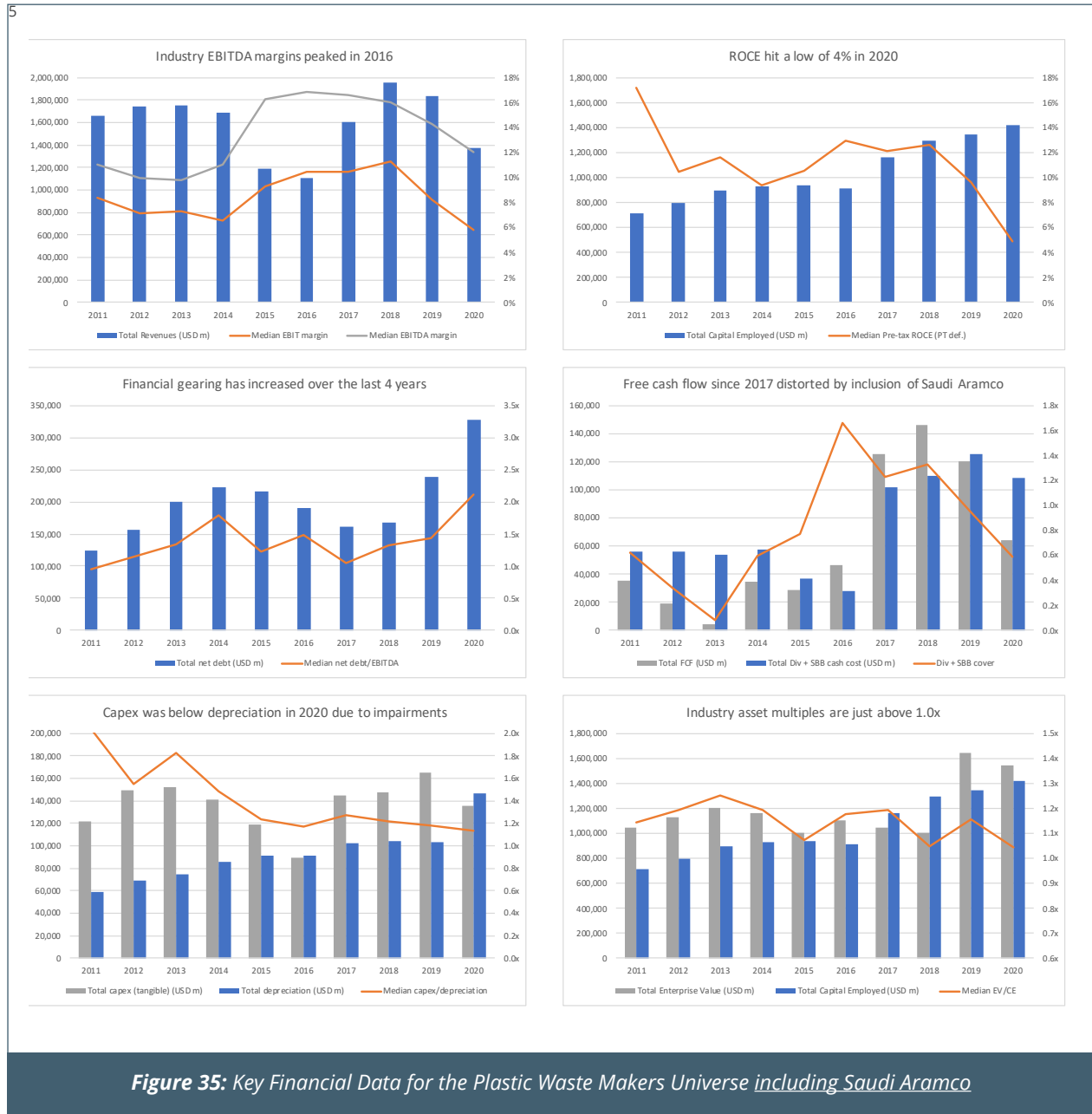




Figure 36: Key Financial Data for the Oil & Gas Companies including Saudi Aramco



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ABOUT PLANET TRACKER

Planet Tracker is an award-winning non-profit financial think tank aligning capital markets with planetary boundaries. Created with the vision of a financial system that is fully aligned with a net-zero, resilient, nature positive and just economy well before 2050, Planet Tracker generates break-through analytics that reveal both the role of capital markets in the degradation of our ecosystem and show the opportunities of transitioning to a zero-carbon, nature positive economy.

PLASTIC TRACKER

The goal of Plastics Tracker is to stem the flow of environmentally damaging plastics and related-products that are creating global waste and health issues by transparently mapping capital flows and influence in the sector starting from resins production through to product-use. By illuminating risks related to natural capital degradation and depletion, investors, lenders and corporate interests across the economy will be enabled to create more sustainable plastics products.

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