Marketing Material

The Price of Climate Risk

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For fundamental investors, climate risk matters to the extent that it impacts free cash flows, and whether that impact is already priced in. Turning the impact of climate risk into an equation quickly becomes very complex (and would in any case contain too many unknowns to be solved easily). The climate risk framework continues to evolve, including the actual carbon emissions trajectory. Perhaps an easier question is whether the most exposed companies are priced at a discount and whether investors are rewarded with a higher (expected) return to compensate for the climate risk.

Academic research on the subject is rich. The past few years have seen rigorous empirical testing of the existence of a carbon premium, i.e. whether lower valuations (and therefore higher potential returns) compensate investors for higher exposure to climate transition risks[1]. These empirical studies suggest that at some point there was a repricing of the most exposed assets, largely since the 2015 Paris Climate Agreement. Whether more is yet to come is an open question.

The most recent 2022-24 (turbulent) period is still too fresh for any academic research to have been published on it. CROCI metrics suggest that the discount in the valuation of the most exposed companies has decreased in the last two years, at least in certain parts of the equity market. Oil & gas majors benefited from the 2022 peak in oil prices, while stock performance of renewable energy companies mirrored their poor profitability.

In recent years, we have examined climate transition risk and its impact on equity valuations in various ways, such as simply applying the EU Emissions Trading System carbon price to companies' scope 1 and 2 emissions to calculate the impact on returns and valuation[2]. In this report, we present insights on what is implicitly priced by investors using our bottom-up approach to economic valuation. In particular: 1) how do valuations compare across different climate transition risk buckets (to provide insights into the carbon premium); 2) how do valuations compare with recent history, and 3) do valuations reflect idiosyncratic industry fundamentals rather than specific climate risk. We dig into the industries with the highest greenhouse gas emissions (and therefore the highest transition risk): Energy, Automobiles, and Airlines.

Our conclusions are:

- Short-term returns and trends in financials remain the key drivers of stock performance. In other words, investors have been relatively short-sighted on climate risks.
- Climate transition and physical risks will undoubtedly impact the financials of the most exposed companies at some stage. But the willingness or capacity of investors to anticipate and integrate these risks in stock prices is not linear. So far, the pricing of risks doesn't seem to have grown with time, even though the consequences of the transition become more negative with every passing year that sees another (Net Zero Emissions) target missed.
- In the meantime, investors tend to price risks as they are perceived and as they materialize, whether in terms of regulation guiding the transition pathway or in terms of physical impact. For this reason, we fear a 'Climate Minsky moment'[3] and abrupt integration of climate risk at discrete points in time over the coming decades.
- A continuous and close monitoring of climate risk at industry and company level remains essential, given the specific risks and decarbonisation trajectories. In addition, there must be regular stringent stress testing of the longer-term sustainability of the most exposed companies. Against this backdrop, CROCI's economic valuation metrics based on current cash returns remain an efficient value signal in our view, incorporating all the adjustments to accounting metrics that allow meaningful comparison of companies across different sectors and countries.

[1] Bolton and Kacperczyk, (2023). Global Pricing of Carbon- Transition Risk. The Journal of Finance
[2] CROCI Outlook : The pendulum's swing back to value, February 2024
[3] Carney, M. (2018). A Transition in Thinking and Action. International Climate Risk Conference for Supervisors, De Nederlandsche Bank, (April), 1–9.

Key take-aways on Energy, Automobiles and Airlines

In this report we categorise companies under CROCI coverage into three climate risk categories and dig into their relative valuation. We then analyse the main drivers of fundamentals and valuation in three of the most exposed industries: Energy, Automobiles and Airlines, with the latter two consuming close to sixty percent of oil produced by the former.

The **Energy sector** appears to have no additional risk premium despite its high exposure to climate transition. At 1.0x its net capital invested (NCI), it continues to trade within its historical asset multiple range. The value of this capital invested—still dominated by fossil fuel—has been partly impaired since 2020, up to a cumulative ten percent of the total in the upstream E&P business and representing six percent of the total operating assets of the oil majors. Not so much because of climate transition but because of COVID-19, these impairments triggered a repricing of the sector at the time and left a healthier capital base for the future and a relatively reliable economic price-to-book (EV/NCI) for gauging the sector's valuation.

We estimate the risk of further asset impairment will remain low as long as oil price remains elevated, and the majors retain their recently acquired capex discipline. When stress testing the value of upstream assets under 2030 forecasts of the International Energy Agency (IEA) Net Zero Emissions scenario, we conclude that thirteen percent of the current equity value of oil & gas majors would be at risk in aggregate.

In the **Automobile industry**, electric and hybrid vehicle leaders enjoy a valuation premium of 1.9x EV/NCI (average 2021-2025E) compared to 0.7x for laggards, suggesting promising prospects for companies ready for the transition to electric vehicles (EVs). Leaders' consistent reinvestment allows them to expand capabilities and command the valuation premium. Meanwhile, laggards are adopting a cautious investment approach, reducing capex and R&D spending given the uncertainty of the industry's path to net-zero emissions. However, current valuations may not fully reflect climate risks and opportunities, given caveats regarding future regulations and policies.

A recent twist is that the premium of battery electric vehicles (BEV) manufacturers compared to hybrid leaders has decreased due to a price war between Tesla and BYD. Moreover, hybrids are expected to remain relevant for longer than expected due to their practicality, despite having a higher carbon footprint than BEVs. BEVs face challenges such as limited range and a lack of charging infrastructure. To put this into perspective, the reaction of investors to valuations and premiums for companies transitioning to new technologies are influenced by evolving trends, narrative shifts, and government support. Meanwhile, in the short term, valuations are more likely to be influenced by financial trends and market noise, rather than longer-term considerations of fitness for climate transition.

In the **Airline industry**, despite stricter carbon emission regulations in the European Union (EU) compared to the United States, there is no clear evidence that the valuation discount of airlines operating in Europe against their US counterparts has increased. While EU airlines have a lower average EV/NCI ratio of 1.04x versus US airlines' 1.25x (average 2022-2024E), the valuation gap has been narrowing in recent years. Historically, US airlines have enjoyed higher returns on capital (CROCI cash return) compared to EU airlines, resulting in a valuation premium. However, recent data indicates that this advantage may be fading. The reasons for the decline in asset multiples for US airlines are unclear, potentially attributed to factors such as the grounding of Boeing fleets, supply chain vulnerabilities, or anticipation of stricter emission regulations. The absence of strong climate risk evidence in the valuation of EU relative to US airlines may be attributed to the sector's unique characteristics. The ubiquitous nature of the aircraft fleet, flying routes, and airlines gaining pricing power may provide part of the explanation why regulated EU airlines are not losing competitiveness to relatively less regulated US counterparts.

Considering the industry, the transition will certainly come at a cost, through a combination of carbon allowances to cover CO2 emissions and investment in lower emission aircraft. We conclude that future costs including (depreciation of) capex connected to climate transition could nearly wipe out the sector's operating profit. Given the current lacklustre returns generated by the industry, airlines will need to share the cost with other stakeholders or risk going out of business. A secular increase in demand for air travel could help.

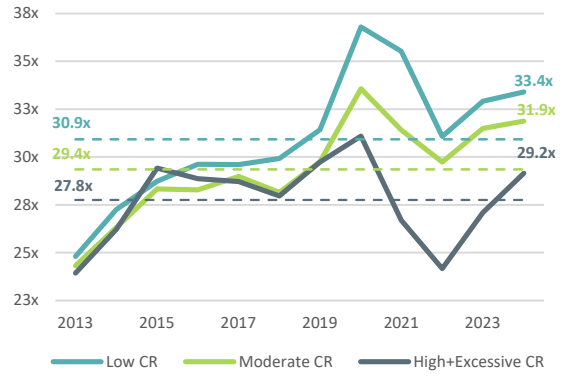
1/ Valuation Sensitivity to Climate Transition Risk

CROCI Universe and DWS Climate Transition Risk Grade (CTR)

CROCI covers 885 companies globally (or 830[4] excluding Financials and Real Estate). We segregate this universe of 'industrial' (i.e., non-financial) companies into climate risk categories based on the DWS ESG climate transition risk grade (CTR grade). This grade is derived from the combination of three vendors' assessment and integrates double materiality aspects ('inside out' and 'outside in' impacts). It is a best-in-class approach against the global (cross-sector) universe.

We group companies into three buckets: (1) the '**High+Excessive**' climate risk category, which groups the companies graded F under CTR (1% of CROCI Universe), and the E-graded (28%); (2) the '**Low**' climate risk category which groups the A-graded (3%), and the B-graded (13%) companies. (3) the '**Moderate**' category, encompassing the C- and D-graded companies situated between the previous two groups. We then calculate the valuation of each risk bucket using median Economic PE, CROCI's proprietary valuation metric based on economic data (adjusted from pro-forma accounts).

Figure 1: Median Economic PE by Climate Risk (CR) Categories



Source: DWS, CROCI. Data as on 5 June 2024. Dotted Lines are Average for 2013 and 2023

Valuation by Climate Risk Category

Companies exposed to 'High+Excessive' climate risk currently trade on a 2024E Economic PE of 29.2x, below the median Economic PE of the 'Low' (33.4x 2024E) and 'Moderate' (31.9x 2024E) categories, a similar position to the past ten years (Figure 1). The valuation discount of the 'High+Excessive' risk category has increased over the past ten years: from 3% in 2013 to 13% in 2024E. The current discount (13%) is close to the ten-year average, although it has recently receded from its peak of 25% in 2021, 22% in 2022, 18% in 2023 (Figure 2). We segregate the period after 2015—when COP15 and the Paris Climate Agreement created a shift in climate awareness—into two sub-periods that best mirror the change in trend: 2015-2021 and 2022-2024E.

Figure 2: Discount in the (Median) Economic PE of the 'High+Excessive' vs 'Low' and 'Moderate' Climate Risk Categories

Source: DWS, CROCI. Data as on 5 June 2024

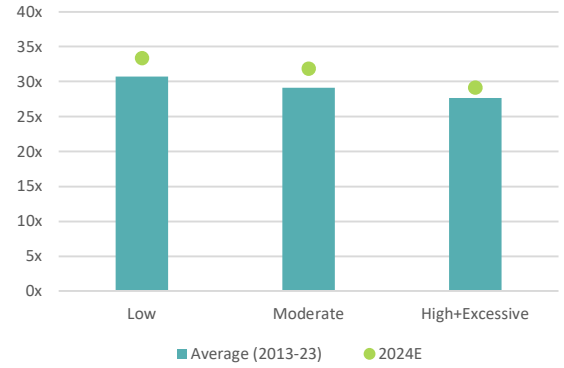
The discount in valuation of 'High+Excessive' climate risk companies compared to both 'Low' and 'Moderate' risk categories suggests that a climate risk premium has built up in the past ten years. This supports recent academic research papers on this subject[5]. Does the decline in the valuation discount we've observed since 2021 reveal a fade in this risk premium? Or is it driven by changes to (other) key drivers of the discounted free cash flow and of the fundamental value of these companies?

The 'High+Excessive' climate risk companies have re-rated over time. The increasing climate transition risk does not seem to have weighed on the Economic PE of this category in absolute terms (or if it has, it has been offset by other factors). A re-rating of the 'Low' risk companies has also occurred over the same period but at a higher magnitude, which explains why the discount of the most at-risk category has increased over the whole period.

4 Refer to Figure 35 for aggregated data of companies in CROCI's global coverage.

5 (i) Campiglio, Daumas, Monning and Von Jagow (2022). Climate-related risks in Financial Assets. Journal of Economic Surveys
(ii) Bolton, Halem and Kacperczyk, (2022). The Financial Cost of Carbon. Journal of Applied Corporate Finance
(iii) Bolton and Kacperczyk, (2023). Global Pricing of Carbon- Transition Risk. The Journal of Finance

Figure 3: 2024E and 2013-23 Average of Climate Risk Categories' Median Economic PE

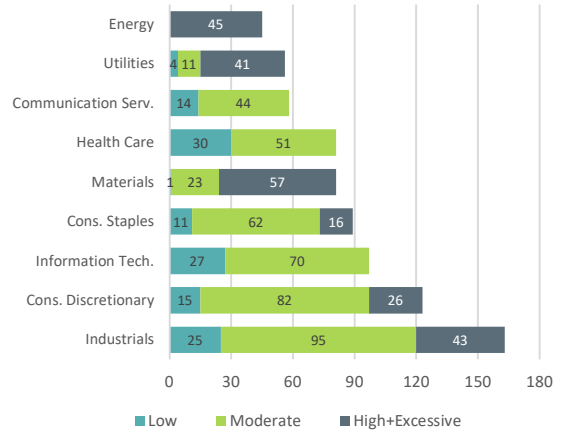


Source: DWS, CROCI. Data as on 5 June 2024

Sector Constituents of the Climate Risk Categories

Looking at the industry constituents of the various climate risk buckets we built, it is no surprise to see differences in sector representation: after all, climate transition risk is by its nature very industry driven. Nearly half of the 'High+Excessive' category is made up of Energy and Materials companies. Information technology (IT), Health Care and Industrials/Commercial & Professional Services account for over two-thirds of the 'Low' risk bucket. (Figure 4).

Figure 4: Sector Constituents for Climate Risk Categories (Based on Number of Companies)



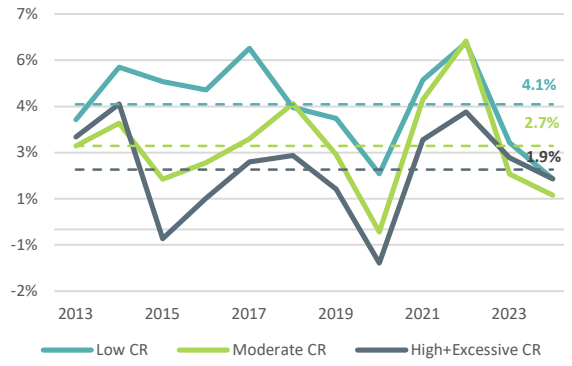
Source: DWS, CROCI. Data as on 5 June 2024

Fundamental trends of the various climate risk buckets

The differences in business and financial trends between the industries that make up the various buckets have been major drivers of their absolute and relative valuation, maybe even to a greater extent than longer-term climate risk. This is presumably because it is not yet certain which trajectory each industry will follow to transition.

The 'Low' risk companies have demonstrated high capital growth over the last ten years (4.1% p.a.[6]) while companies in the 'High + Excessive' risk category have grown at half this pace. The growth rate of the two buckets converged briefly in 2023 but clearly follow different rates over the long term (Figure 5).

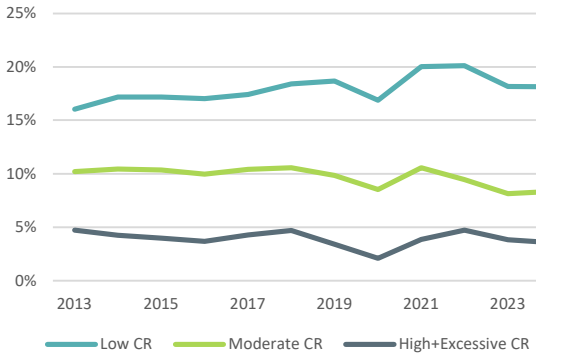
Figure 5: Median Growth in Net Capital Invested (NCI) by Climate Risk (CR) Categories



Source: DWS, CROCI. Data as on 5 June 2024

The same goes for respective cash returns generated by those respective categories. The 'Low' risk companies are also much more profitable than the 'High + Excessive' risk companies and this is true over the entire period (Figure 6 shows CROCI cash returns).

Figure 6: Median CROCI by Climate Risk (CR) Categories

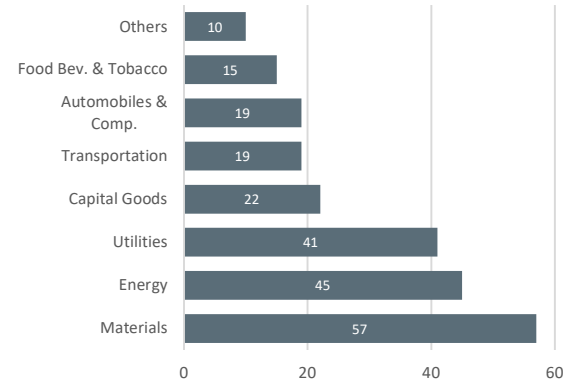


Source: DWS, CROCI. Data as on 5 June 2024

6 Measured using CROCI's Net Capital Invested, an estimate of the real replacement value of a company's assets.

As suggested above, these differences in fundamentals clearly reflect the differences in the underlying industry constituents and the nature of the business models found in the respective categories. To understand the drivers behind the evolution of the 'High+Excessive' risk discount, we look into some of the key fundamentals and trends in three selected industries from this risk category: Energy, Automobiles and Airlines (Figure 7). Transport industries represent close to sixty percent of global oil demand and are therefore highly exposed to the transition from oil to alternative sources of energy. Utilities and the power grid mix will be key in the transition, of course. CROCI's coverage in Utilities is not excessively exposed on the risk side, however, given companies that are significantly exposed to coal are not covered; and gas is still envisaged as an alternative source of power in the medium term. As for industries other than Transport which also rely on GHG emission-intensive processes like chemicals and steel, there are still a lot of question marks over the path and the economically viable technologies that will allow transition. Further work is necessary before we can set up a meaningful methodology for integrating and stress testing carbon risks for these industries.

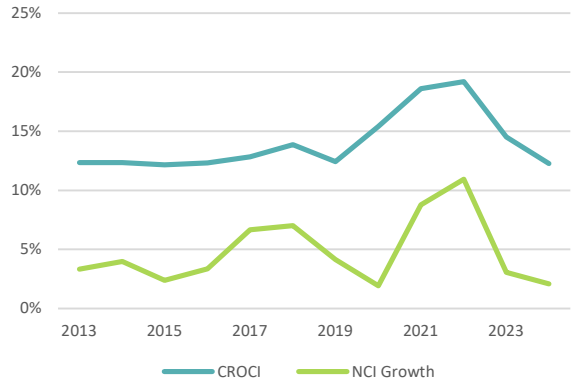
Figure 7: Industry Group Constituents for High+Excessive Climate Risk Category (Based on Number of Companies)



Source: DWS, CROCI. Data as on 5 June 2024. Others include constituents in total in four Industry Group

A couple of words on the 'Low' risk bucket: IT companies are highly represented in A and B grades, with software companies being the most represented, and they have benefited from an increase in their Economic PE in recent years. They have traded above their ten-year average since 2019. The only exception was 2022 when the market was still catching up with an improving earnings trend on the way out of the pain of the pandemic and with inflation not yet having hit margins. Even if there were some variations within different IT sub-sectors, there was clearly a re-rating in the overall asset multiple of the sector mirroring the rise in the average cash return. In the same way, capital growth in the IT sector as a whole accelerated significantly over the period (looking beyond the recent slowdown) (Figure 8).

Figure 8: Median CROCI cash return and NCI Growth (%) of Global Information Technology Sector



Source: DWS, CROCI. Data as on 5 June 2024

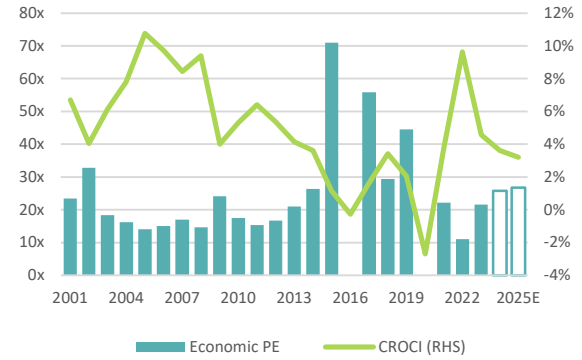
Past performance does not predict future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Unless stated this data is as on June 2024.

2/ Energy: Any evidence of a climate risk premium?

Valuation of the Energy sector is still driven by the (oil price) cycle before anything else!

In 2022, the Developed Market (DM) Energy sector was trading on an Economic PE of just 11.0x, compared to its median Economic PE of 21.6x since 2001 and 27.0x over the past ten years (Figure 9). The deep discount in 2022 essentially reflected a normal pattern in cyclical sectors: when oil prices and returns peak, as happened with the energy crisis triggered by the invasion of Ukraine, investors generally tend not to fully acknowledge the peak in returns but instead price cyclical stocks/sectors on a level of profitability close to mid-cycle levels. And as returns revert to their long-term average or mid-cycle, the Energy sector valuation ratio went back to 21.6x Economic PE in 2023 and 26.7x in 2024E, i.e., closer to its long-term average (Figure 9).

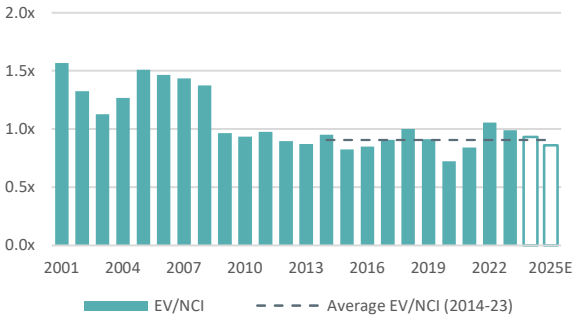
Figure 9: Economic PE and CROCI cash return of Developed Market Energy Sector



Source: DWS, CROCI. Data as on 10 June 2024. Blank years represent not meaningful Economic PE.

In this context, the asset multiple is an alternative indication of the Energy sector's valuation, or indeed any cyclical sector, for assessing (potential) de- or re-rating over time. Based on economic price-to-book value (EV/NCI), the Energy sector has not been materially de-rated in recent years, despite the overhang of climate transition and likely eventual phase-out of oil demand. The sector[7] has been trading between 0.9x and 1.1x over the past couple of years, in line with its ten-year average. After a short span of de-rating in 2020 at 0.7x, largely thanks to the COVID-19 pandemic and the associated collapse in demand for oil, the sector saw a meaningful re-rating in 2021 (0.8x) and 2022 (1.1x), mainly driven by high oil and gas prices. It currently trades at 1.0x EV/NCI (Figure 10).

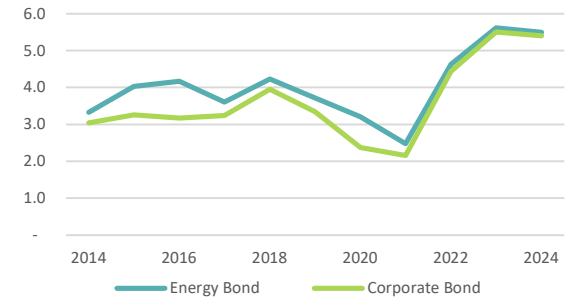
Figure 10: EV/NCI of Developed Market Energy Sector



Source: DWS, CROCI. Data as on 10 June 2024

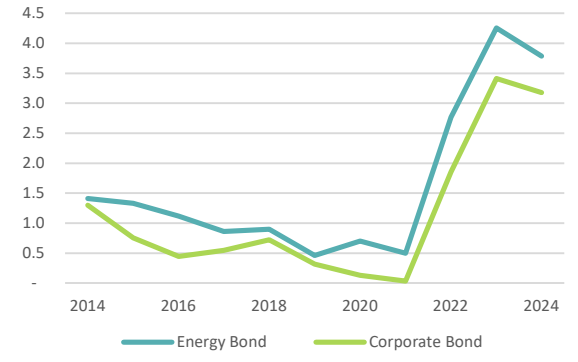
On the debt side, we observe no sustained rise in the yield of the Energy Bond Indices against the Investment Grade Corporate Indices of the respective regions whether in the US or in Europe (Figure 11 and 12).

Figure 11:Yield (%) of USD Denominated Bloomberg Investment Grade Corporate and Energy Bond Indices



Source: Bloomberg Finance L.P. Data as on 5 June 2024

Figure 12: Yield (%) of EURO Aggregate Bloomberg Investment Grade Corporate and Energy Bond Indices

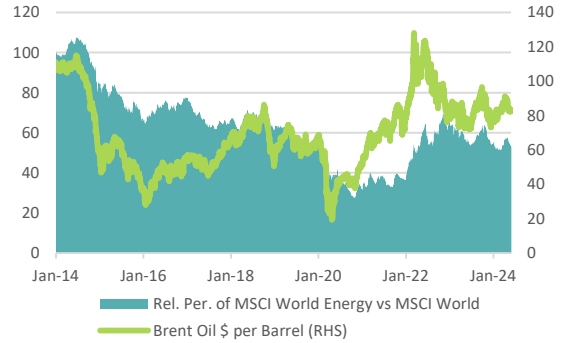


Source: Bloomberg Finance L.P. Data as on 5 June 2024

7 Refer to Figure 36 for aggregated data of Energy companies in CROCI's global coverage.

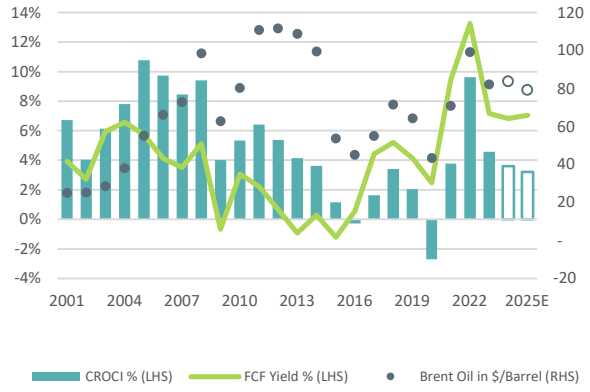
Valuation multiples and the performance of the sector have been driven by short-term drivers — oil price, production levels and capex — rather than being penalised for long-term climate transition risks. This was shown clearly by the sector's outperformance in 2022 mirroring the surge in oil prices (Figure 13) and cash returns (Figure 14) while capex was kept under control (barely reaching what was needed to replace depleted reserves) – leading to significant free cash flow increases (Figure 14).

Figure 13: Relative Performance of MSCI World Energy and Brent Oil Prices (Since 1-1-2014)



Source: DWS, CROCI. Data Sourced from Bloomberg Finance L.P. as on 27 May 2024

Figure 14: Developed Market Energy Sector Profitability and Free Cash Flow versus Oil Prices



Source: DWS, CROCI. Data as of 10 June 2024. Brent Oil Prices Sourced from Bloomberg Finance L.P. as on 21 May 2024

Oil demand has not yet peaked, given that non-OECD countries' consumption is still rising (Figure 15). Combined with the constraints in supply that have either directly or indirectly arisen from the international political context, the supply-and-demand situation supported the oil price at around USD 80 per barrel since the end of 2021. Both the energy crisis in Europe_putting the question of sustainability of energy supply front and centre of consumers' minds_and the opportunity for oil majors to benefit from high oil prices and volumes probably deferred the sense of urgency around the transition.

Figure 15: Global Oil Demand (YoY % change)

Source: International Energy Agency, DWS, CROCI. Data sourced from Bloomberg Finance L.P. as on 5 June 2024. Calculated based on Million Barrels of Oil Per Day.

The recent decision by some oil majors to downsize their plans to reduce production and decarbonise exhibits the same logic to some extent.

Shell

In June 2023, the company disavowed its previous target to cut oil output by 20% by 2030 and vowed to keep oil production steady until 2030. Further, in March 2024, it reduced its 2030 target of a fall in the carbon intensity of energy it sells to a range of 15-20% from 20% judged from a 2016 baseline. It also scrapped its 2035 target of a 45% fall in net carbon intensity due to uncertainty in the pace of change in the energy transition. The company also stated that investment in oil and gas will be needed because demand for oil and gas is expected to drop at a slower rate than the natural decline rate of the world's oil and gas fields (around 4-5% a year)[8,9].

During its recent annual general meeting, Shell shareholders overwhelmingly rejected a climate resolution filed by an activist group. The resolution urged Shell to align its medium-term carbon emissions reduction targets with the Paris Climate Agreement, including emissions from fuels burned by consumers. However, it received 18.6% support from shareholders, compared to just over 20% last year[10]. As highlighted in the chart below (Figure 16), shareholders' support for climate resolutions has been fading since 2022.

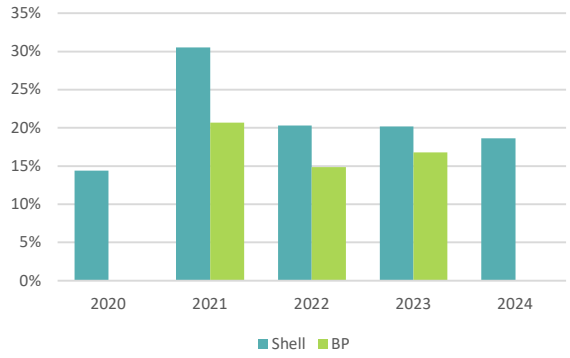
BP

In February 2023, BP made significant adjustments to its climate transition strategy. The company recalibrated its oil and gas production reduction target from 40% to 25% by 2030, relative to 2019 levels. It scaled back its ambitious emissions reduction targets from a range of 35-40% to a range of 20-30% by 2030, citing

8 Shell plc Energy Transition Strategy 2024
9 Shell plc Capital Markets Day 2023
10 https://www.reuters.com/sustainability/climate-energy/shell-shareholders-reject-investor-climate-resolution-2024-05-21/

the need to invest in oil and gas to meet current demands. BP also announced an increase in its investments in oil and gas by around USD 1 billion per year[11].

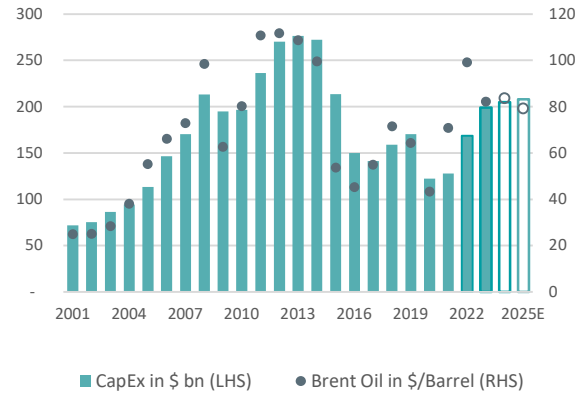
Figure 16: Shareholders' Support for Climate Related Resolutions



Source: Company Data, DWS, CROCI. Data as on 5 June 2024. No Bar Denotes No Resolution in Respective Years. Percentage shareholders supporting the resolution.

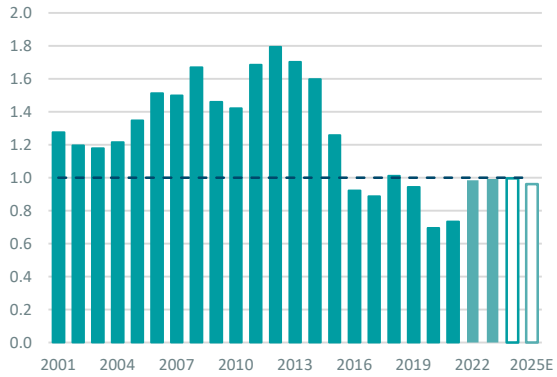
In terms of capex, however, Energy majors have demonstrated discipline compared to previous oil price peaks (Figure 17) as well as compared with their maintenance capex (Figure 18). This is quite different from the traditional surge in green fields and capex following peak oil prices, diluting subsequent returns through diminished asset productivity.

Figure 17: Developed Market Energy Capex and Oil Prices



Source: DWS, CROCI. Data as on 10 June 2024. Brent Oil Prices Sourced from Bloomberg Finance L.P. as on 21 May 2024

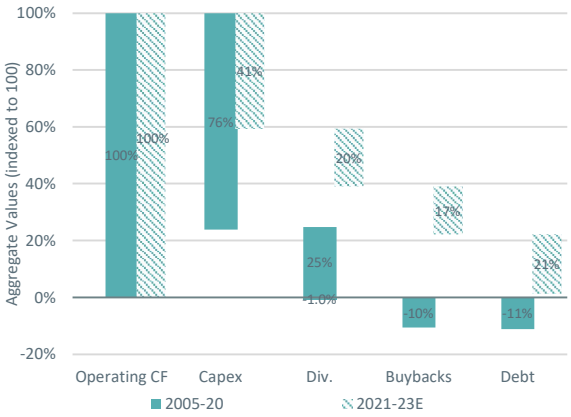
Figure 18: Developed Market Energy 'Capex to Maintenance Capex' Ratio



Source: DWS, CROCI. Data as on 10 June 2024

Capex discipline has allowed Energy companies to generate high free cash flow (FCF), pay dividends, and buy back shares and also deleverage their balance sheet at the same time (Figure 19).

Figure 19: Use of Cash Flow by Developed Market Energy



Source: Company Data, DWS, CROCI. Data as on 10 June 2024

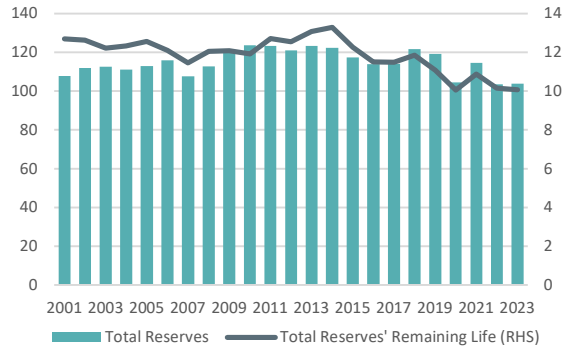
What is the risk of stranded assets or significant impairment at this stage?

The climate transition is expected to translate into a decline in demand for fossil fuel at some stage, beginning with oil and followed eventually by gas. Given that the average remaining life of Oil & Gas Exploration & Production properties in Developed Markets is only 10 years (Figure 20), it is unlikely that existing assets will be stranded, i.e. retired before the end of their initially planned useful life. However, they would be at risk of yielding lower cash flow in the future under the combined impact of declining demand along with falling prices. The fair value of Exploration & Production properties—the largest source of EBITDA generation and the largest destination for capital invested in integrated oil & gas companies—would therefore decline; and, if lower than their net accounting value in the balance sheet, they

11 bp Integrated Energy Company strategy update 7 Feb 2023

would be impaired. This is the principal risk we evaluate in the analysis below, whilst acknowledging the climate transition would have other impacts on Energy companies.

Figure 20: Developed Market Energy companies Oil and Gas Reserves and Their Remaining Life



Source: Company Data, Bloomberg Finance L.P. Data as on 5 June 2024

In aggregate, Oil & Gas companies impaired a cumulative ten percent of the current value of their exploration and production (E&P) assets since 2020. That year, the pandemic-related lockdowns drove the oil price down to USD 43 per barrel. Consequently, most companies lowered the long-term oil price assumptions they used in impairment tests; but not as low as the USD 42 per barrel forecasted for 2030 under the IEA NZE scenario (path to Net Zero in 2050), though. To complement and assess the risk of further impairments, we have annually stress tested the value of existing assets of Energy companies under this IEA scenario[12]. Although it remains to be seen whether states, industries and companies will do what it takes to comply with a well below 2-degree scenario, the IEA NZE scenario is to be considered as 'best case for the planet' and sort of 'worst case scenario for oil'. Note that we are not considering how oil companies would transition and evolve towards a more 'climate-friendly' business model at this stage and how they would potentially minimise this risk: some of them invest in renewables but globally their share in the total investments in this area is only in low single digits!

Under the IEA NZE scenario, the WTI oil price would be USD 42 per barrel and the US natural gas price of USD 2.4/MMBTU by 2030[13]. We take 2030 as the year of reference given this time horizon is closer to the remaining useful life of existing assets than 2050 forecasts would be and is also more reflective of the average horizon of anticipation in the context of an equity investment.

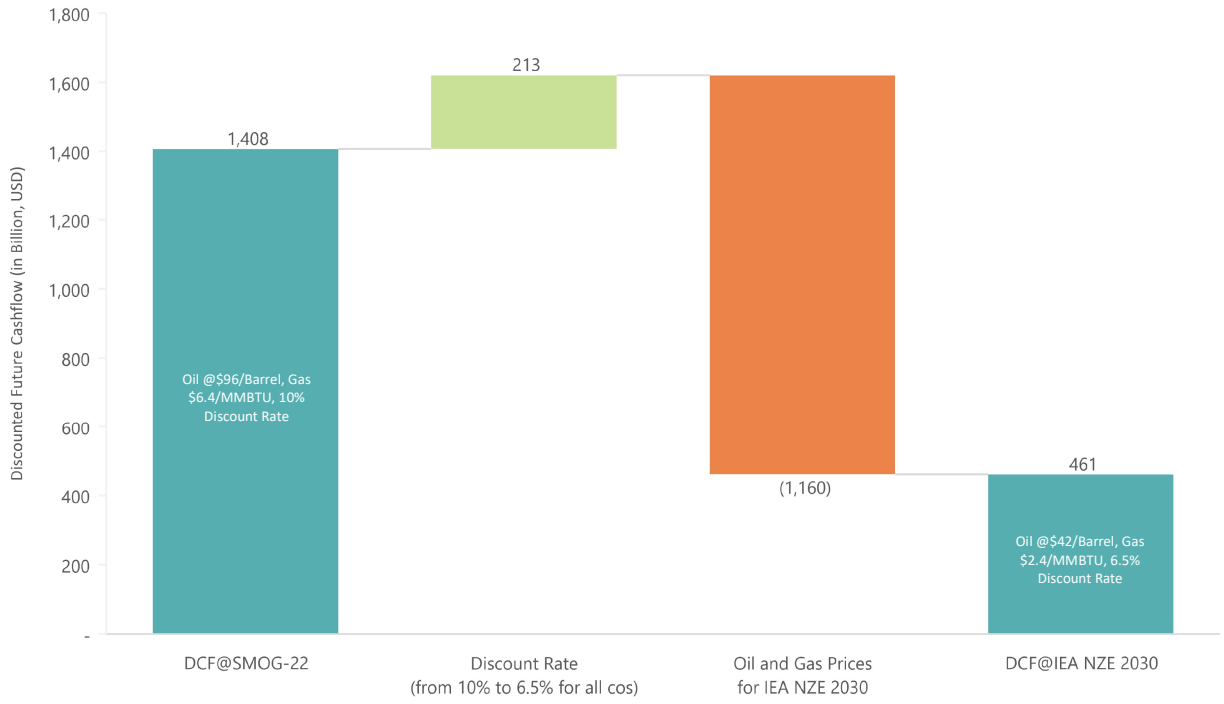
CROCI Methodology^ to Stress Test the Value of Upstream Assets under IEA NZE 2030 Scenario

For our stress test, we (re-)calculate the fair value of the existing E&P assets under the IEA NZE 2030 forecasts and compare it with the net accounting value registered in the balance sheet. We start from the latest published (2022) SMOG value which is the Standard Measure of Oil & Gas assets that companies are required to disclose every year; a DCF of E&P assets calculated on the latest twelve-month average (of first day of the month) oil & gas price. We re-calculate this SMOG value at the IEA NZE 2030 forecasts mentioned below and at a discount rate of 6.5% rather than the 10.0% after-tax used by those companies under SMOG. Note that in 2020, the oil price averaged USD 43 per bbl, close to the IEA NZE scenario 2030 assumption, providing us with a very good indication of fair value under this NZE scenario at the time. As for the discount rate, we use 6.5% which is CROCI estimate of the long-term global equity cost of capital plus a 100bp spread to be on the cautious side (even though there is no evidence of a specific spread for Energy companies). IEA NZE forecasts in volumes for oil & gas (demand)—a decline of 2.4% p.a. for oil and 3.2% p.a. for natural gas until 2030—they are relatively aligned with the natural depletion rate of existing reserves and already embedded in the calculation of the SMOG value, so there is no need to modify any assumptions here. Once we have calculated the estimated fair value of E&P assets under IEA NZE forecasts, we compare it with the net accounting value of those in the balance sheet and we infer the estimated (risk of) impairment as well as the value of net assets after this impairment ('impaired NCI').

As illustrated in Figure 21, the Standardised Measures of Oil and Gas (SMOG) E&P assets of companies we cover in developed markets was USD 1,408 billion in 2022. Recalculated under 2030 oil & gas price forecasts of the IEA NZE scenario and at a discount rate of 6.5%, this SMOG value would be USD 461 billion. When compared with the net value of these assets on balance sheets at the time, it would imply an impairment of USD 579 billion (Figure 22). Part of this amount relates to future capex (accounted for in SMOG calculation and which we neutralise here). Some impairments were also charged in 2023 by those companies and should be deducted. All in all, the value of E&P assets as of today would be USD 457 billion lower than their balance sheet value, should the forecasts of the IEA NZE for 2030 materialise now (Figure 22). The latter is of course a very conservative scenario, given that this is not likely to materialise overnight but should be seen as an assessment of the value at risk under a stress test scenario.

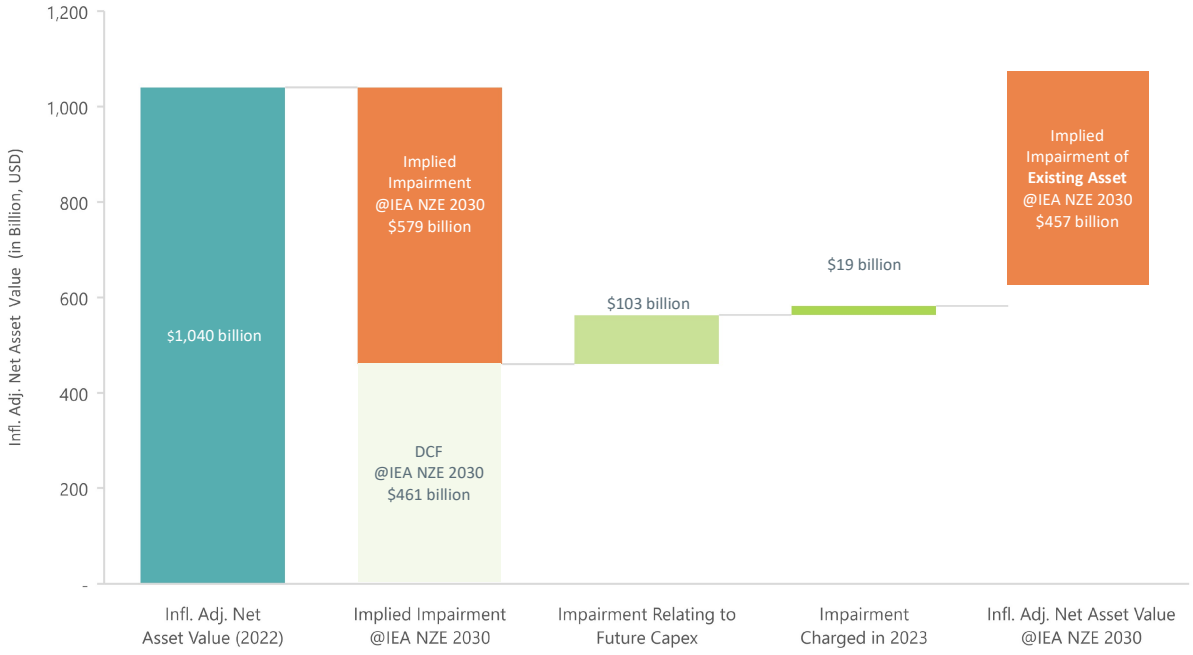
12^ CROCI Methodology to Stress Test the Value of Upstream Assets, set up in 2020. 13 World Energy Outlook 2023 published by the IEA.

Figure 21: Estimated Discounted Future Cash Flow of Developed Market Energy Upstream Assets under IEA NZE 2030 Scenario (Based on SMOG-2022 Value)



Source: Company Data, DWS, CROCI. Data as on 5 June 2024. SMOG is a GAAP Standardized Measure of Oil & Gas assets based on a DCF at previous twelve-month av. oil & gas prices

Figure 22: Estimated Impairment in Net Value of Developed Market Energy Upstream Assets under IEA NZE 2030



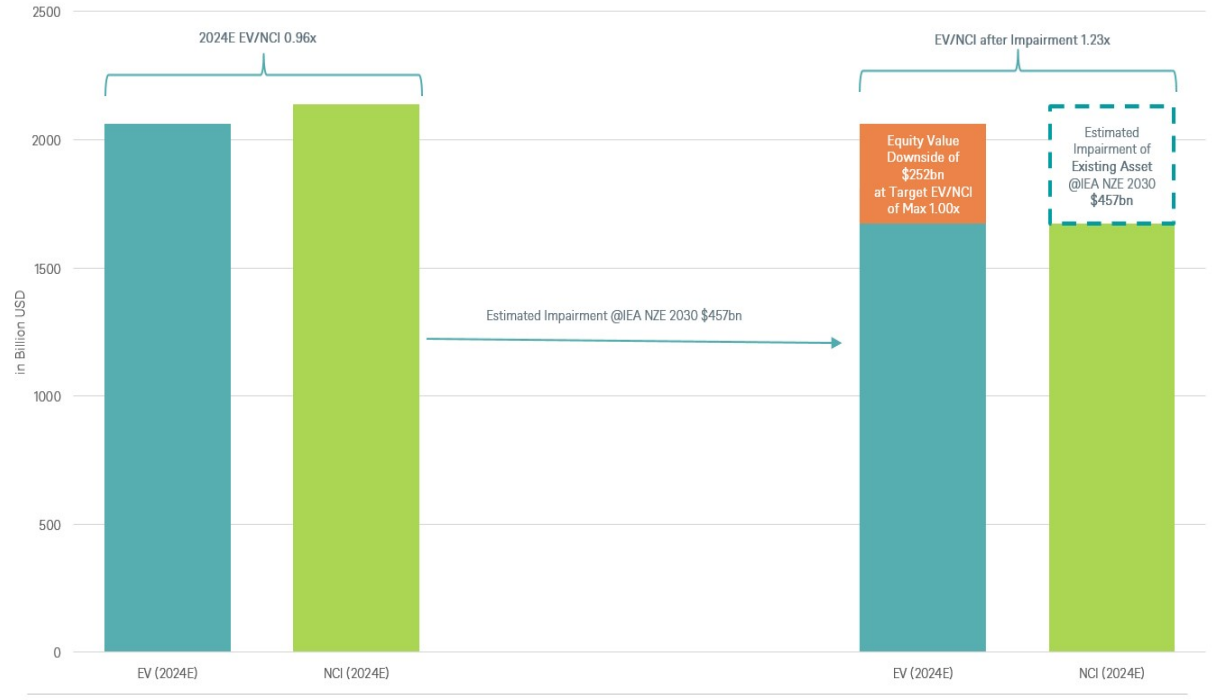
Source: Company Data, DWS, CROCI. Data as on 5 June 2024

Past performance does not predict future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Unless stated this data is as on June 2024.

We then need to assess how much of this estimated impairment, or loss of net asset value, is already priced in by the market. This requires an assessment of what the valuation multiple of the sector should ultimately be (target EV/NCI). For this purpose, we use the long-term asset multiple at which the sector has been trading—a median EV/NCI of 1.0x over the last ten years—which happens to be the asset multiple at which the sector currently trades based on 2024E NCI. When recalculated on a revised and impaired NCI basis (after the above estimated impairment of USD 457 billion) EV/NCI comes at 1.23x. Compared with a target maximum EV/NCI of 1.0x for each company, we can infer what portion of impairment is not yet priced by investors and thus the potential loss of equity value.

All in all, under the IEA NZE 2030 forecasts, CROCI analysis suggests that the equity value of Developed Market Energy companies would be USD 252 billion or thirteen percent lower than their current level in aggregate (Figure 23). At the company level, this stress test allows us to identify companies with the highest risk of impairment and consequent loss of equity value. In our coverage, potential losses range from zero to thirty percent of the current market capitalisation with a median loss at ten percent. Six companies are at risk of a loss of more than fifteen percent. Not surprisingly, most of these companies spent heavily during the peak of oil prices in the previous cycle and have therefore accumulated capex at a high price, as the price of oil & gas services and equipment generally evolve in synch with the price of the underlying commodity.

Figure 23: Estimated Impact of the IEA NZE 2030 Scenario on NCI and Equity Value of Developed Market Energy



Source: Company Data, DWS, CROCI. Data as on 5 June 2024

Since 2020, we have observed disciplined capex, barely allowing the replacement of depleted reserves at the current oil price and limiting the risk of additional impairment as confirmed by earnings publications since then.

We continue to closely monitor the evolution in the Energy sector though, in particular the capex trend and the climate transition path.

Fossil fuel vs renewables

Following a spectacular performance until 2020, the alternative energy industry has steadily been losing its valuation premium over the fossil fuel industry. Amidst intense competition from Chinese manufacturers, heightened inflation post-COVID-19 as well as supply chain/quality issues, the alternative energy sector has struggled to maintain its cash return, which has declined from 6.3% in FY16 to 3.8% in FY23 (Figure 24).

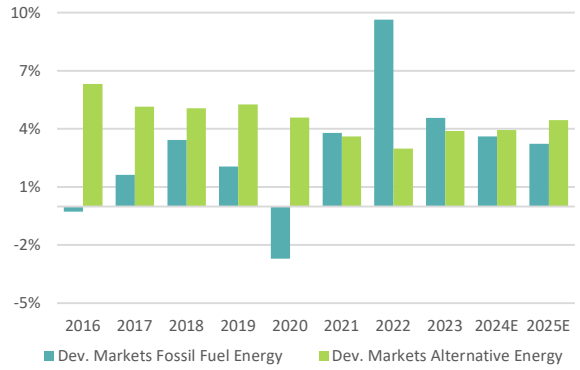
In contrast, the fossil fuel industry experienced a resurgence in profitability post COVID-19 due to rising oil and gas prices; the industry generated an average cash return of 6% between FY21 and FY23. This has prompted investors to shift their focus and significantly derate alternatives whose aggregate economic price-to-book declined from 2.4x in FY21 to 1.3x in FY24. By contrast, fossil fuel companies have re-rated since 2021.

Fossil fuel companies continue to demonstrate capital discipline despite high oil and gas prices which has resulted in decent returns even after the peak of 2022, but also superior free cash flow growth (10% p.a. on average since 2021) and above-average dividend yield and share buybacks. In contrast, alternatives are grappling with negative free cash flow due to lower profitability and higher capex thanks to climate transition efforts (Figure 25).

Amid declining profitability and a challenging business environment, many companies have not only impaired their investments in the alternative energy sector but also scaled back their alternative energy investment plans in 2023. In contrast, after significant impairments in 2020, the oil and gas industry has barely reported impairments since 2021. If oil prices remain elevated over an extended period (the average remaining life of upstream assets is 10 years) with continued disciplined capital expenditure, the industry may avoid having to charge major impairments on existing assets.

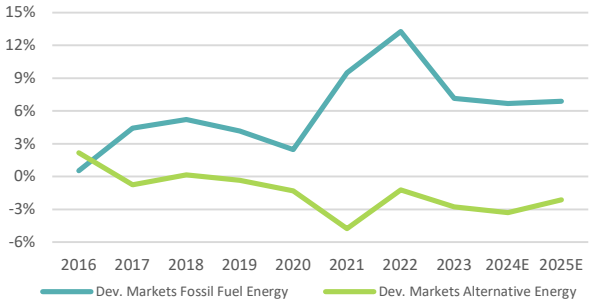
The fossil fuel industry currently trades in line with economic book value, within its long-term range. Alternative energy trades at nearly one-third above the economic book (Figure 26). Both industries are expected to generate sub-cost of-capital (4.5%) cash returns this year. Alternatives will need to show profitability improvements for their position as beneficiaries of the climate transition to translate into better valuation or face the risk of further de-rating in the short-to-medium term.

Figure 24: Profitability (CROCI cash return) of Fossil Fuel and Alternative Industries



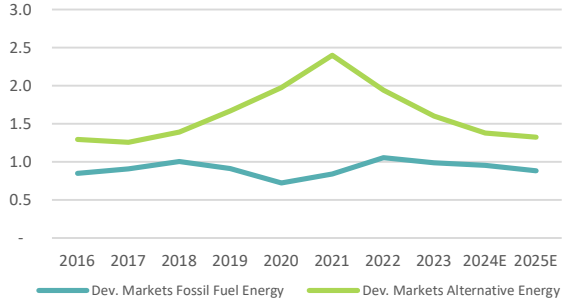
Source: DWS, CROCI. Data as on 10 June 2024

Figure 25: Free Cash Flow Yield of Fossil Fuel and Alternative Industries



Source: DWS, CROCI. Data as on 10 June 2024

Figure 26: Asset Valuation (EV/NCI) of Fossil Fuel and Alternative Industries



Source: DWS, CROCI. Data as on 10 June 2024

3/ Transport

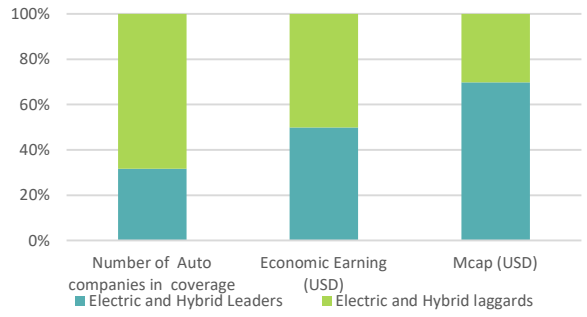
3.1 Automobiles

Electric/hybrid leaders clearly trade at a premium vs traditional ICE manufacturers

The century-long dominance of the internal combustion engine (ICE) is coming to an end, although the speed of this transition remains uncertain. The global shift towards zero-emission vehicles, driven by increased environmental awareness and government initiatives, has prompted both consumers and policymakers to embrace electric vehicles (EVs) as a cleaner alternative. This shift in perspective has sparked remarkable changes within the automotive sector and given rise to new-age automakers such as Tesla Inc. and BYD Company. In recent years, the share price of EV pioneer Tesla has outperformed those of traditional automakers, propelling it to become the world's most valuable car company in terms of market capitalization.

Automakers at the forefront of electric and hybrid vehicles are generally enjoying higher valuations than traditional automakers who are trailing behind in this area. Companies leading in electric and hybrid vehicles currently represent 70% of aggregate automobile CROCI market capitalization[14] and contribute 50% of the overall automobile CROCI economic earnings (Figure 27). By contrast, traditional automakers lagging in the electric and hybrid vehicles segment, despite contributing 50% of the CROCI automobile economic earnings, only account for 30% of the total automobile CROCI market capitalization.

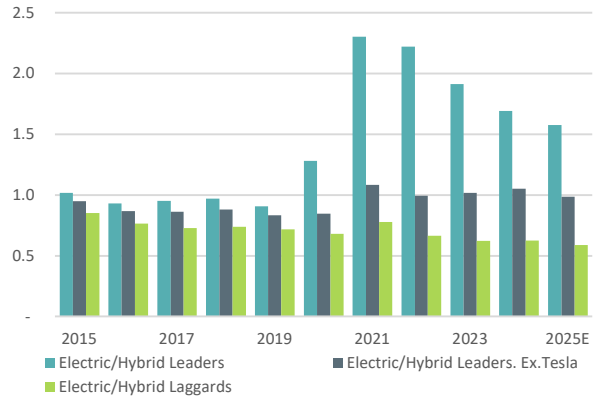
Figure 27: Electric and Hybrid Leaders vs Laggards' Contribution to Economic Profit and to Market Capitalization



Source: DWS, CROCI. Data as on 06 June 2024
Electric and Hybrid Leaders: Companies with more than 20% of volumes derived from electric or hybrid vehicles
Electric and Hybrid laggards: Companies with less than 20% of volumes derived from electric or hybrid vehicles

There is also a noticeable valuation premium in asset multiple metrics (Figure 28). Leaders in electric and hybrid vehicles are trading at 1.9x EV/NCI (avg. 2021-2025E), while laggards are trading at 0.7x EV/NCI (avg. 2021-2025E). Even excluding Tesla from the equation, the remaining leaders in electric and hybrid vehicles still maintain a premium at 1.0x EV/NCI (avg. 2021-2025E).

Figure 28: Asset Multiple (EV/NCI) of Automakers in Coverage



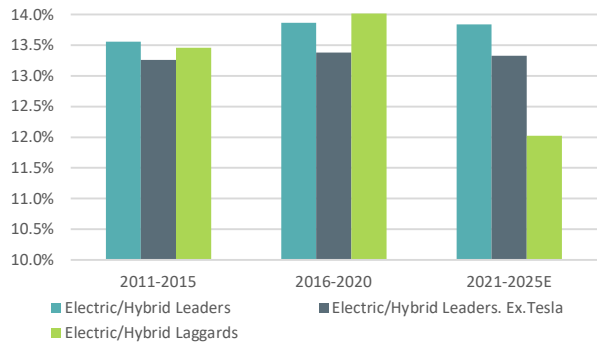
Source: DWS, CROCI. Data as on 06 June 2024
Electric and Hybrid Leaders: Companies with more than 20% of volumes derived from electric or hybrid vehicles
Electric/Hybrid Leaders. Ex.Tesla: Companies with more than 20% of volumes derived from electric or hybrid vehicles, excluding Tesla.
Electric and Hybrid laggards: Companies with less than 20% of volumes derived from electric or hybrid vehicles

The frontrunners in the electric and hybrid vehicle are currently enjoying a premium position due to their consistent reinvestment in the business, allowing them to expand their manufacturing capabilities in preparation for the anticipated increase in EVs production. Conversely, laggards in the same sector have seen a decline in capital expenditure and research and development spending as they adopt a more cautious approach to investments amid uncertainties in the pathway to net-zero for the automotive industry (Figure 29). The percentage of sales allocated to capital expenditure and research and development for electric and hybrid vehicle laggards is projected to decrease from 14.0% (average for 2016-2020) to 12.0% (average for 2021-2025E). Traditional automakers like General Motors and Ford Motor have decided to delay their EV investment plans to synchronize production with decreased demand caused by rising inflation and interest rates. This strategic move is aimed at preserving capital and potentially enhancing short-term margins and free cash flow.

[14] Refer to Figure 37 for aggregated data of automobile companies in CROCI's global coverage.

Mercedes-Benz has also delayed its electrification target, extending the timeline by five years, previously aiming for 50 percent of new vehicle sales to be electric by 2025. These recent developments raise concerns about the ability of many traditional automakers to successfully transition to EVs in the long-term.

Figure 29: Capex Including Research and Development (R&D) Spending as Percentage of Sales



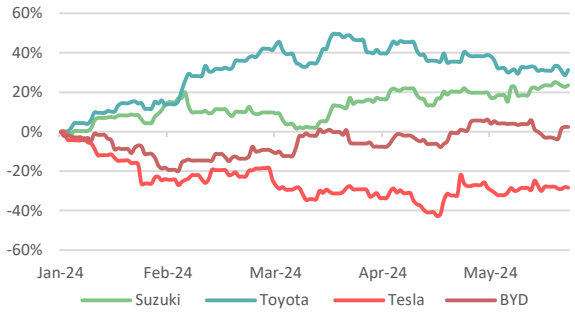
Source: DWS, CROCI. Data as on 06 June 2024
Electric and Hybrid Leaders: Companies with more than 20% of volumes derived from electric or hybrid vehicles.
Electric/Hybrid Leaders. Ex.Tesla: Companies with more than 20% of volumes derived from electric or hybrid vehicles, excluding Tesla.
Electric and Hybrid Laggards: Companies with less than 20% of volumes derived from electric or hybrid vehicles.

The valuation premium of EV only leaders has recently receded vs Hybrid leaders

More recently, the premium of BEV manufacturers vs. hybrid leaders has receded after several months of underperformance by the former reflecting intensifying competition between Tesla and BYD. The challenging economic environment, coupled with a price war initiated by Tesla, has prompted traditional automakers to reduce the prices of EVs, impacting their already struggling electric/hybrid segment. These aggressive price cuts significantly impacted margins which, together with concerns about slower adoption of EVs, have led to a nearly 30% decrease in Tesla's shares year-to-date (Figure 30). Similarly, other BEV manufacturers have witnessed declines in their stock prices. Lucid Group has seen a decline of almost 34% this year to date, while Rivian's shares have nearly halved.

In the meantime, and contrary to earlier views, hybrids have been projected to remain significant in the market for the foreseeable future, especially considering the hurdles faced by drivers of pure EVs, in particular lack of charging infrastructure and limited driving range, which remain significant obstacles and sources of frustration. These factors, among others, have contributed to an increase in the stock prices of hybrid technology leaders such as Toyota Motor.

Figure 30: Share Price Performance of EV leaders vs. Hybrid Leaders



Source: DWS, CROCI. Data as on 31 May 2024.
Toyota and Suzuki have been recognized as frontrunners in the hybrid market, while Tesla and BYD have been identified as EV leaders.

Is climate risk adequately reflected in the valuations of automobile companies?

The gap in asset multiples between EV leaders and EV laggards suggests that there is a higher expected return (i.e. a lower valuation) compensating for the higher risk for the companies that are the most exposed to the climate transition. This does not mean that current valuations fully capture these risks and opportunities, though, especially given the uncertainties surrounding the regulatory and policy framework expected to evolve in the future.

The lower valuations of EV laggards are also a reflection of the substantial investments in research and development and additional manufacturing capabilities required for the necessary ramp-up in EV production—with ICE and EV platforms running in parallel in the transition phase—as well as the narrower profit margins and higher financial leverage associated with the transition in the short to medium term. For example, in the first quarter of 2024, Ford Motor experienced a significant loss of over USD 100,000 per electric vehicle manufactured[15], primarily due to considerable selling price decreases, while production costs on those EVs are still higher than for ICE (in the absence of economies of scale). In the meantime, leaders in electric and hybrid vehicles are well-positioned to capitalize on opportunities arising from the climate transition boosting their EV sales and offsetting the decline in ICE vehicle sales, thereby commanding a valuation premium.

The valuation premium of EV/hybrid leaders is also influenced in the short-to-medium term by political decisions on emission thresholds and penalties which set the regulatory landscape for the sector as well as the pace of the transition to full EVs. In the United States, for instance, the Environmental Protection Agency has recently implemented a "technology-neutral" regulatory framework[16] that provides automakers with greater flexibility in meeting emissions standards through hybrid technology. In the

[15] Ford Motor Q1 2024 earnings presentation.

[16] https://www.epa.gov/newsreleases/biden-harris-administration-finalizes-strongest-ever-pollution-standards-cars-position

EU, the potential change in leadership within European institutions could potentially lead to a re-evaluation[17] of the 2035 deadline for phasing-out the sale of ICE vehicles, despite the significant progress made by the automotive industry in transitioning to EVs.

In the ever-evolving landscape of the automotive industry, valuations (and any valuation premium given to the companies perceived to be navigating the transition most successfully) are a function of the challenges posed by evolving technologies, shifts in narrative, and varying levels of support from policymakers. In the meantime, these valuations and the relative premium and discount between transition leaders and laggards have been mostly influenced by relatively short-term trends in financials and market noise; including their ability to make high initial investments required for EV profitable by reaching break even volumes.

In the long run, as manufacturers prioritize profit margins over volume, there is a plausible scenario where auto manufacturers pass on (part of) the cost of transitioning to consumers which could result in decreasing demand for automobiles, creating more uncertainty for the billions of capital invested in the transition to EVs. This could result in excess production capacity in addition to existing ICE overcapacity, amidst weak global demand. The inevitable outcome of this overcapacity may involve the closure of manufacturing facilities, brand consolidation or the cessation of operations for weaker brands.

Even though current leaders in the EV industry may continue to lead, companies that are currently falling behind will need to innovate and adapt. Failing to do so would bring them into the vicious circle of lower returns, financial challenges, and reduced equity valuation, ultimately resulting in a potential struggle for survival. Partnerships or government assistance may help. Japanese automaker Subaru Corporation recently highlighted its struggle associated with the EV transition, stating that there's too much risk in building new electric models on their own, and they will now rely more on Toyota Motors for help[18]. Subaru's CEO emphasized that "*through this approach of joint development, joint production, and joint supply, we will ensure flexibility in the areas of development and production while mitigating risks with TMC (Toyota) at a time when it is difficult to clearly predict future trends.*"

[17] https://www.france24.com/en/live-news/20240506-eu-election-could-force-sharp-turn-in-electric-car-policy

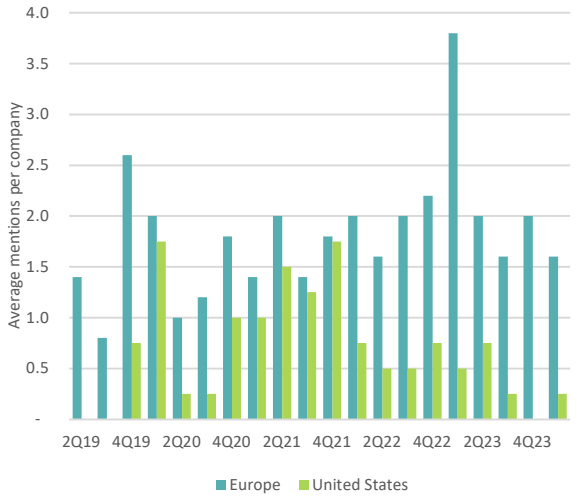
[18] https://contents.xj-storage.jp/xcontents/AS07355/12051317/cae2/4c4e/8e64/cc4070eb6188/20240510202407853s.pdf

3.2 Airlines

The recent policy change of the EU Emissions Trading Scheme presents an opportunity to assess the impact of carbon pricing on the aviation industry's valuations. With aviation being the most emission-intensive mode of transport, it's crucial to determine whether investors are fairly pricing in climate risk.

The EU has more stringent and costly environmental regulations for airlines than the US. The EU Emissions Trading Scheme requires all airlines operating in Europe[19] to pay for excess emissions beyond their allocated free allowances (and such free allowances are about to be completely phased out in the next couple of years[20]). In contrast, US airlines follow a voluntary and less stringent framework under ICAO's CORSIA scheme[21]. European regulations will necessarily impact the economics of airline companies, returns on capital and/or flight costs and may affect the dynamic of low-cost air travel in Europe. As an illustration of how much of a concern the topic is, we show below our survey of the frequency of discussions about climate issues during investor calls by European airlines compared to their US counterparts in recent years (Figure 31).

Figure 31: Frequency of Climate Issues Being Discussed at Earning Calls of Airline Companies

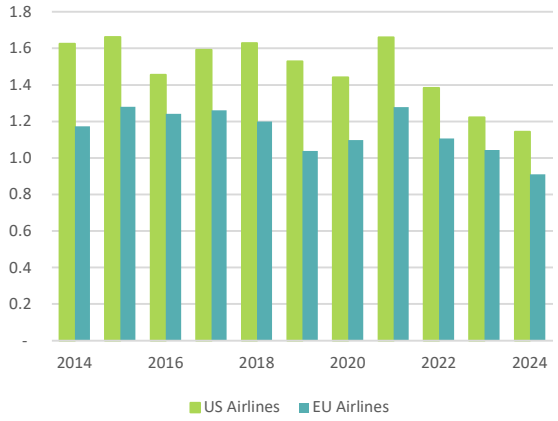


Source: DWS, CROCI. Bloomberg Finance L.P. Data as on 14 May 2024.
The frequency depicted in the graph above represents the unique instances in which airlines within CROCI coverage have addressed the topic of 'Greenhouse Gas Emissions' in their filings of presentations and transcripts. This encompasses direct mentions of discussions regarding 'Greenhouse Gas Emissions' and related terms like 'CO2 emissions'.

The core question of whether the risks of climate change are reflected in airline valuations comes down to perspective.

It is evident that EU and US airlines have been trading on different valuation multiples for over a decade (Figure 32). EU airlines have been trading on an average asset multiple (EV/NCI) of 1.04x over the 2022-2024E period, while US airlines have been trading on an average 1.25x. But despite the recent implementation of a stricter and more punitive regulatory framework in the EU, there is no noticeable trend of a sustained increase in the discount at which EU airlines trade compared to US airlines over time. In fact, in recent years there has been a gradual narrowing of the valuation gap between the two regions. Is this narrowing discount a reflection of the likely future introduction of the emissions trading scheme for airlines in the US?

Figure 32: Asset Multiple (EV/NCI) of US and EU Airlines in Coverage



Source: DWS, CROCI. Data as on 06 June 2024

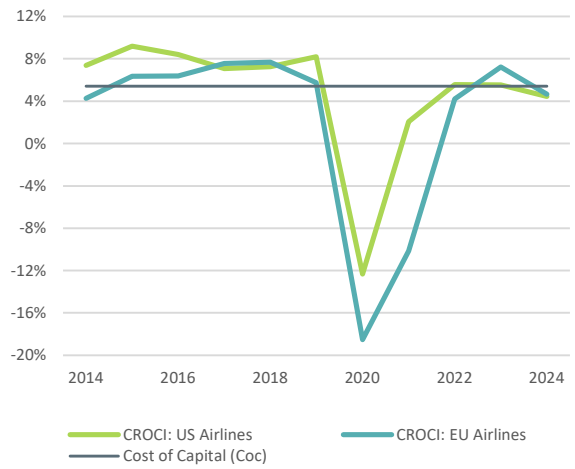
Pinpointing the exact reason for the recent decrease in the asset multiple of US airlines is challenging, as factors such as rising fuel prices, trade tensions, geopolitical risks, Boeing737 MAX fleet grounding, and supply chain disruptions from Boeing can all impact returns and asset multiples. What we observe is that the differences in returns on capital (CROCI cash return) between the US and EU airlines, while historically in favour of US airlines and possibly a reason for their valuation premium, has disappeared if not reversed recently (Figure 33). This may explain part of the decline in the US airlines valuation premium.

[19] https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-aviation_en#:

[20] https://www.europarl.europa.eu/legislative-train/package-fit-for-55/file-revision-of-the-eu-emission-trading-system-for-aviation

[21] https://www.faa.gov/about/office_org/headquarters_offices/apl/aee/corsia

Figure 33: EU and US Airlines' Cash Return on Capital Invested (CROCI)



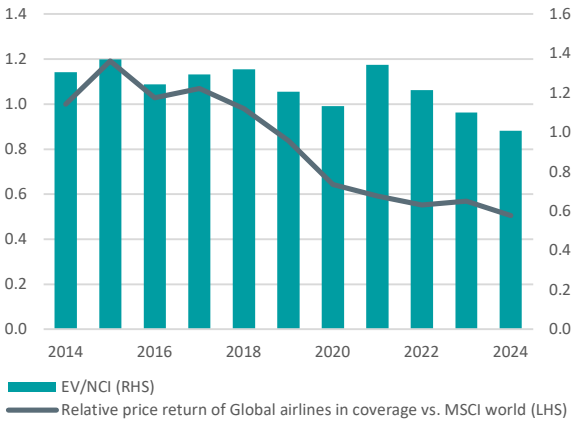
Source: DWS, CROCI. Data as on 06 June 2024

The possible absence of climate risk evidence in the relative valuation between EU and US may be attributed to the unique characteristics of the aviation sector, where loss of competitiveness of regulated (EU) vs. less regulated (US) firms is not as significant as in some other industries. Airline companies compete 'on a route by route' basis regardless of their nationality. Additionally, airlines' key asset, their aircraft fleet, can be relocated, allowing them to shift operations to non-regulated routes and potentially cause carbon leakage.

Considering the industry as a whole, i.e. global airlines[22], the ability to transition is contingent upon several key factors. Transition will come at a cost for sure and will be a combination of the cost of carbon allowances to cover CO2 emissions and the need to invest into less emitting aircrafts, whether more (energy) efficient aircrafts or running more on sustainable aviation fuel. Every new generation of aircraft has successfully decreased emissions[23] by approximately 15-20%, which is a promising advancement in sustainability within the aviation industry. Running sensitivity analysis under several scenarios we conclude that this cost/capex will no doubt be very significant and could possibly wipe out almost the entire operating profit. Ultimately the actual impact on return and valuation will depend on the exact trajectory taken and is very difficult to assess as of today, given the number of unknown parameters in the equation.

What we can say at this stage is that in the light of the current lacklustre returns generated by the industry, airlines will need to share the cost to transition with other stakeholders or risk going out of business. There is potential for airlines to pass some of these costs on to their clients, taking advantage of their pricing power amidst a seemingly steady increase in demand for air travel. The International Air Transport Association (IATA)[24] expects passenger demand to grow annually by 3.8% for the period 2023-2043. The price increase passed on by airlines and the sensitivity of demand to these fluctuations in airline ticket prices will ultimately determine the overall impact on the industry returns.

Figure 34: EV/NCI and Relative Share Price Performance of Global Airlines



Source: DWS, CROCI. Bloomberg Finance L.P Data as on 6 June 2024

Investors are starting to take climate risks into consideration; however, current valuations may not adequately factor in these future risks (Figure 34). The extent to which climate transition risk impacts valuations will vary depending on the company's and industry's chosen mitigation strategies and transition pathway.

[22] Refer to Figure 38 for aggregated data of airline companies in CROCI's global coverage.

[23] https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet-new-aircraft-technology/#:~:text

[24] https://www.iata.org/en/pressroom/2024-releases/2024-06-03-01/#:

4/Conclusion

Our conclusion is simple: short term returns and trends in financials remain the key drivers of stock performance and investors have been relatively short-sighted on climate risks. One example of an opposing factor in recent years is the rise in oil prices which benefited oil & gas companies. Climate transition and physical risks will undoubtedly impact the financials of the most exposed companies at some stage. But the willingness or capacity of investors to anticipate and integrate these risks in stock prices is not linear and so far, doesn't seem to have grown with time, even though consequences of the transition become more negative with every passing year that sees another (Net Zero Emissions) target missed.

In the meantime, investors tend to price risks as they are perceived and as they materialize, whether in terms of regulation guiding the transition path or in terms of physical impact. For this reason, we fear a 'Climate Minsky moment' and abrupt integration of climate risk at discrete points in time over the coming decades.

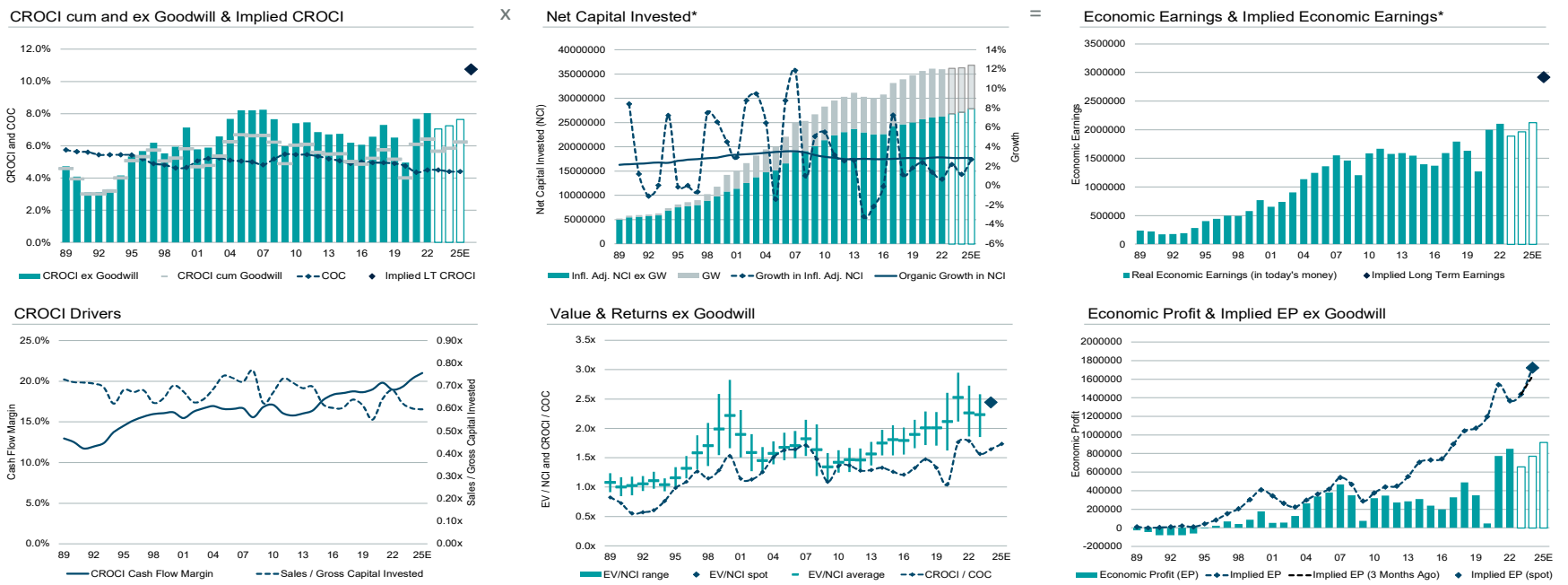
Continuous, close monitoring of climate risk at both industry and company level remains key given the specific risks and decarbonation trajectories. In particular, investors need to understand how these risks are likely to materialise in each specific industry, how they are likely to be addressed, what the transition implies in terms of spending and capital allocation, and the ability of companies to share the cost of transitioning with other stakeholders.

In addition, there must be regular stringent stress testing of the longer-term sustainability of the most exposed companies, based on the most aggressive path to Net Zero, as deemed necessary by reference to climate or energy organisations. This is the approach followed by CROCI with the objective of eliminating from coverage all those companies whose sustainability is at risk in the medium or long term. With this pre-requisite in place, we think that CROCI's economic valuation metric based on current levels of profitability remains an efficient value signal, incorporating all the adjustments to accounting metrics that allow meaningful comparison of companies across different sectors and countries[25]. The CROCI Economic PE metric remains our central signal when systematically selecting companies for our Core Value strategies.

[25] As most recent illustration, refer CROCI publication: Carbon Allowances and Financial Accounts (2023)

5/ Appendix

Figure 35: Global Equities CROCI

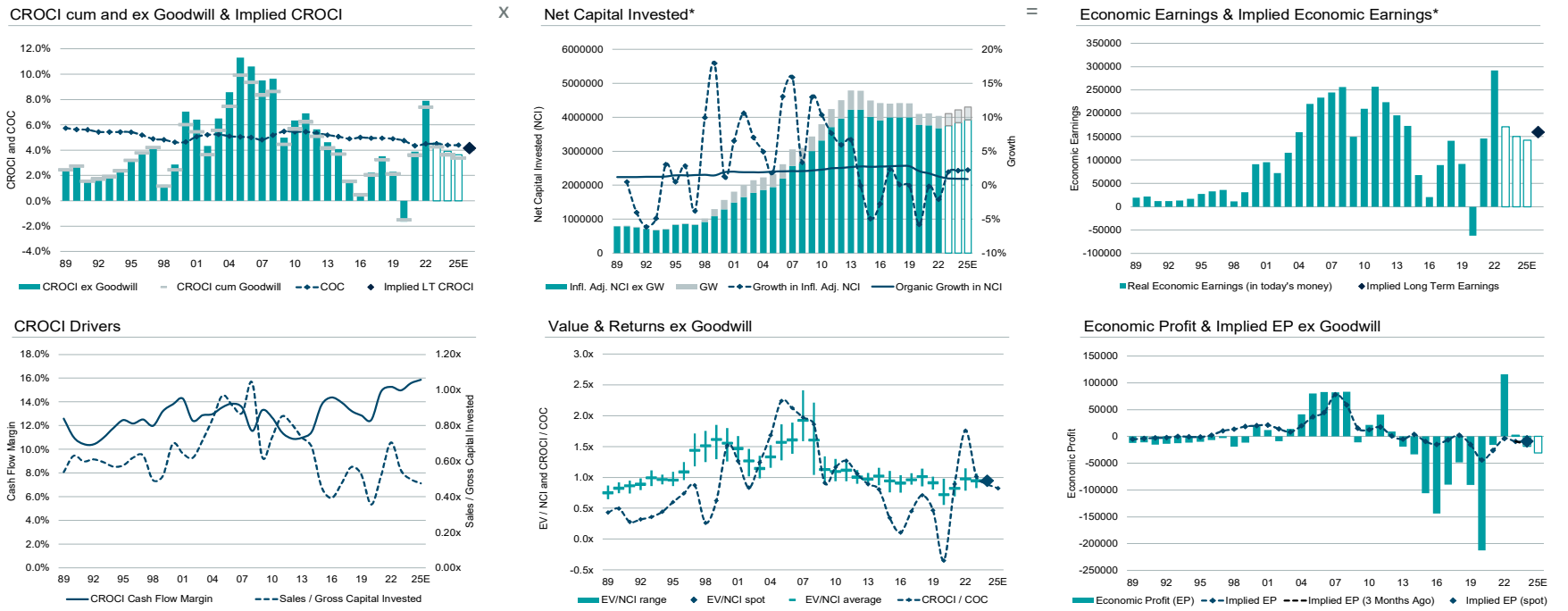


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Enterprise Value (USD bn)	17854	20191	24913	23230	20512	23264	25439	26527	29524	32481	33396	33652	38539	42050	43637	47801	58658	54480	57840	66300	65008
Market Cap (USD bn)	14468	16645	20732	17804	15027	17861	19548	20243	23332	26090	26729	26537	30655	33458	34507	38403	49399	45227	48332	57252	57228
EV/NCI Ex. GW	1.68x	1.71x	1.82x	1.63x	1.34x	1.42x	1.47x	1.46x	1.56x	1.75x	1.81x	1.79x	1.89x	2.01x	2.01x	2.11x	2.52x	2.26x	2.23x	2.44x	2.28x
Economic PE	20.4x	20.8x	22.1x	21.4x	22.5x	19.2x	19.7x	21.4x	23.3x	26.0x	29.2x	29.6x	28.9x	27.5x	30.8x	42.6x	32.9x	28.1x	31.7x	33.8x	29.9x
Accounting PE	15.1x	15.4x	16.5x	15.6x	15.7x	13.2x	13.0x	13.8x	15.7x	17.2x	19.3x	18.8x	18.4x	17.5x	19.1x	24.8x	20.1x	16.8x	18.8x	20.8x	18.7x
Cost of Capital	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.50%	4.40%	4.40%
CROCI Ex. GW	8.2%	8.2%	8.2%	7.6%	6.0%	7.4%	7.5%	6.9%	6.7%	6.7%	6.2%	6.1%	6.6%	7.3%	6.5%	5.0%	7.7%	8.0%	7.0%	7.2%	7.6%
Implied CROCI	8.5%	8.5%	8.8%	8.5%	7.4%	7.7%	8.0%	7.8%	8.1%	8.9%	8.9%	9.0%	9.4%	9.9%	9.8%	10.0%	11.0%	10.2%	10.1%	10.8%	10.0%
Implied Economic Earnings/ Economic Earnings	103%	104%	106%	111%	123%	105%	107%	114%	121%	132%	143%	148%	143%	136%	151%	202%	143%	127%	143%	149%	132%
Inflation Adj. Net Capital Invested Ex. GW (USD bn)	10654	11833	13687	14212	15256	16367	17342	18126	18898	18542	18487	18771	20358	20952	21723	22609	23246	24092	25884	27135	28462
Accounting Net Capital Employed Ex. GW (USD bn)	6742	7402	8482	8790	9190	9892	10649	11196	11728	11600	11510	11681	12682	12937	14325	14709	15085	15580	16304	16849	17561
Percentage of Sales Cap'd. (Avg. Life of Intangibles) 3% (6)																					
Economic Life (Age) of Tangible Assets - in years	16 (7)	16 (7)	16 (7)	16 (7)	16 (7)	16 (7)	16 (7)	15 (7)	15 (7)	15 (7)	15 (7)	15 (7)	15 (7)	15 (7)	14 (7)	14 (7)	14 (7)	14 (7)	14 (7)	14 (7)	14 (7)
Accounting Life (Age) of Tangible Assets - in years	16 (9)	16 (9)	16 (9)	16 (9)	17 (10)	18 (10)	17 (10)	17 (10)	18 (10)	17 (10)	17 (10)	17 (10)	18 (10)	17 (10)	16 (9)	17 (10)	16 (10)	17 (10)	17 (10)	17 (10)	17 (10)

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of industrial (ex. financials) companies in CROCI's global coverage. Data in USD as on 05 June 2024. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect. "E" after a year indicates that the numbers are based on consensus forecasts. *Displayed in today's money.

Past performance does not predict future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Market and index performance data is sourced from Bloomberg Finance L.P. Company data is from the CROCI database. Unless stated this data is as of June 2024.

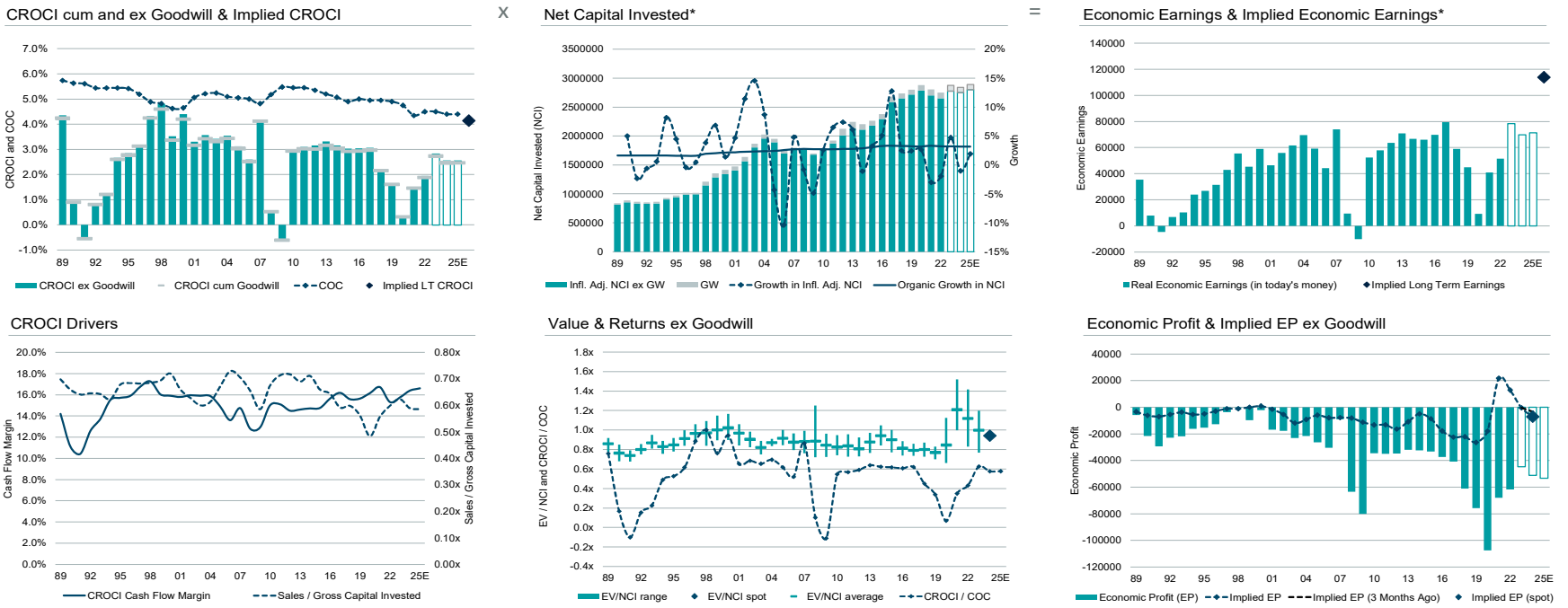
Figure 36: Global Energy



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Enterprise Value (USD bn)	2006	2370	3376	3004	2470	2662	3119	3095	3249	3482	3095	2917	3188	3426	3153	2389	2751	3314	3459	3630	3530
Market Cap (USD bn)	1930	2263	3273	2790	2181	2323	2679	2588	2704	2882	2480	2265	2533	2796	2466	1675	2089	2751	2908	3122	3122
EV/NCI Ex. GW	1.57x	1.61x	1.93x	1.61x	1.13x	1.09x	1.12x	1.00x	0.97x	1.02x	0.94x	0.91x	0.96x	1.01x	0.91x	0.72x	0.82x	0.97x	0.94x	0.95x	0.88x
Economic PE	13.9x	15.1x	20.2x	16.7x	22.6x	17.3x	16.1x	17.8x	21.0x	25.0x	56.0x	nm	43.0x	28.7x	39.8x	nm	21.2x	12.3x	20.7x	24.1x	24.3x
Accounting PE	9.3x	9.8x	13.1x	11.0x	14.5x	11.2x	9.7x	10.4x	12.4x	14.7x	29.3x	49.7x	20.6x	14.7x	16.6x	nm	9.4x	6.2x	9.3x	10.9x	10.6x
Cost of Capital	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.50%	4.40%	4.40%
CROCI Ex. GW	11.3%	10.6%	9.5%	9.6%	5.0%	6.3%	6.9%	5.7%	4.6%	4.1%	1.7%	0.5%	2.2%	3.5%	2.3%	-1.7%	3.9%	7.9%	4.6%	3.9%	3.6%
Implied CROCI	7.9%	8.0%	9.3%	8.3%	6.2%	6.0%	6.1%	5.4%	5.0%	5.2%	4.6%	4.5%	4.8%	5.0%	4.5%	3.4%	3.6%	4.4%	4.2%	4.2%	3.9%
Implied Economic Earnings/ Economic Earnings	70%	76%	98%	86%	124%	94%	88%	95%	109%	127%	274%	856%	213%	142%	195%	nm	92%	55%	93%	106%	107%
Inflation Adj. Net Capital Invested Ex. GW (USD bn)	1280	1475	1754	1871	2190	2431	2795	3080	3348	3411	3288	3216	3318	3385	3461	3317	3350	3401	3668	3837	4001
Accounting Net Capital Employed Ex. GW (USD bn)	938	1105	1301	1378	1566	1745	2031	2229	2429	2449	2319	2289	2345	2335	2488	2313	2317	2325	2412	2498	2563
Percentage of Sales Cap'd. (Avg. Life of Intangibles) 0.0% (5)																					
Economic Life (Age) of Tangible Assets - in years	18 (9)	18 (9)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)
Accounting Life (Age) of Tangible Assets - in years	19 (10)	19 (10)	19 (10)	17 (9)	17 (9)	17 (9)	18 (10)	18 (9)	18 (9)	17 (9)	17 (9)	18 (10)	19 (10)	20 (11)	19 (11)	20 (12)	20 (12)	21 (13)	21 (13)	21 (13)	21 (13)

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of Energy companies in CROCI's global coverage. Data in USD as on 05 June 2024. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect. "E" after a year indicates that the numbers are based on consensus forecasts. *Displayed in today's money.

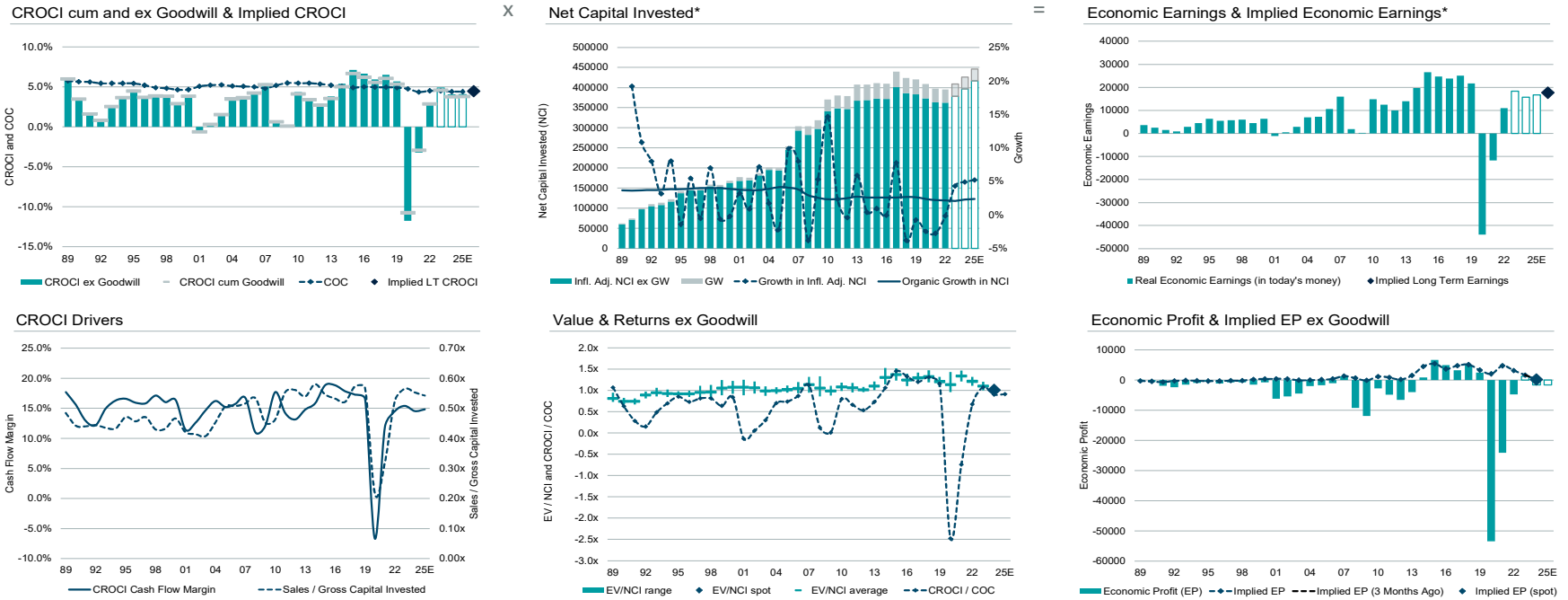
Figure 37: Global Automobiles



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Enterprise Value (USD bn)	1253	1110	1200	1206	1111	1151	1239	1283	1485	1595	1598	1548	1714	1794	1793	2056	2897	2703	2642	2589	2548
Market Cap (USD bn)	451	546	616	490	447	583	655	653	854	932	892	771	858	860	770	993	1935	1795	1704	1653	1654
EV/NCI Ex. GW	0.91x	0.88x	0.88x	0.88x	0.84x	0.83x	0.84x	0.81x	0.88x	0.94x	0.90x	0.81x	0.79x	0.80x	0.77x	0.85x	1.21x	1.12x	1.00x	0.94x	0.89x
Economic PE	29.3x	33.6x	21.2x	nm	nm	27.7x	27.0x	25.5x	26.4x	29.8x	29.7x	26.8x	25.8x	36.0x	46.4x	nm	79.8x	57.5x	35.4x	37.1x	34.9x
Accounting PE	12.1x	18.7x	12.8x	nm	nm	10.2x	9.3x	8.8x	10.0x	10.6x	9.9x	8.4x	8.5x	9.6x	10.6x	19.5x	15.1x	13.1x	10.3x	11.1x	10.6x
Cost of Capital	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.50%	4.40%	4.40%
CROCI Ex. GW	3.1%	2.6%	4.2%	0.5%	-0.6%	3.0%	3.1%	3.2%	3.3%	3.2%	3.0%	3.0%	3.1%	2.2%	1.7%	0.3%	1.5%	1.9%	2.8%	2.5%	2.5%
Implied CROCI	4.6%	4.4%	4.3%	4.6%	4.6%	4.5%	4.6%	4.3%	4.6%	4.8%	4.4%	4.1%	3.9%	4.0%	3.8%	4.0%	5.3%	5.0%	4.5%	4.1%	3.9%
Implied Economic Earnings/ Economic Earnings	148%	168%	102%	860%	nm	151%	147%	137%	137%	151%	146%	134%	127%	178%	227%	nm	347%	259%	159%	163%	154%
Inflation Adj. Net Capital Invested Ex. GW (USD bn)	1371	1268	1360	1362	1315	1395	1481	1589	1694	1692	1775	1904	2168	2242	2332	2433	2397	2417	2651	2749	2871
Accounting Net Capital Employed Ex. GW (USD bn)	1044	919	990	982	914	952	1009	1116	1219	1259	1319	1427	1625	1671	1756	1791	1716	1699	1851	1894	1964
Percentage of Sales Cap'd. (Avg. Life of Intangibles) 4% (6)																					
Economic Life (Age) of Tangible Assets - in years	9 (4)	9 (4)	9 (4)	9 (5)	9 (5)	10 (5)	9 (5)	9 (5)	9 (5)	9 (5)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)	9 (4)
Accounting Life (Age) of Tangible Assets - in years	10 (6)	11 (6)	11 (6)	10 (6)	11 (7)	12 (8)	12 (8)	12 (8)	12 (8)	11 (7)	11 (6)	11 (6)	11 (6)	10 (6)	10 (6)	11 (7)	11 (7)	12 (7)	12 (7)	12 (7)	11 (7)

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of automobile companies in CROCI's global coverage. Data in USD as on 05 June 2024. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect. "E" after a year indicates that the numbers are based on consensus forecasts. *Displayed in today's money.

Figure 38: Global Airlines



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023E	2024E	2025E
Enterprise Value (USD bn)	135	177	235	216	218	275	279	270	314	378	407	374	424	424	392	366	426	398	401	401	398
Market Cap (USD bn)	64	92	129	90	72	108	97	83	126	184	222	185	223	221	190	156	189	160	171	174	174
EV/NCI Ex. GW	1.02x	1.05x	1.13x	1.06x	0.99x	1.08x	1.06x	1.01x	1.10x	1.30x	1.37x	1.24x	1.29x	1.32x	1.21x	1.13x	1.34x	1.21x	1.10x	1.01x	0.93x
Economic PE	27.3x	24.0x	20.9x	nm	nm	24.8x	29.4x	35.4x	29.0x	24.3x	19.2x	18.7x	21.8x	20.3x	21.2x	nm	nm	40.0x	22.7x	25.4x	23.3x
Accounting PE	16.8x	16.2x	13.3x	nm	nm	12.4x	16.0x	25.7x	18.7x	12.9x	9.4x	9.2x	11.3x	10.3x	9.7x	nm	nm	32.8x	8.9x	8.8x	7.7x
Cost of Capital	5.05%	5.00%	4.82%	5.18%	5.48%	5.45%	5.45%	5.35%	5.20%	5.07%	4.90%	5.00%	4.95%	4.95%	4.90%	4.75%	4.35%	4.50%	4.50%	4.40%	4.40%
CROCI Ex. GW	3.7%	4.3%	5.4%	0.7%	0.1%	4.4%	3.6%	2.9%	3.8%	5.4%	7.1%	6.6%	5.9%	6.5%	5.7%	-11.8%	-3.2%	3.0%	4.8%	4.0%	4.0%
Implied CROCI	5.1%	5.2%	5.5%	5.5%	5.4%	5.9%	5.8%	5.4%	5.7%	6.6%	6.7%	6.2%	6.4%	6.5%	5.9%	5.4%	5.8%	5.5%	5.0%	4.4%	4.1%
Implied Economic Earnings/ Economic Earnings	138%	120%	101%	831%	nm	135%	160%	189%	151%	123%	94%	94%	108%	101%	104%	nm	nm	180%	102%	112%	102%
Inflation Adj. Net Capital Invested Ex. GW (USD bn)	132	170	207	204	220	255	263	266	285	290	297	301	328	321	325	323	318	328	364	397	427
Accounting Net Capital Employed Ex. GW (USD bn)	79	91	105	107	114	124	126	127	134	139	150	159	181	192	227	217	198	185	197	208	221
Economic Life (Age) of Tangible Assets - in years	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	17 (8)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)	16 (8)
Accounting Life (Age) of Tangible Assets - in years	18 (8)	18 (8)	18 (8)	17 (8)	18 (9)	19 (9)	17 (9)	17 (9)	18 (9)	18 (9)	18 (9)	18 (9)	19 (9)	17 (8)	16 (7)	16 (7)	17 (8)	17 (9)	18 (9)	18 (9)	18 (9)

Source: Company reports, Bloomberg Finance L.P., DWS and CROCI. The table shows aggregate data of airline companies in CROCI's global coverage. Data in USD as on 05 June 2024. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect. "E" after a year indicates that the numbers are based on consensus forecasts. *Displayed in today's money.

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CROCI Company Research

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