

An aerial, top-down view of a complex industrial facility, likely a refinery or chemical plant, captured at night. The scene is illuminated by artificial lights, creating a mix of bright yellow and green highlights against the dark background. The facility is a dense network of pipes, walkways, and large cylindrical tanks. In the upper portion of the image, there are several large, dark, circular tanks arranged in rows. A prominent feature in the lower-middle section is a tall, cylindrical structure with a red band near its top. The overall impression is one of a large-scale, intricate industrial operation.

Fitch Ratings

Regulatory Risk Amid Global Emissions Gap

Carbon Pricing

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Climate Policy Risk Exposure: 4 Key Characteristics

This paper is the first in a series exploring four aspects of climate policy risk from a credit perspective:



Source: Fitch Ratings

Related Research

[What Investors Want to Know: ESG Relevance Scores \(Feb 2019\)](#)

[EU's High CO2 Prices to Accelerate Utilities' Transition \(Feb 2019\)](#)

[High Carbon Prices, Policy Changes to Weigh on EMEA Steelmakers \(Aug 2019\)](#)

[European Autos Face Electrification Challenge \(Sep 2019\)](#)

[What Investors Want to Know: Utilities' Carbon Dioxide \(Jan 2019\)](#)

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Global Emissions Gap Creating Policy Risk

Most countries lag substantially behind their existing Nationally Determined Contribution (NDC) pledges, let alone the emissions trajectories required to limit warming to 1.5C. This increases the risk of a rapid increase in the scope of climate regulation given the timings (2020 and 2023) of the stock-take of NDC performance and 'ratchet' mechanisms of the Paris Agreement.

Main Lever to Address the Emissions Gap

The impetus to turn pledges into action is far from uniform across the world. The effectiveness of carbon pricing schemes in reducing emissions is limited by low coverage and prices – although this is beginning to change in EMEA, Latin America and Asia Pacific. Carbon pricing is a technology-agnostic policy measure so prices, coverage and exemptions may tighten to align with NDCs.

Pricing Likely to Impact More Sectors

The manufacture of carbon-intensive commodities (steel, cement, ammonia fertilisers, and ethylene) will be affected by any tightening of coverage and prices because of the technical challenges of decarbonising existing technologies, overall energy intensity, and the lack of substitutes. Regional differences in industrial processes and practices will also affect compliance costs.

Sector Characteristics Determine Exposure

Impacts of carbon pricing will not be felt uniformly even within affected regions, and will be determined by a range of sector and company/facility specific characteristics. Asset lifespan, availability of substitutes, mitigation possibilities and competitive position are key determinants of exposure to climate policy risk.

Fuel and Electricity Costs Weigh on Industry

Governments have been helping to mitigate direct and indirect costs of carbon, but older and inefficient plants will increasingly struggle to obtain support. In the meantime pressure for carbon reduction is likely to erode financial support. Canada, Japan, South Korea, Mexico, South Africa and the EU are expected to see a significant fall in free carbon allowances by 2023.

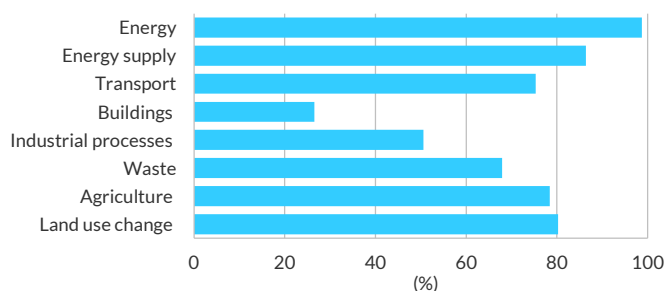
The effects on the bottom line for companies will ultimately depend not just on carbon pricing but net allowances – which will be influenced by plant-level factors and some of the company-level characteristics outlined above.

Global Emissions Gap Creates Policy Risk

Most climate regulations and policies remain insufficient to meet the goals of the Paris Agreement. The Global Stocktake, scheduled in 2023, will present the first five-year review of progress and the expectation that countries 'update and enhance' their pledges in the form of new NDCs in 2025 increases the risk of a rapid and sustained tightening of climate policy and carbon pricing within the rating horizon in countries that have seen broad support for decarbonisation. Some 23 countries, including Germany, Mexico, France, the UK and Canada, have also pledged to revisit existing NDCs in 2020 – most of which make reference to a wide range of sectors, but with very limited targets beyond energy, industry and transport. The chart below shows references by sector:

References by Sector in First-Round NDCs

Coverage in NDCs



Source: Fitch Ratings

Main Lever to Address Emissions Gap

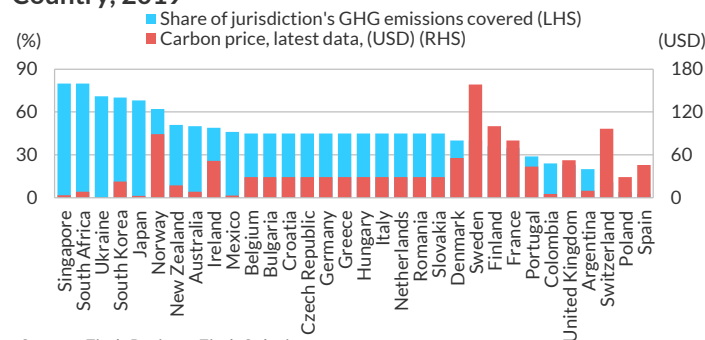
Globally there is a wide disparity between the strength and direction of climate policies at the national and subnational level. The range of carbon prices in use (from around USD 1/tonne to USD 140/tonne, with over half below USD 10/tonne) reflects this. Many carbon intensive sectors, such as aviation, buildings, waste and agriculture are outside of pricing schemes. Coverage remains geographically patchy, with fossil-fuel dependent economies at present largely disengaged.

We believe that support for renewables may continue to be the politically expedient choice for policymakers in export-oriented economies, rather than a substantial increase in the scope and price of carbon. This is likely to result in many schemes remaining limited in terms of geographical coverage within the ratings horizon – despite an upward trajectory in prices. Nonetheless, there is growing activity in both the deployment and stringency of ETS schemes in EMEA, Latin America and Asia Pacific.

Carbon pricing has the advantage of being a technology-agnostic policy measure to drive economy-wide decarbonisation, and so free allocation and compensation measures should be viewed as transitional and increasingly likely to be withdrawn to better align with NDCs. We expect the EU Emissions Trading Scheme (ETS) carbon price to maintain its historically high level of EUR 20 for the near future, and for free allocations to be increasingly phased out in the power sector.

The following chart outlines some of the variation in both price and coverage.

Coverage and Average Rate of Carbon Pricing Schemes by Country, 2019



Source: Fitch Ratings, Fitch Solutions

Auto Emissions and Capital Expenditure

Though not directly affected by carbon pricing, the car industry is a good example of the disruptive effects of climate regulation on other industries. In the EU, new vehicle emissions targets will be phased in next year, requiring manufacturers to cut their average fleet emissions to less than 95g of CO₂ per kilometre by 2021 – or face a EUR95 fine per vehicle for every gram of CO₂ that exceeds this target. Average emissions in 2018 were 121g of CO₂/km.

Fitch estimates compliance costs at EUR15.5 billion, with producers facing an average 14% reduction in earnings by 2021. Many are rapidly expanding their production of electric vehicles to take advantage of EU 'super credits' for zero emission vehicles to offset some of these costs. Given the higher costs and lower margins of EVs relative to internal combustion engines, this is expected to affect the profitability of car manufacturers in the short-to-medium term, and we have already seen profit margins squeezed in recent years.

Fitch's ESG Relevance Scores for the auto sector show GHG emissions and air quality issues are material credit factors for the sector. All the major developed and emerging market manufacturers in the sector score '4' or '5', indicating that this is either having a moderate or high impact on our credit rating decisions.

Pricing Could Affect More Sectors

Although the degree of enforcement and corresponding impact on the costs of climate regulations remains highly uncertain, the scope of climate regulations is expected to increase in both geographical coverage and stringency in the coming decade. While historically European countries have led carbon pricing globally, recent years have seen a tightening of policy commitments and an expansion of carbon pricing in both Asia Pacific and Latin America.

Limited Impact on Global Coal Use

The role of carbon pricing in facilitating a shift away from coal is a major area of focus for investors and regulators within the rating horizon. We believe that carbon pricing will erode the competitive position of coal in some regions, but that coal will remain an important element of the generation mix in large parts of Asia Pacific for the foreseeable future. Coal phase-out has been visibly accelerated by carbon pricing in a handful of markets, notably the UK. In Germany, many coal assets face early closure and the

degree of compensation to producers and generators remains uncertain.

In regions applying a carbon price to power generation, rising prices have yet to translate into an immediate effect on earnings. In most cases, carbon costs are being passed through into higher wholesale electricity costs, which then feed through into retail electricity prices. This is particularly the case in Poland and South Africa, where coal constitutes the bulk of the fuel generation mix. In markets such as Germany, where utilities' assets are typically more diversified across energy sources, companies may be better placed to diversify away from these costs, although the early closure of nuclear capacity has significantly affected CO₂ reduction targets.

The table below shows issuer default ratings, carbon exposure and ESG Relevance Scores for selected EMEA utilities. More than half have a score of 4 for GHG emissions/air quality, indicating that this is either an emerging risk or a contributing factor to the rating decision, and an elevated carbon exposure, indicating high carbon intensity in their generation mix. When assessing business profile risk, under its rating navigator for utilities, Fitch assigns rating category levels for the carbon intensity of assets (see [Appendix](#)).

IDR, Carbon Exposure and ESG Relevance Score for selected EMEA Utilities

Utility	IDR	Carbon Exposure ^a	ESG.RS (GHG/AQ)
TAURON Polska Energia S.A.	BBB	b	4
Bulgarian Energy Holding EAD	BB	bbb	3
CEZ, a.s.	A-	bb	4
ENEA S.A.	BBB	b	4
Energa S.A.	BBB	b	3
PGE Polska Grupa Energetyczna S.A.	BBB+	b	4
Drax Group Holdings Limited	BB+	bbb	4
RWE AG	BBB	bb	4
Orsted A/S	BBB+	a	1
Iberdrola, S.A.	BBB+	a	3

^a Carbon Exposure: Graded scale from 0-300 tonnes CO₂e/kWhr (a) to >600 tonnes/kWhr (b)
Source: Fitch Ratings

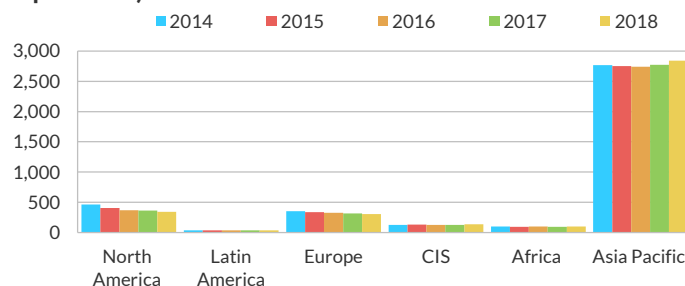
Nonetheless, carbon pricing regulation has proven to be much less influential on a global scale than the shifting economics of energy sources in promoting a move away from coal. In APAC, the falling costs of solar PV has been the main driver in switching away from coal generation locally – together with a desire to reduce high dependence on coal imports and currency effects on import prices. As a result, many thermal coal plants in APAC (particularly in India) are operating at low capacity rates and are unprofitable due to low utilisation rates.

Demand for thermal coal has nonetheless been resilient in Asia in the past five years and coal is expected to continue to form the majority of the generation mix in markets such as China, India and Indonesia. This is partly due to the need for large baseload capacity for regional grids, and the major role of state owned enterprises (and increasingly private equity) in financing expansion. While

many western banks and institutional investors are increasingly reluctant to finance new coal projects, this is not as yet having an impact on investment in Asia.

In China, the government is seeking to reduce overcapacity and replace plants with poor emission controls. Fitch research indicates that over 200GW of coal projects and or existing capacity will have to be suspended or cancelled if China is not to surpass its stated cap of 1,100GW coal capacity by 2020. Mergers of a number of state-owned enterprises with coal interests in 2018 and 2019 underline the efforts to consolidate and rationalise higher emissions plants. We expect a modest fall in growth of coal in the domestic market over time, falling from 66% to 48% of generation capacity by the late 2020s as a result of increased share of renewables. Asia-Pacific coal use dominates global consumption, underlining the importance of regional climate policies to the global economics of coal production:

Coal Consumption by Region (m Tonnes of Oil Equivalent)



Source: Fitch Ratings, BP Statistical Review of Energy 2019

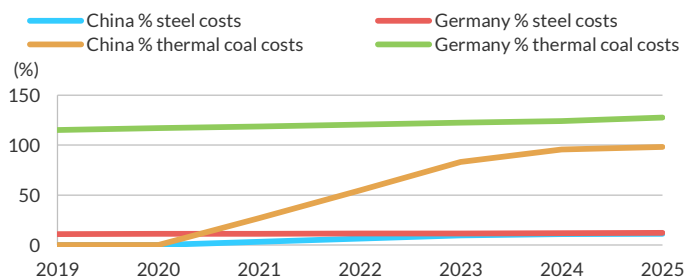
Impact on Other Sectors

The manufacture of carbon-intensive primary commodities (steel, cement, ammonia and ethylene) is exposed to higher fuel and the energy costs of carbon pricing because of the inherent technical challenges of decarbonising existing technologies. These industries have been largely shielded from these effects to date, although the China ETS rollout from next year will be eventually expanded to address these.

Though initially limited to the power generation sector (on the basis that data is most readily available) the China ETS will ultimately cover eight sectors: power, steel and iron, non-ferrous metals, building materials, chemical production, paper, and aviation. We anticipate this expansion will begin in 2023 at the earliest and initially to include free allowances. Crucially, the ETS is based on benchmark carbon efficiency *in each sector* rather than an absolute cap and seen as less likely to promote fuel switching as a result.

Fitch's analysis of the effects of the ETS on EMEA steel producers points to falling free allowances in recent years. Increases in both average and marginal costs of production will be increasingly felt by capacity-sensitive and energy intensive industries as prices rise. The chart belows shows projected future ETS allowance costs per tonne of output versus average production costs under a scenario of 100% purchase of allocations for both thermal coal generation and steel production; in practice, because these activities are sensitive to capacity utilisation, the effects on marginal costs will be higher as production declines.

Projected ETS Costs Per Tonne of Output Relative to Average Production Costs for Thermal Coal and Steel



Source: Fitch Ratings, Berkley National Laboratory, CRU

Sector Characteristics Determine Exposure

Despite the impacts of carbon pricing policies being limited to a handful of sectors and countries at present, we see a consistent set of characteristics that determine exposure to carbon price increases and ability to adapt.

These will differ both within and between sectors and are leading to investment shifts within the ratings horizon in certain sectors and regions, with impacts likely to expand:

- Median asset lifespan: assets with longer lifecycles will generally entail more costly adaptation or replacement
- Availability of substitutes: consumers/producers may switch to less carbon intensive (and costly) goods and services if available
- Mitigation possibilities: these can range from energy switching, to more complex and costly changes to processes
- Competitive pressures: goods and services with high price sensitivity and global competition may have less ability to pass on costs

The table *Median Asset Lifespan by Category* outlines some of the variation in asset lifespan by sector – those sectors with longer asset lifespans may face significantly higher costs in adjusting to higher carbon prices.

High Mitigation Costs for EMEA Metals Producers

Producers may opt to diversify away from markets or activities likely to be highly exposed to carbon price costs – while others with a strong regional presence may be forced to adopt costly mitigation activities to safeguard localised production. In the steel sector, despite the wide use of free allocations, many producers have opted to lower production in the EU or to alter production processes.

ArcelorMittal recently cited high carbon prices (alongside weak demand and rising imports) behind the intention to cut 9% of its European output, idling inefficient or loss making plants and thus potentially benefiting profitability in the short term. ThyssenKrupp, meanwhile, has outlined a plan to move towards carbon neutrality by 2050 through hydrogen-based production process at a cost of at least EUR 10 billion. Such facilities would shift to the top of the CO₂ performance benchmark in Europe for steel production.

Median Asset Lifespan by Category

	Median asset lifespan (years)	
Fossil assets	Coal and consumable fuels	40
	Others – oil and gas	40
	Oil and gas exploration & production	6
	Integrated oil and gas	10.5
Fossil fuel dependent infrastructure	Highways and railways	17.2
	Utilities	28
High carbon assets facing shift to low carbon technologies	Marine transport	20
	Paper and forest products	12.3
	Electrical equipment	5
	Automobile manufacturing	10
	Agriculture	10
High carbon assets without low carbon competitors	Metals and mining	9
	Construction materials	9.1
	Construction and engineering	28

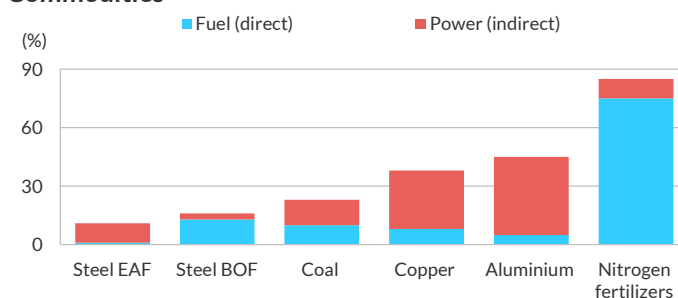
Source: Fitch Ratings, NIESR, UNEP-FI

Regional patterns in technology use will also influence exposure. For example, steel production by blast furnace will be significantly more exposed to carbon price increases than electric arc furnace technologies. Some emerging market steel manufacturers use less carbon intensive electric arc furnaces, so could see their competitive position strengthened through the imposition of carbon border taxes – as proposed by the European Commission.

Fuel and Electricity Costs Weigh on Industry

As rising electricity prices are passed through to energy-intensive businesses, those that operate in internationally competitive markets with limited ability to pass these costs through to consumers will face increasing competitive pressures, and the degree to which they will be compensated for these costs remains uncertain. The chart below shows the relative contribution of fuel and power to the total costs of commodity production.

Fuel and Power as a % of Total Production Costs for Major Commodities



Source: Fitch Ratings, CRU

Critical considerations will be the degree to which carbon prices contribute to the fixed costs of companies and the degree to which these costs can be passed on to consumers. The following two tables show that free allocations for power may fall sharply in some areas. Of the major global economies, Canada, Japan, South

Korea, Mexico, South Africa and the EU are expected to see a significant fall in the percentage of free allowances provided to power generators by 2023. We anticipate that these increasing prices for power generators will be largely passed on to energy-intensive industries, though with different levels of impact by sector and region.

National Carbon Prices, % Free Allowances to Power Generators and Effective Rates, 2019

2019	National carbon price USD/t CO2	Free allowances to power generators (%)	Effective carbon price to power generators USD/t CO2
Argentina	0.00	100	0.00
Australia	0.00	100	0.00
Brazil	0.00	100	0.00
Canada	7.55	80	1.51
Chile	6.30	100	0.00
China	0.00	100	0.00
Colombia	4.91	100	0.00
Europe	27.00	0	27.00
India	0.00	100	0.00
Indonesia	0.00	100	0.00
Iran	0.00	100	0.00
Israel	0.00	100	0.00
Japan	2.66	85	0.40
Kazakhstan	0.00	100	0.00
South Korea	21.09	8	19.40
Mexico	2.70	80	0.54
Morocco	0.00	100	0.00
Russia	0.00	100	0.00
South Africa	0.00	100	0.00
Turkey	27.00	0	27.00
UK	13.00	0	13.00
Ukraine	20.25	100	0.00
USA	0.00	100	0.00

Source: Fitch Ratings, CRU

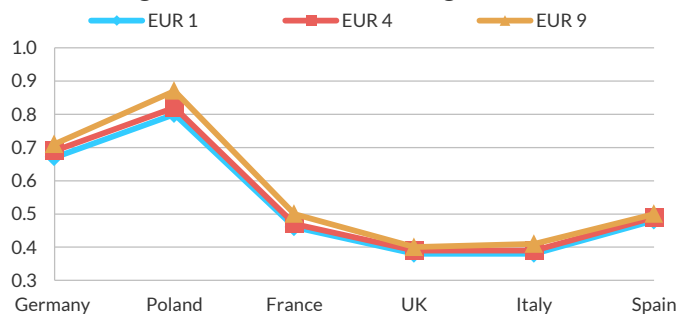
National Carbon Prices, % Free Allowances to Power Generators and Effective Rates, 2023 (Projected)

2023	National carbon price USD/t CO2	Free allowances to power generators (%)	Effective carbon price to power generators % increase from 2019
Argentina	8.91	100	0
Australia	0.00	100	0
Brazil	0.00	100	0
Canada	41.51	60	1000
Chile	8.91	100	0
China	17.21	100	0
Colombia	5.95	100	0
Europe	28.68	0	6
India	0.00	100	0
Indonesia	0.00	100	0
Iran	0.00	100	0
Israel	0.00	100	0
Japan	2.87	65	150
Kazakhstan	25.62	80	0
South Korea	26.99	4	34
Mexico	3.14	30	307
Morocco	0.00	100	0
Russia	0.00	100	0
South Africa	9.03	80	0
Turkey	28.68	0	6
UK	21.51	0	65
Ukraine	28.68	100	0
USA	0.00	100	0

Source: Fitch Ratings, CRU

The degree of market concentration tends to be an important factor in companies' ability to pass on additional costs of carbon. Companies operating in markets with a more diverse energy mix and competition between electricity sources are often better placed to absorb or cross-subsidise these costs in the short term with low-carbon energy sources. In addition, elasticity of demand for certain products may differ between regions, particularly emerging and developed markets, based on differences in consumption patterns. For example, Poland has a higher sensitivity to increases than the UK, due to differences in the grid mix and patterns of consumption, as shown in the chart below:

EU ETS Marginal Increase Pass-Through

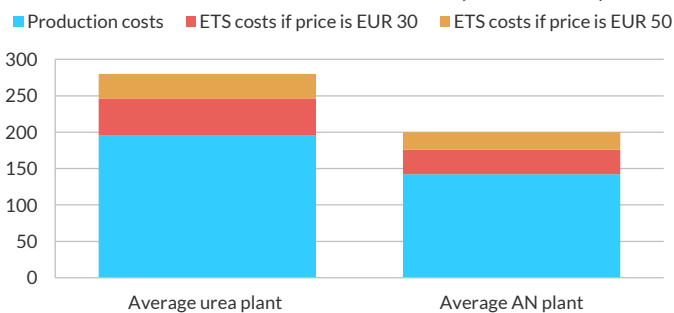


Source: Fitch Ratings, ICIS

Metals and Fertilisers: The Effects of Pass-through Costs

Metal and fertiliser production are seen to have the highest risk in developed markets: both are energy and trade-intensive processes with high sensitivity to price changes and competition – with energy accounting for 30-70% of production costs. Allowances in the EU from 2021 will continue to apply 100% of allocations for sectors at the highest risk of relocation. Less exposed sectors will see a reduction from 2026 towards 0%, but the complexity of applying free allocations means that many less efficient sites may still be in deficit.

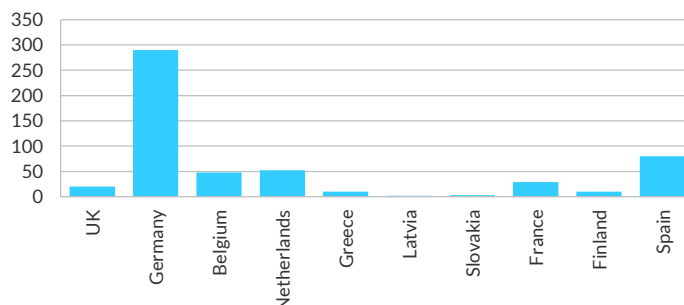
ETS Prices as a Share of Fertilizer Costs (EUR/tonne)



Source: Fitch Ratings, CRU, Copenhagen Economics

Compensation for industries affected by rising energy costs is widely applied in the EU, and other regions applying carbon prices, but a complex process with different approaches is applied between countries with varying levels of support in place. Free allowances are also used to help mitigate these costs but are heavily contingent on site-specific characteristics; older or inefficient production processes will generally not benefit from these.

Indirect Cost Compensation by Country, 2017, (M EUR)



Source: Fitch Ratings, CRU

These findings point to a rising indirect impact on production from taxes on fuel and energy. The degree of impact and compensation or protection to industries remains highly uncertain and subject to strong political influence – while this may limit effects in some areas, political pressure for decarbonisation could increase.

Next Steps: Quantifying Impact

Taken together, these findings suggest that carbon pricing will have an increasingly important role in climate regulation, though with effects limited to a number of countries and industrial sectors. For the latter, rising fuel and electricity costs will be the major drivers. We have outlined four characteristics that will determine the degree of impact from these cost increases, providing some sectoral examples. A next step will be quantifying the differences in risk arising from these characteristics.

Climate Policy Risk Exposure: 4 Key Characteristics



Source: Fitch Ratings

Appendix: Factors and Sub Factors

Fitch Ratings' Ratings Navigator for Corporates includes a breakout of commonly considered factors and sub factors for key industrial sectors and uses them to highlight strengths and weaknesses of issuer profiles. It also includes the Factor Summary Observation, an electronic summary of these factors:

Ratings Navigator Factors

General	Sector risk profile		
	Operating environment		
Business profile	Management and corporate governance	Issuer default Rating	Factor summary observation
	Position and cash flow profile		
	Regulation		
	Market trends and risks		
	Asset base and operations		
Financial profile	Profitability and cash flow		
	Financial structure		
	Financial flexibility		

Source: Fitch Ratings

In the case of EMEA Utilities, a Carbon Exposure sub-factor is also included within the Asset Base and Operations Factor assessment. This is banded by carbon intensity of production processes:

Asset Base and Operations Sub Factors

Asset quality	High asset quality likely to benefit opex and capex requirements compared with peers	a
	Mid-range asset quality not likely to affect opex and capex requirements compared with peers	bbb
	Poor asset quality likely to affect opex and capex requirements, but diversified risk	bb
	Low asset quality likely to affect opex and capex requirements, high risk	b
Asset diversity	Assets in a state of disrepair, without near term prospects of adequate opex or capex	ccc
	High diversification by geography, generation source, product, jurisdictions	a
	Partial diversification by geography, generation source, supplied product	bbb
Carbon exposure	Limited diversification by geography, generation source, supplied product	bb
	No meaningful diversification by geography, generation source, supplied product	b
	Concentration in one location with significant disruptive economic characteristics impairing operations	ccc
	Energy production mostly from clean sources and low carbon exposure (<300g CO2/kWhr)	a
Carbon exposure	Energy production balanced between clean and thermal sources; medium carbon exposure (<450g CO2/kWhr)	bbb
	Energy production largely from thermal sources; high carbon exposure (<600g CO2/kWhr)	bb
	Energy production largely from thermal sources, particularly coal and lignite; high carbon exposure (>600g CO2/kWhr)	B

Source: Fitch Ratings

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