World Benchmarking Alliance

Waking the giants: Insights on the decarbonisation and just transition efforts of the heavy industries

Insights report

June 2024

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The 2024 Climate and Energy Benchmark for the heavy industries

Heavy industries of aluminium, cement and iron & steel accounted in 2022 for about 19% of global energy-related CO_2 emissions. Known for their hard-to-abate emissions, they play a crucial role in the global decarbonisation journey. Within the next decade, significant emissions reductions must be achieved within the next decade, driven by investments in clean technologies and new business models. Meanwhile, these industries must continue to supply the raw materials needed for expanding clean energy infrastructure and protect their workers. This insights report examines how leading companies in aluminium, cement, and steel manufacturing are tackling these challenges.

In 2022, emissions from the aluminium, cement and iron & steel industries made up about 7 gigatonnes (Gt) of carbon dioxide (CO_2), or 19% of global emissions. By 2030, to align with the International Energy Agency's (IEA) Net-Zero Emissions (NZE) Scenario (IEA 2023), the combined emissions of the three industries will need to decrease by about 22% to a global total of approximately 5.4 Gt of CO_2.

The sector can achieve significant emissions reduction with actions and technologies that are readily available to companies. For instance, steel emissions can be lowered by 40% by enhancing material efficiency and circular economy compared to current production practices (IEA 2019), while clinker substitution has the potential to reduce emissions from cement production up to 50% (Habert et al. 2020). In the long run, however, deeper structural changes are required to keep the heavy industries aligned with a 1.5°C scenario. The sector has long investment cycles of typically 40 years, which means that production facilities in place today will likely remain emitting well past 2050. Consequently, by 2050, 95% of CO_2 in cement production will have to be captured and stored, and 96% of primary steel production will need to come from near-zero carbon processes (IEA 2022). This will require transitioning to innovative processes utilising low- to zero-carbon energy carriers and feedstocks, like biofuels, electricity, hydrogen, and carbon capture and utilisation (CCU) for carbon feedstock. Implementing these alternatives mandates a substantial scaling up of infrastructure alongside phasing out or converting the operations of existing industrial plants.

On the positive side, heavy industries can expect an increasing demand for high-value low-carbon materials with the low-carbon transition. The materials produced by these industries are fundamental to constructing renewable energy infrastructure. For instance, the steel consumption of wind industries is expected to double over 2021-2030 (S&P 2021), while an overall increase of 28% in steel demand is forecasted by 2030 under the NZE assumptions (IEA 2023). Furthermore, the aluminium sector plays a crucial role in supplying battery enclosures for electric vehicles (EVs), charging infrastructure and power transmission lines.

Keeping abreast with these changes, heavy industries will need to re-invest their increased revenues from the growing demand for these materials in both cleaner means of production and the protection

of their workers. Failing to invest in the former, particularly, will leave these companies exposed to increasing regulatory pressures as governments expand the scope of carbon pricing and policies to avoid carbon leakage. The European Union's (EU) Carbon Border Adjustment Mechanism (CBAM) aims to put a carbon price on imports of certain carbon-intensive industrial goods into the EU, equivalent to the carbon costs paid by EU producers under the EU Emissions Trading System (EU ETS). For sectors like steel, the CBAM could significantly increase costs for major exporting countries like China and India by 2034 if they do not adopt cleaner production methods.

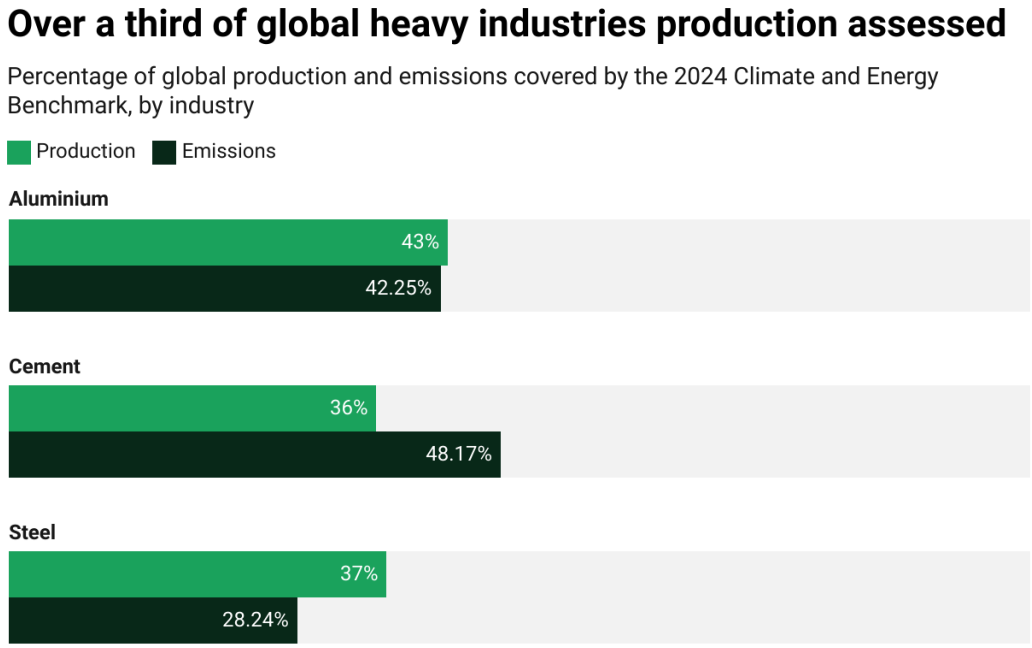
Finally, companies need to factor in the impacts of technology and policy changes in their training and compensatory measures for workers to ensure a just transition. In the steel sector, for example, the green transition is estimated to directly affect 2.4 million jobs globally (Agora Industry, Wuppertal Institute and Lund University 2021) due to coal-based assets that risk becoming obsolete. The signs are visible that more work and long-term planning is needed, as recent steel plant closures are already impacting local workers and communities. Tata Steel's shutdown of blast furnaces at Port Talbot in Wales will eliminate nearly 3,000 jobs in a local economy heavily reliant on steel. British Steel's plans to lay off over 2,000 workers at its Northern England mills will similarly affect those areas. In the US, Cleveland-Cliffs' closure of a West Virginia tin mill threatens around 900 jobs in the sector.

The challenges are mounting on aluminium, cement and steel companies to implement robust transition plans that ensure long-term, future-proof employment, while putting the sector firmly on the path to climate neutrality and maintaining competitiveness in a rapidly changing global market. This report presents the five key findings from the 2024 Heavy Industries Benchmark and a technical summary of the Accelerate Climate Transition (ACT) assessment findings covering key elements of companies' low-carbon transition plans. The findings are designed to provide investors, civil society and policymakers – as well as the companies themselves – with the insights needed to take responsible and effective action.

WBA's mission is to build a movement to measure and incentivise business impact towards a sustainable future that works for everyone. Working with over 400 organisations in our Alliance, we envision a society that values the success of business by what it contributes to the world. To achieve this, we need all actors in the ecosystem to drive the needed transformations. If you have any feedback on our findings, please reach out to Vicky Sins, Decarbonisation and Energy Transformation Lead at WBA: info.climate@worldbenchmarkingalliance.org

Keystone companies in the 2024 Heavy Industries Benchmark

The 2024 Heavy Industries Benchmark assesses a total of 91 companies in the aluminium (12), cement (34) and iron & steel industries (45). Together, the combined operational scope 1 and 2 emissions of the selected companies amounted to 2.6 Gt of CO_2 in 2022, approximately 7% of the world's global energy-related emissions (IEA 2022) and 28% of the emissions originating from the heavy industries sector as a whole (IEA 2023).



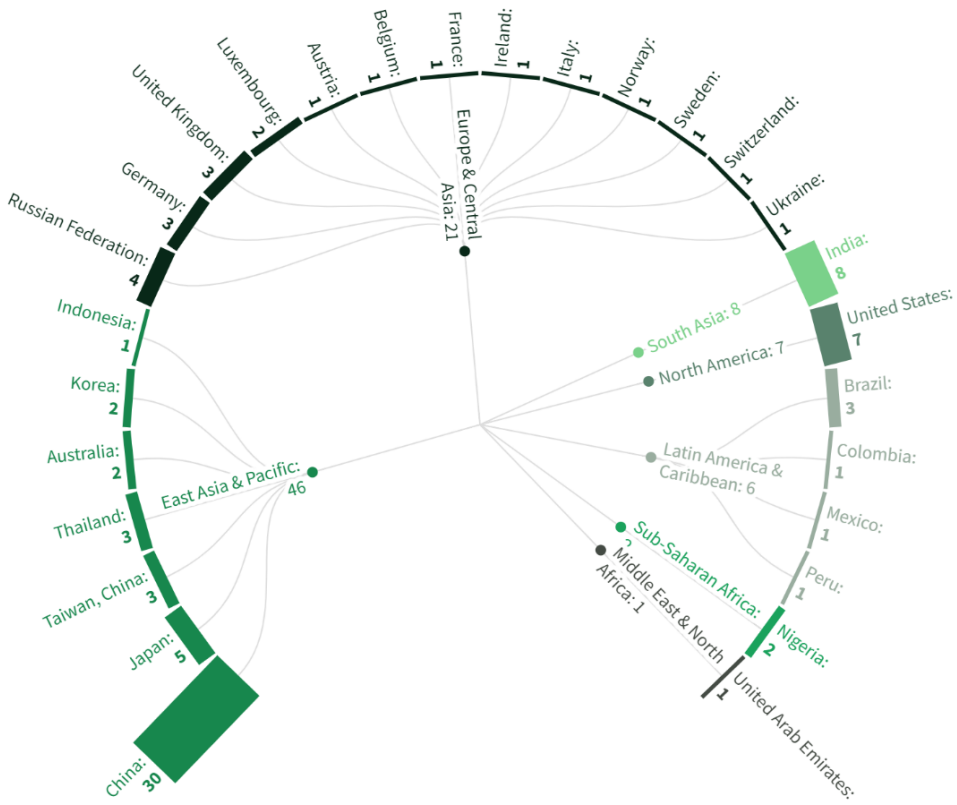
In terms of production footprint, the 91 assessed companies were responsible in 2022 for approximately 43% (0.03 billion tonnes) of the global aluminium production, 36% of the global cement production (1.5 billion tonnes) and 28% (0.69 billion tonnes) of the global steel production. In terms of industry-specific emissions, the benchmark encompasses nearly half of global emissions from cement production, 42% of the emissions related to primary aluminium production and approximately 28% of the emissions from steel production. These figures highlight that though the assessed companies constitute only a moderate share of the total companies in the sector, the extent of their operations and the magnitude of their emissions is significant at both global and sectoral scales. For instance, while the benchmark assesses only 12 aluminium companies, these contributed to about half of the global production in 2022.

As the heavy industries sector evolves with the energy transition, companies are adapting new ways to remain competitive, secure their resources and increase their production capacities. To achieve this, some companies are turning to mergers and acquisitions and the expansion of their portfolios (Deloitte 2024). This emerging trend was evidenced among the companies assessed in this benchmark. Out of the 91 companies, 40 have gone through or will go through a merger or acquisition within a three-year timeframe of 2022. This is the latest year on which all companies are

evaluated based on publicly available information reported until 31st December 2023. Depending on the indicator, the benchmark typically considers data reported for the years between 2017 and 2022.

Geography of the Heavy Industries Benchmark

Overview of regions and countries represented, by HQ location



The geography of the assessed companies is a reflection of the production asymmetries observed for some of the heavy industries worldwide. Emerging markets and developing economies accounted for 74% of global steel production in 2021 (World steel Association 2022), while China is currently the country of origin for nearly half of the global cement production (Global Cement and Concrete Association 2023). Accordingly, about 50% of the companies assessed in the 2024 Heavy Industries Benchmark are headquartered in the East Asia & Pacific region and a total of 56 are headquartered in developing economies, including countries from Sub-Saharan Africa. That said, companies in the Organisation for Economic Co-operation and Development (OECD) countries constitute a significant 36% share in the benchmark, dominated by companies headquartered in Europe. In terms of ownership structure, the majority of companies (67) are publicly listed and only nine are state owned. The remaining are privately owned.

All companies are evaluated with regard to their climate performance – Accelerate Climate Transition (ACT) assessment – and social performance – the just transition (JT) and core social indicators (CSI). For more details regarding the methodologies used in the 2024 Heavy Industries Benchmark, please refer to the benchmark methodology document.

The next sections of the report present an overall summary of the results, before detailing the five key findings.

Summary of results

The average score for the 91 companies evaluated in the 2024 Heavy Industries Benchmark stands at a mere 21.1 out of 100. Out of this, the ACT score of companies contributed 16.1 points to the final score on average, while the social score averaged at 5.0 points. The ACT and social dimensions respectively constitute 60% and 40% of the total final score. On average, cement companies obtained higher benchmark scores, averaging at 25.6, followed by aluminium companies with an average score of 23.8 and finally iron & steel companies with an average score of only 17.0.

Sectoral performance on the ACT assessment follows the same trend as the overall scores, with cement companies obtaining an average score of 20.5 (out of 60), aluminium companies scoring 14.8 and iron & steel companies scoring 13.1. In the social dimension, companies in the aluminium sector show the best performance, with an average score of 9.1 (out of 40). Cement and iron & steel companies only manage average scores of 5.1 and 3.9 respectively.

Average scores by region

Region	ACT (60%)	Social (40%)	Total (100%)
Latin America & Caribbean	26.9	8	34.9
Europe & Central Asia	22.1	8.5	30.6
South Asia	19.6	6.3	26
North America	19.5	6.1	25.6
Middle East & North Africa	10.3	6.8	17.1
East Asia & Pacific	11.4	2.7	14.1
Sub-Saharan Africa	4.5	3.7	8.1

The average scores per region were noted to be higher for companies headquartered in the Latin America & Caribbean region, particularly for the ACT assessment for which the average regional score is 26.9. In relation to the social dimension, companies in the region obtained an average score of 8.0. This is practically the same as for companies headquartered in Europe & Central Asia, which, with an average score of 8.5, is the best-performing region in the social dimension of the benchmark. Companies located in the Latin America & Caribbean region have an overwhelming representation of cement manufacturers: five out of the six companies evaluated from the region. These include some of the best performers on the benchmark, which explains the high overall average score.

Companies headquartered in Europe & Central Asia show a higher benchmark performance on average than those in North America; this is true for both the ACT and just transition dimensions. The average ACT score of companies headquartered in North America amounts to only 88% of the average ACT scores for companies in Europe & Central Asia, while for the social dimension, this value is 72%. The average benchmark scores for companies located in East Asia & Pacific are very low.

About 60% of the companies headquartered in this region are iron & steel companies, a sector with overall lower ACT and social scores. Still, it is telling that the region in which the majority of the global cement and steel capacity is headquartered, so substantially lags behind in terms of planning for the energy transition and securing a just transition.

Average scores by type of economy

Economy	ACT (60%)	Social (40%)	Total (100%)
Advanced	23.4	8.1	31.5
Emerging market and developing economies	11.5	3.1	14.6

Average scores by ownership

Ownership	ACT (60%)	Social (40%)	Total (100%)
Public (67)	19.4	5.8	25.2
Private (15)	9.1	4.2	13.3
Government (9)	3.2	0.5	3.7

Similar to the results of the Electric Utilities Benchmark and the Oil & Gas Benchmark, publicly traded companies show better average ACT and social scores than those that are privately owned or those with majority government stakes. Publicly traded companies obtained an average ACT score of 19.4, which is about two times higher than the average observed for private companies and six times that observed for companies controlled by governments. Also coherent with the previous benchmarks, company size measured in terms of activity – in this case global production of aluminium, cement or steel – is not associated with significant differences in ACT or social scores. Categorising companies according to their material production (see below) reveals small maximum differences between classes: about 2.0 points for ACT scores and 1.4 for social scores.

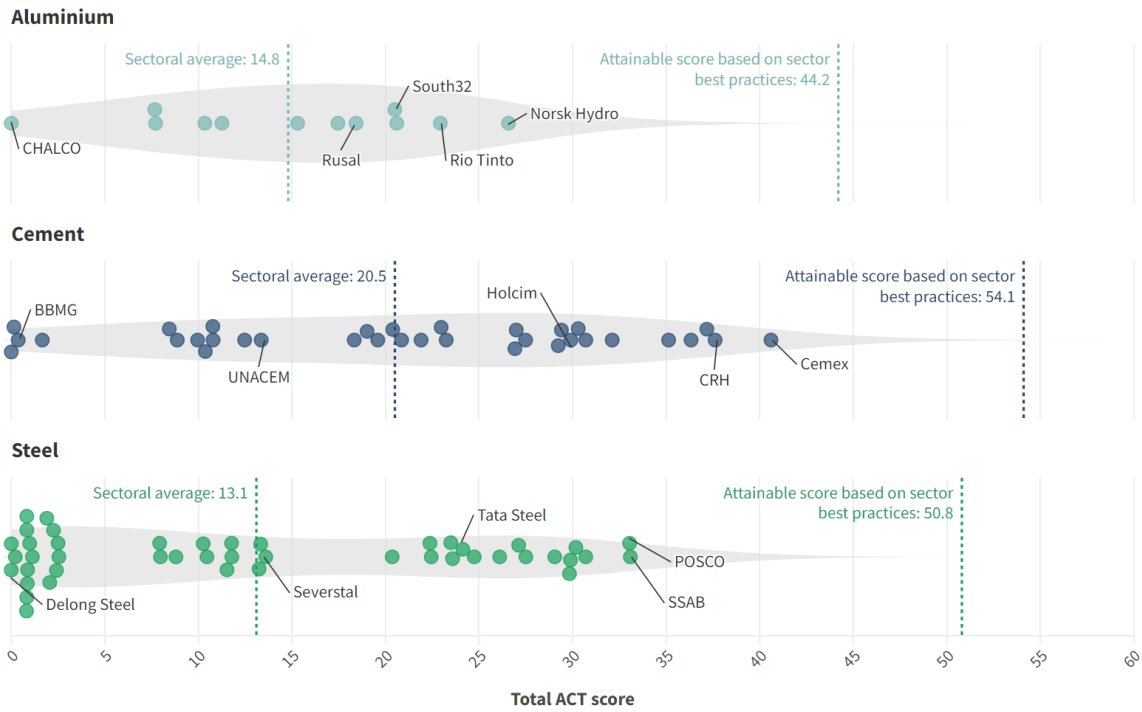
Average scores by production

Percentage of global sector production	ACT (60%)	Social (40%)	Total (100%)
>2%	18.8	5.2	24.0
1 to 2%	18.1	6.4	24.4
0.5 to 1%	20.1	5	25.1
less than 0.5%	18.8	5.2	24.0

While the overall performance of companies on this benchmark is low across both ACT and social dimensions, a disaggregated view at the company- and industry-level reveals substantial heterogeneity of performance. In the cement industry, only eight companies attained an ACT score above 30, i.e. 50% or more of the maximum available score. Despite their relative position as sectoral leaders, cement companies can and should be doing more. A synthetic ACT score composed of all best practices evaluated in this benchmark (determined as the sum of the best scores achieved for each indicator) for the cement industry returns a possible attainable ACT score of 54. The highest-scoring company in the ACT dimension on the benchmark, Cemex (see below), lags a full 14 points from this achievable score.

In the aluminium industry, not a single company attains even half of the maximum benchmark score. Norsk Hydro, the best-performing company in the aluminium industry in the ACT assessment trails 18 points behind the attainable score based on existing best practices observed throughout the sample.

Distribution of ACT scores by industry

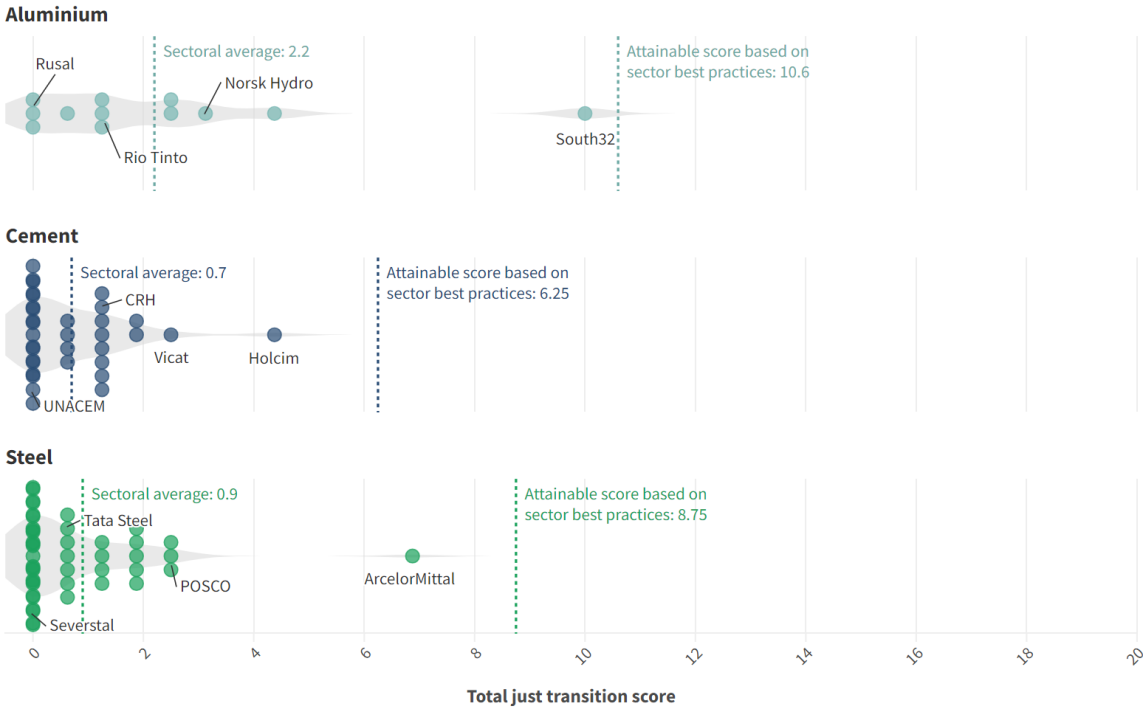


In the iron & steel industry, a large prevalence of companies with poor disclosure and non-disclosers, concentrated particularly in East Asia, bring the overall average ACT score down. Only four iron & steel companies (SSAB, POSCO, Voestalpine and Gerdau) attain more than 50% of the total benchmark score. Similar to the aluminium industry, the best-performer among iron & steel companies (SSAB) still lags 17 points behind the ACT score that is possible for companies to achieve with current best practices. These examples show how even the top-ranked companies on the benchmark significantly lag behind the type of performance expected from industry leaders, having so far failed to implement already available best practices in different areas of the ACT assessment.

For low-ranking companies on the benchmark, bridging the gap to the average ACT score is a matter of undertaking relatively simple but crucial steps. These include setting near- and long-term emissions reduction targets, transparent disclosure of research and development (R&D) investments in low-carbon technologies and developing their first version of a transition plan to organise and operationalise the company's vision for a cleaner future.

Evaluating the results from the lens of the just transition indicators, which account for 20% of the total benchmark score, reveals the existence of clear front-runners across the three industries. For the aluminium and iron & steel industries, there is a significant gap between the best-ranked company and the remaining companies in the benchmark. This is in strong contrast to the ACT assessment.

Distribution of just transition scores by industry



Importantly, the best-ranked companies for the just transition indicators determine, to a large extent, the best just transition practices within the sector. A synthetic just transition score composed of all best practices evaluated in this benchmark (determined as the sum of the best scores achieved for each indicator) for the aluminium industry is only one point higher than the just transition score of South32, the leading aluminium company on the just transition assessment. The same is true for the cement and iron & steel industries, with the gap being only marginally higher.

This trend is worrying because the concentration of best practices among a narrow sample of companies limits the possibilities for cross-learning. In addition, the companies that embody most of the best just transition practices are themselves poor performers overall. In the case of the cement industry, for example, the best-scoring company, Holcim, fails to get even 25% of the total just transition score. When it comes to just transition, the benchmark leaders are failing to deliver even the most basic performance, and there are limited examples and instances of best practices available from other companies.

Five key findings

This section presents the five key benchmark findings, outlining the most significant challenges and opportunities for achieving a just low-carbon transition in the heavy industries sector. The next section further delves on the findings for individual ACT assessment modules.

Key finding 1: Companies need to triple efforts to reduce emissions intensity and align with 1.5°C in the next five years

The emissions intensity of the benchmarked companies decreased on average by 0.8% annually between 2017 and 2022. With this current trend, companies will continue to digress from the reduction path needed for a 1.5°C world. To counter this, companies must triple their current efforts, achieving annual reductions of 2.4% in emissions intensities over the next five years. Failing to do so will increase the reliance of the heavy industries sector on high-risk, high-cost technologies post-2030.

The anticipated global demand for aluminium, cement and steel implies that in order to keep total emissions in check, companies need to make significant progress in lowering their specific emissions, that is the amount of emissions per unit of output. Companies can do this by enhancing energy and material efficiency, switching to low-carbon fuels and adopting innovative, near-zero emissions production methods. Cement and steel industries, particularly, need to step up these efforts to decrease emissions by an average of approximately 3% on an annual basis until 2030 (IEA NZE 2023 cement, steel).

Insufficient emissions decline poses future risks

The benchmarked companies do show some progress in reducing specific emissions per output of production. Between 2017 and 2022, reduction in emissions intensities were observed for 47 of the 91 companies. In contrast to this general trend, a total of 11 companies reported an increase in emissions intensities over the same timeframe. It is important to note that sufficiently detailed data on emissions intensities was available for only 67%, i.e. 61 of the 91 companies assessed in the benchmark.

The yearly emissions reduction rate across the benchmarked keystone companies stood only at about 0.8% per year, with important sectoral differences. While the average emissions intensity reduction for cement companies was estimated at 1.2% a year, for steel companies the average rate was only 0.46% and for aluminium companies the rate was 0.5%.

Over the next five years, aluminium, cement and iron & steel companies need to reduce their specific emissions by 2.4%, 2.5% and 2.9% on average, respectively, to comply with the Paris Agreement. Presently, only four companies in the 2024 Heavy Industries Benchmark fall into this category when regional, technological and supply chain specifics are factored in. Three of these are cement companies: Dalmia Bharat, Cemex and SIG, and one is an iron & steel company: Nucor. These companies were responsible for about 0.09 Gt of CO_2 emissions in 2022, which represents only 1.2% of the global emissions for the aluminium, cement and iron & steel industries.

If companies fail to align their emissions reduction with 1.5°C in the short-term, they will incur higher costs and risks post-2030, such as having to use non-mature low-carbon technologies that are presently not market ready and whose implementation costs are likely to be high.

Key finding 2: Net zero will be impossible unless companies radically increase investments to make low-carbon technologies market ready

Many of the technologies necessary for the decarbonisation of heavy industries are not yet market ready and demand significant levels of research and development (R&D). Only 24% of the benchmarked companies report R&D investments in low-carbon technologies, and only 10% report their investments in non-mature technologies specifically. Among the disclosing companies, around 46% of total R&D investments go towards developing low-carbon technologies, showing an equal priority alongside other R&D expenses. While this trend is encouraging, there is a clear need not just for increased disclosure but also increased investments towards market-ready low-carbon technologies, without which net zero will be unattainable.

Companies in the heavy industries sector must scale up investment in R&D activities on low-carbon technologies to accelerate the transition to net-zero emissions. These capital-intensive industries have long investment cycles; so, devoting resources to developing viable low-carbon solutions now is crucial to avoid locking in emissions-intensive assets for decades. Moreover, investing in R&D will help the sector drive innovation and create new technologies that in turn can decarbonise other hard-to-abate sectors. With strategic R&D funding, heavy industries can align innovation timelines with their investment windows and unlock multi-billion dollar markets for clean technologies.

Investments in non-mature low-carbon technologies need to gain momentum

While 54 (59%) companies reported their total R&D spending for the year 2022, when sectioning the analysis by investments in low-carbon technologies, the share drops to less than a quarter (22 companies). Still, total R&D investments in low-carbon technologies across the assessed companies was found to be USD 1.4 billion for 2022, constituting circa 46% of the total amount spent on R&D by the companies. This is a positive development showing that these companies are at least placing research needs in low-carbon technologies on par with other R&D expenses.

The picture is less encouraging when evaluating R&D reporting for non-mature low carbon technologies, i.e. technologies that are not yet market ready. Only nine (10%) of the companies provide any convincing evidence of expenses allocated to R&D of non-mature low-carbon technologies, making up an amount of about USD 0.12 billion in 2022 (less than 10% of the total R&D investments reported). When companies do disclose consistent R&D investments in non-mature low-carbon technologies, these can vary substantially, from up to 37% of total R&D to less than 1% (with an average share of about 16%). Given that only a few companies report this detail, it makes these numbers only indicative of an overall dearth of investments in this area, without providing a clearer trend or picture. What is clear is that investments in non-mature low-carbon technologies are being driven by a rather small number of companies that are yet to be joined by the bulk of their sector peers. Lack of momentum in this area not only risks making the transition to clean aluminium, cement and steel more expensive (given that development costs are not shared), but also delaying the market readiness of some vital low-carbon technologies.

Key finding 3: Good practices for strong transition plans exist, but need to be emulated by major players and laggards alike.

Among the assessed companies, 28% have transition plans covering all business units and operations, while 13% extend these plans to their entire value chain. Additionally, 12% of the companies commit to reporting progress annually on their transition plans and have a defined stakeholder feedback process. Moreover, 23% incorporate a carbon price into their cost calculations as a financial indicator, and 8% align it with a low-carbon scenario, integrating it into key business decisions. The prevalence of these good practices in the sector shows that achieving the fundamentals of a robust transition plan is within the reach of all companies. What is required is for major players to elevate their transition planning standards and for laggards to follow suit.

Climate transition plans are crucial for demonstrating a company's commitment to a 1.5°C pathway and are relevant in positioning and communicating its actions towards a net-zero economy to stakeholders and capital markets. Transition plans outline strategies to align the company's activities with ambitious climate science recommendations and policy goals, focusing on reducing greenhouse gas emissions by 2030 and achieving net zero by 2050, while enabling organisations to stay ahead of policy changes and secure profitability.

Target setting a common practice, but alignment with 1.5C yet to be attained

Setting convincing climate targets is a requisite step for a credible transition plan. Encouragingly, target setting is a common practice across the benchmarked companies and, more often than not, companies disclose some form of emissions reduction targets, be it for the short-, medium- or long-term. Around 57 (62%) of the companies in the 2024 Heavy Industries Benchmark have set emissions targets for their main operational emissions (consisting of combined scope 1 and 2 and scope 1 emissions). Most of the companies (47%) disclose emissions targets for the year 2030, while only 31% commit to reductions in operational emissions until the year 2050. However, only 20 (22%) companies have set targets in relation to scope 3 emissions. This highlights that a considerable amount of companies are still not holding themselves adequately accountable for their supply chain emissions.

While disclosing emissions targets is becoming a widespread practice, in 2022, just 5% of the aluminium, cement and steel emissions globally came from companies that have 1.5°C-aligned targets. When regional, technological and value chain aspects are considered, only three out of the 57 target disclosing companies have direct emissions targets that are fully aligned with the Paris Agreement, in the short and long term.

Few companies cover all the basics of transition planning

Of the 91 companies assessed, 13% demonstrate convincing evidence of a comprehensive transition plan that encompasses all business units and their value chains, setting a benchmark for emissions accountability. In the aluminium industry, 58% of companies have transition plans covering all business units, while nine cement companies (26%) have comprehensive plans for both operations and value chains. Three of the iron & steel companies assessed have similarly extensive plans.

Financial considerations within transition plans are acknowledged by some companies, with 34% providing financial quantification. Additionally, 65% of the companies outline short-term actions, with

31% detailing these plans thoroughly. The cement industry leads in this area, with 44% of the companies offering detailed descriptions of short-term actions.

Although positive examples exist throughout the three assessed heavy industries, some fundamentals for transition planning still need to be elevated. A significant gap exists in companies reporting financial content within their transition plans, with 66% of all companies lacking quantification of financial projections or cost estimates; the iron & steel industry performs the worst here at 76%. Planning of long-term actions is also lacking, with only 25% of the companies detailing achievable long-term actions, and aluminium companies performing particularly poorly. Moreover, only 13% of the companies commit to reviewing and updating their transition plans regularly, with Holcim and Heidelberg Materials in the cement sector committing to updates at least every five years.

Key finding 4: Top performers demonstrate the feasibility of a just transition, but the majority struggles to keep pace.

Most heavy industries companies assessed in this benchmark are neither committed to, nor planning or undertaking actions towards ensuring that their low-carbon transitions are just. Half of the companies in the benchmark score 0 on all the just transition indicators, which assess companies on six fundamentals for a just transition, including social dialogue, planning and upskilling of workers. Meanwhile, the top performer scored half of the available points and four companies scored at least 20%, showing that there are just transition practices already prevalent in the sector and therefore feasible to attain.

A 'just transition' envisions workers and communities that are thriving and resilient to change, while remaining within 1.5°C as set out in the Paris Agreement. A just transition is about striking the right balance between the need to rapidly decarbonise, while respecting workers' rights and being considerate of all the stakeholders that are impacted, to ensure that decarbonisation is successful without major backlash from those whose lives will change as a result.

Companies play a vital part in ensuring a just transition, by understanding and working towards a low-carbon transition aligned with a 1.5°C pathway, and at the same time understanding and addressing the social impacts these changes will have. With adequate planning for the low-carbon transition, companies can foresee what their low-carbon future may look like; foresight that is necessary for ensuring that the transition is just.

A just transition ideally holds space for workers, communities and vulnerable groups that are impacted to play a part in shaping how the transition will happen. Companies should, therefore, engage these groups through social dialogue and in jointly shaping the decarbonisation journey. Social dialogue enables inclusive decision-making on any topic and brings commitment from all those involved in the process towards the decisions they have helped make through negotiation. As such, it is unfortunate that only 18% of the assessed companies a commit to engaging in social dialogue.

Furthermore, 89 of the 91 assessed companies score 0 on just transition planning, which emphasises the point that nearly all heavy industries companies in this benchmark need to make considerable progress to ensure a just transition. The two companies with a positive score show some good examples on what planning for a just transition may look like in the heavy industries sector. Similarly, 89 of the 91 companies score 0 on their efforts for social protection and social impact management.

Only two companies show some examples of programmes to address the social impacts of the low-carbon transition on affected stakeholders.

South32 and ArcelorMittal

Companies in the 2024 Heavy Industries Benchmark show an overall lack of consideration for ensuring a just low-carbon transition. In total, only two companies evidence any good practices in this area, and each of these takes a different pathway.

South32, the top performer, focuses its just transition efforts at specific locations across different countries, as it continues to develop its approach to be applied in more locations. Importantly, the company shows it has an understanding of what impacts its transition may have, gained by conducting a value chain analysis. The company's local actions are further supported by strategic work at the corporate level, such as ensuring alignment between lobbying efforts and ensuring a just transition.

ArcelorMittal, on the other hand, displays frequent stakeholder engagement and partner collaboration, which are central to making progress on a just transition. The company's just transition strategy includes identifying and taking adequate measures to avoid causing direct and indirect adverse impacts on fundamental human rights of workers and communities. Through this collaboration, ArcelorMittal demonstrates a fundamental practice and commitment for a just low-carbon transition.

Key finding 5: The heavy industries lack commitment and activity in practicing basics of responsible business conduct.

Almost all the benchmarked companies show a considerable lack in both commitment and actions when it comes to ensuring all the basics of responsible business conduct. Only 55%, just over half, have a policy level commitment to ensure the health and safety of their employees, and only seven companies disclose a basic amount of information on the health and safety of their employees. Meanwhile, less than half (45%) of all companies are committed to respecting human rights. Further, only nine (10%) of the companies disclose the categories of stakeholders whose human rights may have been impacted by their activities, and only three of these provide examples of engaging with these stakeholders.

The companies covered in the 2024 Heavy Industries Benchmark employ over 2.9 million workers in total. Yet, most fail to show adequate commitment and actions towards decent work practices and respect for human rights. Companies in the heavy industries sector are susceptible to a range of potential serious human rights issues as well as workplace safety risks. Common risks in this sector may originate in raw material sourcing and the supply chain as well as include discrimination at the workplace. Through a human rights due diligence process, companies can identify which issues are salient for their business specifically.

While just over half of the companies (55%) are committed to protecting the health and safety of their workers, only seven companies, with a total of 159,000 workers, disclose fundamental quantitative information regarding the health and safety of their workers. These disclosures are what allow us to

track the workplace health and safety outcomes, and with non-disclosure of this information for the majority of the sector, we cannot follow up on the commitments and basic health and safety performance of these companies. This leaves millions of workers of the companies in this benchmark at risk of continued mismanagement of their workplace safety.

Meanwhile, less than half (45%) of the assessed companies are committed to respecting human rights. Only nine (10%) of the companies disclose the categories of stakeholders whose human rights may have been impacted by their activities, and only three of these provide examples of engaging with these stakeholders. All the heavy industries companies assessed in the benchmark need to strengthen their commitments and actions to protect those whose human rights are at risk of being violated.

Technical summary

This section provides an in-depth look into the ACT assessment results of the 2024 Heavy Industries Benchmark. The summary is arranged by topic, drawing on analyses from the individual ACT performance modules and indicators. The table below outlines the modules and indicators discussed under each topic.

For more information about the ACT performance scoring, please refer to the dedicated ACT methodologies for the aluminium, cement and iron & steel industries. The Heavy Industry 2024 benchmark has utilized climate questionnaires provided by CDP as a data source to score several elements assessed under the ACT methodology.

TABLE 1: TECHNICAL SUMMARY TOPICS AND THE ACT MODULES AND INDICATORS COVERED

Technical summary topic	ACT modules/indicators
Targets	Module 1
Emissions performance	Indicator 2.1
Investments	Module 3 and CapEx
Climate oversight and governance	Indicators 5.1, 5.2 and 5.4
Transition planning and scenario analysis	Indicators 5.3 and 5.5
Supplier and client engagement	Modules 6 and 7
Trade associations and policy engagement	Module 8
Low-carbon business activities	Module 9

Targets

A public-facing decarbonisation target is an indication of corporate commitment to reducing emissions. Companies without ambitious targets are unlikely to be adequately committed to decarbonising, and therefore this indicator has a high impact on the likelihood of a successful low-carbon transition. Targets provide a direction towards which companies can align their strategy, capital expenditure and R&D to deliver the requisite emissions reductions.

The emissions reduction targets set by the benchmarked heavy industries fall short of what is needed to drive a low-carbon transition at the required scale and speed. Of the assessed companies, almost a third are yet to set any target and an astonishing three quarters have not yet set a net-zero target for their scope 1 and 2 emissions.

What targets have been set?

Out of the 91 heavy industries companies assessed in this benchmark, 68% have publicly disclosed an emissions reduction target. The 29 companies without any emissions reduction target contribute to nearly 30% of the combined scope 1 and 2 emissions of all the companies covered in the benchmark. Interestingly, among these 29 companies, 79% are headquartered in China, while out of the total of 91 assessed companies, only 33 are Chinese. This clearly highlights a lack of emissions reduction commitment from Chinese companies, which is problematic considering that over half of global aluminium, cement and steel production currently takes place in China.

Setting scope 1 and 2 emissions reduction targets is of prime importance for heavy industries companies, since their operations are highly emissive. Depending on the type of energy consumed to

feed production processes, either scope 1 emissions (combustion of fossil fuels) or scope 2 emissions (electricity and heat consumption) will predominate.

Among the 45 assessed steel companies, 24 (53%) have set scope 1 and 2 emissions targets. The same is the case for seven (58%) aluminium companies out of 12. When it comes to cement companies, 14 (41%) out of 34 have set scope 1 and 2 emissions targets and another 35% have set scope 1 emissions targets. The fact that a significant proportion of cement producers only cover their scope 1 emissions is explained by the assessed cement companies reporting that scope 2 and scope 3 emissions represented less than 15% of their total emissions in 2022 on average. Companies should, however, ensure that their targets cover all significant sources of emissions related to their activities.

While more than 70% of the scope 1 and 2 emissions of the assessed companies are covered by targets set by cement and steel companies, this ratio is lower than 40% for aluminium companies. Of the 91 assessed companies, 31 (34%) companies have set at least one short-term target for scope 1 and 2 emissions, i.e. reductions targeted by no later than 2032, ten years after the reporting year 2022. On the other hand, 36 (40%) companies have set at least one long-term target, i.e. reductions targeted by no sooner than 2033.

In total, 51 targets with a short-term horizon have been observed, out of which 13 have been set for 2025 and 30 have been set for 2030. Additionally, 37 targets with a long-term horizon have been observed, out of which 28 have been set for 2050.

Among the 91 assessed companies, only 20 (22%) have set at least one target including their scope 3 emissions. These 20 companies include about 40% of aluminium companies and 30% of cement companies, but only 10% of steel companies. This result highlights that the heavy industries, and more particularly the steel industry, comprise a very limited share of producers who are considering the emissions arising from their value chain.

Are the targets ambitious enough?

To determine whether a company's target is aligned with its 1.5°C pathway, and is therefore sufficiently ambitious, the ACT methodologies require a company to disclose sufficient detail on each target. Only 53 (58%) of the companies disclosed enough information for their targets to be assessed in this benchmark.

Among the 91 companies, only three: CRH, Heidelberg Materials and Taiwan Cement, score 100% on the targets ambition indicator, and two others: Cementos Argos and Cemex, score higher than 90%. Together, these five companies represent 7% of the scope 1 and 2 emissions of the 91 companies in the benchmark, with 180 million tonnes of CO_2 equivalent ($MtCO_{2eq}$). This means that a large majority of companies do not set targets that are ambitious enough and adequately cover their scope 1 and 2 emissions for both the short and long term.

While 53 companies score positively on the target ambition assessment, only 30 score more than half the available points. This is explained by one or more of the following situations.

- Companies may have set only short- or long-term targets, while both are required to get a full score.
- Companies may have set some targets that are not ambitious enough to align with their 1.5°C pathway, especially in the short term.

- Companies may have set net-zero targets without specifying and quantifying their reliance on carbon offsets. Such targets are not rewarded in the assessments since it is not possible to determine the effective emissions reduction these companies intend to achieve.

Out of the 91 assessed companies, 34 (37%) have set net-zero scope 1 and 2 emissions targets, among which 11 (12%) have also considered scope 3 emissions.

When assessing targets, the ACT methodology also measures companies' historic target achievement and current progress towards active emissions targets. In total, 13 (14%) of the companies in this benchmark are on track to achieving all their emissions targets, while 49 (54%) of the companies have scored 0 on this indicator.

Case study: Taiwan Cement

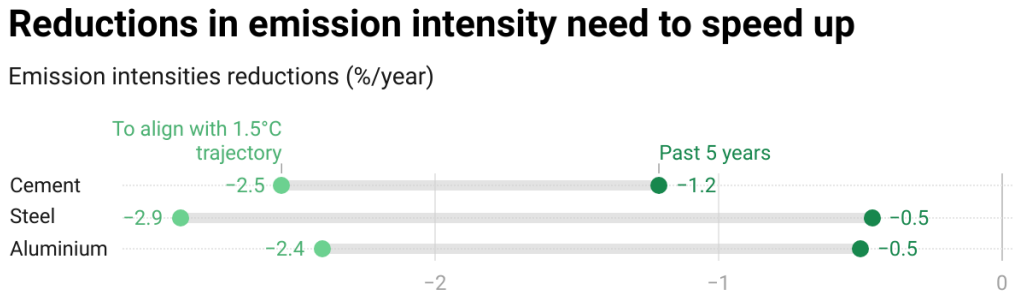
Taiwan Cement aims to reach net zero across its scope 1 and 2 emissions by 2050. To achieve its 2050 net-zero target, the company counts on the following action levers: substituting fossil fuels with alternative fuels and self-produced renewable energy, replacing clinker with alternative raw materials, progressing energy efficiency, implementing waste heat recovery systems to reduce electricity purchase, implementing energy storage technologies, and using carbon capture solutions. Taiwan Cement quantifies the expected contribution of each action lever to get to net-zero emissions and mentions related running projects allowing the company to reduce its emissions. The company's 2050 net-zero target is also supported by its intermediary targets for 2025 and 2030.

Emissions performance

The indicator trend in past emissions intensity compares a company's rate of emissions reduction over the previous five years with the rate required by its 1.5°C pathway over the coming five years. Emissions intensity is an important metric to track the extent to which companies are improving their production processes and cleaning their energy sources. Comparing a company's past and projected emissions intensity trends with its 1.5°C pathway provides a good measure of its progress towards transition and gives an indication of the scale of change the company needs to make to align with a low-carbon future.

How are past emissions intensities aligned with 1.5°C requirements?

In total, nine (75%) of the assessed aluminium companies, 28 (82%) of the cement companies, and 24 (53%) of the steel companies disclosed emissions intensity values for their production. On average, cement companies have decreased their emissions intensities at about 1.2% a year, followed by aluminium and steel companies with yearly reductions of around 0.5% (see below).



However in order for cement companies to align their yearly reductions in emissions intensities with a 1.5°C pathway over the next five years, they would need to double their current performance to achieve reductions of 2.5% annually. The gap between current and required performance is larger for aluminium and steel companies. These companies have only reduced emissions intensities on average by 0-5% a year an need to attain average yearly reductions of 2.4% and 2.9% respectively to align with a 1.5°C pathway. This represents a substantial increase from current levels of effort.

In total, only eight (9%) of the companies evaluated in the 2024 Heavy Industries Benchmark show a past emissions intensity performance that is substantially aligned (i.e. 80% or more) with a 1.5°C pathway. These companies accounted for about 0.19 Gt of CO_2 emissions in 2022, representing only 2.7% of the global emissions for the assessed aluminium, cement and iron & steel companies. Only four companies out of the 91 show past reductions in their emissions intensities fully compatible with the Paris Agreement. These companies are Cemex, Dalmia Bharat and SIG, among the cement producers, and Nucor, the only company among the iron & steel producers. No aluminium company shows past emissions intensity reductions fully aligned with a 1.5°C pathway. Arconic, the best-scoring aluminium company under this indicator, only showed 80% alignment with a 1.5°C pathway.

Nucor

Nucor uses electricity in most of its operations due to its pioneering business model of steel production using electric arc furnaces (EAFs). As reported by the company, 40% of this electricity comes from renewable or zero-carbon energy sources. Consequently, the company's emissions intensity is relatively low and has been steadily declining over time. In 2017, the company's emissions intensity was 0.50 tonnes of CO_2 per tonne of crude steel and in 2022 this decreased to 0.44 tonnes. This represents a total decline of 12%, or 2.4% per year, a value that matches the reductions required by the company's specific 1.5°C pathway.

Nucor has been further diversifying and greening its energy supply chain. In 2021, it signed a long-term agreement with Ørsted to purchase energy from the 367 megawatt (MW) wind farm in Texas and in 2023 with NextEra Energy Resources for 250 MW from phase-two of its Kentucky solar project. With this, Nucor's emissions intensity is expected to continue to decline. The company has also been promoting circular steelmaking, which is one of the most efficient ways to reduce material and hence energy inputs. Currently, its scrap recycling operations make up 56% of the raw materials segment output which supplies its other business segments.

Investments

R&D and low-carbon capital expenditure (CapEx) are crucial for the decarbonisation of heavy industries such as aluminium, cement and iron & steel, which face significant challenges due to the need to develop non-mature technologies, readying them for the market. These industries rely on long-lived assets like blast furnaces, which can operate for 20 to 30 years, making it essential to invest in innovative solutions that can be integrated into existing infrastructure over time. Yet, 41% of the assessed companies do not disclose their CapEx, while 46% do not disclose their R&D investments.

Low-carbon technology investment and patent disclosure

		Aluminium	Cement	Steel	Total
CapEx shares	Current low-carbon	2	8	7	17
CapEx shares	Planned low-carbon	2	2	2	6
R&D shares	Mature low-carbon	0	12	10	22
R&D shares	Non-mature low-carbon	0	5	4	9
Patent activity	Low-carbon patenting	0	6	13	19

Number of benchmarked companies: Aluminium - 12, Cement - 34, Steel - 45, Total - 91.

Research and development

Investment in R&D is necessary to reduce the costs and speed up deployment of innovative low-carbon technologies. Out of the 91 companies in the benchmark, 54 (59%) reported information on their R&D expenditure; however, only 22 (24%) reported information on how much of this was dedicated to low-carbon technologies in 2022.

Dalmia Bharat, JSW Steel and Vicat lead with 100% of their R&D invested in low-carbon technologies, followed by Siam Cement with a 91% low-carbon R&D share. These companies invest in technologies such as carbon capture, use and storage (CCUS), adapted process to manufacture clinker using renewable energy, or hydrogen use in steelmaking. The average low-carbon R&D share for the 22 companies that reported this figure is close to 50%. However, the cumulative low-carbon R&D investments for these 22 companies only represent 3% of the cumulative R&D investments captured in this analysis. The leading region in terms of low-carbon R&D investments is South Asia: seven (88%) out of the eight assessed companies from this region disclosed both their total and low-carbon R&D investments. The two other regions with more than half the companies disclosing this data are Europe & Central Asia and East Asia & Pacific, with 67% and 57% disclosing companies respectively.

Non-mature technologies are key to addressing some of the intractable, hard-to-abate emissions from different sectors, and so the ACT methodology rewards companies for their investments in these technologies. Around 35% of global CO_2 reductions between now and 2050 will result from low-carbon technologies that are currently in the demonstration or prototype phase (IEA 2023). Typical examples for heavy industries are 100% electrolytic hydrogen-based direct reduced iron (DRI)

steelmaking, carbon capture through indirect calcination, alternatives to conventional raw materials and clinker for cement production, and inert anodes for primary aluminium production.

Yet, only nine (10%) of the 91 assessed companies clearly disclosed their R&D investments in non-mature technologies. Around half of the R&D investments dedicated to low-carbon technologies for these nine companies are directed towards non-mature technologies. However, the cumulative 2022 investments for non-mature technologies amounted to just around USD 116 million, i.e. less than 10% of the total R&D investments reported.

Low-carbon patenting

Low-carbon patenting activity is an important indicator of a company's ability to transition and develop new low-carbon business models in an era of electrification and decarbonisation. Evidence of patenting activity could only be found for 38 (42%) of the assessed companies, and a smaller group of 19 (21%) companies also disclosed activity related to low-carbon technologies. The steel industry shows a slightly higher share of disclosure, with 47% of the companies having reported their patenting activity in 2022, compared to aluminium and cement industries with 33% and 38% respectively. These trends are a bit more pronounced when considering low-carbon technologies only, since no aluminium company was found to have reported any related low-carbon patent. When comparing regions, East Asia & Pacific and Europe & Central Asia are the only ones where some companies disclosed their low-carbon patenting activities.

Just over 9,300 patents were reported in total in 2022 by the companies covered in this benchmark, among which 383 were dedicated to low-carbon technologies, representing a mere 4% of total patents. This ratio has been found to be quite stable over the last five years. With such a low ratio of low-carbon to total patents, industry or regional comparisons remain limited and do not provide insightful information.

Capital expenditure

Of the 91 companies assessed, 20 (22%) disclosed the proportion of CapEx invested in low-carbon technologies in the reporting year 2022. Companies disclosing this information spend on average about 12% of their CapEx on low-carbon technologies. Only Heidelberg Materials, Salzgitter and Tata Steel invest more than a fifth of their CapEx in low-carbon technologies, with 23%, 24% and 23% shares respectively. From the data found in the benchmark analysis, there is no evidence that any of the 91 companies have a low-carbon CapEx share exceeding 25%.

Reporting total CapEx appears to be a common practice among companies in different regions; CapEx data was found for 100% of the assessed companies in Latin America & Caribbean, North America, South Asia and Sub-Saharan Africa. The share of companies reporting total CapEx goes down to 62% in Europe & Central Asia and 39% in East Asia & Pacific, this latter region comprising 46 (51%) of the 91 companies in this benchmark. The only company from Middle East & North Africa covered in the benchmark did not disclose its total CapEx. When it comes to disclosing low-carbon CapEx, companies from Latin America & Caribbean and Europe & Central Asia took the lead, with 50% and 48% of the companies having reported this figure respectively.

Analysing CapEx disclosure at the level of the three industries, cement companies take the lead, followed by aluminium and lastly by steel companies. In total, 28 (82%) of the cement companies and nine (75%) of the aluminium companies in the benchmark reported their total CapEx, while 17 (38%) of the steel companies did the same. That being said, the share of companies disclosing their low-carbon CapEx in a comprehensive way is quite low for all three industries: 32% for cement, 17% for aluminium and 16% for steel.

For the 20 companies that reported both their total and low-carbon CapEx, the average share of investments in 2022 directed towards low-carbon technologies was only 12%. However, when the total CapEx of the 54 companies that disclosed overall CapEx information is considered, the share of investments dedicated to low-carbon technologies falls to just 5%. Not only do companies need to significantly improve diclosure of overall as well as low-carbon CapEx, the observed figures make it clear that currently companies are not investing enough in identified solutions to contribute to the low-carbon transition of their industry.

Contrary to what is observed for disclosure quality, steel companies are the best performers in terms of their share of low-carbon CapEx, with an average of 16% in 2022, compared to 11% for cement companies. The aluminium industry trails behind with an average low-carbon CapEx share of just 4%, and the best-performing aluminium company in this regard, Rio Tinto, only reaching a 7% share of low-carbon CapEx. No clear regional trend is observed in companies' performance.

The ACT assessment also looks at CapEx planned for the near future. Few companies include such forward-looking data in their disclosure: for 2023, information on planned total CapEx and planned low-carbon CapEx was found for only 33% and 11% of the assessed companies, respectively. The gap is even higher for 2024, only two years following the 2022 reporting year, with 4% of the companies having disclosed total CapEx, and 2% having disclosed low-carbon CapEx. However, it is worth mentioning the case of Norsk Hydro, which has planned to invest 62% of its CapEx in low-carbon technologies in 2023 – an exceptional figure compared to the 5% average planned by other companies.

Climate governance and oversight

Corporate climate oversight and governance help ensure that companies include the low-carbon transition in their strategic plans and address other environmental challenges. By having a structured framework for climate oversight, companies can set and meet emissions reduction targets and commit to achieving the Paris Agreement goals.

Climate governance

For 24 (26%) of the assessed companies there was no convincing disclosure indicating the existence of an established structure dedicated to climate governance. The majority, i.e. 56 (61%) of the companies reported maintaining board-level oversight of climate-related issues, indicating that governance of climate change mitigation primarily rests with boards or the Chief Executive Officer (CEO). From a formal perspective at least, heavy industries companies are allocating climate governance to high levels of corporate management. There are nevertheless significant differences between the investigated industries.

For 67% of the aluminium companies and 76% of the cement companies, oversight of climate change issues rests with the highest level of the management structure, while for the iron & steel industry this is only observed for 49% of the companies. A stronger contrast is revealed when results are evaluated by ownership types. It is publicly owned companies where oversight for climate change issues is more often allocated to the highest level of corporate management; this was observed for 49 (73%) of such companies. By contrast only one government-owned company (11%) follows this practice. Baowu, an iron & steel company headquartered in Shanghai, integrates green and low-carbon initiatives into its board of directors' responsibilities and manages climate change issues through its Carbon Neutrality Office. Private companies sit in between this range with six (40%) of the companies having board-level climate oversight.

Although companies have been placing climate change oversight at the highest level of corporate management, they are notably lagging behind in making sure the management structure is equipped

with adequate climate change expertise. The existence of some level of climate expertise at the board level was only identified for 15 (16%) of the companies. As such, over 80% of the assessed companies fail to demonstrate the existence of adequate climate change expertise at the management level responsible for climate oversight.

In the ACT methodology, climate expertise is characterised by five key attributes: possessing academic or professional qualifications specifically related to climate change and the low-carbon transition (excluding purely energy-related backgrounds); professional experience in roles or organisations focused on climate change and low-carbon initiatives; active membership in organisations that drive corporate knowledge on these issues; and, demonstrating technical knowledge through recent publications/outputs on the impacts, risks and solutions associated with climate change.

Votorantim Cimentos

The Brazilian company Votorantim Cimentos is the only one where one of the board committee members has the full academic/professional qualifications relating to climate change and sustainability, required to achieve the maximum score in relation to this benchmark indicator. The member's qualifications include ESG Global Competent Boards Designation and an executive education programme on corporate sustainability and climate change, publications related to environment and social risk analysis and sustainability, membership in the sustainability committee, and professional experience related to climate change and sustainability. In addition, the board of Votorantim Cimentos is responsible for oversight of climate-related issues and, the CEO is responsible for executing board decisions related to the environment, among others.

Climate-related incentives

In total, 39 (43%) of the assessed companies reported having management incentives linked to climate change mitigation. For 30 (33%) of the companies, management incentives were set at the highest level of decision-making authority in the organisation (responsible for guiding its overall strategy and direction). The remaining 52 (57%) companies did not report any climate-related incentives.

Companies provide different types of monetary rewards for achieving climate-related performance, including annual bonuses, bonuses as a percentage of salary, salary increases and other forms of incentives over both the short- and long-term. Among the companies in this benchmark, the most popular model was the inclusion of incentives within the company's long-term incentive plan. This was observed for 24 (26%) of the companies. The remaining companies with climate-related incentives adopted a short-term view by making incentives part of annual bonuses or other short-term incentive plans.

Transition planning and scenario analysis

Companies should establish a time-bound action plan outlining how they will adapt and prepare for a low-carbon transition. This action plan should include medium- and long-term targets, quantified objectives and financial commitments. The plan should also be informed by climate scenario analysis to ensure its ambition is sufficient to align with a 1.5°C pathway.

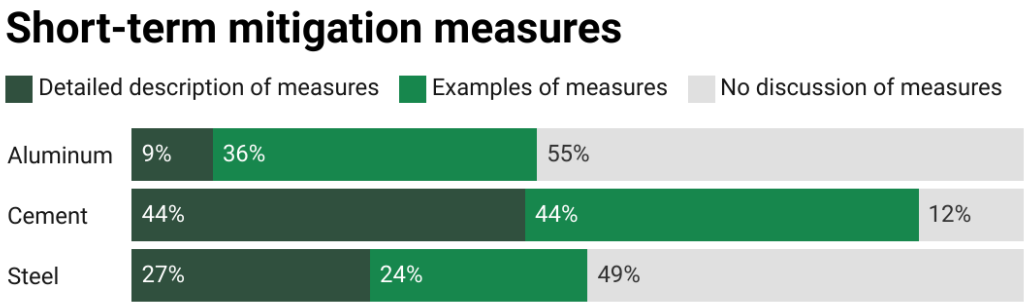
Transition planning

Of the 91 companies assessed, only 12 (13%) show convincing evidence of a transition plan that covers all business units/operations as well as upstream and downstream activities related to the company's production activities. This is the level of coverage that all companies need to strive for as it expands the company's accountability to include its value chain emissions. No aluminium company was observed to fall into this latter category, but seven (58%) of the companies in the aluminium industry provided evidence of a transition plan applicable to all business units/operations.

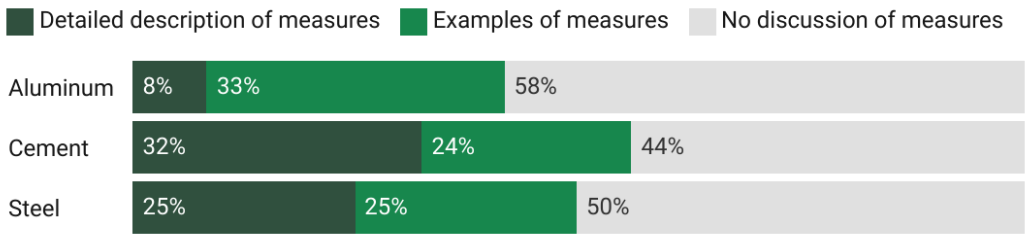
Nine cement companies: Asia Cement, Boral, CRH, Holcim, Ramco Cement, Taiheiyo Cement, Titan Cement, Vicat and Votorantim Cimentos, representing circa 26% of the industry sample covered in the benchmark, have a transition plan applying to both company operations and the value chain. For the iron & steel industry, this was observed to be the case for only three companies: Ansteel, JFE Holdings and POSCO, representing about 7% of the assessed iron & steel companies. More importantly though, for 31 (69%) of the companies evaluated in the iron & steel industry, no convincing disclosure was found of the existence of any type of transition plan. In comparison, the same is true for only nine (27%) of the assessed cement companies.

Next to the existence of a transition plan, companies were evaluated on the extent to which financial content was included in the plan, such as financial projections or indicators, and how decarbonisation aligns with the company's long-term vision and business strategy. Failing to present convincing evidence of financial considerations in the transition plan weakens the credibility of companies as it becomes unclear whether they are embedding carbon reduction efforts in key operational activities.

For 60 (66%) of the companies no evidence was found of quantified financial content, such as projections, cost estimates or other estimates of financial viability associated with the transition plan, although these might have been referred to within the plan. Specifically, this was the case for 34 (76%) of the iron & steel companies – the worst performing industry under this indicator – and for eight (67%) of the aluminium companies and eight (53%) of the cement companies.



Long-term mitigation measures



To achieve their decarbonisation goals, companies should develop both short- and long-term actions. Half of the 91 assessed companies did not disclose examples of actions they expect to implement in the long term (beyond the next five years). Only 23 (25%) of the companies provided detailed descriptions of relevant and achievable long-term actions they expect to implement to make the transition a reality. The aluminium industry performed the worst under this indicator with few companies disclosing detailed long-term actions associated with their transition plans. The outlier is Norsk Hydro, which disclosed detailed descriptions of long-term actions.

Overall more companies disclosed short-term actions rather than long-term ones. In total 59 (65%) of the companies provided a description of planned short-term actions. Detailed descriptions of short-term actions were observed for 28 (31%) of the companies but with marked sectoral discrepancies. While only 12 (27%) of the iron & steel companies disclosed detailed descriptions of their planned short-term actions, 15 (44%) of the cement companies did so.

Commitments by companies to establish processes for reviewing and updating their transition plan were found to be missing across most of the assessed companies. Of the 91 companies, only 12 (13%) disclose a commitment to review and update their transition plan with either a defined timescale or process. Of these, only two cement companies: Holcim and Heidelberg Materials, commit to updating their transition plan at least every five years with a defined process. No similar level of commitments were found for companies in the aluminium and iron & steel industries.

POSCO

POSCO has a transition plan in place – the Carbon Neutrality Roadmap – that encompasses the entire value chain, from production and research to sales and purchasing. The roadmap considers financial content linked to potential profits and losses of POSCO, short- and long-term considerations. Short-term actions include developing technologies to reduce the proportion of metallurgical coal used in steel production, reduce the use of molten iron in our steelmaking processes and expand the use of scrap metal. The Company frequently reports to the Management and Board of Directors on the progress of carbon neutrality. It also includes in its risk management specific to carbon neutrality a monitoring and reporting system. POSCO has implemented an internal carbon pricing system that reflects potential risks tied to carbon costs during the investment decision-making process. Climate change scenario testing and analysis has also been employed following IEA NZE 2050 scenarios and Task Force on Climate-related Financial Disclosures (TCFD) recommendations.

Scenario testing and carbon price

Companies should develop their transition plans based on a 1.5°C scenario. More than half (53%) of the assessed companies have not conducted any scenario analysis or have not defined the scope of their analysis. This figure is highest for the iron & steel industry in which 26 (58%) of the companies were found to not have conducted a scenario analysis. Only four cement companies: CRH, Cementos Argos, Heidelberg Materials and SIG, and two iron & steel companies: ArcelorMittal and Nippon Steel, were found to have conducted scenario analysis that applied to all business units/operations and the rest of the value chain.

Among the assessed companies, 28 (31%) identified the use of a carbon price embedded in cost calculations as a financial indicator. Only nine (20%) of the iron & steel companies made use of a carbon price in quantitative terms for cost calculations. For the aluminium and cement industries, the share of companies making quantitative use of carbon pricing was 50% (6 companies) and 39% (13 companies), respectively. For the remaining 53 (58%) of the assessed companies, no indication was found of the consideration of a carbon price, both in qualitative or quantitative terms. About seven (8%) of the companies aligned the carbon price with a low-carbon scenario and integrated it into the financial scenario used for making key business decisions. These companies were Cemex, Holcim, Kobelco, Norsk Hydro, Tata Steel, Thyssenkrupp and Vicat.

Nippon Steel

Nippon Steel's scenario testing encompasses a comprehensive analysis of its entire value chain, from upstream procurement and direct operations to downstream demand for its products and services. This testing spans a medium- to long-term timeframe, extending up to 2050, and includes evaluations of market and technology shifts, reputation, policy and legal factors, and physical risks. The company assesses the potential impacts of global temperature increases under three scenarios: 1.5ºC, 2ºC and 4ºC, with particular attention to the 2ºC scenario as outlined by the IEA, and assumes the implementation of carbon pricing across all regions. For each scenario, Nippon Steel provides a qualitative description of the potential impacts and corresponding strategic responses, ensuring that the company is prepared for various future developments.

Supplier and client engagement

Heavy industries are a hard-to-abate sector for which a low-carbon transition poses higher challenges. Moreover, companies in this sector play an important role in the supply chain of the buildings and transportation sectors. Considering that aluminium, cement and iron & steel companies sit at the top of the supply chain for other high-emitting sectors, it is even more important for them to have strong engagement strategies with clients and suppliers to ensure a comprehensive low-carbon transition.

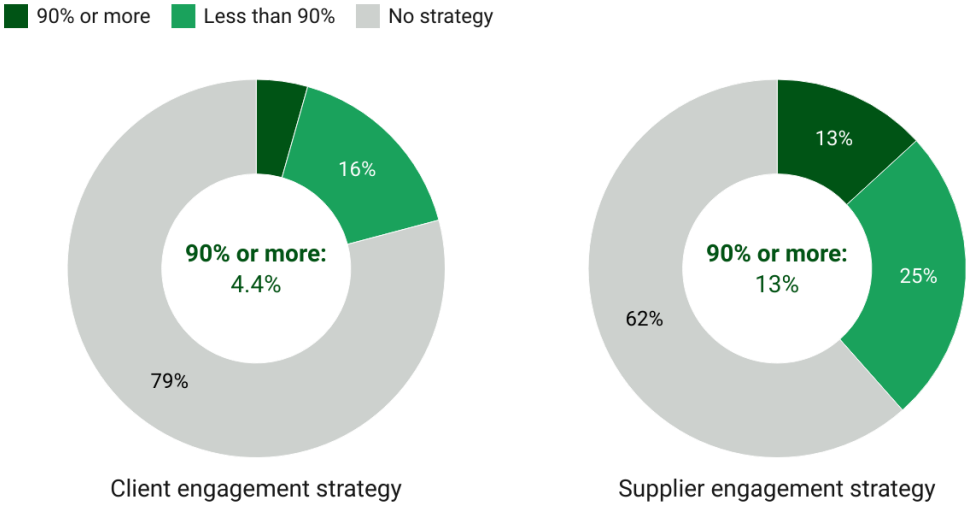
The scope 3 emissions in the aluminium, cement and iron & steel industries represent between 10-50% of total emissions, depending on the industry and the specific company's activities. Despite, their position in the supply chain and the importance of indirect emissions for their own decarbonisation, few companies have implemented comprehensive supplier and client engagement strategies. Out of the 91 assessed companies, only five (6%) reported a strategy to engage with clients and 17 (19%) reported a strategy to engage with suppliers on greenhouse gas reduction targets. The sector must make active efforts to engage with its clients and suppliers on greenhouse gas emissions reductions.

Supplier engagement

Overall, the heavy industries sector demonstrates poor performance in terms of climate-related supplier engagement. On average, the companies received only 17% of the points available for supplier engagement strategy and activities.

Scope of client and supplier engagement strategies

Percentage of benchmarked companies whose engagement strategies apply to more (or less) than 90% of their revenues *or* client-/supplier-related scope 3 emissions.



Among the 91 companies assessed, only 12 (13%) have a supplier engagement strategy that encompasses over 90% of their procurement spending or covers more than 90% of supplier-related scope 3 emissions. Despite this, more than half of the companies lack a strategy to influence their suppliers' climate performance, and none require suppliers to reduce their emissions. Only five (6%) companies mandate their suppliers to publicly report their emissions, and the same number include greenhouse gas emissions reduction or reporting requirements in their supplier selection or contract renewal processes. For those that set emissions reduction requirements, over half have a process to address non-compliance, with 11 (12%) companies suspending or further engaging non-compliant suppliers to drive improvements. Additionally, only four companies: JSW, Salzgitter, SSAB and Taiwan Cement, exclude suppliers who fail to make significant improvements after engagement. In terms of evaluating the impact of their strategies, 20 (22%) companies use quantitative measures, while six (7%) rely on qualitative assessments.

Titan Cement

Titan Cement stands out as the top-performing company under the supplier engagement module. The company requests all its key suppliers to set objectives and targets to reduce environmental impacts, devise action plans to mitigate climate change-related impacts as well as report progress on an annual basis. The company also includes education initiatives in its engagement strategy and cooperates with suppliers to introduce innovative products with the potential to reduce CO_2 emissions.

Client engagement

Among the 91 companies assessed, 72 (79%) lack a client emissions reduction strategy. However, 20 (22%) of the companies have implemented various measures to encourage their clients to reduce emissions. Additionally, 24 (26%) companies disclose the impact of their client engagement activities in quantitative terms. Despite these efforts, the sector's approach to client engagement generally lacks a well-defined structure, clear objectives, consistency and transparent key performance indicators (KPIs) to assess effectiveness.

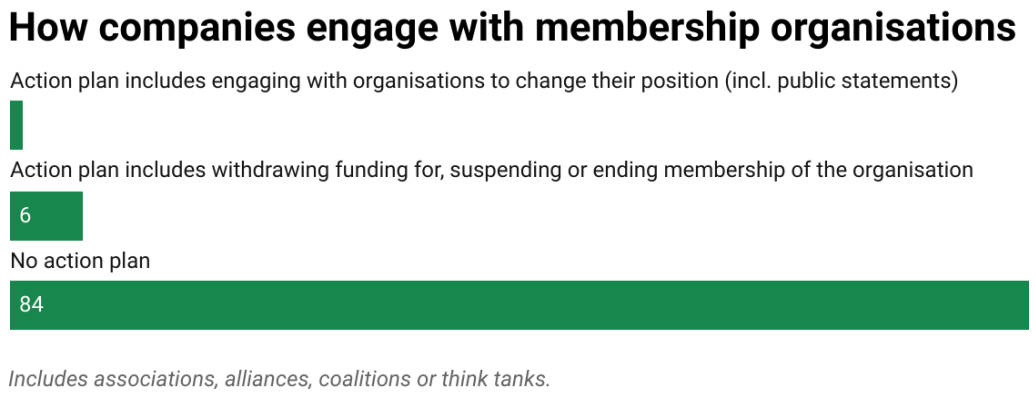
Trade associations and policy engagement

As hard-to-abate sectors increasingly receive more attention from the climate change momentum, a corresponding policy environment is needed to urge them on their decarbonisation journey. Several countries are developing initiatives to create a market for low-carbon industrial products, such as their inclusion in emissions trading systems in the EU and the US. It is estimated that by the end of 2021, more than 90% of the world's steel capacity and production came from countries committed to achieving net-zero emissions by mid-century (OECD 2022).

Companies also play a key role in the low-carbon transition of the heavy industries sector, with many industry organisations being initiated for international cooperation, such as the First Movers Coalition, the SteelZero Initiative and IRENA's Alliance for Industry Decarbonisation. Moreover, by supporting climate-positive measures and associations, companies can intervene when the trade associations they are members of do not align with these policies.

Strength of engagement strategy

Trade alliances, associations, coalitions and think tanks are key instruments through which companies can indirectly influence climate-related policy. Yet, 78% of the companies assessed in this benchmark have not disclosed how they govern their relationships with these influential parties. Moreover, over 83% of the companies do not have a process in place to monitor and review the climate policy positions of the alliances, associations, coalitions and think tanks which they are members of. Additionally, 84 out of the 91 companies fail to disclose an action plan for addressing instances when the associations they support are found to oppose climate-positive policies. Only six companies mentioned action plans to withdraw funding, suspend or end memberships in alliances, associations, coalitions or think tanks when they oppose climate-positive policies.



Out of the 91 companies, only 14 (15%) are not members of nor provide funding to any alliances or associations with climate-negative activities or positions. Of the remaining 77 companies that are members of associations involved in climate-negative activities or positions, only 25 are not on the board nor provide funding to these associations.

Support for the Paris Agreement and climate initiatives

On a more positive note, 53 (58%) of the assessed companies publicly support significant climate policies, with 36 of these explicitly committing to the Paris Agreement. Despite these commitments, only 11 (12%) of the companies have implemented a monitoring and review process to ensure their policy positions align with the Paris Agreement goals. In the aluminium industry specifically, only one company out of 12, actively participates in small-scale or pilot projects with local authorities to implement climate-related partnerships.

Low-carbon business activities

Companies must adapt to stay profitable in a low-carbon economy. They need to transition away from high-carbon business models to ensure that all revenue stems from low-carbon products and services. The ACT assessment focuses on two key aspects of companies' businesses: the share of income from low-carbon products and services and their actions to embrace new low-carbon business models while phasing out high-carbon ones. Additionally, companies' actions to mitigate life cycle emissions associated with low-carbon assets are also assessed.

Revenue from low-carbon products and services

Out of the 91 assessed companies, seven: Cemex, China Steel, Dalmia Bharat, Norsk Hydro, Salzgitter, SSAB and Voestalpine, disclosed their share of revenue from low-carbon products and services. In 2022, the average low-carbon revenue share among these companies was 30%. Notably, only three companies reported a low-carbon revenue share exceeding 30% in 2022: Dalmia Bharat leads with a percentage of 82%, followed by SSAB at 32% and China Steel at 31%. Among these seven companies, four are in the steel industry: China Steel, Salzgitter, SSAB, and Voestalpine. Two companies, Cemex and Dalmia Bharat, are in the cement industry, while Norsk Hydro operates in the aluminium industry.

In addition to evaluating the overall share of company revenue from low-carbon products and services, the increase in this share over time was also assessed. This evaluation covered the two years leading up to the 2022 reporting year. In 2020 and 2021, the average revenue share from low-carbon products and low-carbon services was 34% and circa 28%, respectively, for the seven companies that reported these figures. It is important to note that SSAB did not disclose this percentage for 2020, and Norsk Hydro did not disclose this percentage for 2021. Among the other five companies that provided information from 2020 to 2022, Dalmia Bharat and Salzgitter have slightly increased their share of revenue from low-carbon products and services in 2022 compared to 2020.

Lowering the carbon intensity of the business portfolio

Company performance in relation to expanding new, low-carbon business models was evaluated based on their current implementation of sector-specific decarbonisation actions and the projected growth of these activities.

The decarbonisation actions tailored to the aluminium, cement and iron & steel industries were derived from the IEA's mitigation measure recommendations per sector. These recommendations are primarily centred on actions likely to deliver the highest contribution to greenhouse gas reductions by 2030. Companies are evaluated on whether they are creating or expanding low-carbon business models, or implementing these decarbonisation actions within existing low-carbon business models.

For the aluminium sector, the recommended decarbonisation actions encompass services provided to the electrical grid, low-carbon electricity self-generation, substitution with thermal energy and adopting good circular waste practices. In the cement industry, recommended actions involve developing zero-clinker cement and producing low-clinker cement products, enhancing the use of biomass, contributing to low-carbon optimisation of construction, developing CCU/CCS solutions and

increasing the recycling rate of concrete and cement. For the steel industry, recommended actions include switching to low-carbon electricity in the steelmaking process, increasing the integration of hydrogen technology in steelmaking, increasing steel waste collection and/or the use of scrap steel, developing CCU/CCS solutions and the valorisation of by-products for the steel sector.

Aluminium

Out of the 12 aluminium companies included in the 2024 Heavy Industries Benchmark, only three are currently engaged in only one low-carbon business out of the four that are recommended for aluminium companies. Alcoa is active in providing services to the electrical grid, with renewable sources comprising 86% of its global smelting portfolio's power consumption in 2022. Emirates Global Aluminium recycled 100% of its dross in 2022, with the recycled dross generating salt slag repurposed for use in the cement, steel and other industries. In addition to these two companies, which show ambitious scale in adopting low-carbon business practices, Norsk Hydro has established a dedicated company to generating renewable energy for industrial processes, particularly for bauxite refining.

When it comes to scheduling the growth of low-carbon businesses, the three aforementioned aluminium companies aim to expand only the low-carbon business in which they are currently engaged. However, these decarbonisation actions are not expected to even double in size within the next five years. Another aluminium company, Hindalco, plans to expand its renewable energy portfolio by adding capacity for 71 MW of hybrid (wind + solar) energy and is finalising a renewable hybrid energy project with pumped hydro storage to deliver 100-300 MW of round-the-clock power.

While aluminium companies aim to expand their current low-carbon business practices but do not anticipate a substantial increase. This indicates a significant gap in the industry's overall adoption of a comprehensive low-carbon strategy.

Cement

Out of the 34 cement companies included in the 2024 Heavy Industries Benchmark, 12 (35%) companies are currently engaged in low-carbon businesses. Among them, four companies: Cemex, Dalmia Bharat, Ramco Cements and Shree Cement, are involved in two low-carbon businesses out of the six recommended for cement companies. Seven companies: China Shanshui Cement, CRH, Siam Cement, Taiheiyo Cement, Taiwan Cement, UltraTech Cement and Vicat, are active in one low-carbon business. None of the cement companies assessed is currently involved in three or more low-carbon businesses. Currently, five companies are active in contributing to low-carbon optimisation of construction, of which four companies: China Shanshui Cement, Ramco Cements, Siam Cement and UltraTech Cement, are already low-carbon aligned.

In overall, 70% (24) of the cement companies assessed have scheduled growth in at least one low-carbon business. The most ambitious companies in terms of planned growth are Cementos Argos and Holcim, which aim to be active in five low-carbon businesses from 2023 to 2028. They are followed by Asia Cement, Cemex, Heidelberg Materials, UltraTech Cement and Vicat, each of which is planning growth in four low-carbon businesses. Of the six low-carbon businesses recommended for cement companies, the most preferred future activity is producing low-clinker cement products, followed by enhancing the use of biomass and the development of CCU/CCS technologies.

Engagement and ambition levels on low-carbon businesses vary significantly among cement companies. Some show a strong commitment to expanding their low-carbon initiatives, while others are just beginning to incorporate these practices. Overall, low-clinker cement production and advanced carbon capture technologies emerged as key focus areas.

Cemex

Cemex has developed Vertua Cement Plus and Ultra with a lower CO2 footprint. Vertua Ultra Zero Concrete, is a geopolymer clinker-free concrete that reduces CO2 emissions by up to 70% compared to standard concrete (CEM I). In 2021, low-carbon ready-mix sales made up 3% of the company's global ready-mix sales. Additionally, Cemex is among the few cement companies active in producing low-clinker cement products. Vertua® sales accounted for 41% of its total cement volumes and 33% of its total concrete sales in 2022. The company has set a target of achieving 50% of Vertua® cement and ready-mix sales by 2025. Cemex also aims to lead the sectoral transition by developing another crucial business model: the advancement of Carbon Capture, Utilization, and Storage (CCU/CCS) technologies. The company plans to establish its first net-zero CO2 emission plants by 2030.

Iron & steel

Out of the 45 iron & steel companies included in the 2024 Heavy Industries Benchmark, 11 (24%) are currently engaged in low-carbon businesses. Among them, NLMK and Nucor are active in two low-carbon businesses each, while Ansteel, China Steel, Evraz, Gerdau, JFE Holdings, Maanshan Iron & Steel, Steel Dynamics, Tata Steel and Ternium are each active in one low-carbon business out of the five recommended activities for iron & steel companies. None of the iron and steel companies are currently involved in three or more low-carbon businesses.

The most preferred low-carbon business model currently adopted by iron & steel companies is increasing steel waste collection and/or the use of scrap steel, with nine out of the 11 companies engaged in low-carbon initiatives focused on this aspect at varying levels. For example, Ansteel has a recycling rate of 100% for both of its steel production subsidiaries and JFE Holdings introduced the Double-slag Refining Process (DRP®) to increase the amount of scrap iron used in all its steelmaking facilities. Evraz, Maanshan Iron & Steel and NLMK, on the other hand, have lower recycling rates.

Apart from this business model, other low-carbon initiatives already adopted by the industry include the valorisation of by-products. For example, Tata Steel achieves 100% slag granulation for the cement industry. Additionally, Ternium and Nucor promote the switch to low-carbon electricity in the steelmaking process, with 65% and 40% of their electricity generated from renewable or zero-carbon energy sources, respectively.

Next to this, 22 (48%) iron & steel companies are expanding their low-carbon business models, with some aiming to double in size within the next five years. The most sought-after low-carbon business model among these companies is increasing steel waste collection and/or the use of scrap steel, pursued by 15 (33%) of the steel companies, out of which only SSAB schedules to at least double the size of this business model in the upcoming five years. Following this, 13 companies have planned for growth in integrating hydrogen technology in steelmaking and promoting the switch to low-carbon electricity in steel production (Gerdau, JSW Steel and Salzgitter aim to at least double the size of the latter low-carbon business model in the upcoming five years). Additionally, ten companies are targeting growth in developing CCU/CCS solutions across industries, while nine companies are focusing on valorising by-products. The most ambitious companies in this regard are JFE Holdings and Kobelco, which aim to grow five low-carbon businesses. They are followed by China Steel, JSW Steel, Nippon Steel, POSCO, Salzgitter, Thyssenkrupp and US Steel, each of which is planning growth in four low-carbon businesses.

There is movement towards integrating sustainable practices in steelmaking, with a strong focus on recycling and energy efficiency. Companies are strategically prioritizing certain low-carbon models over others, reflecting both current capabilities and future aspirations. A few companies are leading with advanced and multiple low-carbon initiatives, but the most common picture is of an industry that is only now beginning to scale their low-carbon business efforts.

Appendix: Companies in the Heavy Industries Benchmark 2024

Company name	Country of headquarters	Sub-sector
Alcoa	United States of America of America	Aluminium
Arconic	United States of America of America	Aluminium
Century Aluminum	United States of America of America	Aluminium
CHALCO	China	Aluminium
China Hongqiao	China	Aluminium
Emirates Global Aluminium	United Arab Emirates	Aluminium
Hindalco	India	Aluminium
Norsk Hydro	Norway	Aluminium
Rio Tinto	United Kingdom	Aluminium
Rusal	Russian Federation	Aluminium
South32	Australia	Aluminium
Vedanta Resources	United Kingdom	Aluminium
Anhui Conch Cement	China	Cement
Asia Cement	Taiwan, China	Cement
BBMG	China	Cement
Boral	Australia	Cement
BUA Cement	Nigeria	Cement
Buzzi Unicem	Italy	Cement
Cementos Argos	Colombia	Cement
Cemex	Mexico	Cement
Cemros	Russian Federation	Cement
China Res. Building Materials Technology	China	Cement
China Shanshui Cement	China	Cement
CNBM	China	Cement
CRH	Ireland	Cement
Dalmia Bharat	India	Cement
Dangote Cement	Nigeria	Cement
Heidelberg Materials	Germany	Cement
Holcim	Switzerland	Cement
Huaxin Cement	China	Cement
InterCement	Brazil	Cement
Martin Marietta	United States of America of America	Cement
Ramco Cements	India	Cement
Shree Cement	India	Cement
Siam Cement	Thailand	Cement
Siam City Cement	Thailand	Cement
SIG	Indonesia	Cement
Taiheiyo Cement	Japan	Cement
Taiwan Cement	Taiwan, China	Cement
Titan Cement	Belgium	Cement
TPI Polene	Thailand	Cement
UltraTech Cement	India	Cement

UNACEM	Peru	Cement
Vicat	France	Cement
Votorantim Cimentos	Brazil	Cement
Yatai Building Materials	China	Cement
Ansteel	China	Steel
ArcelorMittal	Luxembourg	Steel
Baotou Steel	China	Steel
Baowu	China	Steel
China Steel	Taiwan, China	Steel
CITIC Pacific Special Steel	China	Steel
Delong Steel	China	Steel
Donghai Special Steel	China	Steel
Evraz	United Kingdom	Steel
Gerdau	Brazil	Steel
Guangxi Shenglong Metallurgical	China	Steel
Hanwa	Japan	Steel
Hebei Jingye Group	China	Steel
Hesteel	China	Steel
Hunan Valin Steel	China	Steel
Hyundai Steel	Korea, Rep.	Steel
JFE Holdings	Japan	Steel
JiuQuan Iron and Steel Group	China	Steel
JSW Steel	India	Steel
Kobelco	Japan	Steel
Liuzhou Iron & Steel	China	Steel
Maanshan Iron & Steel	China	Steel
Metinvest	Ukraine	Steel
Nanjing Iron & Steel	China	Steel
Nippon Steel	Japan	Steel
NLMK	Russian Federation	Steel
Nucor	United States of America of America	Steel
POSCO	Korea, Rep.	Steel
Rizhao Steel	China	Steel
SAIL	India	Steel
Salzgitter	Germany	Steel
Severstal	Russian Federation	Steel
Shagang	China	Steel
Shandong Iron & Steel Group	China	Steel
Shougang	China	Steel
SSAB	Sweden	Steel
Steel Dynamics	United States of America of America	Steel
Tata Steel	India	Steel
Ternium	Luxembourg	Steel
thyssenkrupp	Germany	Steel
Tsingshan Holding	China	Steel
U.S. Steel	United States of America of America	Steel
Voestalpine	Austria	Steel
Xinhua Metallurgical	China	Steel
Xinyu Iron & Steel	China	Steel

About the World Benchmarking Alliance

Founded in 2018, the World Benchmarking Alliance (WBA) is a non-profit organisation holding 2,000 of the world's most influential companies accountable for their part in achieving the United Nations Sustainable Development Goals. It does this by publishing free and publicly available benchmarks on their performance.

WBA shows what good corporate practice looks like so that leading companies have an incentive to keep going and laggards feel pressure to catch up. WBA has identified seven systems that, if transformed, have the greatest potential to put our society, planet and economy on a more sustainable and resilient path. These are the transformation of our social system, our agriculture and food system, our decarbonisation and energy system, our nature system, our digital system, our urban system and our financial system.

By benchmarking companies on each system transformation every second year, WBA reveals where each company stands in comparison to its peers, where it can improve and where urgent action is needed. The benchmarks provide companies with a clear roadmap of the commitments and changes they must make. Over time, they will show whether or not these 2,000 companies are improving their business impact on people, workers, communities and the environment. They equip everyone – including a community of about 390 organisations, referred to as the WBA Allies – with the insights that they need to collectively ensure that the private sector changes.

For more information, visit www.worldbenchmarkingalliance.org and follow us on Twitter @SDGBenchmarks.

If you have any feedback on our findings, please reach out to Vicky Sins, Decarbonisation and Energy Transformation Lead at WBA: info.climate@worldbenchmarkingalliance.org

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