AlliedOffsets

High Integrity Demand in
the VCM: Forecast Analysis
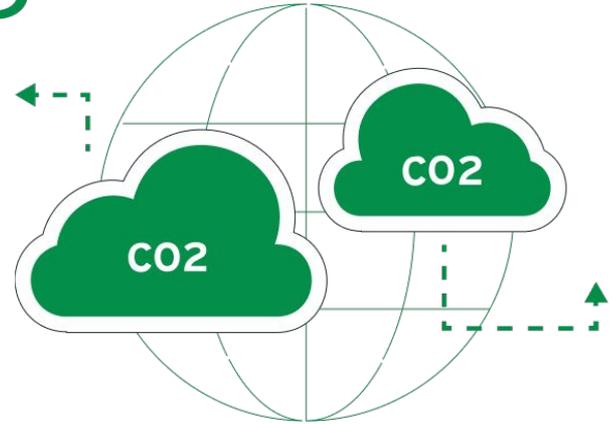
Table of Contents

AlliedOffsets

Overview

With carbon markets growing in both size and public awareness, there is an increasing need to understand how carbon offsetting can contribute to companies' overall decarbonisation strategies.

In order to do so, it's important to understand how much carbon dioxide companies are emitting, what percentage of emissions are covered by an emissions reduction target, and what demand for credits may be if companies use carbon credits to meet their targets.

This analysis uses AlliedOffsets data on carbon credits, company emissions, and emissions reductions targets in order to model various demand scenarios for the market. The emphasis is to understand how carbon credits can be used to complement, not replace, emissions reductions. To this end, we examine hard-to-abate companies that may struggle to meet emissions reductions targets, especially in the short term.

The findings in this report are meant to inform carbon market participants, sustainability officers, and policymakers on the potential for carbon market activity in helping to reduce and remove carbon emissions globally.

The research was funded by IETA. We appreciate comments and feedback from Andrea Abrahams, MD VCM at IETA, and Guy Turner, MD Carbon Markets at MSCI.

Research Questions

IETA commissioned AlliedOffsets to conduct analysis relating to the following questions:

- Q1: To what extent will the demand for carbon credits increase if credits are used to support company targets in cases where targets have been missed?

- Q2: To what extent will the demand for carbon credits increase if credits are used to offset scope 3 emissions where corporates cannot decarbonise scope 3 at the pace of scope 1 and 2?

- Q3: Consider the use of carbon credits to close the gap for hard-to-abate sectors. What is the emission gap by sector in 2030, 2040, and 2050 to decarbonise these sectors aligned with the Paris goals?

To answer these questions, AlliedOffsets used a sample dataset of companies that have retired credits in the VCM, have set emission reduction targets, and for which public emissions data is available. We also estimated emissions baselines for the 6,378 largest companies by market cap* to extrapolate our analysis to the wider market.

*6,378 represents the companies on the list with no negative employee or revenue values.

Research Questions

The overall aim of this analysis is to provide insights into some of the key discussions happening around the use of carbon offsets, including:

- What is a 'credible' use of carbon credits? Specifically, when used for offsetting purposes, credits should not replace companies' emissions reductions goals.
  To this end, we examine various scenarios where offsetting is considered to be additional and not a substitute for reducing emissions. This builds on research conducted by organisations like the Mission Possible Partnership (MPP) on reduction pathways for the hard-to-abate sector firms; an analysis of how many companies have set emissions reductions targets; how many companies' targets are not in step with the targets needed to meet Paris Agreement pathways; and how many companies are currently missing their targets.

- What is the potential total demand for carbon credits, if companies were to offset in a credible way, aligning with the scenarios examined above?
  To this end, we have mapped out the demand for credits from companies that are currently in the VCM, using existing and target emissions. We also created emissions estimates for companies that are not in the VCM, using company location, sector, revenues, and employees. When those companies had emissions reductions targets, we were able to map projected emissions going out to 2050.

Key takeaways highlight some of our findings can be found on the next page.

Key Takeaways

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1 **81%** of companies have not yet set climate targets. This represents **63G** tCO2e (note the double counting of scope 3 emissions)***** and should be a greater focus of our attention.

2 Amongst companies who have set targets, Scope 1 & 2 emissions have exceeded reduction targets by 26%, and Scope 3 emissions by 62%, per year on average (1.5G tCO2e).** Assuming this rate of under-delivery on targets continues, this could represent **4.5G** tCO2e in 2030 (**14G** tCO2e in 2050).

3 Hard-to-abate sectors have a greater challenge to deliver reductions at a pace aligned with Paris. Based on MPP, the gap in 2030 is between **2.5** to **7.5G** tCO2e.*** This gap could be closed - to some extent - with investment in carbon markets.

*Unless otherwise specified, all emissions figures in this report represent Scope 1, 2 and 3 emissions. AlliedOffsets acknowledges that Scope 3 emissions, particularly for energy companies, are double-counted in this report. We have estimated emissions consistent with existing corporate Scope 3 reporting criteria, which does not take into account the emissions of other companies.

**To illustrate this, consider a company whose target required it to reduce Scope 1 & 2 emissions by 100M tCO2e and Scope 3 emissions by 50M tCO2e each year until 2030. Missing targets at the rate of 26% and 62% would mean the company would actually reduce Scope 1 & 2 emissions by 74M tCO2e, and Scope 3 emissions by 19M tCO2e, annually -- emitting 57M tCO2e above target. In the first year, the company's above-target emissions would be 57M tCO2e (26M Scope 1 & 2, 31M Scope 3). In the second year, the company's emissions would start at 57M above target, and the gap would grow to 114M tCO2e (57M + 57M). In the third year, the gap would grow to 171M tCO2e (114M + 57M), etc.

***Numbers correspond to different MPP decarbonisation scenarios. Under a "Fastest abatement" scenario, the gap is estimated to be 2.5G. Under a "Low cost" scenario, the gap is estimated be 7.5G.

Set the Scene: Background, Data & Methodology
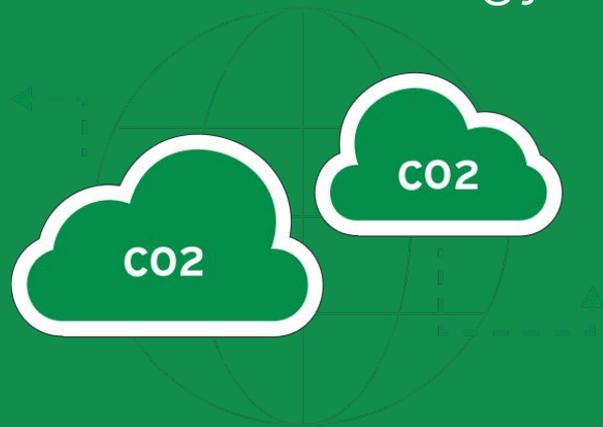
AlliedOffsets Sample

AlliedOffsets has the largest database of VCM projects, issuances, and retirements worldwide. This research is based on AlliedOffsets' emissions dataset, comprising 957 companies who retire credits (hereafter referred to as '**the Sample**'), 445 of which have set a net zero or science-based target. The total baseline emissions for the Sample is 22.1G tCO2e.

- The Sample represents approximate 1/3 of global emissions in 2023

- The Sample includes 445 companies who have net zero targets:

    - 295 with known SBTi targets

    - 150 with known NZT commitments

The Sample
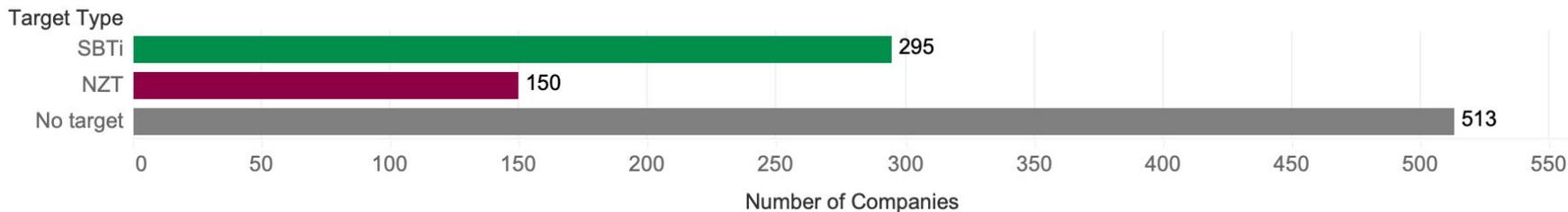
Methodology

AlliedOffsets analyzed emissions data, modelled reduction pathways, and tracked retirements for hundreds of companies.
- We extracted SBTi and Net Zero targets from companies' commitments and modelled a linear reduction model from baseline to near and long-term targets.
  - Where we had emissions data for the baseline year reported in a company commitment, we set the baseline to that year. In other cases, we set the baseline to the earliest year for which we had emissions data. Baseline years range from 2015 to 2023.

We extrapolated our emissions modelling to the 6,378 (hereafter referred to as '**the Extrapolated Dataset**') largest companies by market cap globally.

These companies represent $81T market cap (74% of global) across 73 countries.
- In order to estimate baseline emissions for these companies, we created a model, trained on AlliedOffsets data, that estimated current GHG emissions (tCO2e), based on a combination of:
  - Company sector
  - Annual revenue
  - Number of employees
- We estimated Scope 1 & 2 emissions together; Scope 3 emissions were estimated separately.
- The total GHG emission baseline for the Extrapolated Dataset was calculated to be ~88G tCO2e*, **.
- The Sample therefore represents 25% of the Extrapolated Dataset

*AlliedOffsets acknowledges that Scope 3 emissions, particularly for energy companies, are double-counted in this report. We have estimated emissions consistent with existing corporate Scope 3 reporting criteria, which does not take into account the emissions of other companies.
**All emissions are estimations, but we have compared our estimates with MSCI's total emissions figures for the 8,700 largest firms worldwide (most recently reported, scope 1,2,3), and the figures are similar in scale. These firms represent 99% of the global equity investment opportunity set, across 23 developed and 24 emerging markets. MSCI number is 97.1Gt CO2e.

AlliedOffsets Extrapolated Dataset

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We created emissions predictions for the Extrapolated Dataset as follows:

Total Emissions: 88G tCO2e
- Scope 1 & 2 emissions: 11G tCO2e
- Scope 3 emissions: 77G tCO2e*

We then forecasted decarbonisation trajectories for companies as follows:

- SBTi: 50% reduction by 2030, 90% reduction by 2050
- NZT: 100% reduction by 2050
- No target: no emissions reduction

*AlliedOffsets acknowledges that Scope 3 emissions, particularly for energy companies, are double-counted in this report. We have estimated emissions consistent with existing corporate Scope 3 reporting criteria, which does not take into account the emissions of other companies.

Sample Representativeness

We believe the Sample is representative for the following reasons:
- The total estimated emissions from the Extrapolated Dataset (88GT Co2e), is four times higher than that of the Sample (22GT CO2e), however the average emissions per company is higher in the Sample. This indicates that the companies in the Sample include a large proportion of global heavy-emitter
- Although emissions in Extrapolated Dataset are four times that of the Sample, emissions covered by targets is only 1.5 times the Sample. This is important because our modelling work on missed targets is based on the Sample.

Average GHG Emissions: Sample vs. Extrapolated
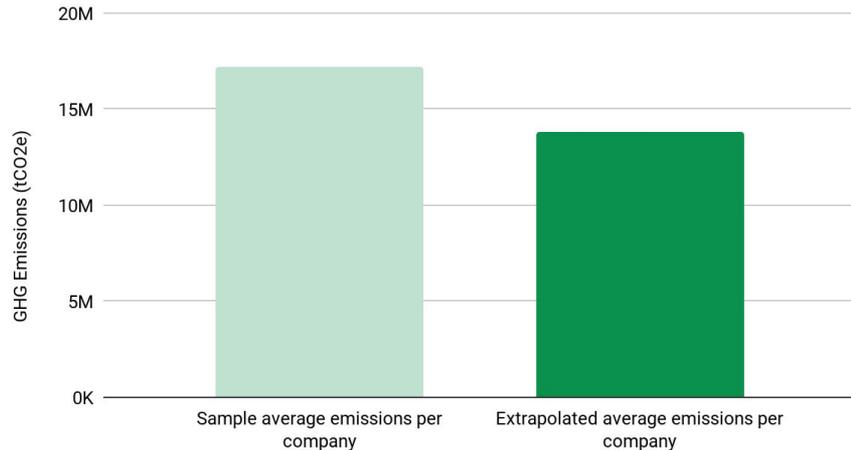
Emissions covered by Targets: Sample vs. Extrapolated

11
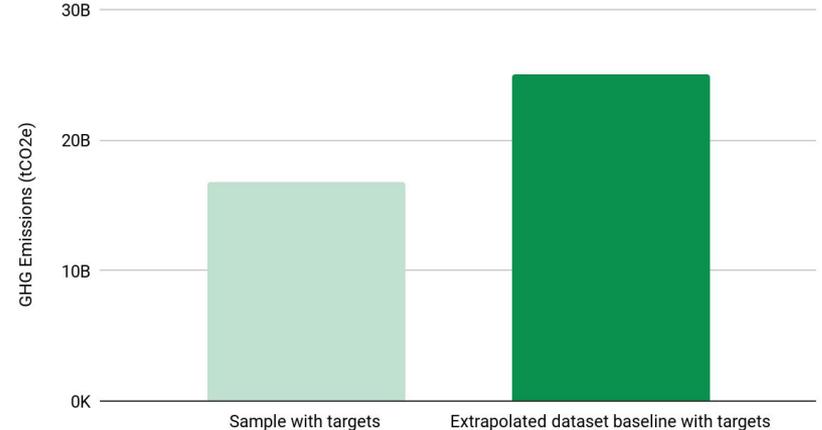
Size of the Challenge
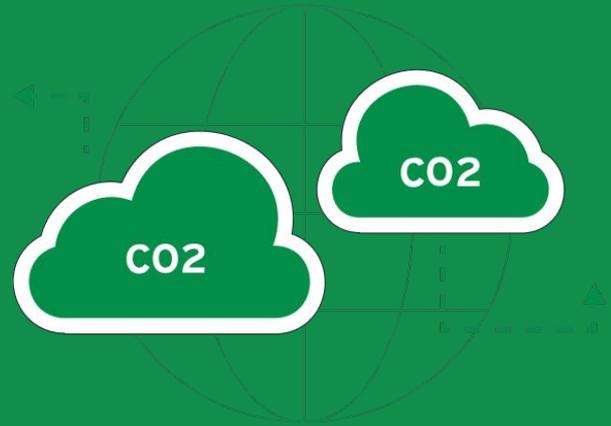
Size of the challenge

- Companies in the Extrapolated Dataset account for 88G tCO2e emissions.

- **81%** of these companies have not set an emission reduction target (63G tCO2e).

- For all companies to get on-track with Paris-aligned targets, corporate ambition would need to **increase by 2 to 3 times.**

- Carbon credits are not a substitute for decarbonisation. Rather, credits can lower the barrier to entry for setting reduction targets and help close the gap.

See Appendix C for more detail.

Size of the Challenge

Baseline emissions: 88G · Emissions covered by target: 25G · Size of the challenge: 54G · Paris aligned 2050 emissions: 8.8G
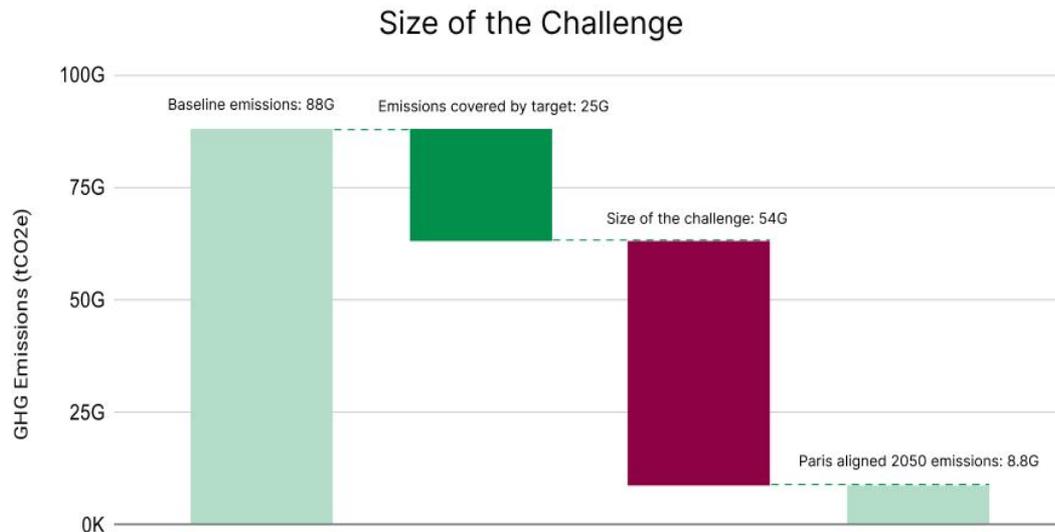
The "size of the challenge" is defined as the difference between stated targets and global adoption of a Paris-aligned reduction pathway.

13

Size of the challenge, Extrapolated data set, scope 1,2&3

This analysis compares the estimated current state of targets set vs. a scenario in which all companies set targets in line with the Paris pathway.

Based on current targets, emissions from the Extrapolated Dataset are only expected to reduce by 27% by 2050. ●

To align with the Paris pathway by 2050, collective ambition would need to be 2 to 3 times greater than current targets.

Therefore, the "size of the challenge" amongst corporates to limit to 1.5 degree warming is **36G** ● tCO2e at 2030 and **55G** ● tCO2e at 2050.

See Appendix E for scopes breakdown.

Scope 1, 2 & 3 Emissions Pathways by Target Type

Legend: No target | ● Paris Aligned target | ■ SBTi | ■ NZT

Y-axis: GHG Emissions (tCO2e) — 0K, 25B, 50B, 75B, 100B
X-axis: 2023–2050
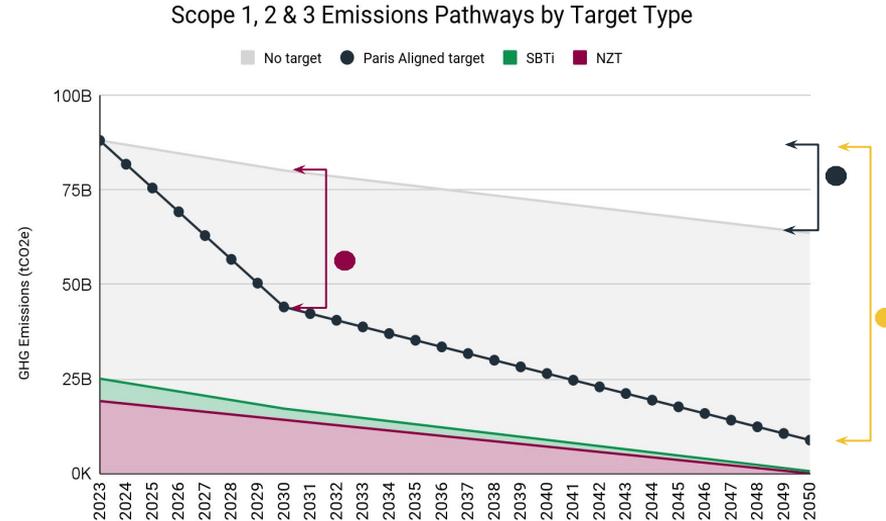
Credits are not a substitute for targets

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As an observation, we found that companies in the Extrapolated Dataset who have been active in the VCM have also been more likely to set targets.*

Amongst companies active in the VCM, 71% have set a target, while only 14% companies with no VCM activity have set a target.

This table shows the split of the Extrapolated Dataset emissions by 1) whether a company has had a retirement and 2) whether it has set a target				
	Target Set?	**Share of Companies**	**Share (Scope 1 & 2 GHG Emissions)**	**Share (Scope 3 GHG Emissions)**
No VCM activity	Target	14%	27%	22%
	No target	86%	73%	78%
VCM activity	Target	71%	58%	60%
	No target	29%	42%	40%

*This finding aligns with the MSCI/Trove November 2023 Report, *Using carbon credits to meet corporate climate targets*.

Emissions Gap
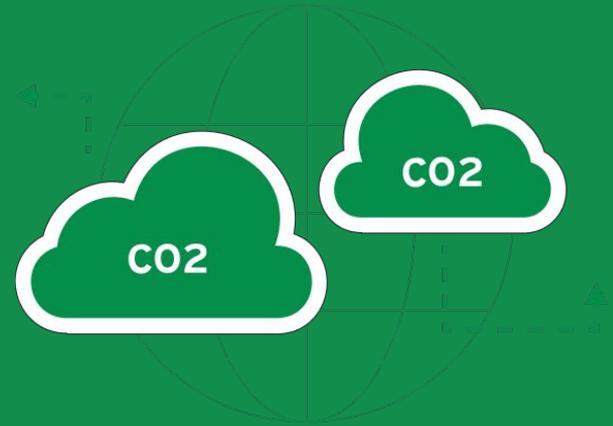
Missed Targets

To calculate the likelihood of corporates missing targets, we assessed the frequency of historical missed targets, and then calculate the volume of greenhouse gasses associated with missed targets.

Where we have data on targets from baseline, we see that more than half of companies have missed a target in at least one year.

On aggregate, total Scope 1 & 2 targets are missed by 26% of target reduction volume, and Scope 3 targets by 62%, annually.

- If this trend continues, we estimate the emissions gap from missed targets in the Extrapolated Dataset to be **4.5G** tCO2e in 2030.

- Even if more companies set Paris-aligned targets, the risk of missing targets would remain.

Emissions Gap from Missed Targets: Current targets

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Assuming that emissions will exceed Scope 1 & 2 targets by 26%, and Scope 3 emissions by 62%, each year:

- Companies in the Extrapolated Dataset will have an emissions gap of **4.5G** ● tCO2e (285M Scopes 1 & 2, 4.2G Scope 3) by 2030, and **14G** ● tCO2e in 2050.*

See Appendix E.3 for 2040 and 2050 figures with scopes breakdown.

Emissions gap on current targets

Baseline ─ Actual predicted emissions ■ Missed targets ■ Emissions Target

GHG Emissions (tCO2e)
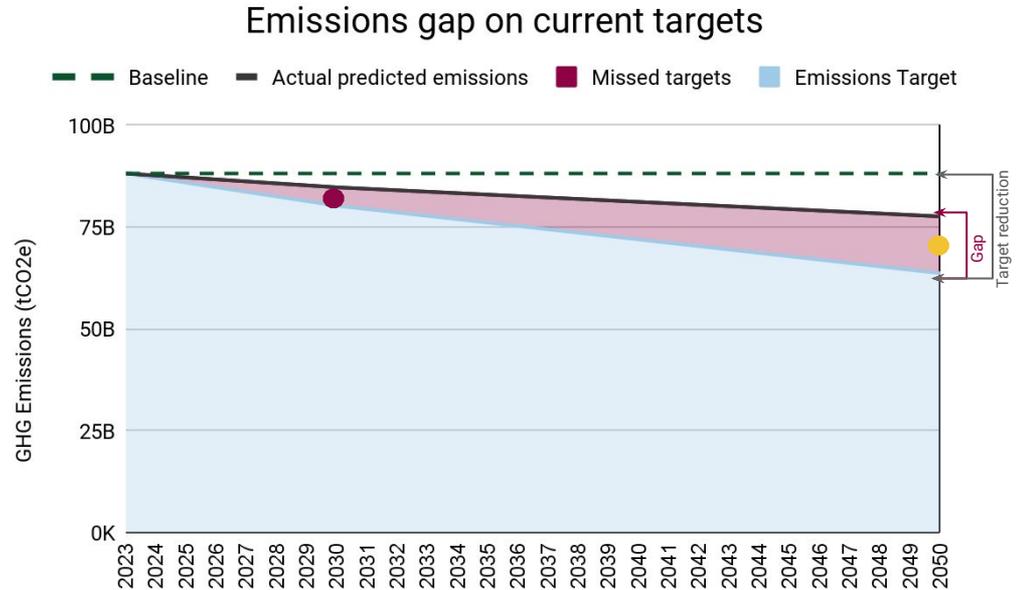
Emissions Gap from Missed Targets: Paris-aligned corporate ambition

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Even if all companies set Paris-aligned targets, the risk of missed targets will still exist.

Assuming that the missed target risks remains 26% of Scope 1 & 2, and 62% of Scope 3:

- The emissions gap will be **~25.5G** ● tCO2e (1.5G Scopes 1 & 2, 24G Scope 3) in 2030, and **~45.5G** ● in 2050.*

* See Appendix E.3 for 2040 and 2050 figures.

Emissions gap on Paris aligned pathway

Legend: — — Baseline — Actual predicted emissions ■ Missed targets ▢ Paris aligned emissions
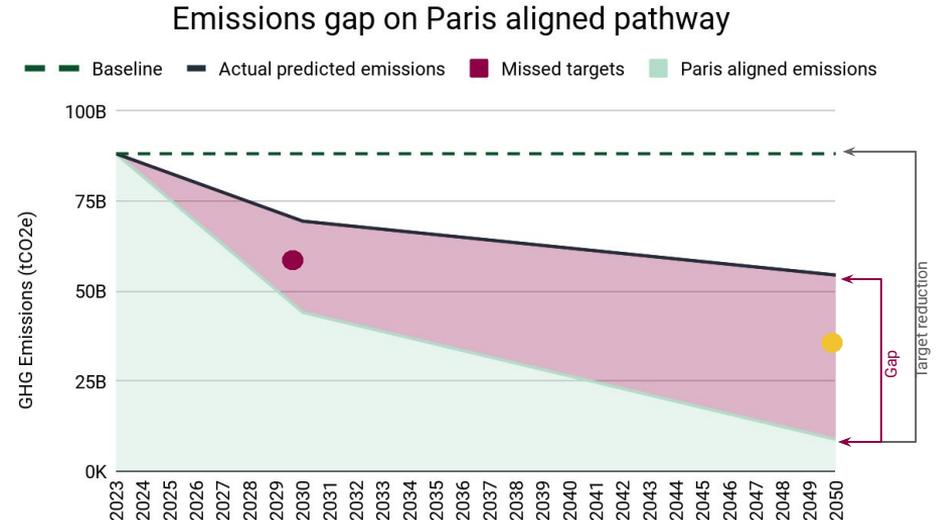
Chart represents targets set by 100% of Extrapolated companies

19

Carbon Credits in Hard-to-Abate Sectors

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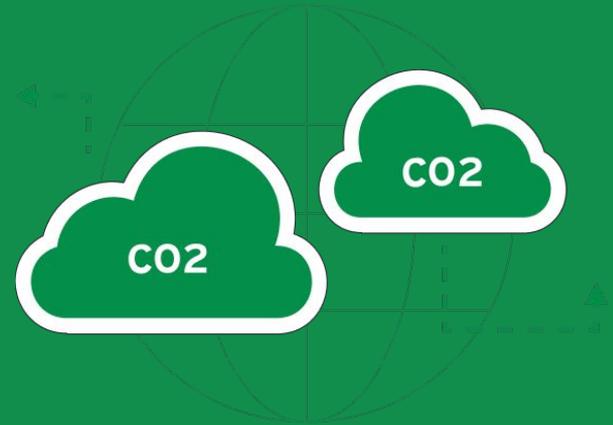
Hard-to-Abate Sectors

- The Mission Possible Partnership (MPP) defines hard-to-abate sectors as those relating to heavy industry and transport. MPP identifies seven hard-to-abate sectors: concrete, steel, aluminium, chemicals, aviation, shipping and trucking.

- In this analysis, we apply MPP decarbonisation scenarios to the companies defined as hard-to-abate* within the Extrapolated Dataset.

- We find an emissions gap between a Paris-aligned reduction pathway and both low-cost and fastest-abatement MPP pathways. Carbon credits could fill this gap.

*AlliedOffsets hard-to-abate sector classifications: Ground and Maritime transportation, Airlines, Mining, Industrials

Carbon Credits in Hard-to-Abate Sectors

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- Hard-to-abate sectors will find it more difficult to decarbonise than others.

- Carbon credits provide an opportunity to close the gap between decarbonisation pathways and Paris-aligned pathways.

- We estimate the emissions gap in 2030 to be between **2.5G** ●tCO2e (fastest abatement scenario) and **7.5G** tCO2e ● (low cost scenario).

See Appendix G for more detail.

Opportunity for Credits in Hard-to-Abate Sectors: 2030

Baseline: 22G

Low cost pathway reduction: 2.5G

Fastest abatement additional reductions: 5G

● Opportunity: 7.5G

● Gap: 2.5G

Paris aligned 2030 emissions: 11G

Hard-to-abate Emissions Gap by Sector

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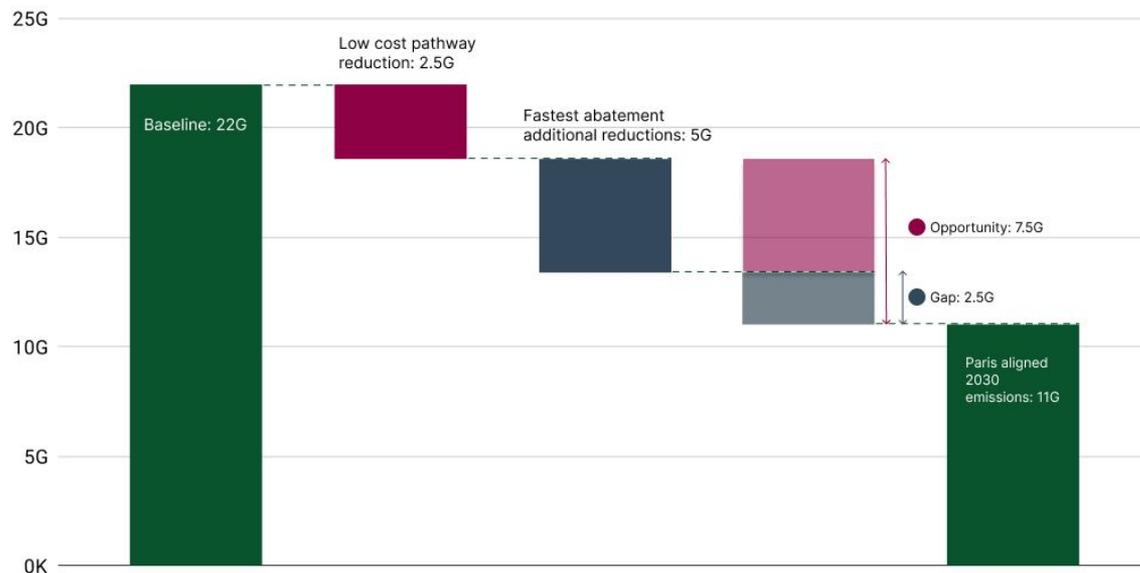
- The majority of the emissions gap will likely come from transport and industrial sectors, as they account for 43% and 55% of hard-to-abate sector estimated emissions.
- While airline emissions account for a relatively small proportion of hard-to-abate emissions, with CORSIA Phase I retirements required by 2030, this will be an important focus for carbon markets and future credit demand.

| Sector	Scenario	Emissions Gap 2030	Emissions Gap 2040	Emissions Gap 2050
Airlines	Fastest Abatement	60M	0	0
	Low Cost	186M	68M	37M
Ground and Maritime Transportation	Fastest Abatement	1B	0	0
	Low Cost	3B	1B	639M
Industrials	Fastest Abatement	1B	0	0
	Low Cost	4B	1.5B	821M
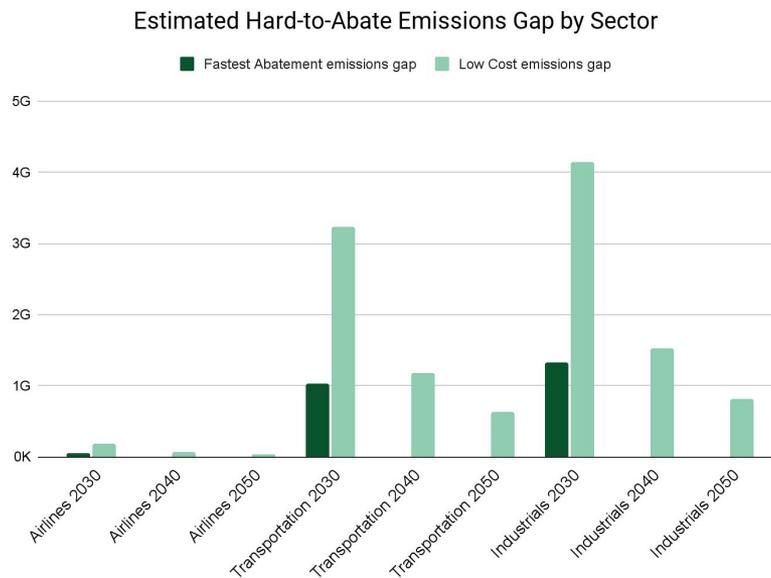
Estimated Hard-to-Abate Emissions Gap by Sector

■ Fastest Abatement emissions gap　■ Low Cost emissions gap

*Estimated baseline emissions from largest companies by market cap in Ground and Maritime transportation, Airlines, Mining and Industrials sectors.

Missed Targets in Hard-to-Abate Sectors

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Tying the hard-to-abate sector analysis back to the analysis on missed targets, it is important to note that we see evidence of wider emissions gaps amongst companies in hard-to-abate sectors.

Modelling of the Sample shows companies in hard-to-abate sectors typically miss their targets by greater GHG volumes.

Therefore, the case for credits to help meet Paris-aligned pathways is even greater for hard-to-abate sectors.

Annual Missed Emissions Targets by GHG Volume per Company
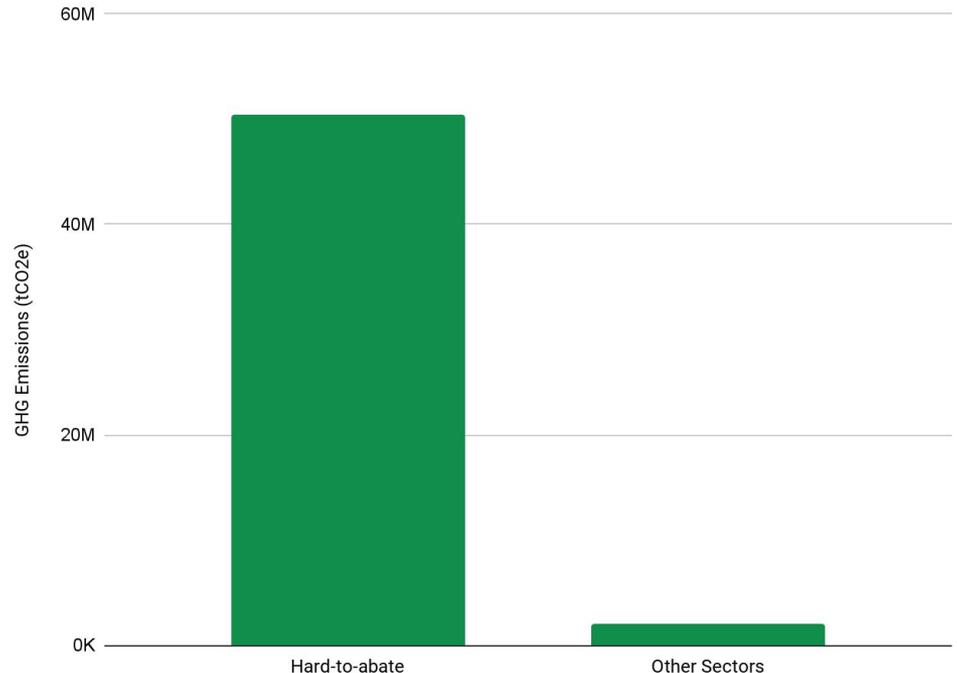
Conclusion
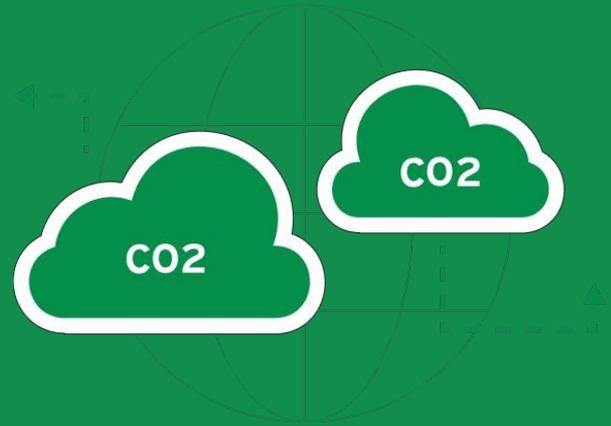
Conclusion

- The most pressing concern for decarbonisation is the number of companies that have not yet set emission reduction targets.
- Carbon credits are not a substitute for decarbonisation. Rather, credits can lower the barrier to entry for setting reduction targets.
- There may also be opportunity for carbon credits to close the gap caused by missed targets.
- Carbon credits provide a solution for companies in hard-to-abate sectors that cannot feasibly decarbonise in line with the Paris agreement.

Appendix
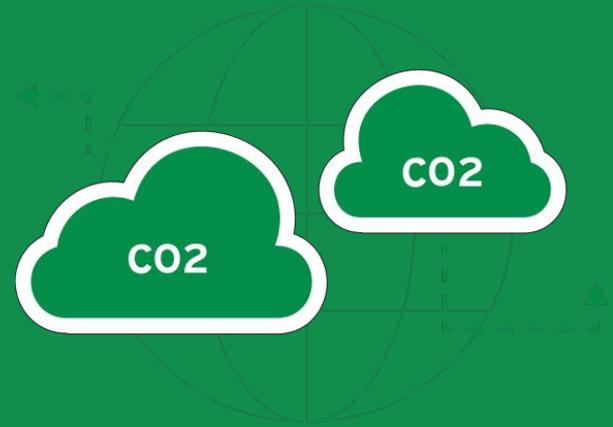
Appendix A: AlliedOffsets Emissions by Sector

Emissions by target and sector

	SBTi	NZT	No target
Agriculture	87M		0M
Airlines	24M	13M	31M
Consumer Goods	14M	4M	3M
Consumer Services	5M	15M	1M
Cosmetic Industry	14M		1M
Education			0M
Energy	65M	258M	13M
Fashion	3M		1M
Financial Services	4M	4M	10M
Ground and Maritime Transportation	140M	94M	12M
Health care & Healthcare	3M	7M	0M
Industrials	28M	10M	38M
International Organization			1M
Law Firms	0M		0M
Luxury Goods	1M		0M
Materials	12M	89M	75M
Media	0M		0M
Mining		0M	
Municipality			0M
Non-Governmental Organization			
Professional Services Firms	5M	14M	4M
Public Sector	10M		1M
Technology and Telecommunication	12M	3M	6M

Avg Baseline Emissions

0M — 258M

28

Appendix B: Sample vs Extrapolated data emissions by Sector

AlliedOffsets Sample vs. Extrapolated Dataset
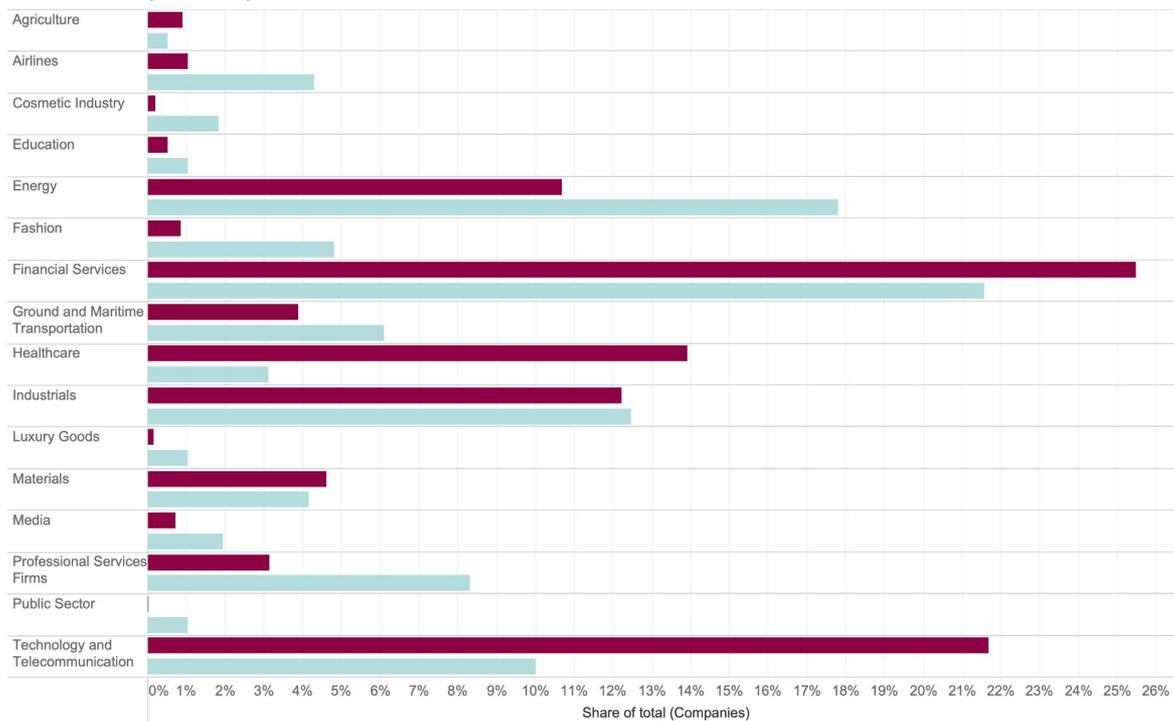
Measure Names
- Market Cap Emissions Share
- Sample Emissions Share

Appendix C: Emissions covered by targets

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- Companies without targets are estimated to emit **7.5G** tCO2e annually directly (Scope 1 & 2), with an additional **55.5G** tCO2e annual indirect (Scope 3) emissions.

The table below shows the estimated emissions from the Extrapolated Dataset, grouped by scope and target type. Approximately 68% of Scope 1 & 2 emissions come from companies that have not yet set a reduction target.

Target	Companies	Scope 1 & 2 GHG Emissions	Scope 3 GHG Emissions	Share (Scope 1 & 2 GHG Emissions)	Share (Scope 3 GHG Emissions)
SBTi	483	660M	5B	6%	7%
NZT	708	3B	16B	26%	21%
No target	5187	7.5B	55.5B	68%	72%

Appendix D Sample Emission Predictions

This research predicts emissions reductions amongst The Sample based on published SBTi and Net Zerotargets. Company targets, if met, will result in an overall emissions decrease of 92% between baseline and 2050.

Total GHG emissions (tCO2e) in study group: **16.8G**
- **2.5G** Scope 1 & 2
- **14.3G** Scope 3

The companies in the Sample aim to reduce 5.7G tCO2e by 2030. This relates to a reduction from baseline of:
- **922M tCO2e** Scope 1 & 2 tCO2e
- **5G tCO2e** Scope 3 tCO2e

| Year | Emissions reduction (tCO2e) from baseline | | |
	Scope 1 & 2	Scope 3	Total
2030	922M	5G	**6G**
2040	2G	9G	**11G**
2050	2G	13G	**15G**

Appendix E

This table shows:
1. Annual emission reductions required by current targets
2. Annual emissions reductions required to align with the Paris agreement
3. Annual discrepancy between current targets and Paris-aligned emission reductions
4. Cumulative discrepancy (emissions that exceed Paris agreement alignment) by 2030
5. Cumulative discrepancy by 2050

	Emissions reduction (tCO2e) required to meet targets		
	Scope 1 & 2	Scope 3	Total
Annual reduction on current targets	128M	779M	**907M**
Annual Paris Aligned reductions	368M	3G	**3G**
Annual size of challenge	240M	2G	**2G**
Cumulative size of challenge by 2030	4G	32G	**36G**
Cumulative size of challenge by 2050	6G	48G	**54G**

Appendix E.1 Answer to Question 1

To what extent will the demand for carbon credits increase if credits are used to support companies to close the emissions gap created by missed emission reduction targets (Scopes 1 & 2)?

- Over half of the companies in the Sample are not on track to meet 2030 emission reduction targets, and in some cases have actually increased emissions since baselining.

- On current trends, the demand for credits to close the gap between actual emissions and Scope 1 & 2 reduction targets could reach 285.4M tCO2e in 2030, 601.0M tCO2e in 2040 and 916M tCO2e in 2050.

- If all companies in our Extrapolated Dataset set targets and use offsets similarly, demand could reach 1.5G tCO2e in 2030, 2.1G tCO2e in 2040 and 2.6G tCO2e in 2050.

Appendix E.2 Answer to Question 2

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To what extent will the demand for carbon credits increase if credits are used to offset Scope 3 emissions where corporates cannot decarbonise Scope 3 at the pace of Scope 1 & 2 and/or where corporates have little to no control over Scope 3 emissions?

- There is evidence that companies are missing their Scope 3 targets at higher rates than they are missing their Scopes 1 & 2 targets.

- On current trends, the demand for credits to close the gap between actual emissions and Scope 3 reduction targets could reach 4.2G tCO2e in 2030, 8.6G tCO2e in 2040 and 13.0G tCO2e in 2050.*

- If all companies in our Extrapolated Dataset set targets and use offsets similarly, demand could reach 23.9G tCO2e in 2030, 33.4G tCO2e in 2040 and 43.0G tCO2e in 2050.*

*AlliedOffsets acknowledges that Scope 3 emissions, particularly for energy companies, are double-counted in this report. We have estimated emissions consistent with existing corporate Scope 3 reporting criteria, which does not take into account the emissions of other companies.

Appendix E.3 Answer to Questions 1 & 2

Data tables

1. Predicted emissions gap from missed targets on current ambition:

Year	Emissions gap (tCO2e) from missed targets		
	Scope 1 & 2	Scope 3	Total
2030	285M	4G	**4.5G**
2040	601M	9G	**9G**
2050	917M	13G	**14G**

2. Predicted emissions gap from missed targets if companies aligned with Paris agreement ambition:

Year	Emissions gap (tCO2e) from missed targets		
	Scope 1 & 2	Scope 3	Total
2030	1.5B	24G	**25.4G**
2040	2.1G	33G	**35.5G**
2050	2.6G	43G	**45.6G**

Appendix F.1 Answer to Question 3

Consider the use of carbon credits to close the gap for hard-to-abate sectors.

- The emissions gap to decarbonise hard-to-abate sectors to align with the Paris agreement is 2.4G tCO2e in 2030 under a fastest-abatement scenario, 7.6G tCO2e in 2030, 2.8G tCO2e in 2040 and 1.5G tCO2e in 2050 under a low-cost scenario.

- Decarbonisation costs are prohibitive in some hard-to-abate sectors, and even fastest abatement scenarios do not meet Paris-aligned emissions targets until after 2030.

- Carbon credits are not proposed as a solution to allow companies to meet their goals while maintaining business-as-usual practices. However, high-integrity credits may allow companies who have missed targets stay on track, and may give hard-to-abate sectors the final push they need to achieve 1.5 degree warming.

Appendix F.2 Answer to Question 3

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Data table

Year	HTA emissions gap		
	Fastest Abatement scenario	Low Cost scenario	Business as Usual scenario
2030	2.5G	7.5G	12.5G
2040	0	3G	16G
2050	0	1.5G	24.5G

Appendix G Hard-to-Abate Decarbonisation

This analysis builds on the MPP emissions pathways for aluminium, ammonia, steel, aviation and shipping. AlliedOffsets combined scenarios within each sector, classified as Business-as-usual (BAU), Low Cost, and Fastest Abatement. We calculated the proportional difference from a Paris-aligned pathway, and applied that to our hard-to-abate sector baseline of 22G tCO2e*.

The MPP Low Cost emissions reduction scenario currently exceeds the Paris pathway by **69%** ● in 2030.
- Applying this trend to the hard-to-abate sectors within the Extrapolated Dataset companies, the emissions gap is **7.5G** tCO2e.

The Fastest Abatement scenario is set to exceed the Paris pathway by **22%** ● in 2030.
- Applying this to the Extrapolated Dataset, the emissions gap is **2.5G** tCO2e.

Paris Pathways vs. MPP Scenarios (Aluminium, Ammonia, Steel, Aviation, Shipping)

*Estimated baseline emissions from largest companies by market cap in Ground and Maritime transportation, Airlines, Mining and Industrials sectors.