2022 CARBON COMPASS℠ METHODOLOGY

Iron & Steel, Cement and Aviation

JPMorgan Chase & Co.

Contents

1. Introduction

A key aspect of JPMorgan Chase & Co.'s ("JPMorgan Chase", the "Firm" or "we") environmental sustainability strategy is how we engage with clients that operate in carbon-intensive industries, with the goal of helping accelerate the low-carbon transition and set a path toward global achievement of net-zero emissions by 2050.

In 2020, we committed to align key sectors of our financing portfolio with what we consider to be the primary goals of the Paris Agreement, which aims to limit the global average temperature rise to well below 2 degrees Celsius, and ideally to 1.5 degrees Celsius, above pre-industrial levels. This means we are measuring the greenhouse gas (GHG) emissions of our clients in key sectors of our financing portfolio (our 'financed emissions') and setting emissions intensity reduction targets for these sector portfolios. Our targets apply to the financing that we directly provide to clients in those sectors as well as our share of facilitated financing through our underwriting in debt and equity capital markets. In May 2021, we became the first large U.S. bank to establish 2030 portfolio-level emissions intensity reduction targets – which we set for three sectors: Oil & Gas, Electric Power and Auto Manufacturing – and published our Carbon Compass℠ methodology detailing our approach. We also announced our intention to set similar targets for additional sectors in the future.

We are now setting net-zero-aligned targets for three additional sectors – Iron & Steel, Cement and Aviation – building on the approach and foundation we set with our initial three sectors. We chose to address these three sectors next based on their contribution to total global emissions and the technical and economic maturity of their available decarbonization pathways. We believe expansion to additional sectors also helps us further sharpen our focus on the interplay between the supply and demand sides of the global energy system, which is vital to advancing overall decarbonization and the global path to net-zero emissions. For example, by understanding evolving technologies and approaches in both the Electric Power sector and major industrial sectors pursuing electrification, we believe we are better positioned to meet the needs of both types of clients, including helping them seize opportunities to accelerate and strengthen their transition strategies.

In establishing our own methodology, we enlisted the support of ERM, a global pure-play sustainability consultancy with deep sectoral, technical and business expertise in the low-carbon energy transition, to challenge and enhance our efforts. We believe the approach we have co-developed is practical and future ready, and reflects leading thinking on decarbonization for these sectors.

The table below summarizes the baseline portfolio-weighted average carbon intensity and the 2030 target we have set for the Iron & Steel, Cement and Aviation sectors.

Metrics, Baselines and 2030 Targets – Iron & Steel, Cement and Aviation

SECTOR	DETAILS			BASELINE		2030 TARGET
	Scope(s) Included	Scenario Used	Unit of Measurement	Baseline Year	Portfolio Baseline	
Iron & Steel	Scopes 1 and 2	IEA NZE	t CO_2e / t crude steel	2020	1.454	**1.010** -31% from baseline
Cement	Scopes 1 and 2	IEA NZE	kg CO_2e / t cementitious product	2020	647.8	**460.0** -29% from baseline
Aviation	Scope 1 (tank-to-wake)	IEA NZE	g CO_2 / RTK	2021	972.6	**625.0** -36% from baseline

We continue to rely on climate scenario data from the International Energy Agency (IEA) World Energy Outlook (WEO), including the Net Zero Emissions by 2050 Scenario (IEA NZE), which we have used to set our targets for the three new sectors. According to IEA, the NZE scenario sets out what is required to achieve net-zero CO_2 emissions by 2050, which is consistent with efforts to limit the long-term increase in average global temperatures to 1.5°C. When we refer to "net-zero" alignment in this document, we are referencing that our new targets are intended to align to the IEA NZE scenario. Moving forward, we plan to re-evaluate our targets for the Oil & Gas, Electric Power and Auto Manufacturing sectors to align them with a net-zero emissions pathway.

The values above are based on the most suitable data and scenario projections available as of September 2022. Future updates to the IEA NZE scenario and/or other inputs — for example, to reflect changes in global emissions, available technologies or economic conditions — may result in changes to the implied emissions trajectories, and therefore our targets for these sectors. Improving visibility, quality and availability of data may also necessitate a restatement of our baseline for one or more of the included sectors in the future. We will regularly monitor these changes and assess the need to recalibrate our metrics and targets as appropriate.

For more information on each sector target, including the scenario and methods used, the emissions included and other details, see descriptions of the sector-specific methodologies that follow this introduction.

Over time, we aim to continue expanding this work to additional carbon-intensive sectors, engaging with our clients on their decarbonization journeys, and aligning that work with global climate goals and evolving best practices for the financial sector. For additional information on our environmental sustainability strategy and how we are supporting our clients, see JPMorgan Chase's 2022 Climate Report.

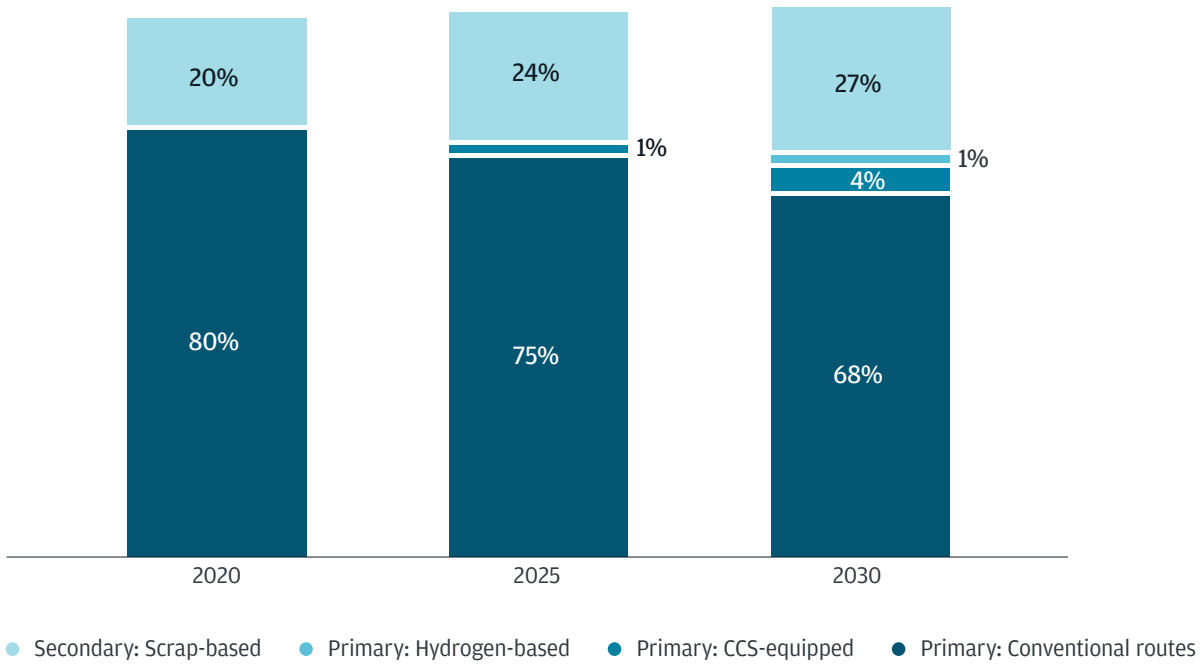
2. Iron & Steel

The Iron & Steel sector's direct and indirect CO_2 emissions account for approximately 10% of global emissions, making it the highest emitting of the heavy industrial sectors.[1] This is mostly due to its heavy reliance on metallurgical coal, which is converted into coke and used to generate heat and strip oxygen from the iron ore. The industry is considered hard-to-abate given the climate challenge associated with the likelihood of continued growth in global steel demand – driven in part by infrastructure needs related to the wider low-carbon transition – and the overall capital intensity and long useful life of its existing production assets.

Decarbonization pathways for the sector include electrification, increasing scrap recycling, using lower-carbon energy inputs such as biomass or hydrogen, and deploying carbon capture, use and storage (CCS/CCUS) technologies to reduce direct CO_2 emissions. In particular, modifying or replacing the traditional blast furnace/basic oxygen furnace (BF-BOF) production route is necessary to reduce dependence on coal and enable the use of other sources of energy. Lower-carbon alternatives that are currently available include biomass-based BF-BOF, electric arc furnace (EAF) and/or natural gas-based direct-reduced iron (NG DRI) processes, while longer-term options such as blue or green hydrogen-based DRI may help drive much deeper decarbonization in the future.

Although several promising technologies are on the horizon, more will need to be done to drive the scale necessary to fully align with a path to net-zero emissions by 2050.

Steel Production by Share of Process Routes in the IEA NZE Scenario



Source: IEA Net Zero by 2050

Note: Values for 2020 are IEA estimates

1 Iron and Steel Technology Roadmap. IEA, Paris. 2020.

2.1. Key Decisions

Our target for the Iron & Steel sector focuses on the intensity of Scope 1 and 2 GHG emissions associated with crude steel production, in order to capture emissions and activity from both primary and secondary steelmaking processes.

We obtained a net-zero-aligned carbon intensity trajectory for the sector using the IEA NZE scenario, adjusted to include Scope 2 emissions from electricity consumption. From this we derived a 2030 target of 1.010 t CO_2e / t crude steel, representing a 31% reduction from our 2020 portfolio baseline of 1.454 t CO_2e / t crude steel.

Sector Portfolio Target Summary – Iron & Steel

Activity Focus	Iron and steel manufacturing
Scope	Scope 1 and 2 CO_2e – including both energy-related and process emissions – from production of primary and secondary crude steel
Metric	t CO_2e / t crude steel
Scenario	IEA NZE, adjusted to include Scope 2 emissions
2030 Target	1.010 t CO_2e / t crude steel
Data Sources	CDP, S&P Global Trucost, World Steel Association (WSA), Wood Mackenzie (WoodMac), Global Energy Monitor (GEM) Global Steel Plant Tracker (GSPT), IEA World Energy Outlook, company disclosures

2.2. Methodology Detail

2.2.1. BOUNDARIES

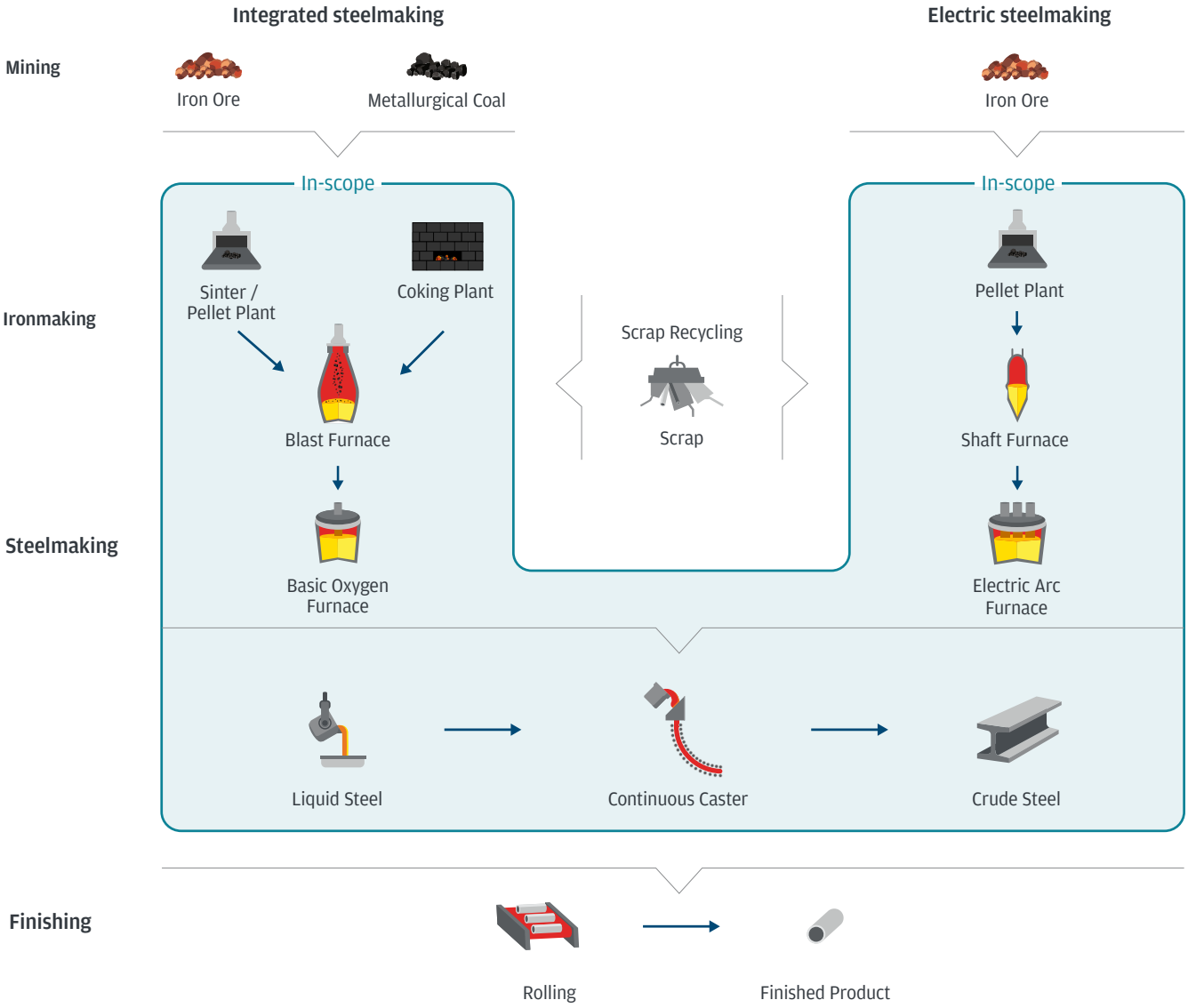
Our methodology for the Iron & Steel sector includes Scope 1 and 2 GHG emissions associated with the production of crude steel, which refers to steel in its first solid state, when it is cast after leaving the final furnace. Scope 1 includes direct energy-related emissions from fuel combustion (including any on-site electricity generation) and process emissions from iron ore reduction, the use of lime fluxes, ferroalloy production, carbon-containing electrodes, calcination of carbonates and consumption of graphite anodes in EAFs. Scope 2 includes indirect emissions from grid-purchased electricity. While electricity-related emissions have not historically been very significant, they are included in recognition of the importance of EAFs to the sector's decarbonization pathway.

The activities we focus on include both primary and secondary steelmaking. This is consistent with the boundary used for the sector-specific modeling underlying IEA's NZE scenario. It is also estimated to account for the majority of total value chain emissions for the sector.

Scope 3 emissions, which are primarily driven by iron ore extraction and transport, account for a negligible portion of total emissions and are therefore excluded.

Under our methodology, individual client emissions may be offset by company-implemented carbon removal projects — including CCS/CCUS, direct air capture and nature-based solutions — provided they are properly attributed according to standard GHG accounting protocols. Reductions associated with third-party carbon removal projects that have been validated and registered on an eligible platform will also be considered. Renewable energy credits (RECs) are permitted but may only be counted against Scope 2 emissions from purchased electricity. Our methodology does not currently give credit for other types of carbon offsets, including company-implemented or third-party avoidance offsets. However, we recognize that carbon markets are rapidly evolving with a focus on improving both the quality and quantity of available credits. We will continue to monitor developments and consider the feasibility of recognizing additional types of offsets in the future.

Iron & Steel Sector Boundary



2.2.2. METRIC

The emissions intensity of JPMorgan Chase's Iron & Steel sector portfolio is evaluated using the metric tons CO_2e per metric ton of crude steel produced.

$$\frac{\text{Scope 1 + 2 Emissions - Credits (t } CO_2e)}{\text{Crude Steel (t)}}$$

An intensity-based metric is effective for its ability to capture wide variation in the emissions profiles of different steelmaking processes, and because reduction in carbon intensity of such processes — rather than a material reduction in steel demand — is expected to be the primary driver of decarbonization for the sector. It also allows for more consistent tracking and comparison to support taking emissions into account as part of our financing decisions.

2.2.3. SCENARIO AND TARGET

The benchmark trajectory for the sector is based on sector-specific projections of CO_2 emissions and production from the IEA NZE scenario. Because IEA NZE only projects Scope 1 emissions for the sector, we use the scenario's energy demand inputs to allow for Scope 2 emissions inclusion.

Although our metric includes non-CO_2 emissions — because they are commonly included in reporting for this sector — IEA's scenario projections are for CO_2 emissions only. However, since the sector's non-CO_2 emissions are relatively insignificant, further adjustments to the IEA trajectory are not necessary.

We have derived a net-zero-aligned target by converging to the scenario's 2050 emissions projection for the sector and interpolating the corresponding carbon intensity in 2030, similar to the criteria in the Science Based Targets initiative's (SBTi) Sectoral Decarbonization Approach (SDA). This results in a target of 1.010 t CO_2e / t crude steel, representing a 31% reduction from our 2020 portfolio baseline of 1.454 t CO_2e / t crude steel.

2.2.4. DATA SOURCES AND CONSIDERATIONS

To calculate the carbon intensity of companies in JPMorgan Chase's Iron & Steel sector portfolio, we use Scope 1 and 2 emissions data from CDP and S&P Trucost and production data from the World Steel Association (WSA) and Wood Mackenzie. Where production data is unavailable, we use capacity data sourced from the Global Energy Monitor (GEM) Global Steel Plant Tracker (GSPT) to derive an estimate of annual production. If emissions data is unavailable, we calculate estimates using average utilization and emissions factors for the company's capacity of each of the major production routes (BF-BOF, scrap-EAF, and NG DRI-EAF). If none of these methods are available, we use a conservative proxy value equivalent to the 75th percentile of the available data for other portfolio companies.

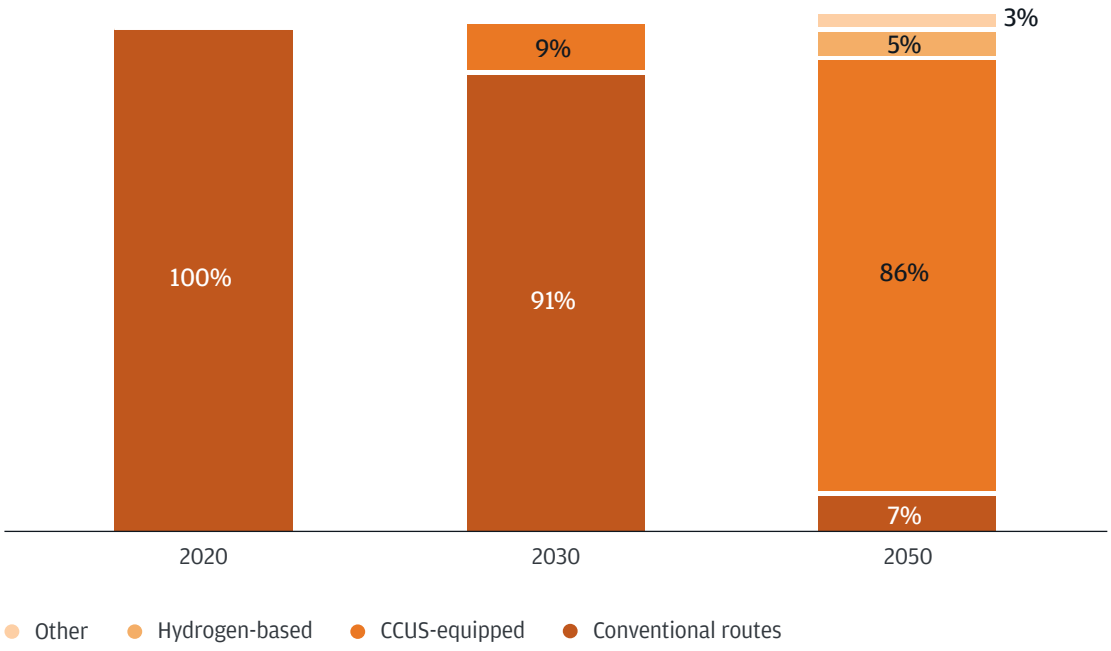
Moving forward, we will continue to monitor developments in the availability of data — especially those relevant to the evolving composition of our portfolio and the further development of sector decarbonization strategies — and consider updates to our methodology as appropriate.

3. Cement

The Cement sector is responsible for approximately 7% of global CO_2 emissions and a quarter of all industrial emissions.[2] Cement production is generally considered hard-to-abate due to its emissions resulting not just from energy consumption but also from the chemical process of calcination, an essential step in cement production that directly releases substantial quantities of CO_2.

Abatement strategies for the sector therefore include efforts to reduce reliance on clinker (the processed material that results from calcination) by using supplementary cementitious materials (SCMs) and other cement substitutes that partially replace cement to reduce its concentration in finished cement products. Replacing the use of fossil fuels to generate process heat is also a key lever for reducing emissions, with possibilities including the use of alternative fuels or electrification at different stages of the production process. However, these strategies alone will not be sufficient to align the sector with a path to achieving net-zero emissions by 2050, so experts also see a long-term role for CCS/CCUS technologies, as well as efforts to reduce future demand, such as prolonging the life of buildings and infrastructure and scaling the use of alternative building materials and techniques.

Cement Production by Share of Process Routes In The IEA NZE Scenario



Source: IEA Net Zero by 2050

Note: Percentages may not total 100 due to rounding

The complexity and scale of many of these changes will necessitate work across the industry, supportive policy and long-term capital investments, particularly in emerging economies where the majority of future demand and production are expected to be concentrated.

2 Energy Technology Perspectives 2020. IEA, Paris.

3.1. Key Decisions

To assess net-zero alignment of JPMorgan Chase's Cement sector portfolio, we evaluate the intensity of Scope 1 and 2 GHG emissions from cement manufacturing. We calculate intensity using the production metric of cementitious product, as this captures both the primary driver of emissions (clinker production) and potential levers for reducing them, including the use of SCMs and other cement substitutes.

The benchmark trajectory was obtained from the sector-specific emissions and activity pathways in the IEA NZE scenario. From this we derived a 2030 target of 460.0 kg CO_2e / t cementitious product, representing a 29% reduction from our 2020 portfolio baseline of 647.8 kg CO_2e / t cementitious product.

Sector Portfolio Target Summary – Cement

Activity Focus	Cement manufacturing
Scope	Scope 1 and 2 CO_2e
Metric	kg CO_2e / t cementitious product
Scenario	IEA NZE, adjusted to include Scope 2 emissions and align with use of cementitious product metric
2030 Target	460.0 kg CO_2e / t cementitious product
Data Sources	CDP, S&P Global Trucost, Global Cement and Concrete Association (GCCA), company disclosures

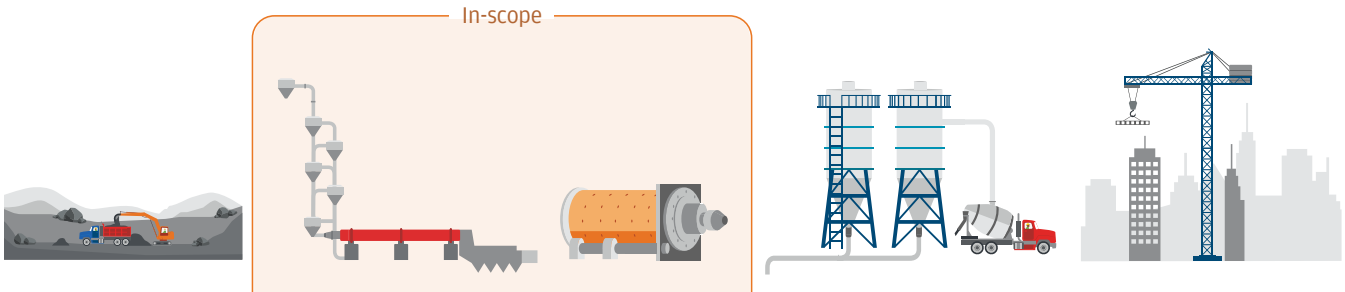
3.2. Methodology Detail

3.2.1. BOUNDARIES

The Cement sector methodology includes Scope 1 and 2 CO_2 emissions associated with manufacturing of cementitious product. Cementitious product refers to all clinker produced by the client company for the purposes of making cement or direct clinker sale, plus gypsum, limestone, cement kiln dust, all clinker substitutes consumed for blending and all cement substitutes, and excluding clinker bought from third parties.

Scope 1 includes emissions from both the combustion of fuels and the decomposition of limestone in the clinker production process. Scope 2 includes emissions associated with electricity purchased for production uses, such as for cement grinders or other equipment. Together, these account for approximately 96% of total lifecycle emissions for the sector. While Scope 2 emissions are relatively small in comparison to Scope 1, we include them for several reasons: (1) they are well represented in the available data and projections for the sector; (2) many cement companies include them in their decarbonization strategies and targets; and (3) excluding them would require complex adjustments to company emissions data, since some generate power on-site (resulting in Scope 1 emissions) while others purchase it from utilities (resulting in Scope 2 emissions).

Cement Sector Boundary



Scope 3 emissions from mining and quarrying, processing, transport, and logistics are estimated to account for just 4% of total emissions and are therefore excluded.[3] Some companies have integrated operations, meaning that certain upstream or downstream activities may also contribute to their Scope 1 and 2 emissions. However, since these activities are not a significant driver of overall emissions, no adjustments to company emissions totals are made. Scope 3 emissions from purchased cement and clinker can be significant for some companies, but are excluded due to lack of consistent reporting, and because they are already included in Scope 1 and 2 emissions of clinker producers when taking a global perspective.

Under our methodology, individual client emissions may be offset by company-implemented carbon removal projects — including CCS/CCUS, direct air capture and nature-based solutions — provided they are properly attributed according to standard GHG accounting protocols. Reductions associated with third-party carbon removal projects that have been validated and registered on an eligible platform will also be considered. RECs are permitted but may only be counted against Scope 2 emissions from purchased electricity. Our methodology does not currently give credit for other types of carbon offsets, including company-implemented or third-party avoidance offsets. However, we recognize that carbon markets are rapidly evolving with a focus on improving both the quality and quantity of available credits. We will continue to monitor developments and consider the feasibility of recognizing additional types of offsets in the future.

3.2.2. METRIC

The emissions intensity of JPMorgan Chase's Cement sector portfolio is evaluated using kilograms of CO_2 per metric ton of cementitious product produced.

$$\frac{\text{Scope 1 + 2 Emissions - Credits (kg } CO_2e)}{\text{Cementitious Product (t)}}$$

Similar to our approach for other sectors, the use of an intensity-based metric is effective for capturing variations in the strategic and operational characteristics of different clients and providing insight into the full range of decarbonization strategies being deployed in the sector. It also allows for more consistent tracking and comparison to support taking emissions into account as part of our financing decisions.

The production metric — cementitious product — refers to all clinker produced by the client company for the purposes of making cement or direct clinker sale, plus gypsum, limestone, cement kiln dust, all clinker substitutes consumed for blending and all cement substitutes, and excluding clinker bought from third parties. Use of cementitious product is specified by GHG Protocol's CO_2 Accounting and Reporting Standard for the Cement Industry and Global Cement and Concrete Association's (GCCA) Sustainability Guidelines for the monitoring and reporting of CO_2 emissions from cement manufacturing, which guides how companies report their data, and is also recommended by the Transition Pathway Initiative (TPI) and SBTi.

3 McKinsey & Company. Laying the foundation for zero-carbon cement. May 2020.

3.2.3. SCENARIO AND TARGET

The benchmark trajectory for our Cement sector methodology is based on the sector-specific projections of CO_2 emissions, energy use and production volumes from the IEA NZE scenario. Since production data in the scenario is expressed as metric tons of cement rather than cementitious product, we perform a conversion using a factor derived by TPI from data compiled by GCCA.[4]

Although our metric includes non-CO_2 emissions — because they are commonly included in reporting for this sector — IEA's scenario projections are for CO_2 emissions only. However, since the sector's non-CO_2 emissions are relatively insignificant, further adjustments to the IEA trajectory are not necessary.

Using the resulting trajectory, we have calculated a net-zero-aligned, 2030 carbon intensity target of 460.0 kg CO_2e / t cementitious product, representing a 29% reduction from our 2020 baseline of 647.8 kg CO_2e / t cementitious product.

3.2.4. DATA SOURCES AND CONSIDERATIONS

To calculate the carbon intensity of companies in JPMorgan Chase's Cement sector portfolio, we use Scope 1 and 2 emissions data sourced from CDP and S&P Trucost and production data reported by companies. If neither cementitious nor cement production data are available, we may use as an alternative company-reported input, such as clinker production, cement capacity or clinker capacity, to derive cementitious product. If none of these methods are available, we use a conservative proxy value equivalent to the 75th percentile of the available data for other portfolio companies.

Moving forward, we will continue to monitor developments in the availability of data — especially those relevant to the evolving composition of our portfolio and the further development of sector decarbonization strategies — and consider updates to our methodology as appropriate.

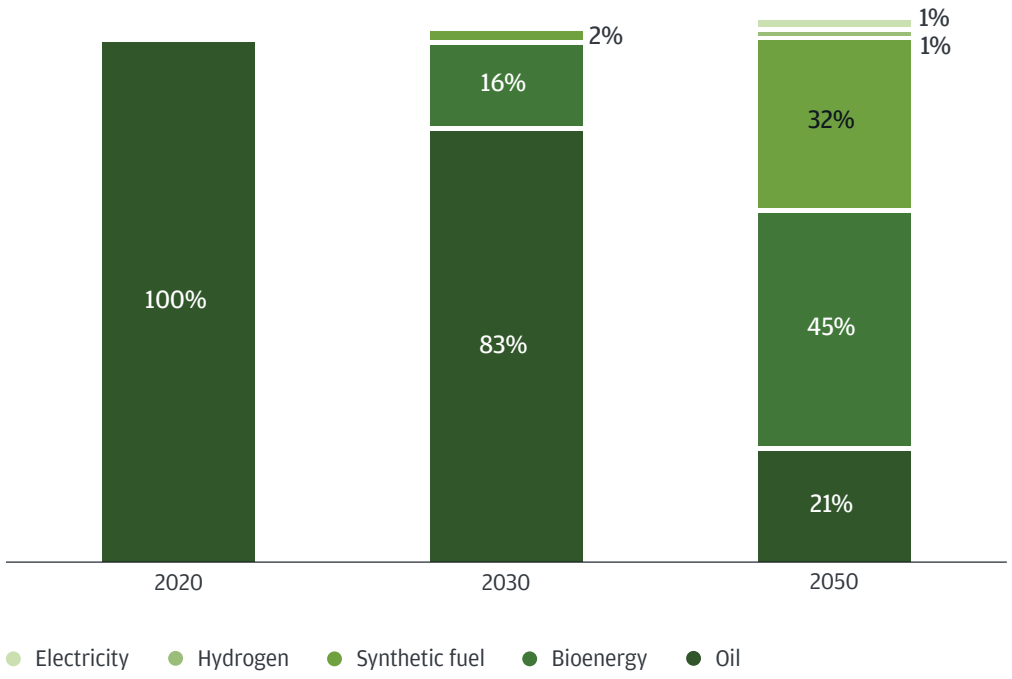
4 GCCA. Cement Industry Energy and CO_2 Performance: Getting the Numbers Right (GNR). 2019.

4. Aviation

The Aviation sector currently accounts for over 2% of global CO_2 emissions, mainly from commercial airline operations.[5] It is considered a hard-to-abate sector because of the significant technical barriers to replacing fossil fuels in its operations and the high cost of solutions such as sustainable aviation fuels (SAF) and fleet replacement. Options for decarbonization are also constrained by challenging industry economics, which have been amplified by recent events including the COVID-19 pandemic and energy market disruptions resulting from the war in Ukraine.

To date, the industry has made progress primarily through fleet modernization, with newer engine technologies, lighter materials, improved aerodynamics and other factors contributing to a more than 50% reduction in emissions per passenger kilometer since 1990.[6] Higher passenger load factors (i.e., increasing the utilization of aircraft space, especially relative to fuel consumption) and operational improvements have also contributed to a reduction in emissions intensity. Looking forward, though, deeper decarbonization of the sector will require significantly scaling the adoption SAF and other low-carbon technologies, such as electric and hydrogen-fueled propulsion systems.

Global Aviation Energy Consumption by Fuel in the IEA NZE Scenario



Source: IEA Net Zero by 2050

Note: Percentages may not total 100 due to rounding

Bringing each of these options to scale will require significant investment and collaboration both within and beyond the airline industry. In particular, rapidly reducing costs and scaling both production and distribution of SAF are key priorities requiring action by multiple stakeholders, including airlines, aircraft and engine manufacturers, lessors, governments, energy companies, the agricultural sector and others.

5 Aviation Tracking Report. IEA, Paris. September 2022.

6 Fuel Fact Sheet. IATA. December 2019.

4.1. Key Decisions

To assess net-zero alignment of JPMorgan Chase's Aviation sector portfolio, we evaluate the intensity of direct (Scope 1) CO_2 emissions for revenue-generating passenger service and belly freight operations of airline companies, specifically from the combustion of fuels during flight – also referred to as tank-to-wake (TTW) emissions.

We determined a net-zero-aligned carbon intensity trajectory for the sector using emissions data from the IEA NZE scenario, adjusted to exclude emissions from dedicated air freight, along with detailed global flight activity data from the International Air Transport Association (IATA). From this we derived a 2030 target of 625.0 g CO_2 / RTK, representing a 36% reduction from our 2021 baseline of 972.6 g CO_2 / RTK.

Sector Portfolio Target Summary – Aviation

Activity Focus	Scheduled passenger service and belly freight by airline companies
Scope	Scope 1 tank-to-wake (TTW) CO_2 emissions from flights
Metric	g CO_2 / revenue tonne kilometer (RTK)
Scenario	IEA NZE with an adjustment to exclude emissions for dedicated air freight
2030 Target	625.0 g CO_2 / RTK
Data Sources	Platform for Analyzing Carbon Emissions (PACE), International Civil Aviation Organization (ICAO), company disclosures

4.2. Methodology Detail

4.2.1. BOUNDARIES

Our Aviation sector methodology focuses on Scope 1 CO_2 emissions from revenue-generating passenger service and belly freight operations of airline companies. We chose this focus because Scope 1 emissions from flights currently represent more than 98% of airlines' operational emissions, on average, and passengers and belly freight account for the bulk of the sector's activity.[7]

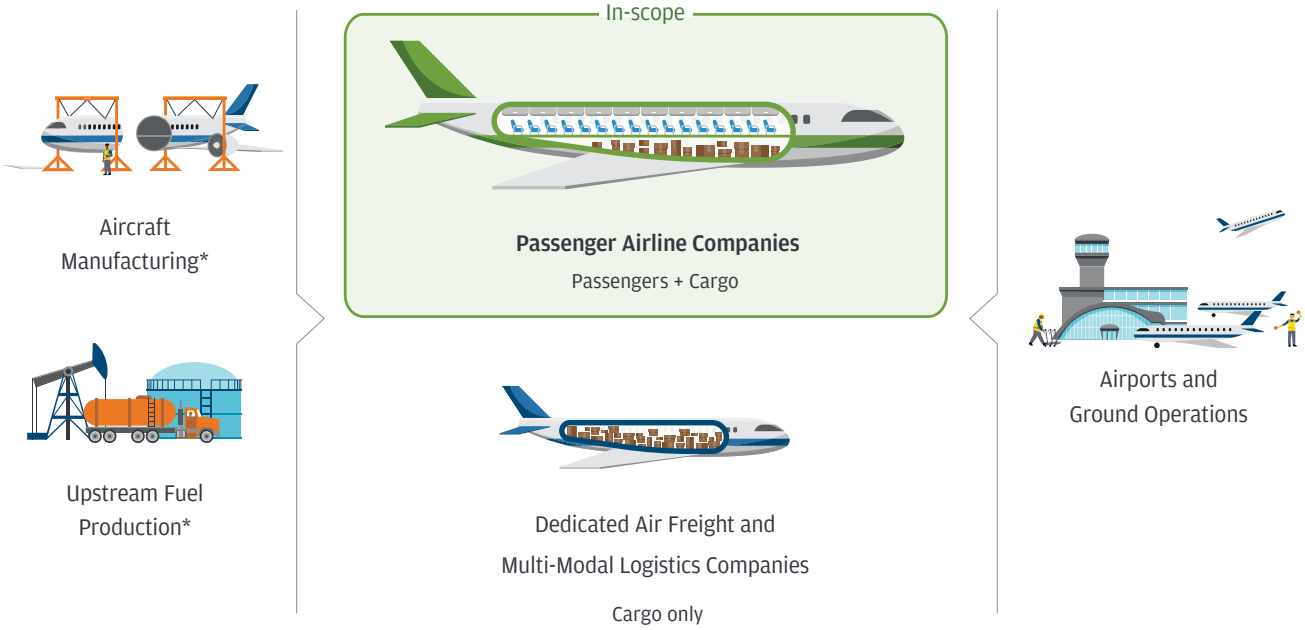
Dedicated air freight and multi-modal logistics companies also play an important role in the sector but are currently not in scope for our target. This is because they represent only a marginal share of total emissions, and also due to challenges with data availability, most notably for distinguishing the share of activity and emissions attributable to aviation compared to other forms of transport used by multi-modal logistics companies.

For our Aviation sector target, we currently focus on Scope 1 emissions from flights, or tank-to-wake (TTW) emissions, resulting primarily from the combustion of jet fuel. A potential well-to-wake (WTW) scope was also considered, in order to capture upstream (Scope 3) emissions associated with fuel production, which are especially important to understanding the impact of SAF. However, upstream emissions for fossil-based jet fuel are already covered by our Operational target for the Oil & Gas sector, and SAF volumes are currently too low to have a significant impact on the overall emissions picture, so these emissions are currently not included as in-scope for our target. Moving forward, we will continue to monitor best practices and data availability for assessing the SAF value chain, with the intention of incorporating relevant emissions in our target in the future.

7 U.S. Federal Aviation Administration (FAA), 2021 Aviation Climate Action Plan. Washington, DC. 2021.

Although our sector boundary only includes direct emissions from flights, it is important to note that airlines' ability to reduce them is dependent on the actions of other stakeholders, both within and beyond the broader Aviation sector. Key future actions include further improvements in engine efficiency, new types of aircraft and propulsion systems, innovative financing structures, and new policies and incentives to support industry-wide action. Efforts are also needed to help further scale the production, deployment and accessibility of SAF, which is expected to be the most important lever for decarbonizing the sector in the near-to-medium term. While we aim to work closely with airlines to advance all of the above, it is equally important for us to engage with other relevant clients – such as engine and aircraft manufacturers, lessors, agricultural producers and others – on their role in enabling transition for this sector.

Aviation Sector Boundary



* Out-of-scope but included in JPMC's engagement efforts with relevant clients

In addition to CO_2 emissions from flights, we also recognize the importance of non-CO_2 effects, specifically emissions of other aerosol particles which may increase the sector's overall climate impact. However, these effects are not currently included in our approach, as there is not yet a clear consensus on how they should be accounted for. This is also consistent with IEA's current methodology for projecting Aviation sector emissions, which includes only end-use CO_2 emissions from jet fuel combustion, as well as with the SBTi's Aviation tool. We intend to reevaluate this approach as more information and guidance become available.

Under our methodology, individual client emissions may be offset by company-implemented carbon removal projects – including CCS/CCUS, direct air capture and nature-based solutions – provided they are properly attributed according to standard GHG accounting protocols. Reductions associated with third-party carbon removal projects that have been validated and registered on an eligible platform will also be considered. In contrast to some of our other sectors, RECs are not permitted for the Aviation sector, as emissions from purchased electricity are not currently in scope. Our methodology does not currently give credit for other types of carbon offsets, including company-implemented or third-party avoidance offsets. However, we recognize that carbon markets are rapidly evolving with a focus on improving both the quality and quantity of available credits. We will continue to monitor developments and consider the feasibility of recognizing additional types of offsets in the future.

4.2.2. METRIC

We measure the emissions intensity of Aviation sector clients using the metric g CO_2 / revenue tonne kilometer (RTK), with RTK reflecting the combination of revenue passenger kilometers (RPK) and freight tonne kilometers (FTK).

$$\frac{\text{Scope 1 TTW Emissions – Credits (g } CO_2\text{)}}{\text{Revenue Passenger Kilometers (RPK) + Freight Tonne Kilometers (FTK)}}$$

Consistent with our approach in other sectors, an intensity-based metric is appropriate for capturing variations in clients' strategies and operations, and for gaining insight into the full range of decarbonization options being pursued. It also allows for more consistent tracking and comparison to support taking emissions into account as part of our financing decisions.

While airlines commonly use the activity metric RPK, we have chosen RTK to capture both passenger and belly freight activity, recognizing that the latter has accounted for a larger share of the industry's activity since the onset of the COVID-19 pandemic. We convert RPK to RTK using a conversion factor of 100 kg per passenger, which is consistent with guidance from SBTi and IATA, and is also used by several airlines in their own reporting.

4.2.3. SCENARIO AND TARGET

The benchmark trajectory for our Aviation portfolio is based on the IEA NZE scenario, which includes detailed projections of emissions and passenger activity through 2050. To improve alignment of our approach with the IEA methodology, emissions attributable to dedicated air freight activity are removed from IEA's total emissions projection.

Using the adjusted scenario projections, combined with detailed data on passenger and belly freight activity from IATA, we derived a 2030 target of 625.0 g CO_2 / RTK, which represents a 36% reduction from our 2021 baseline of 972.6 g CO_2 / RTK.

4.2.4. DATA SOURCES AND CONSIDERATIONS

To calculate the carbon intensity of companies in JPMorgan Chase's Aviation sector portfolio, we use detailed Scope 1 emissions data modeled by the Platform for Analyzing Carbon Emissions (PACE), powered by Fexco and Avocet, and historical passenger and belly freight activity data from the International Civil Aviation Organization (ICAO), supplemented by company-reported data where necessary.

We have chosen to use PACE's modeled flight emissions data to isolate emissions from flight activity. This enables us to exclude other Scope 1 emissions from ground operations and other ancillary non-aviation services (such as complementary road transport, bus operations, etc.), which most closely aligns to our choice of boundary. Furthermore, the use of modeled data by PACE standardizes the emissions calculation methodology for all our clients, improving comparability. Modeled aircraft-level data also provides greater client coverage and data transparency, which are central to effective engagement with our clients. Similarly, ICAO's detailed data on global flight activity provides a consistent and comprehensive reference for comparison of individual airlines' passenger and belly freight activities. In the event that data is unavailable or incomplete for a given company, we use a proxy value equivalent to the 75th percentile of the available data for other portfolio companies.

Moving forward, we will continue to monitor developments in the availability of data — especially those relevant to the evolving composition of our portfolio and the further development of sector decarbonization strategies — and consider updates to our methodology as appropriate. For the Aviation sector specifically, this will include monitoring available data and analytic techniques relating to the global warming impact of aircraft contrails, along with developments in the visibility of emissions originating in the SAF value chain.

5. Conclusion

The addition of new targets for the Iron & Steel, Cement and Aviation sectors expands the application of emissions intensity reduction targets to a larger share of JPMorgan Chase's financing portfolio and further strengthens our approach to engaging with and supporting the low-carbon transition efforts of our clients in these sectors. Among other reasons, we have prioritized these sectors – together with those we have previously set targets for (Oil & Gas, Electric Power and Auto Manufacturing sectors) – based on their contribution to total global emissions, their importance to the wider economy and our aim to help them overcome the significant challenges they face to decarbonize. The aggregate of these six sectors account for the majority of global emissions across the supply and demand side value chains of the global energy system. Our work reflects not only our aim to address the largest and most challenging sources of emissions, but also our commitment to engage and support our clients as they navigate the low-carbon transition.

SECTOR		DETAILS			BASELINE		2030 TARGET
		Scope(s) Included	Scenario Used	Unit of Measurement	Baseline Year	Portfolio Baseline	
NEW Iron & Steel		Scopes 1 and 2	IEA NZE	t CO_2e / t crude steel	2020	1.454	**1.010** -31% from baseline
NEW Cement		Scopes 1 and 2	IEA NZE	kg CO_2e / t cementitious product	2020	647.8	**460.0** -29% from baseline
NEW Aviation		Scope 1 (tank-to-wake)	IEA NZE	g CO_2 / RTK	2021	972.6	**625.0** -36% from baseline
Oil & Gas	Operational	Scopes 1 and 2	IEA SDS	g CO_2e / MJ	2019	5.4 (revised)[8]	**-35%** from baseline
	End Use	Scope 3	IEA SDS	g CO_2 / MJ	2019	66.5	**-15%** from baseline
Electric Power		Scope 1	IEA SDS	kg CO_2 / MWh	2019	375.6	**115.4** -69% from baseline
Auto Manufacturing		Scopes 1, 2 and 3	IEA B2DS	g CO_2e / km	2019	157.8	**92.3** -41% from baseline

8 Revised 2019 portfolio baseline to 5.4 from originally disclosed 6.1.

Moving forward, we plan to further expand our efforts with the addition of targets for other strategically important sectors. We will continue to monitor developments and evaluate the feasibility of updating our existing targets as appropriate. And we will continue to engage with and provide regular updates to our stakeholders on our progress. As we continue to expand our sector-specific targets, we are also focused on aligning our capabilities and efforts to drive progress toward them. For additional information, see JPMorgan Chase's 2022 Climate Report.

Abbreviations

B2DS	Beyond 2 Degrees Scenario
CCS	carbon capture and storage
CCUS	carbon caputure, use and storage
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
EAF	electric arc furnace
FTK	freight tonne kilometers
g	gram
GCCA	Global Cement and Concrete Association
GEM	Global Energy Monitor
GHG	greenhouse gas
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
JPMC	JPMorgan Chase
kg	kilogram
km	kilometer
MJ	megajoule
MWh	megawatt hour
N_2O	nitrous oxide
NGO	non-governmental organization
NZE	Net-Zero Emissions by 2050 Scenario
PACE	Platform for Analyzing Carbon Emissions
RPK	revenue passenger kilometers
RTK	revenue tonne kilometers
SAF	sustainable aviation fuel
SBTi	Science-Based Target initiative
SCMs	supplementary cementitious materials
SDA	Sectoral Decarbonization Approach
SDS	Sustainable Development Scenario
S&P	Standard & Poor's
TTW	tank-to-wheel / tank-to-wake
U.S.	United States
WoodMac	Wood Mackenzie
WSA	World Steel Association
WTW	well-to-wheel / well-to-wake

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