Standard Chartered Net zero approach

Methodological white paper

standard chartered

Contents

I. Introduction

This paper describes our approach to net zero. It lays out the methodology we have used to calculate our emissions and to set our emissions reduction targets at sector level. It also describes the challenges and choices we have faced, and how we have chosen to resolve them.

Our approach reflects our belief that climate change is one of the greatest challenges facing the world today, and that its impact will hit hardest in the markets where we operate. Many of these are currently reliant on carbon-intensive industries for their continued economic growth.

Achieving a just transition – one where climate objectives are met without depriving developing countries of their opportunity to grow and prosper – will require capital and specialised support. We are uniquely placed to help by directing capital to markets that have both the greatest opportunity to adopt low-carbon technology, and some of the toughest transition-financing and climate challenges.

We hope that by setting out this methodology transparently, we can encourage discussion, engagement, and debate. We welcome comments and input, and would invite other financial institutions operating in similar markets to use this methodology to help shape their own approach.

I.I. Methodology

Our methodology builds on global standards, including those set by the Science Based Target initiative (SBTi), the Net Zero Banking Alliance (NZBA) and the Partnership for Carbon Accounting Financials (PCAF). We have also drawn upon Boston Consulting Group's climate, industrial sector and statistical specific capabilities, and Baringa Partners' climate, technical and modelling capabilities.

Where necessary, we have adapted our methodology to meet the following challenges presented by our footprint markets:

- **Lack of client greenhouse gas (GHG) data:** Many of our clients do not yet measure their own emissions. As such we have supplemented this with estimates of client emissions based on statistical regression analysis at sector level. We expect data to improve over time and we intend to integrate it as it becomes available.
- **Lack of scenario granularity:** We use two different global scenarios to assess the evolution of emissions up to 2050. These scenarios are derived from the IEA's Net Zero Emissions by 2050 scenario (NZE) and Current Policies Scenario (CPS). However, the IEA global scenarios are not sufficiently granular for detailed portfolio analysis. We have, therefore, augmented these datasets with a range of data sources that consider the specific pathways for our markets, consistent with reaching net zero by 2050.

I.II. Targets

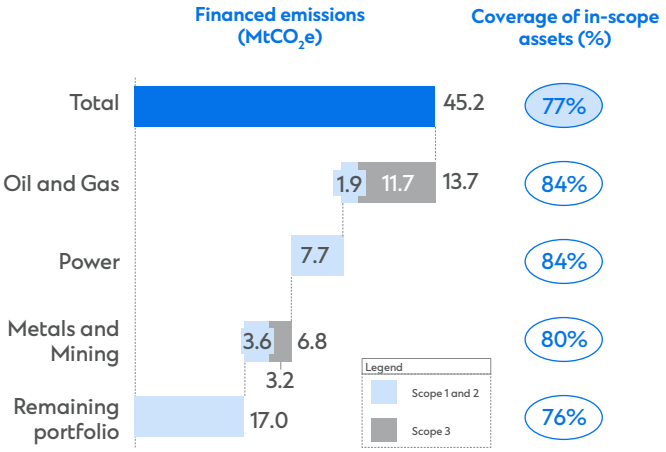
As a starting point, we measured the absolute financed emissions baseline of our corporate lending portfolio as of 2020-year end, focusing on USD74.8 billion of assets (equating to a coverage of 77 per cent of our in-scope assets of USD97.3 billion), equal to 45.2 million metric tonnes of carbon dioxide equivalents (45.2Mt CO_2e). There is currently insufficient available data to accurately reflect the financed emissions of the remaining 23 per cent of our in-scope assets. A linear extrapolation would translate to an overall baseline of up to approximately 59Mt CO_2e. Our view of the baseline estimate will be progressively refined as data availability and quality improves.

Further to calculating our baseline emissions, we have also set targets for our highest-emitting sectors, i.e. Oil and Gas, Metals and Mining, and Power. We have set our 2030 targets using economic emissions intensity in all cases, apart from the Coal Mining* subsector, where we have set absolute emissions targets. Our approach and calculations are set out in the document below.

*Unless otherwise stated, 'Coal Mining' in this document refers to thermal coal mining

These sectors represent approximately 62.5 per cent of our overall absolute financed emissions baseline. Figure 1 provides an overview of financed emissions and assets in scope by sector. The data coverage in these sectors is higher than the average across the portfolio.

Figure 1 – Total financed emissions by sector



For each of the sectors, we have established the following:

- **Baseline:** From an absolute financed emissions perspective, our 2020 year-end total baseline was 45.2$MtCO_2e$, associated with USD74.8 billion in-scope assets. This is our best estimate based on our interpretation of standards and available data and methodologies. We state assumptions and limitations associated with our approach in this paper. As standards and methodologies evolve, and data quality and availability improves, we will continue to refine our emissions calculations further.
- **Projections:** We have projected the evolution of financed emissions up to 2050 using two different global scenarios, to capture the different outcomes between a net zero and 3.5°C world. The gap between these scenarios then provides an initial measure of the decarbonisation challenge, which is further refined at a client level by assessing individual decarbonisation commitments and transition risk mitigation plans.
- **Target setting:** For each of the three sectors we have defined emissions reduction targets that are aligned with our ambition to realise net zero financed emissions by 2050 (see Figure 2). In line with the baseline, we have drawn upon two main target metrics for our commitment. For all sectors except coal mining, we have opted for revenue-based carbon intensity reduction targets, instead of absolute emissions. We have chosen these targets to better reflect the economic profile of our footprint, which covers many low-income emerging markets that require significant capital flows to support their economic growth and development. As the NZE scenario makes clear, this will in part be based on an increased share of global oil and gas production. Further to which, there is the requirement to finance the improved technologies in these industries, as well as the sustainable solutions that will allow these markets to transition away from fossil fuels. Both continued economic growth and a shift towards renewables are key components of the just transition.

  For the coal-mining sector, we have adopted absolute financed emissions reduction targets, recognising the need for a phase out of all thermal-coal-related activities and the growing availability of alternatives to coal e.g. renewables. However, the same cannot be said for oil and gas, where renewable solutions are far less advanced.

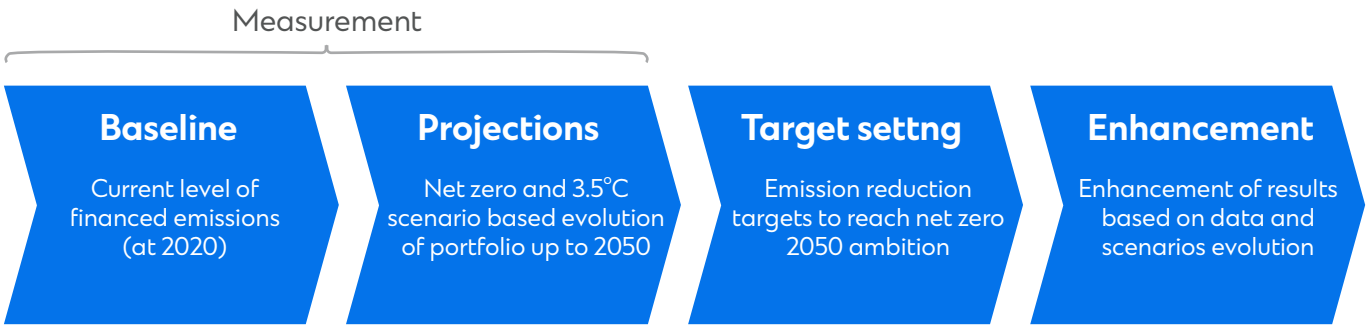
  Achieving these targets assumes a combination of levers, including supporting clients with transition and green financing, assessing exposure to emission-intensive clients or assets that are not on a path to align with our goals, and adding new sustainable clients to our portfolio, especially those clients in emerging markets that are adopting low-carbon business models.

  Our commitment to support growth in our markets, and to provide our clients with transition finance, means that, while our emissions intensity reduction targets are aligned to a net zero pathway, our absolute financed emissions may increase over the next few years before reducing in line with our net zero targets.
- **Enhancement:** Baseline, projections and net zero targets may be refined, adjusted and restated over time as data coverage and granularity improve, emissions scenarios evolve, external policy and regulatory environments expand, industry standards develop and industry circumstances unfold beyond our control.

Figure 2 – Overview of sectoral baseline and emissions reduction targets

Sector		2020 baseline	2030 emission reduction target from 2020 baseline
Oil and Gas (Scope 1, 2 and 3)		3.02 $kgCO_2e$/ dollar client revenue	**-30%**
	Mining (excluding Coal) (Scope 1 and 2)	0.95 $kgCO_2e$/ dollar client revenue	**-33%**
Metals and Mining	**Coal Mining** (Scope 1, 2 and 3)	3.34 $MtCO_2e$	**-85%**
	Steel Producer (Scope 1 and 2)	2.16 $kgCO_2e$/ dollar client revenue	**-33%**
Power (Scope 1 and 2)		3.67 $kgCO_2e$/ dollar client revenue	**-63%**

Figure 3 – Overview of net zero methodology



1. Baseline

The baseline was measured at a single client and portfolio level using two metrics, both aligned with the PCAF measurement standard:

- **Revenue-based carbon intensity[1]:** a measurement of the quantity of GHG emitted by our clients per USD of their revenue
- **Absolute financed emissions:** a measurement of our attributed share of clients' GHG emissions

The lack of production data at the client level, particularly in emerging markets, limits our ability to use a production-based carbon intensity baseline. As client revenue data is more readily available, it was deemed to provide the best trade-off between data availability and calculation accuracy. We aim to engage with clients to collect production and emissions data of a granularity that would support a production-based carbon intensity baseline.

Revenue-based carbon intensity allows a homogeneous measurement between clients and sectors, for example upstream, midstream, or downstream oil companies which may have different emissions profiles. It is also applicable to specific sub-sectors where it is harder to link industrial activity to production figures, such as oil and gas shipping companies.

There are potential limitations related to this approach, for example, short-term fluctuations of commodity prices, and therefore revenues, can lead to carbon intensity volatility.

Our aim is to report production-based carbon intensity as the availability and quality of data improves.

1. Defined by PCAF as Weighted Average Carbon Intensity (WACI). The Global GHG Accounting & Reporting Standard for the Financial Industry, PCAF 2020, p23, Table 2.1, retrieved from here. Also S&P Trucost's standard metric, retrieved from here.

Revenue-based carbon intensity

At a single client level, revenue-based carbon intensity is computed as:

Equation 1 – Calculation formula for revenue-based carbon intensity at client level

$$Revenue\ based\ carbon\ intensity_{Client,\ 2020} = \frac{Client\ GHG\ emissions_{2020}}{Client\ revenues_{2020}}$$

At a portfolio level, revenue-based carbon intensity is computed as:

Equation 2 – Calculation formula for revenue-based carbon intensity at portfolio level

$$Revenue\ based\ carbon\ intensity_{Portfolio,\ 2020} = \frac{\Sigma\left(\frac{Outstanding\ exposure\ to\ client_{i,2020}}{Client\ EVIC_{i,2020}} * Client\ GHG\ emissions_{i,2020}\right)}{\Sigma\left(\frac{Outstanding\ exposure\ to\ client_{i,2020}}{Client\ EVIC_{i,2020}} * Client\ revenues_{i,2020}\right)}$$

Where:

- 'i' stands for one specific client and the summation is performed across all clients in a given portfolio
- 'EVIC' stands for enterprise value including cash

Worked example for revenue-based carbon intensity at portfolio level

The following worked example illustrates the use of the above formula in calculating the revenue-based carbon intensity at sector/portfolio level given three sample clients in the sector/portfolio:

- Client-specific measures are needed to compute revenue-base carbon intensity: (A) outstanding exposure, (B) EVIC, (C) revenue, and (D) total GHG emissions.
- For each client we calculate (E) financed emissions (see Equation 3)
- We calculate (F) attributed revenue for each client as the ratio of (A) outstanding exposure over (B) EVIC, multiplied by (C) revenue
- As outlined in Equation 2, the ratio of the sum of (E) financed emissions over the sum of (F) attributed revenue is the (G) revenue-based carbon intensity (i.e. 0.05 $kgCO_2e/USD$)

Table 1 – Data used to calculate portfolio emissions (illustrative)

Client		(A) Outstanding exposure (USD)	(B) EVIC (USD)	(C) Revenue (USD)	(D) Total GHG emissions (tCO_2e)	(E) Financed emissions (tCO_2e)	(F) Attributed revenue (USD)
$Client_a$		55,550,000	664,574,590	4,081,000,000	179,581,000	15,010,692	341,119,798
$Client_b$		3,782,148	77,932,737	60,961,947	25,307,000	1,228,172	2,958,540
$Client_c$		1,099,424	32,041,970,613	12,398,000,000	5,146,678,000	176,593	425,400
	Σ	60,431,527	32,784,477,940	16,539,961,947	5,351,566,000	16,415,457	344,503,738

(G) Revenue based carbon intensity ($kgCO_2e/USD$) 0.05

Absolute financed emissions

At a single client level, absolute financed emissions are computed as:

Equation 3 – Calculation formula for absolute financed emissions at client level

$$Absolute\ financed\ emissions_{Client,2020} = \frac{Outstanding\ exposure\ to\ client_{2020}}{Client\ EVIC_{2020}} * Client\ GHG\ emissions_{2020}$$

At a portfolio level, absolute financed emissions are computed as:

Equation 4 – Calculation formula for absolute financed emissions at portfolio level

$$Absolute\ financed\ emissions_{Portfolio,2020} = \sum\left(\frac{Outstanding\ exposure\ to\ client_{i,2020}}{Client\ EVIC_{i,2020}} * Client\ GHG\ emissions_{i,2020}\right)$$

Where 'i' stands for one specific client and the summation is performed across all clients in a given portfolio.

1.1. Baseline input data, sources, and enhancements

When considering a client's outstanding exposure, the PCAF standards recommend using the "follow the money" principle, to understand and account for the climate impact in the real economy. We have included the outstanding balance sheet exposure at 2020 year-end, as well as corporate bonds held for financing purposes[2]. Undrawn commitments and products in the corporate lending portfolio that do not contribute to our on-balance-sheet exposure (e.g. letters of credit) are not considered.

A client's EVIC is measured as follows:

- Listed companies: as the sum of market capitalisation and book value of total debt (in line with PCAF, no deductions to account for cash have been performed)
- Private companies: as the sum of book value of total equity and book value of total debt

Even though the market capitalisation of listed companies could be impacted by stock price fluctuations, and therefore introduce volatility in our measurement of financed emissions, we have decided to use the 2020 year-end value for computation of EVIC since:

- It is aligned with the PCAF[3] standard and supports comparability with peers
- Movement in medium and long-term market capitalisation are typically linked to fundamental changes in a company's business activity. Such trends should be reflected in our attributed share of emissions

Scope 1 and 2 GHG emissions have been included for each of our three industry sectors. Scope 3 GHG emissions have been measured for the Oil and Gas sector and Coal Mining subsector, since reducing the combustion of their product is key to reaching net zero targets. Coverage of Scope 3 GHG emissions for additional sectors will be evaluated in future as standards develop.

2. Products and activities in scope include Corporate Lending (Commercial Mortgages, Corporate Overdraft, Corporate Revolving Term Loan, Corporate Short-Term Loan, Corporate Term Loan, Commercial Real Estate (CRE) Revolving Term Loan, CRE Term Loan, Other Corporate Lending), Bond-based Financing, Transaction Banking (Trade Loans), Corporate Finance (Leveraged Structured Solutions, Project and Export Finance) and Financial Markets (Vanilla Commodities, Credit Solutions, Money Markets). Trading book market positions have been excluded, in alignment with NZBA guidelines and in light of the transitory nature of the book

3. "Enterprise Value is defined as: the sum of the market capitalisation of ordinary shares at fiscal year-end, the market capitalisation of preferred shares at fiscal year-end, and the book values of total debt [...]" The Global GHG Accounting & Reporting Standard for the Financial Industry, PCAF 2020, p50, retrieved from here.

We have sourced clients' GHG emissions from a third-party database[4]. This information was available for approximately 61 per cent of the outstanding exposure in scope of the baseline. Where this information was not available, clients' GHG emissions were estimated using a statistical regression analysis of emissions against client revenue at sector level.

1.2. Quality control checks

We have undertaken an extensive review and challenge process to verify the output of our baselining methodology[5].

This process focused on two key aspects:

- **Data taxonomy:** we reviewed the internal industry sector classification[6] of each applicable client. In some cases, clients were excluded from the regressions as the underlying business activity was not aligned with that of the overall sector and, therefore, not consistent with the sector's revenue-based carbon intensity (e.g. we have excluded commodity trading facilities classified within the Metals and Mining sector).
- **Regression analysis:** we reviewed and challenged the regression analysis. First, we augmented the data to include all emissions data points available from the third-party data provider for a given sector (i.e. not limited to data points from our clients). The accuracy of the regression results was then tested with a challenger model, which re-performed all the regressions using an alternative dataset. The analysis resulted in a typical error margin up to about 15 per cent on sectors in scope on a revenue-based carbon metric. This was deemed acceptable due to variations in taxonomy and client base between databases.

4. S&P Global Trucost, a database containing emissions information for a universe of over 15,000 companies, representing 95 per cent of global market capitalisation. Information about each company is updated annually using a mix of disclosed and, where gaps are present, modelled data. Retrievable from here.

5. This process leveraged sector and statistical expertise provided by Boston Consulting Group.

6. The client-by-client review was performed with a dedicated focus on our priority sectors.

2. Projections

We have utilised two global projection scenarios for the timeframe 2020 to 2050, to capture the range of outcomes that a net zero and a 3.5°C world would bring.

While NZE has external recognition, it lacks the appropriate level of regional and sectoral coverage required for our footprint. We have therefore enhanced this scenario, as detailed in the Annex, to create the Augmented NZE scenario. This defines a target pathway for our portfolio that is consistent with reaching net zero by 2050. The augmentation process enables us to:

- Determine results for some individual sectors missing from NZE
- Determine pathways for 12 regions
- Represent results for other GHG
- Include full results for intervening years 2025, 2035 and 2045 for each sector and region.

The gap between the 3.5°C and Augmented NZE scenarios provides an initial measure of the decarbonisation challenge. For our key exposures in high emitting sectors, we considered our client's decarbonisation commitments and transition risk mitigation plans to reduce the gap to target.

Baringa Partners' Augmented NZE scenario is an enhancement of the IEA's NZE, published in May 2021, which is consistent with global warming of 1.5°C by 2100 with 50 per cent probability[7]. The NZE aims to ensure that energy-related and industrial process CO_2 emissions to 2030 are in line with reductions in 1.5°C scenarios with no, low or limited temperature overshoot assessed by the Intergovernmental Panel on Climate Change (IPCC) in its Special Report on Global Warming of 1.5°C.

Baringa Partners derived the 3.5°C scenario from the IEA's CPS, which captures existing government policies and trends worldwide, aligned to a global warming of 3.5°C by 2100 with 50 per cent probability. It assumes there is no action taken globally beyond policies that have been enacted and trends already in evidence as of November 2019, before the COVID-19 pandemic took hold.

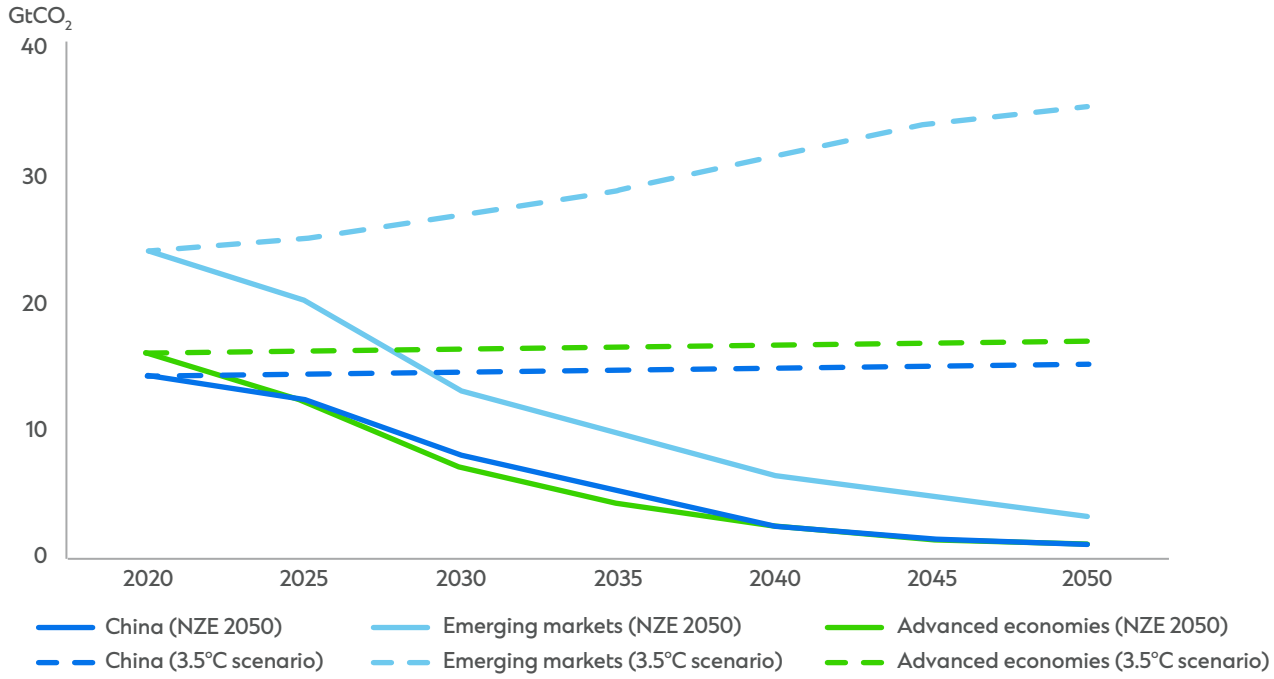
2.1. Methodology for sector projections – Scope 1

The global scenarios show results for Scope 1 emissions at source, i.e. where they are physically released. As the IEA only publishes limited data for each scenario, the next step was to expand the level of detail, so we obtained a fully developed global scenario including results for individual regions and sectors, at five-year intervals from 2020 to 2050. We then mapped our portfolio to these regions and sectors for each of these years.

In the Augmented NZE scenario, all regions trend towards zero emissions, with emerging markets decarbonising more gradually than advanced economies as a result of their stronger economic growth and the fact that they are starting from a lower emissions reduction starting point. In the 3.5°C scenario, most regions show flat or increasing emissions over time. The resulting projections for absolute CO_2 emissions in the two scenarios, at the regional level, are shown in Figure 4.

7. Net Zero by 2050, A Roadmap for the Global Energy Sector, International Energy Agency 2021, p48 (as quoted in IPCC 2018). Retrievable from here.

Figure 4 – Global scenario CO_2 emissions per region



2.2. Methodology for sector projections – Scope 2 and Scope 3

For reporting and target-setting purposes, in addition to Scope 1, it is also necessary to project our clients' Scope 2 (power-related) and Scope 3 (upstream and downstream) GHG emissions. By their very nature, Scope 2 and Scope 3 emissions involve double-counting: the power sector's emissions are counted a second time when they are attributed to the electricity consumer as Scope 2; and Scope 3 emissions are counted upstream and/or downstream as well as at the emissions source.

In both scenarios, Scope 2 emissions are projected using the power sector pathways for the specific type of power generation (industry, transport, or building). Scope 3 emissions are projected based on production trends for oil, gas, and coal. Scope 3 is determined by the CO_2 embedded in the fossil fuel produced, which assumes that all the fuel is combusted and ignores the impact of carbon capture, utilisation, and storage (CCUS).

2.3. EVIC evolution

The estimate of portfolio-level financed emissions is based on our share of financing at an individual client level, where our share is determined by the ratio of our exposure to the client in relation to their EVIC.

The growth in emissions in the 3.5°C scenarios are the result of increased economic activity. This has the adverse effect of growing our measure of financed emissions, even though our exposure to the client remains constant. As the economic activity of a company is increasing, as can be evidenced from its emissions, the value should likewise grow (i.e. through the EVIC). Evolving the EVIC in this way would naturally flatten our share of financed emissions.

While the current standards or scenarios do not provide direct guidance on how the EVIC of a client is expected to change over time, we have modelled EVIC in line with growth (or decline) in production or equivalent trends in respective sectors and regions.

To evolve EVIC at the client level, we have utilised the sectoral and regional production trends from the 3.5°C scenario to evolve each company's EVIC. While production levels in

some industries are expected to decrease over time in the NZE scenario, it is assumed that companies in those sectors, such as Oil and Gas, will manage to retain their EVIC due to a shift in their business models to more efficient technologies. It may be possible to further refine this approach to consider variations across sectors and apply these to the underlying company trajectories.

2.4. Client-level transition pathways

Sectoral emissions trajectories have been applied to individual clients, starting from the year-end 2020 baseline, to form a view of client-level financed emissions in the two scenarios.

The gap between the 3.5°C and Augmented NZE scenario trajectories measures the emissions reductions our clients need to enact to meet net zero ambitions, for clients that are currently on a 3.5°C trajectory. We have applied the same Standard Chartered exposure levels for both scenarios. We expect this gap to be reduced over time as the result of our clients' decarbonisation efforts. In order to form a more accurate view of the client-level transition required, and the support that we would need to provide to our clients, we have taken into account their latest publicly stated commitments, as well as information on their transition risk mitigation plans gathered from our engagement with them.

We have used this information to create a range of 'gap to target' trajectories at the overall portfolio level:

- Conservative trajectory: considering each client's publicly stated commitments, if available, and only where they have an average or better than average transition risk mitigation plan (see Annex for detail)
- Commitment trajectory: considering each client's publicly stated commitments, if available, without any further adjustment to the status of their transition risk mitigation plans
- Optimistic trajectory: considering each client's publicly stated commitments, as per the 'Commitment trajectory'. This also assumes a 2°C trajectory for clients who have not made a public commitment but who have stated an intention to align to the Paris Agreement through our engagement

Clients who do not meet these criteria, with respect to public commitment, mitigation plan, or stated intention, are assumed to align to the relevant sectoral 3.5°C trajectory.

With increasing engagement and client commitment to transition planning, we expect the gap between our clients' pathways and Augmented NZE trajectory to reduce over time.

2.5. Quality control checks

For the 3.5°C scenario, we have applied IEA CPS input assumptions. The quality control exercised by the IEA in its World Energy Outlook has been implicitly translated to the 3.5°C scenario. We have carried out detailed comparisons to ensure we understand any material differences. Of particular importance, the cumulative global CO_2 emissions between 2020 and 2040 differ by just 6 per cent between the 3.5°C and CPS scenarios. In summary, we are comfortable that the 3.5°C scenario materially aligns with IEA's CPS.

3. Target setting

For the first wave of net zero targets, we have prioritised our highest emitting sectors: Oil and Gas, Metals and Mining, and Power. Collectively, these account for approximately 62.5 per cent of our emissions baseline.

We have used two metrics for our targets: absolute financed emissions and revenue-based carbon intensity. For all sectors except Coal Mining, we have opted for revenue-based carbon intensity reduction targets to allow for future growth in emerging markets, and to support our clients on their journey to decarbonise by providing transition finance. We have adopted absolute financed emissions reductions for the Coal Mining subsector recognising the need for a phase out of all thermal coal-related activities and the growing availability of alternatives to coal, especially renewables. This is in contrast to oil and gas, where there are still fewer sustainable alternatives.

We have identified three specific levers to help to achieve our net zero targets:

- **Providing our clients with transition and green financing:** Supporting our clients on their decarbonisation journey through the provision of transition finance and expert advice is, and will continue to be, at the heart of our approach. This is essential in emerging markets to ensure continued economic and social development and to help drive a just transition. Without such support companies will struggle to scale-up transition technologies at the required rate.
- **Assessing exposure to emission intensive clients and/or assets:** We continue to engage with our clients to better understand their transition plans. This will allow us to assess and balance both their intent and ability to transition to lower emission technologies. In some cases, particularly for the highest emitters, we may need to reassess the extent of our relationship.
- **Adding new low carbon intensity clients to our portfolio:** As part of our journey to net zero, we will be looking to engage with and promote companies who are at the forefront of solving the technical challenges of a low-carbon economy.

Approach to transition finance

We define transition finance as any financial services provided to clients to support them align their business and/or operations with a 1.5°C trajectory.[8]

To operationalise our net zero commitment, we have developed a Transition Finance Framework[9] that will act as an eligibility guide, informing which assets we can label as 'transition'. The Framework will help accelerate the flow of capital to decarbonisation activities, our clients to net zero by 2050, and in turn reduce our financed emissions.

In the absence of a current global consensus on labelling economic activities as 'transition' we have aligned our Framework with NZE and have followed the principles laid out by the Climate Bonds Initiative and the EU Taxonomy. As technologies and science-based scenarios evolve, we will evolve our Framework accordingly.

We have also developed a dedicated methodology to measure client emissions. This approach allows us to understand and measure the impact on driving reduced emissions by supporting transition activity. This in turn reduces the overall carbon intensity for the relevant client exposures.

In each of our high emitting sectors, we have identified sector specific and cross-cutting transition technologies that we expect will play a major role in decarbonisation. For example, in the first wave of sectors:

- **Oil and Gas:** biofuels, CCUS, hydrogen, offshore wind, onshore wind, solar photovoltaics (PV), charging infrastructure

8. Our definition is a starting point and we acknowledge that it will need to adapt and change given the speed at which science-based scenarios, consensus on best practice and regulations are changing

9. Standard Chartered Transition Finance Framework

- **Metals and Mining:** CCUS, switch to renewables, direct reduced iron and electric arc furnaces (DRI-EAF), increased use of scrap for secondary steel production, mining electrification, hydrogen, coal mine methane capture
- **Power:** CCUS, hydrogen, grid expansion, nuclear, stationary batteries, offshore wind, onshore wind, solar PV, charging infrastructure.

For each technology, we have computed the revenue-based carbon intensity based on Equation 5:

- **Annual funding** that will be provided by Standard Chartered
- **Investment required**, to generate one nominal unit of production capacity
- **Capacity factor**, which represents the share of actual usage of nominal production capacity
- **Emissions factor**, as a measure of the GHG emissions attributable to each unit of production capacity
- **Revenues of the technology,** based on the actual production of the technology (annual funding divided by overnight costs multiplied capacity factor) multiplied by the average price per unit of output

3.1. Our approach to carbon credits

Currently, standards, such as the Science Based Targets initiative (SBTi), do not mandate companies to adopt high ambition pathways to net zero[10], nor do they enable companies to account for carbon credits as part of emissions baselines or progress towards net zero targets. However, this is an area of considerable ongoing work. We recognise the potential of high quality carbon credits to direct funds to critical emissions avoidance, reduction and removal projects, and therefore would like our clients to report (alongside their gross emissions) any carbon credits they purchase and retire, with details of what those carbon credits are.

Recognising the critical role of high quality carbon credits in addressing the climate challenge, we intend to compensate for residual operating emissions in our own net zero trajectory. Moreover, we want to recognise clients who take similar action, over and above direct emissions reductions on their respective net zero pathways, creating the right incentives for them to invest in projects that support the goals of the Paris Agreement. We plan to develop and embed a framework for this recognition and incentivisation in 2022.

Current carbon credit standards do not guarantee that quality is as high as possible, which is why we support the goals of the Taskforce on Scaling Voluntary Carbon Markets to develop a set of Core Carbon Principles (CCPs) that will allow the development of consistently high-quality carbon credits. Our aim is that any carbon credit that we sell to clients is of the highest quality and integrity, in line with the CCPs.

Equation 5 – Calculation formula for emissions of a given transition finance technology

$$Revenue\ based\ carbon\ intensity_{Technology} = \frac{\left(\frac{Annual\ funding}{Investment\ required}\right) * Capacity\ factor * Emission\ factor}{Revenues\ of\ the\ technology}$$

10. We have adopted a high ambition path to Net Zero.

4. Future enhancements

The rapid evolution of the standards to measure emissions, the improvement of data coverage and data granularity, the expansion of external policy and regulatory environments, the development of industry standards and industry circumstances that unfold beyond our control mean that, we expect, over time, changes to our approach and targets will be required to address this evolution. Accordingly, a key aspect of our methodology is a periodic enhancement of the inputs and assumptions, aimed at challenging and continually evolving the emissions reduction targets.

This process will be driven by the following factors:

Methodology evolution: PCAF and other standards might evolve to widen the coverage of in-scope products from the current on-balance-sheet exposures. These would include, among others, off-balance-sheet obligations and arrangement of capital markets products (both debt and equity). The methodology would likely evolve to adopt different approaches for these various products and to that extent, we intend to adapt our measurement approach to align with the evolving methodology.

Improvement in data quality: We expect that the availability and reliability of external data on emissions will improve over time, in line with the wider adoption of climate-reporting by clients, e.g. the Taskforce on Climate-Related Financial Disclosures (TCFD) and Carbon Disclosure Project (CDP) questionnaires. We will continue to gather our clients' emissions data and track their progress in line with stated commitments.

Evolution of the metrics: Over and above the revenue-based emissions intensity, we would expect our choice of metrics to evolve to include production-based carbon intensity as an additional metric. To enable such an approach, we plan to assess and integrate production data as they become available more widely in our markets.

Asset level emissions measurement: A key tenet of the transition finance approach is to measure and monitor emissions at an asset level where there is 'ring-fencing' of use of proceeds and/or contractual arrangements to monitor the use of proceeds for the intended transition technology or project. We will therefore aim to work with industry bodies to develop and evolve the methodology, which allows for an acceptable approach to measuring and tracking the emissions linked to transition finance.

Changes in emissions scenarios: Scenarios such as NZE are likely to be updated over time, to reflect changes in the energy picture (for example technologies or policies) and current global, as well as regional/country-level, energy and emissions trends with increased sectoral coverage. Subsequent updates may therefore lead to changes in the required projections, which may then necessitate updating our portfolio targets.

5. Sector deep-dives

We have conducted deep dives into our three highest emitting sectors: Oil and Gas, Metals and Mining, and Power. Our methodology for the baseline, projections, and target setting is described below.

5.1. Oil and Gas

The Oil and Gas sector plays a central role in global efforts to decarbonise, with several of our clients having already made decarbonisation commitments, most with carbon intensity targets for Scope 1 and Scope 2 emissions.

Industry efforts to decarbonise are currently supported by switching to gas, biofuels, hydrogen, and renewables, as well as leveraging technologies such as CCUS and other emissions abatement projects.

The decarbonisation of the Oil and Gas sector is particularly relevant for our footprint, with around 50 per cent of the sector's global emissions originating in Asia, Africa, and the Middle East[11]. The NZE scenario predicts that between 2020 and 2030, emerging markets will grow their market share of both global oil and gas production from 47 per cent to 50 per cent and from 38 per cent to 44 per cent, respectively. However, over the next five years, and specifically in our geographical footprint, while actual gas production is projected to increase by 15 per cent, oil is expected to decrease by 6 per cent.

5.1.1. Baseline

We have categorised clients according to three subsectors, taking into account their primary business activities:

- **Oil and Gas companies** (for example international/national oil companies, independent oil and gas companies, midstream and downstream companies)
- **Oil and Gas service companies** (for example engineering/construction companies, oil field services, oil and gas shipping)
- **Other Oil and Gas companies** (for example financial sponsors, private equity and hedge funds, oil and gas traders)

For Scope 1 and 2, a baseline was computed for all three subsectors. For Scope 3, a baseline has been computed only for Oil and Gas companies. The other two subsectors were excluded from Scope 3 emissions computation, as the underlying business activity does not imply actual production of fossil fuels.

5.1.2. Projections

In the 3.5°C scenario, economic growth is still underpinned by fossil fuels throughout the timeframe, with oil demand increasing roughly 10 per cent and gas demand 75 per cent between 2020 and 2050.

In NZE, the share of fossil fuels in global energy falls from around 80 per cent in 2020 to 20 per cent in 2050, and the residual usage of fossil fuels by 2050 is primarily related to goods where carbon is embedded (e.g. plastics), or production facilities fitted with CCUS. Any remaining usage of fossil fuels is limited to sectors where low-emissions technology options are scarce.

These emissions are not reported separately by the IEA in NZE, so for our Augmented NZE 2050 scenario, we have used the emission projections from the Orderly Paris scenario results provided by Baringa Partners (BOP) (additional details provided in the Annex, Section 7.2).

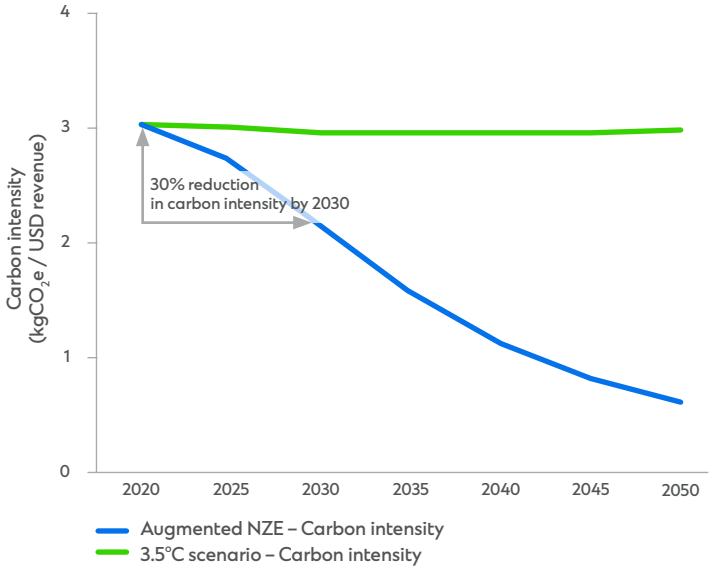
As described in Section 2.2, Scope 2 emissions are projected using the power generation emissions pathway.

Scope 3 downstream emissions make up around 90 per cent of total emissions in the Oil and Gas sector. As described in Section 2.2, projections for Scope 3 have been calculated assuming that all fuel is burned and no impact from CCUS.

11. Estimate from The Transition Finance Imperative, Standard Chartered 2021. Retrievable from here.

Figure 5 shows revenue-based carbon intensity for the oil and gas portfolio under both scenarios and highlights the need for the sector to reduce carbon intensity by 30 per cent by 2030.

Figure 5 - Carbon intensity for Oil and Gas by scenario



5.1.3. Target setting

For this sector, we are setting targets only for Oil and Gas companies and Oil and Gas service companies (excluding Other Oil and Gas companies). In line with SBTi guidance, the revenue-based carbon intensity target covers more than 95 per cent of our current in-scope financing exposure. Over time, we intend to shift to absolute emissions reduction targets for the Oil and Gas sector.

Oil and Gas target: 30 per cent reduction in revenue-based carbon intensity of our portfolio from 2020 to 2030 (from 3.02 to 2.12 $kgCO_2e$/ USD client revenue).

Targets related to Oil and Gas are supported by our public Oil and Gas position statement effective from March 2022[12].

For the Oil and Gas industry, the possible transition pathway includes:

- Reducing Scope 1 and 2 emissions through emissions reduction technologies such as gas flare down, methane monitoring and abatements. In the longer term, technologies like hydrogen and leveraging CCUS will also help curb emissions
- Reducing Scope 3 emissions will be more dependent on technologies that improve end use efficiency, such as more fuel-efficient cars or planes, or reduced use of fossil fuels in heating and power (for example leveraging renewables or biofuels as a replacement).

5.2. Metals and Mining

The Metals and Mining sector provides raw materials that supports much of the global economy. This includes those materials required for building and scaling clean energy technologies at the rate required in NZE. For example, lithium is used in electric vehicle (EV) batteries, rare earth metals are used for EV motors and wind turbines, and platinum is utilised as a catalyst in hydrogen fuel cells. The sector contributes around 12 per cent[13] of global CO_2 emissions (Scope 1 and 2), of which Asia, Africa and the Middle East contribute more than 75 per cent[14].

Structural changes in demand, combined with financial and regulatory pressure, are driving increased awareness of the need for companies in this sector to decarbonise operations. Many of our clients have already made net zero commitments and we are working with them to reduce their emissions through financing transition technologies such as DRI-EAF, CCUS, and electrification or fuel switching.

5.2.1. Baseline

We will seek to categorise clients according to five subsectors, taking into account their primary business activities:

- **Coal Mining:** upstream extraction of thermal coal
- **Mining (excluding thermal coal):** upstream extraction of minerals/metal ores other than thermal coal (e.g. iron ore, bauxite, silver ore, metallurgical coal)

12. Standard Chartered position statement, extractive industries. Retrievable from here.
13. The Transition Finance Imperative, Standard Chartered 2021. Retrievable from here.
14. Estimate from The Transition Finance Imperative, Standard Chartered 2021. Retrievable from here.

- **Steel Producers:** mid-stream production of steel from iron ore (e.g. via blast furnace-basic oxygen furnace (BF-BOF) or electric arc furnace (EAF) processes)
- **Aluminium Producers:** mid-stream production of alumina/aluminium from bauxite (e.g. via Bayer and Hall Heroult processes)
- **Other Metals and Mining clients:** metals processors[15], other metal producers[16], metals traders[17], mining support services[18]

For Scope 1 and 2, a baseline was computed for all subsectors. For Scope 3, a baseline has been computed only for Coal Mining due to significant end use emissions associated with power generation using thermal coal. We are not setting targets for Aluminium Producers and Other Metals and Mining clients at this stage, while specific pathways for these sectors are being developed.

5.2.2. Projections

Mining projections

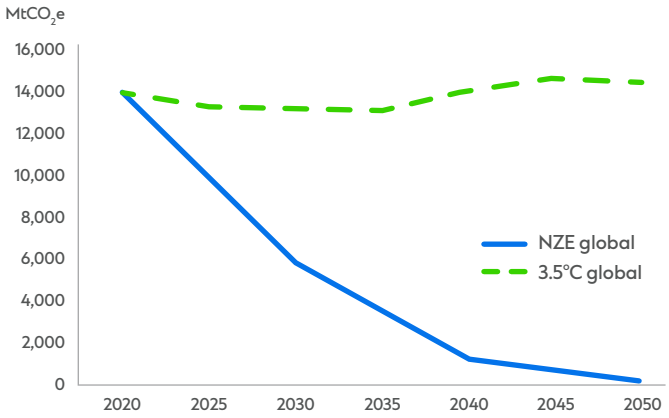
For the Coal Mining subsector, NZE assumes no new unabated coal plants, new coal mines or mine extensions as of 2021. The least efficient coal plants are phased out by 2030 and all remaining coal plants in use are retrofitted by 2040. All unabated coal demand declines by 98 per cent to less than 1 per cent of total energy use in 2050. In contrast, in the 3.5°C scenario, coal production grows by 10 to 15 per cent, depending on the region, over the 2020-2050 timeframe.

Scope 1 emissions from coal production have been determined by applying the specific sectoral results from the BOP scenario.

Scope 2 emissions follow the trend for Power Generation.

Scope 3 absolute emissions are based on coal production. NZE provides data on global coal production over the timeframe, and therefore this global total is not split by advanced economies and emerging markets. Scope 3 absolute emissions trajectories are shown in Figure 6.

Figure 6 – Scope 3 emissions for coal production by scenario



For Mining (excluding thermal coal), NZE stipulates that 'Other Industry' also includes other minerals and metals. We have therefore determined Scope 1 pathways based on 'Other Industry' data from NZE which is only available at the advanced economies and emerging markets level. For this subsector, we plan to update our target when a tailored mining pathway is available from NZE.

Steel Producer projections

In the NZE scenario we see a sustained increase in demand for steel, to support the expansion of energy-related infrastructure. Despite this increase in demand, there is a significant reduction in Scope 1 GHG emissions, which is driven by technological innovation. Almost 60 per cent of emissions reduction in heavy industry is achieved by using technologies under development today such as CCUS and hydrogen. The widespread use of EAF after 2040 assumes a phase-out of coking coal which will drive down global sectoral emissions to close to zero.

Emissions for this sector are often quoted or published in a way that partially includes Scope 2 and/or Scope 3. In our methodology, we differentiate Scope 1 from Scope 2 and 3 to

15. Downstream processing of metal/metal products (e.g. rolling, extrusion, recycling, die-casting)
16. Mid-stream production of metals that are not steel or aluminium (e.g. copper, tin, gold)
17. Metal brokers/dealers/exporters not involved in extraction, production or processing of the ore, metal or mineral itself
18. Service provided to companies that extract minerals/metal ores (e.g. mining training, consulting, explosives manufacture)

support clearer and more precise calculations. We are not yet including Scope 3 emissions for the steel sector because of sparse data availability and lack of clarity on upstream/downstream delineation. We continue to engage with our clients and standard setters to develop a suitable approach to calculating Scope 3 emissions for steel.

5.2.3. Target setting

For Metals and Mining we are setting targets only for Mining (excluding Coal), Coal Mining and Steel Producers. We plan to release targets for Aluminium Producers and Other Metals and Mining clients when dedicated pathways for the sectors have been developed. In line with SBTi guidance, the Coal Mining target covers more than 95 per cent of our current in-scope financing exposure.

Targets related to Metals and Mining are supported by our public extractive industries position statement effective from March 2022.[19]

Mining targets

Mining (excluding thermal coal): 33 per cent reduction in revenue-based carbon intensity of our portfolio from 2020 to 2030 (from 0.95 to 0.63kgCO_2e/USD of client revenue)

Coal Mining: 85 per cent reduction in absolute financed emissions of our portfolio from 2020 to 2030 (from 3.34 to 0.50 MtCO_2e)

Based just on the NZE pathway, the minimum absolute financed emissions reduction of our portfolio would need to be 53 per cent. However, considering our public extractive industries position statement, we have set an absolute financed emissions reduction target going beyond this requirement for the small number of clients in our portfolio directly engaged in thermal coal mining activities.[20]

For the mining industry, the possible transition pathway includes:

- Addressing Scope 1 and 2 emissions through the scale up of renewables and electrification/fuel switch in upstream operations, leading to short-term emissions reduction as well as potential improvement of energy-related operational expenditure
- Continuing divestment from thermal coal mining activities and structural portfolio reshaping in line with global thermal coal phase-out
- Tackling Scope 3 emissions via downstream cooperation across the value chain (e.g. scaling up green steel production facilities).

Steel Producers targets

Steel Producers: 33 per cent reduction in revenue-based carbon intensity of our portfolio from 2020 to 2030 (from 2.16 to 1.45kgCO_2e/USD of client revenue)

For the steel industry, the possible transition pathway includes:

- Increased use of scrap and use of natural gas for virgin steel production are already mature technologies that present decarbonisation opportunities over the next five to 10 years
- Hydrogen (through the DRI-EAF process) and CCUS are longer-term solutions

5.3. Power

The Power sector sits at the forefront of the energy transition. Renewables with technologies such as solar PV and offshore or onshore wind have matured over the past years and enable an accelerated decarbonisation of the Power sector in NZE. Many industries rely on electrification to achieve net zero by 2050 (for example switching to zero-emissions vehicles and EAFs), and this will not be possible without a sufficient supply of low-carbon electricity.

Power demand is expected to increase significantly in the coming decade, driven by both industry and residential sectors. It is estimated that around 800 million people today[21] still lack access to electricity, the majority of whom live in emerging markets. Per capita electricity consumption will increase as these economies develop and standards of living rise.

19. Standard Chartered position statement, extractive industries. Retrievable from here.
20. Standard Chartered position statement, extractive industries. Retrievable from here.
21. World Energy Outlook 2019, International Energy Agency. Retrievable from here.

It is essential that generators and distributors leverage transition technologies and rapidly decarbonise their operations to meet this demand in a sustainable way.

Many of our clients have already made net zero commitments, and we are engaging with them to help reduce their emissions through technologies such as renewables, CCUS and hydrogen. NZE assumes a more than threefold increase in global investment in electricity generation by 2030, including investment in expansion and modernisation of electricity networks.

5.3.1. Baseline

We will seek to categorise clients according to five subsectors, taking into account their primary business activities:

- **Power generators** relying mainly on coal and/or oil as main energy sources
- **Power generators** relying on natural gas as main energy source
- **Power generators** relying on renewables and/or nuclear as main energy sources
- **Power distributors** (pure electricity distributors)
- **Other utilities providers** (for example water suppliers and distributors, sewerage companies, steam and air conditioning supply companies)

For each power generation subsector, regressions have been run to derive the Scope 1 and 2 revenue-based carbon intensities. For the power distributors, regressions were not required as actual Scope 1 and 2 emissions data was available from a third-party provider for all clients in the baseline.

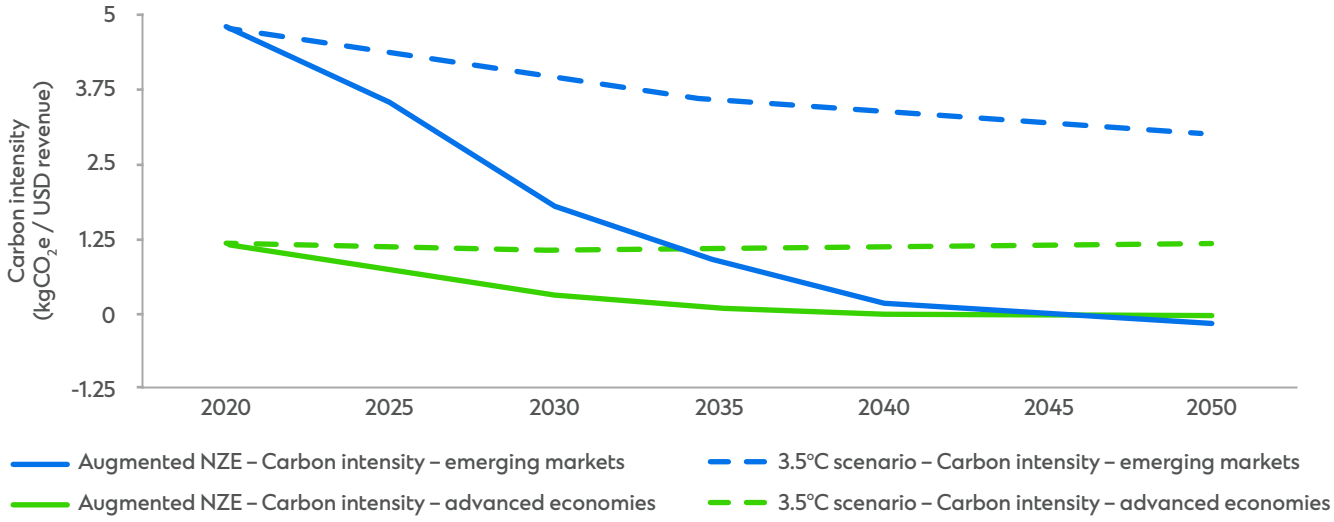
5.3.2. Projections

In NZE global electricity demand more than doubles by 2050. Electricity accounts for almost 50 per cent of total global energy consumption, with 90 per cent being generated from renewable sources (of which more than 70 percent is produced by solar PV and wind). Emissions fall to zero by 2040 then become negative, reflecting widespread use of bioenergy with CCUS. Bioenergy is increasingly used in the electricity sector, accounting for around 5 per cent of final power generation mix.

Scope 1 is the material component of the sector's emissions. Scope 2 is minimal and relates to energy used to operate power plants; its carbon intensity cannot be separated from the overall industry electricity consumption. Scope 3 is not included as there is no agreed approach to its quantification in this sector but, we note that it is less material than the Scope 1 emissions for the sector.

Figure 7 shows the carbon intensity for the Power sector, separated between advanced economies and emerging markets. Even in the 3.5°C scenario, the intensity falls in emerging markets as their reliance on coal reduces over time.

Figure 7 – Power sector carbon intensity by macro-region and scenario



5.3.3. Target setting

For Power we are setting one target covering the four generation and distribution subsectors (i.e. excluding other utilities providers). In line with SBTi guidance, the revenue-based carbon intensity target covers 100 per cent of in-scope financing for electricity generation.

Power target: 63 per cent reduction in revenue-based carbon intensity of our portfolio from 2020 to 2030 (from 3.67 to 1.36kgCO_2e/USD of client revenue).

Targets related to Power are supported by our public power generation position statement, effective from March 2022.[22]

For the Power industry, the possible transition pathway includes:

- Significantly lowering Scope 1 and 2 emissions through the scale up of renewables, nuclear, CCUS, and hydrogen, with renewables presenting a very large opportunity for transition finance in the near term
- Selectively financing grid expansion and switch to gas for clients, recognising that these are key enabling technologies that support the transition towards greener sources of power. Switch to abated gas will be key in the short-term to support the transition away from thermal coal.

22. Standard Chartered position statement, power generation. Retrievable from here.

6. Conclusion and next steps

We have developed a sound methodology to support the implementation of our ambition to reach net zero by 2050. It reflects the best available scientific information and data, and is specifically designed to address the opportunities and challenges in emerging markets.

We anticipate that our methodological framework will need to evolve over time, for example, as a result of enhancements in data availability, the reinforcement of existing standards, and the development of new ones.

We aim to provide updates on progress against the emissions targets outlined in this paper, as well as being transparent around enhancements to our methodology. We plan to promote this transparency both through our disclosures, including our annual TCFD reporting at sc.com/TCFD, and through enabling dialogue with stakeholders via group settings and individual discussion.

Those interested in discussing this white paper further can contact us at sustainability.feedback@sc.com

7. Annex

7.1. Why did we choose the IEA for net zero analysis?

For the purposes of our analysis, we wanted to choose a well-recognised scenario that reaches net zero by 2050, is consistent with limiting global warming to 1.5°C above pre-industrial levels by the year 2100, and also complies with the NZBA guidelines. As of today, there are limited options to choose from in terms of scenarios that offer the right level of granularity for the purposes of our analysis.

The main alternative to NZE would be the Network for Greening the Financial System (NGFS) 1.5°C scenarios that were updated in June 2021. We carefully considered NGFS as an alternative to IEA, but opted to use IEA scenarios for the following reasons:

- In NZE, all sectors of the economy decarbonise roughly to zero by 2050, whereas in NGFS there is more reliance on the power sector (where net emissions are significantly negative by 2050) and less need for other sectors to decarbonise. We judge the NZE approach to be more appropriate due to the onus it places on all parts of the economy.
- The carbon price increase assumed in the NGFS 1.5°C scenarios is significantly higher than the corresponding increase in NZE. We judge the lower yet significant level of reliance on high carbon prices in NZE to be more appropriate.
- Both scenarios have fossil fuel production declining significantly, to around one fifth of today's production levels. We expect this significant decline to lead to a fall in fossil fuel prices. While we see this in the NZE scenario, the NGFS scenario has fossil fuel prices staying fairly constant, which we do not consider to be an appropriate assumption.

Only 20 per cent of the 1.5°C scenarios assessed by the IPCC have the same level of emissions reduction ambition for the energy and industrial process sectors to 2050 as NZE. Furthermore, the IEA scenario has the lowest level of energy-related carbon dioxide removal and bioenergy of any IPCC assessed scenarios that achieves net zero energy sector and industrial process CO_2 emissions in 2050.

7.2. Approach to augmentation and projections aligned to a 1.5°C outcome

While we have used the results from NZE as published by IEA in May 2021 as far as we can, in order to comply with external initiatives such as SBTi and NZBA on target setting, we note a few limitations or gaps with respect to NZE as detailed below:

- With a few exceptions, results are only at global granularity, meaning there are no regional or country level splits. The exceptions include a split of CO_2 emissions into two meta-regions: advanced and emerging markets[23]. It is especially important for our portfolio that the analysis is done with regional granularity, to reflect differing stages of economic development with regions within emerging markets reaching net zero after regions within advanced economies.
- The results are only for CO_2, not other GHG. The IEA comments that for the 1.5°C warming limit to be kept, there will need to be commensurate reductions in other GHG, but they provide no quantification of these.
- Results for some individual sectors are not available in NZE: these include the coal production sector, the oil and gas production sector, oil refining, liquefied natural gas terminals, and agriculture. Although NZE provides projections for total CO_2 emissions and global usage of fossil fuels, these specific sectoral (Scope 1 and 2) results have not been published by the IEA.

23. Net Zero by 2050, A Roadmap for the Global Energy Sector, International Energy Agency 2021, p53, Figure 2.2. Retrievable from here.

- In general, results are only provided for 2019, 2020, 2030, 2040 and 2050. The NZE does include a few specific figures with data for intervening years (2025, 2035 and 2045), and where possible we have utilised this additional information.

To address these gaps and create a full set of results, we have enhanced NZE to create what we refer to as the Augmented NZE scenario:

- We have used the comprehensive and audited BOP scenario to determine more granular pathways. BOP is a scenario aligned to the Paris Agreement, meaning it is a 'well below 2°C' scenario. It has 24 sub-sectors and 12 regions as detailed in Table 2 and 3, respectively. Our approach has been to pro-rate results for GHG across these regions using BOP, preserving the global totals provided in NZE. We have also preserved results for 'advanced economies' and 'emerging markets economies' that are separately provided in Chapter 2 of the NZE[24].

Table 2 – Sectoral emissions pathways expanded by Baringa Partners from the IEA scenarios

Sub-Sector	Sector
Agriculture forestry and other land use	Other energy sector
Aviation	Transport
Cement	Industry
Chemicals	Industry
Coal production	Other energy sector
Commercial heating	Buildings
Domestic cooking	Buildings
Domestic heating	Buildings
Other GHG	Other GHG
Goods shipping	Transport
Iron and steel – BOF	Industry
Iron and steel – EAF	Industry
LNG terminals	Energy processing
Non-energy industry	Industry
Oil and Gas production	Other energy sector
Oil refining	Other energy sector
Other	Other energy sector
Other heating	Other energy sector
Other industry	Industry
Power generation	Energy processing
Rail transport (freight)	Transport
Rail transport (passenger)	Transport
Road transport (freight)	Transport
Road transport (passenger)	Transport

Table 3 – Regional expansion by Baringa Partners with 12 regions included

AUS	Australia and New Zealand
CHN	China
CSA	Central and South America
EUA	Eurasia (mainly Russia)
EUR	Europe, excluding UK and Ireland
IND	India
JPN	Japan, Korea, Taiwan
MEN	Middle East and North Africa
NAM	North America and Mexico
OAP	Other Asia Pacific
SSA	Sub-Saharan Africa
UKI	UK and Ireland

- Given NZE shows results for CO_2 emissions only, for the other GHG, we have used the BOP projections. Other GHG fall by 75 per cent between 2020 and 2050 in BOP, which is aligned to the IEA's Sustainable Development Scenario (SDS)[25]. It is possible that a larger reduction may be needed to keep within 1.5°C of warming, but without clearer guidance, any deviation from the SDS projections is arbitrary. Furthermore, changing the other GHG trajectory would not impact on the CO_2 trajectories that are being applied to our portfolio. In due course, as and when the NZE scenario is more fully developed, the projections for other GHG can be revisited. Note that all emissions except CO_2 are included within a single sectoral bucket, given the absence of data on each of the GHG separately, and the dominance of CO_2 in the emissions total.

24. Net Zero by 2050 Scenario, International Energy Agency 2021, figures and data by chapter. Retrievable from here.
25. World Energy Outlook 2019, International Energy Agency. Retrievable from here.

- For sectors not specified in NZE, we have retained the results from BOP. It may be argued that these specific sectors would decarbonise more in a net zero world than they do in BOP, which is a well below 2ºC scenario, but not necessarily as low as 1.5ºC. However, we consider any quantification of this to be arbitrary. Within the 'Other' sector, we have included process emissions (e.g. conversion between different energy products such as in oil refineries), and other emissions not specified in one of our key sectors. The 'Other' category is used to reconcile total global CO_2 emissions and ensure that all the results in the Augmented NZE scenario are in agreement with published results in NZE.
- We have used NZE projections for total CO_2 emissions in advanced economies and emerging markets[26], to interpolate results for 2025, 2035 and 2045 for each sector and region. The IEA has published results for 2019 and 2020 separately, the latter taking account of the impact of COVID-19. It is unclear how quickly the global economy will recover from the pandemic. For this analysis, the assumption is that a full recovery will have been achieved by 2025. Based on this assumption, we have interpolated between 2019 and 2030, not 2020 and 2030, to obtain results for the year 2025 that are 'normal' in the sense of not being affected by COVID-19. A more refined treatment will be possible when a more complete set of results is published by the IEA.

Our assumptions and their limitations are summarised in Table 4.

Table 4 – Summary of key assumptions in NZE 2050 scenario

Title	Assumption	Limitation
Regional augmentation	Regional results from BOP are scaled (preserving relativities) to NZE meta-regions (advanced/ developing)	In due course, the IEA may publish results for individual regions
Sectoral augmentation	BOP projections are further scaled to NZE results for individual sectors (preserving NZE meta-regional results)	Judgement exercised (more than one way of doing scaling)
Missing sectors	For these sectors – Oil & Gas production, oil refining, LNG terminals, coal production, agriculture, Other GHG–BOP results are used (consistent with IEA SDS)	In due course, the IEA may publish results for missing sectors. Other GHG are treated together as a single sector
'Other' sector	This category is used to reconcile total global CO_2 emissions	Exact treatment of biomass, negative emissions, process emissions and other energy sectors is unclear
Interpolation	NZE has results for 2019, 2020, 2030, 2040, 2050 in Annex A. For CO_2 only, at global level only, the report provides additional results for 2025, 2035, 2045. We have augmented to a full set of results for every five years	Judgement exercised (more than one way of doing temporal augmentation)
Covid impact	Impact assumed to be short-term. For interpolation purposes, 2019 (not 2020) has been used	Duration of COVID-19 impact is unknown
Limited price data	Creating emission intensity pathways based on production at counterparty level requires product pricing information to derive production volumes (given known counterparty revenue)	There is limited pricing data in the NZE (fossil fuels, and power) but not for other sectors

26. Net Zero by 2050 Scenario, International Energy Agency 2021, figures and data by chapter. Retrievable from here.

7.3. Approach to projections aligned to a 3.5°C outcome:

The projections for a 3.5°C outcome have been performed using the 3.5°C scenario, which is closely related to IEA's CPS. All inputs can be retrieved and outputs explained in terms of assumptions and model logic:

- The inputs from IEA CPS consist of macroeconomic growth, demand for products (such as fossil fuels, industrial output) and assumptions on other GHG. By using these inputs alongside the other data sources listed above, Baringa Partners has developed its 3.5°C scenario which yields outcomes that are similar to those in the IEA CPS. We have not attempted to match them exactly since the IEA CPS only goes to 2040, not 2050. Baringa Partners has extended the range of inputs and reach of its global model so that the full timeframe to 2050 is modelled.
- The CPS only considers measures at the governmental or regulatory level that have already been implemented as of late 2019 and hence, does not include the impact from intended or announced policies. The CPS was produced before the impact of COVID-19 was known, and hence projections for all years, including 2020, assume 'normal' conditions in this scenario. This leads to a slight basis difference between NZE and CPS, but the effect is assumed to be short-term and to be minimal by 2025.
- Another key feature of the 3.5°C scenario is that there is no international effort to reduce carbon emissions. In consequence, there are no carbon pricing mechanisms (and no carbon prices) in this scenario. The key assumptions for the 3.5°C scenario, and their limitations, are summarised in Table 5.

Table 5 – Summary of key assumptions in 3.5°C scenario

Title	Assumption	Limitation
Calibration to IEA CPS 2019	Product demand levels – regionally and globally – are taken from IEA CPS	Detailed information is restricted; all available information has been utilised
Other GHG	IEA CPS projections assumed; detailed modelling is limited to CO_2	Optimisation is restricted to CO_2 and other GHG are considered as single sector
Range of policies	Current policies as of 2019 considered by IEA CPS; no further policies on decarbonisation introduced	Policies introduced in 2020/21 or proposed are not considered
COVID-19 impact	Not modelled in 3.5°C-projections (from 2019 base year) assume 'normal' conditions with no impact from pandemic	Year 2020 is on different basis from NZE, which does model impact (especially large on transport sector)
Commodity prices	No carbon pricing; no effort to reduce GHG emissions beyond current (as of 2019) policies	Proposals to introduce or intensify carbon pricing are not considered

7.4. Client-level transition pathways

The following steps, as illustrated in Figure 8, outline our approach to create a range of trajectories for our clients, taking into consideration their decarbonisation plans.

Focusing on our three priority sectors, we have assessed our clients' transition risk mitigation plans, scoring their readiness to respond to risk by utilising information on public disclosures and commitments. A 'transition risk mitigation score' (TRM score) between 0 and 100 has been derived for clients where we have the greatest exposures, which seeks to reflect their readiness to mitigate transition risk.

Figure 8 – Adjusted client trajectory

Conservative trajectory

Where clients in each of the three priority sectors have made **public climate commitments and have a TRM score equal or greater to the sample mean** (based on detailed engagement with our top 2,000 clients):

- Utilise public commitments fully to create client trajectory, using the NZE pathway if commitments are more ambitious than NZE

Where clients in the three priority sectors have not made public climate commitments:

- Assume clients follow the 3.5ºC trajectory

Commitment trajectory

Where clients in each of the three priority sectors have made **public climate commitments:**

- Utilise public commitments fully to create a new trajectory for these clients
- Where clients' commitments are more ambitious then the NZE trajectory, use NZE to be prudent

Where clients in the three priority sectors have not made public climate commitments:

- Assume clients follow the 3.5ºC trajectory

Optimistic trajectory

Utilse **public climate commitments** where available for the three priority sectors, in line with 'Commitment trajectory'. In addition, where clients have not yet made public climate commitments but have declared **intent to meet the requirements of the Paris Agreement** and have a **high TRM score:**

- Assume clients follow a 2ºC trajectory (instead of a below 2ºC trajectory to be prudent)
- A high TRM score is considered to be greater or equal to the sample mean + 1 standard deviation

For all other clients, assume clients follow the 3.5ºC trajectory

8. Glossary

Absolute emissions: Overall emission of GHG (generally classified as Scope 1, 2 and 3 emissions).

Absolute financed emissions: The portion of client emissions attributed to financial services firms due to lending activities extended to the client.

Attribution factor: A measure of outstanding exposure to a given client as a percentage of overall client enterprise value.

BOF: A basic oxygen furnace is a vessel used to convert hot metal into steel. The process is known as the basic oxygen furnace process, basic oxygen steelmaking, or the oxygen converter process.

BF: A blast furnace is commonly used to make iron from a mixture of iron ore, coke, and limestone.

BOP: the emission projections from the Orderly Paris scenario results provided by Baringa Partners (BOP). BOP is aligned to the Paris Agreement, meaning it is a 'well below 2°C' scenario. It has 24 sub-sectors and 12 regions.

CCS: Carbon capture and storage. The process of capturing and storing carbon dioxide (CO_2) before it is released into the atmosphere.

CCUS: Carbon capture, utilisation and storage, also carbon capture, utilisation and sequestration, is a process that captures CO_2 emissions from sources like coal-fired power plants and either reuses or stores it.

CDP questionnaire: The Carbon Disclosure Project runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.

CO_2e: Carbon dioxide equivalent is the number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another greenhouse gas.

CPS: The International Energy Agency (IEA)'s Current Policies Scenario. A baseline picture of how global energy markets would evolve if governments make no changes to their existing policies and measures.

DRI-EAF: Direct reduced iron in an electric arc furnace.

EV: Electric vehicles.

EVIC: Enterprise value including cash. The sum of the market capitalisation of ordinary shares at fiscal year-end, the market capitalisation of preferred shares at fiscal year-end, and the book values of total debt and minorities' interests.

GHG: Greenhouse gas. A gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect.

IEA: The International Energy Agency. Works with countries around the world to shape energy policies for a secure and sustainable future.

IPCC: Intergovernmental Panel on Climate Change.

LNG: Liquified natural gas. A natural gas that has been cooled down to liquid form for ease and safety of non-pressurised storage or transport.

Mt: Million tonnes.

MWh: Megawatt hour. A unit of energy equal to the work done by a power of a million watts in one hour.

NGFS: Network for Greening the Financial System. Founded in 2017 and comprised of 83 central banks and financial supervisors, the network aims to accelerate the scaling up of green finance and develop recommendations for central banks' role for climate change.

NZE: The IEA's Net Zero Emissions by 2050 scenario.

PCAF: Partnership for Carbon Accounting Financials provides support for financial industry alignment with the Paris Climate Agreement.

PV: Solar photovoltaics. The conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect. The photovoltaic effect is commercially utilised for electricity generation.

Revenue-based carbon intensity:
A measurement of the quantity of greenhouse gases emitted by a given client per dollar of revenue of the client.

SDS: Sustainable Development Scenario.

SBTi: Science-Based Targets initiative. Defines and promotes best practice in science-based target setting.

Scope 1 emissions: Direct GHG emissions that occur from sources that are controlled or owned by an organisation.

Scope 2 emissions: Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.

Scope 3 emissions: GHG emissions resulting from assets not owned or controlled by the reporting firm, but that the firm indirectly impacts in its value chain.

t: Tonnes

TFCD questionnaire: Task force on Climate-Related Financial Disclosures promotes advancements in the availability and quality of climate-related disclosure.

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