



Corporate loan portfolio financed emissions and net zero aligned pathways for focus sectors

Towards net zero emissions

[#PositiveImpact](#)

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Introduction

Net zero by 2050: a historic challenge

The world faces a historic challenge. Without urgent and co-ordinated action, climate change will have devastating effects for the world's population and biodiversity. To avoid these effects, it is critical that policymakers, companies and individuals act now to support the achievement of net zero emissions by 2050 in order to limit global temperature increases to 1.5°C above pre-industrial levels by 2100.





A vital role for the banking industry

This will require unprecedented investment to transform the global economy. For example, worldwide capital investment in the energy sector will need to rise to approximately \$5 trillion per year in 2030, 4.5% of global GDP and more than double today's levels according to the IEA¹.

The banking industry will play a vital role in financing this transformation. Deutsche Bank is committed to playing its part in tackling one of the greatest challenges facing humanity today.

A core part of Deutsche Bank's sustainability strategy is our commitment to act as a reliable partner in financing and advising clients on the path toward the Paris Agreement on Climate Change. We want to ensure a just and orderly transition to a lower carbon economy without causing unnecessary negative social effects and widening inequality.

Deutsche Bank will deploy three principal levers to decarbonise. First, providing transition financing to clients to facilitate their transition. Second, rebalancing our loan portfolio towards clients with greater focus on developing decarbonisation plans and on less carbon intensive technologies such as renewables; and third, reducing exposure to clients with limited capacity or willingness to decarbonise.

Reducing carbon intensity in our loan portfolio: key disclosures

At our Sustainability Deep Dive in May 2021, we pledged to publish details of the carbon footprint of our loan portfolio and our pathways to net zero for key sectors.

This paper represents a milestone on that path. We disclose our corporate loan book financed emissions based on the PCAF Standard, combining client-specific emission factors with economic activity emission proxy factors, as well as our PCAF data quality scores to provide additional transparency for investors. We also describe emission reduction pathways for four 'focus' sectors.

Defining the pathway to net zero: selecting the scenario, key sectors and key metrics

In defining pathways to net zero, Deutsche Bank uses the International Energy Agency's (IEA) Net Zero Scenario (NZE). We focus on four carbon intensive sectors: oil and gas, power generation, steel, and automotives. Deutsche Bank uses metrics which are aligned with the decarbonisation pathways of each sector: gigajoules of energy (upstream oil and gas); megawatt hours (power generation); vehicle kilometres travelled (automotive), and tonnes of steel produced (steel).

1 IEA NZE (2021).

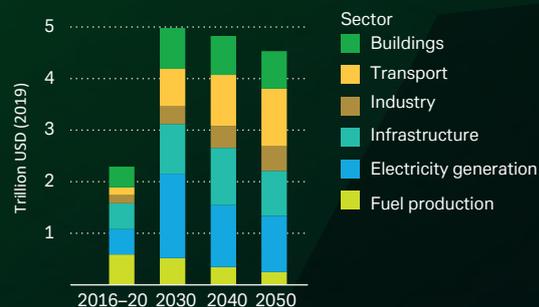


Figure 1: Annual average capital investment in the NZE by sector

Source: IEA NZE (2021), page 81



the annual cost of the rise of worldwide capital investment in the energy sector needed by 2030 — 4.5% of global GDP and more than 2x today's levels — to achieve net zero.

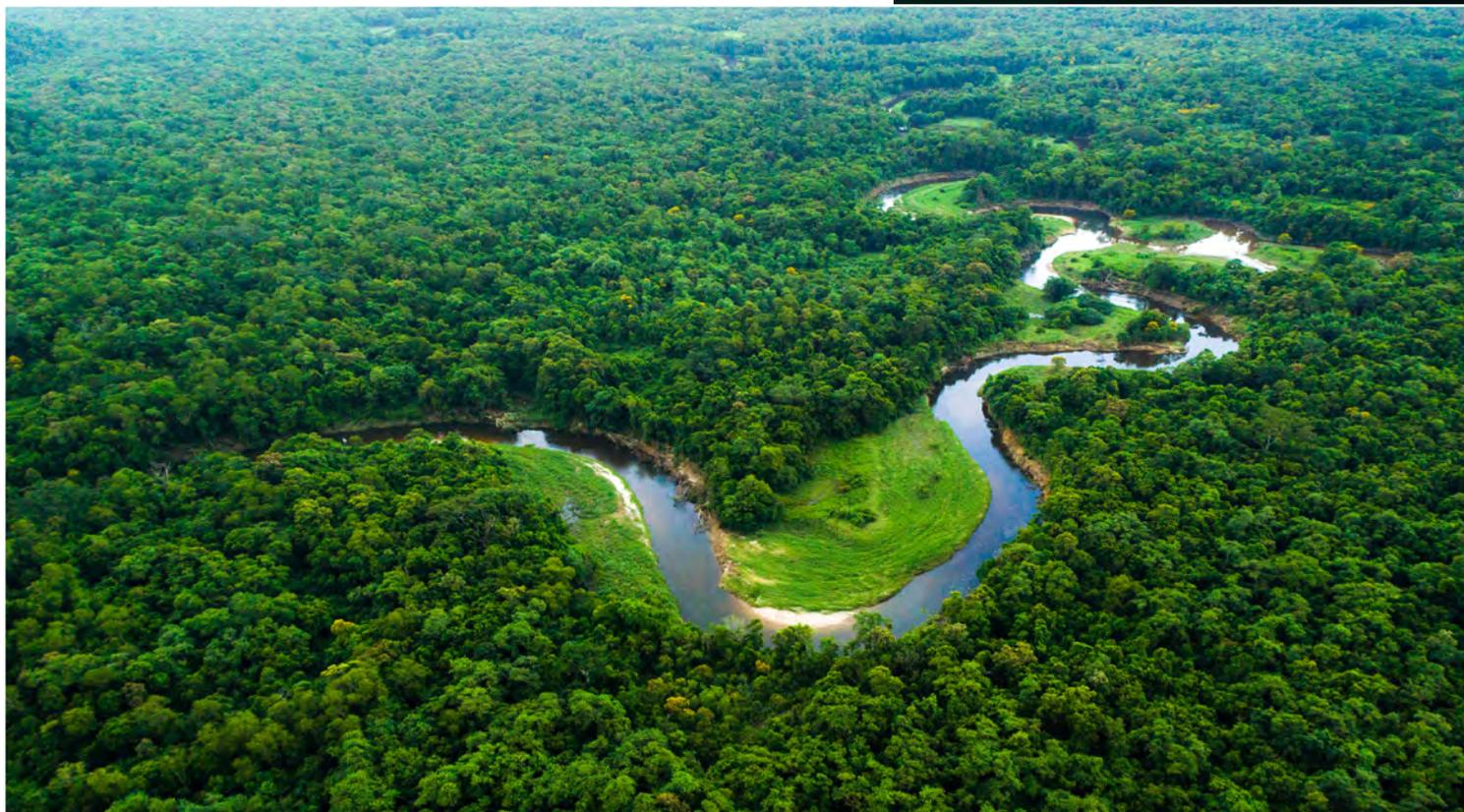


Measuring our financed emissions

As of 31 December 2021, Deutsche Bank's total loan portfolio was €476 billion. Of this, €105 billion, or 22%, consists of loans to our corporate industry sectors². Initial estimates, based on the PCAF standard, suggest that financed emissions from the corporate loan book are 30.8 million tonnes of CO₂ equivalent (scope 1 and 2). Sixty-eight percent of financed emissions are generated by three sectors which account for 16% of corporate lending and just 3.6% of Deutsche Bank's overall loan portfolio. Moreover, emissions are heavily concentrated in a small number of larger exposures within each of those portfolios.

Next steps through end-2022

As outlined in our Sustainability Deep Dive, Deutsche Bank will continue to develop our disclosures. This will include details of financed emissions in other sectors; decarbonisation targets as part of our NZBA commitment; and the financed/facilitated emissions generated by a broader range of products such as capital market instruments and total committed facilities.



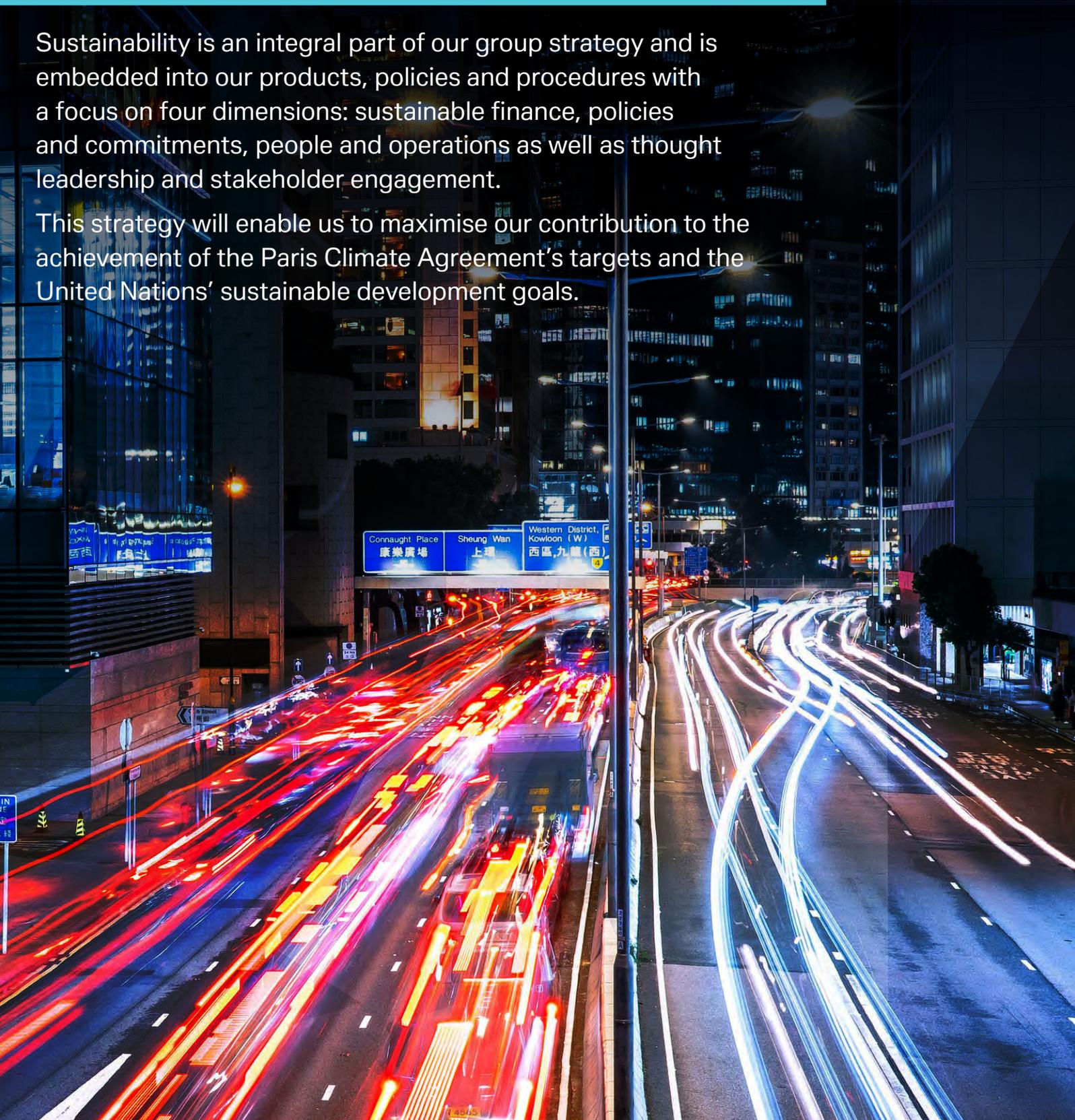
² For the purposes of this disclosure, corporate loans represent total lending to the 17 corporate industry portfolios which Deutsche Bank manages under its industry risk management framework. More details can be found in the annex.



Deutsche Bank's climate strategy

Sustainability is an integral part of our group strategy and is embedded into our products, policies and procedures with a focus on four dimensions: sustainable finance, policies and commitments, people and operations as well as thought leadership and stakeholder engagement.

This strategy will enable us to maximise our contribution to the achievement of the Paris Climate Agreement's targets and the United Nations' sustainable development goals.





Governance

Our sustainability strategy is governed by the Group Sustainability Committee. Chaired by our Chief Executive Officer, the committee consists of Management Board members and the heads of our business divisions, as well as representatives from infrastructure functions.

Our Group Risk Committee, chaired by the Chief Risk Officer, serves as the central forum for review and decision making on matters related to risk, capital and liquidity. It is responsible for the development of our holistic climate risk management framework including the definition of key metrics and risk appetite thresholds.

Financing the transition

The transition to net zero will require a redirection of existing capital towards clean energy technologies alongside a substantial increase in the overall level of investment in energy. Most of this increase will need to come from private sources, mobilised by public policies that create incentives, set appropriate regulatory frameworks and reform energy taxes.

Clearly, the banking sector has a critical role to play in financing this transition, including via on-balance sheet lending, capital market financing and an increase in sustainable assets under management.

In May 2020, we announced that we intend to achieve at least €200 billion in sustainable financing and investments, as defined in our Sustainable Finance Framework, by year-end 2025. At our Sustainability Deep Dive in May 2021, we brought forward this target to year-end 2023 and also published detailed sustainable finance targets for our businesses.

Industry engagement

Deutsche Bank is actively involved in a range of industry initiatives to support the development of data and methodologies to enable banks to measure and monitor emissions and set robust, science-based emission reduction targets.

Deutsche Bank joined the Net Zero Banking Alliance (NZBA) as a founder member in April 2021. The NZBA, convened by the United Nations Environment Programme Finance Initiative (UNEP FI), is a collaboration among some of the world's largest financial institutions to support the alignment of their business activities with net zero emissions by 2050. Our NZBA commitment pledges us to set and disclose net zero aligned targets for key carbon intensive portfolios by Q4 2022.

Via our membership of the NZBA we are also a member of GFANZ, a global coalition of leading financial institutions which is committed to accelerating the decarbonisation of the economy.

The bank is active in a number of projects of the UNEP FI including a working group which is assessing the quantitative relationships between energy efficiency improvements and loan probability of default.

We are members of the Partnership for Carbon Accounting Financials (PCAF) and participate in its sovereign and capital markets instruments working groups as well as its climate data working group. We are also part of the Science Based Targets Initiative's (SBTI) Expert Advisory Group which is focused on the development of the framework for financial institutions.



Our sustainable financing and investments target, by **year-end 2023**

Initiatives we are involved in



UNEP
FINANCE
INITIATIVE



INDUSTRY-LED, U.N.-CONVENED
NET-ZERO BANKING ALLIANCE



Risk management

Reducing the emissions intensities of our portfolios and rebalancing exposures towards clients with credible transition plans in place, will have significant risk management benefits by reducing our exposures to climate transition risks — in particular those arising from higher carbon taxes and reduced global demand for fossil fuels and related products. These actions will also support a reduction in acute and chronic physical risk events over the medium-to-long term.

We have developed, and are embedding, the tools and frameworks needed to manage climate transition and physical risks to our portfolios in line with the ECB's guide on climate-related and environmental risks. Our net zero commitment is embedded in our Group Risk Appetite Statement and our activities are governed by a dedicated Climate and Environmental Risk policy which outlines roles, responsibilities as well as qualitative risk appetite principles and quantitative risk appetite metrics.

Metrics and targets

The key metrics that we use to assess transition risks to our portfolios are carbon intensity and financed emissions. As outlined in more detail below, we estimate and monitor these metrics using the standard of the Partnership for Carbon Accounting for Financials (PCAF).

We utilise an internal climate risk taxonomy to classify sectoral exposures as high, medium or low transition risk based on this analysis as well as the EU taxonomy and internal expert judgement. Our internal client rating models — which are a key component of risk appetite setting — incorporate an assessment of climate and wider ESG risks from a sectoral and individual perspective.

To support this assessment, we review our global business activities with clients in key carbon intensive sectors to enhance our understanding of the nature and robustness of their decarbonisation strategies.

Tracking and managing our progress towards net zero

We will report annually on the development of our portfolio financed emissions and emission intensities vs our selected net zero aligned pathways. Internally, we produce detailed, quarterly climate risk information for senior committees.

By Q4 2022, we will disclose net zero aligned targets for key carbon intensive sectors — including intermediate and final 2050 targets. These targets will be embedded into our group strategic planning, governance and risk management processes.

Our approach at a glance



Sustainable Finance



Policies and Commitments



People and Own Operations



Thought Leadership and Stakeholders



Developing methodological approaches to net zero alignment

Harnessing the PACTA methodology

Our net zero alignment methodology is based on the Paris Agreement Capital Transition Assessment (PACTA) methodology.





The PACTA approach is flexible, catering for a range of metrics which best captures each sectors' unique decarbonisation strategy to meet the Paris Agreement's goals and then measuring a financial portfolio's alignment to them³.

For example, some sectors will need to direct CAPEX towards proven low carbon intensive technologies⁴ (e.g. power generation switching to renewables or producing automobiles with electric powertrains), while vital sectors like steel do not have a comprehensive decarbonisation technology path yet but can nevertheless be tracked by a physical emission intensity (kg CO₂e/T steel produced) metric in the short term to encourage operational efficiency.

Lastly, some sectors (e.g. fossil fuels) need to combine improvements in operational emissions in the short-to-medium term, which can be tracked with a physical emission intensity metric (kg CO₂e/GJ), with a gradual phasing out over the medium to long term.

The climate-relevant sectors currently covered by PACTA (power, coal mining, upstream oil and gas, auto manufacturing, cement, steel, aviation and shipping) collectively account for approximately 75% of greenhouse gas emissions.

A critical feature of the PACTA methodology, coupled with a granular physical asset database provided by Asset Resolution, allows dovetailing of real physical assets (e.g. power plants, steel plants) with their respective regional, sector-specific and forward-looking production pathways and technology deployment. This provides insights into not only where the transition risks lie within banks' portfolios, but also where banks can help with the transition path of their clients. Lastly, banks can also measure their alignment with climate scenarios across key climate-relevant sectors and technologies once decarbonisation pathways from scenario providers (e.g. the IEA) are inputted.

Scenario selection

To assess the pathways required to align to net zero we use the IEA net zero scenario (NZE). The IEA NZE is our preferred benchmark as it is consistent with limiting global warming to no more than 1.5°C above pre-industrial levels by 2100 and is compliant with the NZBA guidelines⁵. More detail on why we chose the IEA NZE decarbonisation pathways can be found in Annex 2.

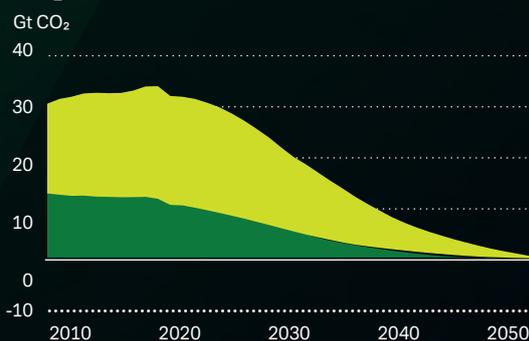
Under the NZE, global CO₂ emissions fall by 38% by 2030 and 100% by 2050 with 2020 as the baseline.

PACTA covers



of current greenhouse gas emissions covering power, coal mining, upstream oil and gas, auto manufacturing, cement, steel, aviation and shipping sectors.

CO₂ emissions



Per capita CO₂ emissions

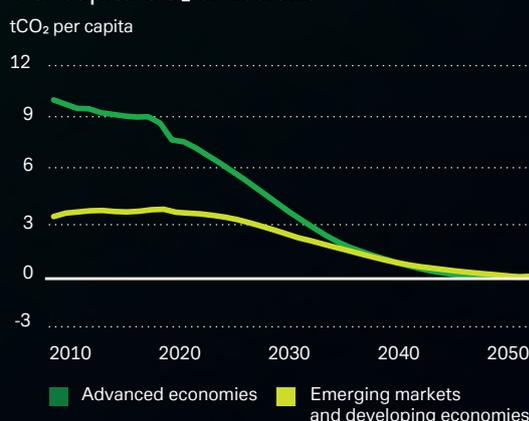


Figure 2: Global net CO₂ emissions in the NZE

Source: Net Zero by 2050: A Roadmap for the Global Energy Sector, page 53

³ A financial portfolio alignment with, for example, a net zero by 2050 scenario from any scenario provider.

⁴ Which can be tracked via a 'technology mix' type metric.

⁵ e.g. internationally credible scenario provider, low/no carbon projection overshoot (w.r.t 1.5°C global carbon budget), conservative reliance on negative emission technologies, minimise mis-alignment with UN Sustainable Development Goals (SDGs).



Sector selection

We show initial net zero aligned pathways for four sectors: oil and gas, power generation, steel and automotives.

These sectors are selected due to (i) their high contribution to our financed emissions (scope 1 and 2) and to global GHG emissions and (ii) in the case of the automotive sector its large contribution to global scope 3 emissions.

We are extending our approach to cover a broader range of sectors, and will disclose targets for the four focus and additional sectors in Q4 2022 — where data and methodologies are sufficiently advanced.

Metric selection

We use sector-specific physical/production based intensity metrics which best capture the decarbonisation pathways of each of our sectors in scope:

- Oil and gas: kg of CO₂e/GJ of production
- Power generation: kg of CO₂e/MW hour of power generation
- Steel: kg of CO₂e/tonne of steel produced
- Automotive: g of CO₂ per vehicle km (light duty vehicles only)

More details on the rationale for this metric selection can be found in Annex 2.





Corporate loan portfolio financed emissions: focus sectors

Methodology

Our corporate industry loan portfolio financed emissions are estimated using the emerging industry standard developed by the Partnership for Carbon Accounting Financials (PCAF) and based on our loan exposures as of end-2021.





The PCAF standard enables banks to combine client specific emissions disclosures with proxy emission factors by NACE code and region, provided by PCAF, for clients which have not yet disclosed. Where possible we use client-specific estimates for the calculations, but these data are not yet available for the majority of our portfolio — particularly for smaller/unlisted clients.

Where a client has disclosed, our financed emissions of the client is calculated by dividing the client’s GHG emissions by its Enterprise Value Including Cash (EVIC) to derive a unit of emission per unit EUR EVIC, which is then multiplied by the size of our loan exposure to that client. Similarly, for clients which have not disclosed, a suitable PCAF proxy factor, being unit of emissions per unit of EUR asset by country and sector, is chosen and then multiplied by the size of the loan exposure to arrive at a financed emissions number for such clients.

The estimates⁶ are based on scope 1 and 2 financed emissions only, as currently recommended by PCAF, and are calculated for drawn facilities only. As we explain later on in the document, we will also include information on emissions from undrawn commitments in future disclosures. For more details on the calculation approach please see Annex 1.

The extent to which we have utilised proxy estimates⁷ is reflected in the PCAF data quality scores provided for the overall portfolio and for each focus sector.

Emissions estimates: focus on key sectors

We estimate that our corporate loan book financed emissions is 30.8 million tonnes of CO₂ equivalent with a PCAF data quality score of 4.1 which reflects our heavy reliance on PCAF data proxies. We anticipate as more clients disclose in the future their GHG emissions our data quality score will improve.

In line with their contribution to global GHG emissions levels, our portfolio financed emissions are heavily concentrated in three carbon intensive sectors: oil and gas, utilities and steel, metals and mining, which account for 68% of total emissions vs their 16% share of our corporate lending and just 3.6% of overall lending.

Figure 3: Corporate loan book financed emissions

Year-end 2021	Loan exposure (€bn)	Financed emissions (scope 1 and 2 Mt CO ₂ e/y)	PCAF data quality score (5 = lowest) ^b
Total loans at amortised cost	476.1		
Total corporate loan exposure	104.8	30.8	4.1
Oil and gas	8.2	9.7	4.1
o/w oil and gas upstream ^a	5.2	8.0	3.8
Utilities	4.5	7.7	3.9
o/w power generation ^a	3.1	6.4	3.3
Steel, metals and mining	4.3	3.5	3.9
o/w steel production ^a	1.3	2.7	3.2
Automotives	7.3	0.5	3.7
o/w automotive production ^a	3.0	0.1	2.7

a In scope of (PACTA) pathway alignment
b More information in Annex 1

⁶ From Refinitiv, a third party data provider.
⁷ A database curated by PCAF.



Figure 4: Share of key sectors in loan exposure and financed emissions

Climate-related data challenges

An aerial photograph of a river with several small, tree-covered islands. The background is a dense green forest. The text is overlaid on this image.

Climate-related data is not comprehensively available today and is not subject to globally consistent and rigorous standards. This lack of availability is reflected in the high PCAF data quality scores for our financed emissions calculations.

While a number of regulators are developing standardised requirements for climate and ESG-related disclosures, we anticipate that it will be several years before we see a meaningful improvement in quality and consistency.

Hence, we and other banks are heavily reliant on assumptions and proxy calculations for our public disclosures and for internal strategy and risk management purposes.

Despite these limitations, we believe that it is key to disclose our data and methodologies in their current state to provide transparency on our portfolios and the impacts of our transition strategies.

Deutsche Bank is developing a group-wide strategy to improve the sourcing of emissions data from third party providers, as well as integrate data obtained directly from our clients — subject to rigorous governance and controls. Client engagement will be key for us to build understanding on current emissions as well as transition strategies.

We expect that as data quality and comprehensiveness improve our financed emissions estimates will change, and we will clearly flag the impact of this in our regular updates.

Other factors which can influence our financed emissions estimates include changes to a company's Enterprise Value Including Cash (EVIC) — where a significant drop in share prices can lead to higher financed emissions due to an increase in PCAF attribution factors. FX translation effects can also impact the estimates — for example if the USD appreciates vs EUR then USD-denominated loan balance reported in EUR currency equivalent will increase leading to higher emissions. Going forwards, we will also flag the impacts of these developments on our reported emissions to provide transparency for our stakeholders.

More broadly, factors such as rising commodity and raw materials prices can drive short-term increases in our exposures e.g. under-committed facilities due to higher working capital needs of our clients. This can lead to additional volatility in our carbon intensive exposure and financed emissions.

In terms of product scope, for future disclosures we will extend beyond the loan book to incorporate a broader range of on balance sheet and off balance sheet activities including capital markets financing as well as our total committed facilities.



Focus sector deep dive: oil and gas

Background

The major sources of global GHG emissions are fossil fuel production and combustion. According to estimates⁸ from the IEA, the combustion of fossil fuels represents 93%⁹ of global CO₂ emissions¹⁰, of which oil accounted for 32% and natural gas 23% in 2020.

Achieving 1.5°C alignment will require a deep reduction of emissions which can be achieved in part through transition to lower carbon intense sources, prevention of technically avoidable methane release and mitigation of emissions via development and adoption of carbon capture utilisation and storage (CCUS).

51%
of global CO₂ emissions¹¹

Oil and gas portfolio value

€8.2 billion

Oil and gas upstream PACTA coverage

€5.2 billion

⁸ IEA NZE, (2021)

⁹ Coal, oil, natural gas combustion activities (Table A.4, page 199, rows 3, 4 and 5) divided by total CO₂ (Table A.4, row 1) in 2020

¹⁰ Note: global CO₂ emission percentages of the four focus sectors are not additive as they correspond to differing emission scopes.

¹¹ Oil and gas combustion activities (Table A.4, page 199, rows 4 and 5) divided by total CO₂ (Table A.4, row 1) in 2020



Deutsche Bank portfolio in scope

Our oil and gas loan portfolio of €8.2 billion is focused on top tier, diversified majors and national oil companies with more than 80% of net credit limits to investment grade companies. Many of these clients have already announced emission reduction targets.

The portfolio in scope of our initial net zero aligned pathway is our €5.2 billion loan exposure to upstream activities of oil and gas producers which have been matched with the physical asset level dataset provided by Asset Resolution.

Decarbonisation scenario under NZE

The NZE scenario projects the share of oil and gas in the global energy supply to fall from around 50% today to around 13% in 2050.

Operational (scope 1 and 2) emission intensities are reduced primarily via prevention of technically avoidable methane emission intensities, ending of methane flaring and significant electrification of operations.

End use (scope 3) emission intensities are reduced via transition away from oil to gas and implementation of abatement strategies for gas combustion.

In 2050, the remaining usage of fossil fuels is primarily driven by goods where the carbon is embedded in the product such as plastics, in facilities fitted with CCUS and/or in sectors where low-emission technology options are scarce.

NZE-aligned emission reduction pathway

Our initial metric selection is physical emissions intensity based (kg of CO₂e per gigajoule) and covers both operational intensity (scope 1 and 2) and end use intensity (scope 3).

Deutsche Bank's current portfolio intensity is broadly aligned with the global sector average. The NZE scenario convergence path implies a 12% reduction in sectoral emissions intensity by 2030 and a 72% reduction by 2050.

Our fossil fuel policy prohibits financing of new projects in the Arctic region and oil sands projects.

The NZE scenario projects the share of oil and gas in the global energy supply to fall from



today to ~13% in 2050.

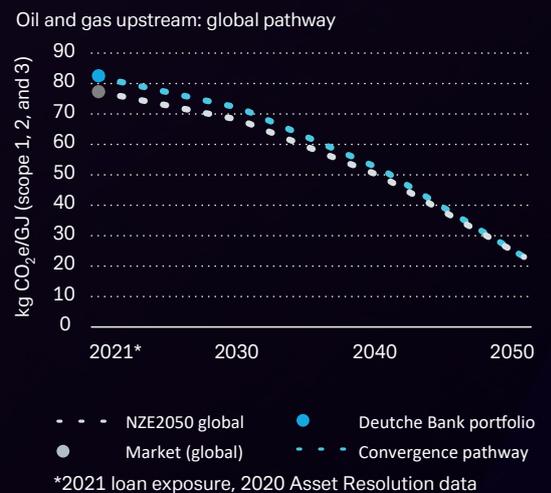


Figure 5: Physical emission intensity decarbonisation pathways, oil and gas sector

Source: PACTA, Asset Resolution and IEA NZE



Focus sector deep dive: power generation

Background

Power generation accounts for approximately 35%¹² of global CO₂ emissions today, largely due to its combustion of fossil fuels.

Achieving 1.5°C alignment will require both a large increase in electricity supply due to increased electrification of end use, as well as a significant shift towards renewable sources of power.

35%
of global CO₂ emissions

Utility portfolio:
€4.5 billion

Power generation PACTA coverage:
€3.1 billion

¹² IEA NZE (2021), total electricity generated in 2020 (Table A.3, page 198, row 1) multiplied by CO₂ intensity of electricity generation (Table A.5, page 200, row 7) in 2020, divided by total CO₂ emissions (Table A.4, page 199, row 1) in 2020



Deutsche Bank portfolio in scope

Our utilities loan portfolio of €4.5 billion is focused on large incumbents in the EU and US that benefit from diversification across the value chain (including transmission and distribution businesses) and/or a balanced energy mix.

The portfolio in scope of our initial net zero aligned pathway is our €3.1 billion loan exposure to power generation companies which have been matched with the physical asset level database provided by Asset Resolution. Roughly 45%¹³ of power generation comes from power plants based in developing countries where producers are generally more heavily reliant on higher emission fuel sources.

Our coal policy prohibits the financing of new coal-fired power plants and places under review the financing of energy companies more than 50% reliant on thermal coal to ensure they have credible diversification plans in place.

Decarbonisation scenario under NZE

The NZE scenario projects a significant increase in energy needs, due to higher economic activity and electrification of end uses, as well as a fundamental shift in the way electricity is generated.

Global generation from renewables increases nearly three times by 2030 and grows eightfold by 2050. This raises the share of renewables in total output to almost 90% in 2050.

Solar and wind become the leading sources of electricity globally before 2030. Hydropower and generation using bioenergy also increase significantly. The NZE also projects that nuclear power will make a significant contribution with output rising 40% by 2030 and doubling by 2050 using 2020 as the baseline. In contrast, the use of unabated fossil fuels is sharply reduced with coal fired electricity generation cut by roughly 70% by 2030 and phased out completely by 2040. Large scale oil-fired generation is largely phased out in the 2030s and natural gas fired electricity generation is 90% lower by 2040 using 2020 as the baseline.

NZE-aligned emission reduction pathway

Our initial metric selection is physical emissions intensity based (kg of CO₂e per megawatt hour of power generation) and covers direct, scope 1 emissions only. Deutsche Bank's current portfolio intensity is lower than the global sector average supported by our relatively higher financial mix exposure to gas versus coal fired power generation, and marginally higher financial mix exposure to renewables, hydro, and nuclear based power generation. Our NZE scenario convergence path implies a 69% reduction in emissions intensity by 2030 and a 100% reduction by 2040.

Financed technology mix

The key lever for power generation decarbonisation is increased use of renewables. Based on Asset Resolution's physical asset database, our current financed technology share of renewables is 21% with a further 19% in hydro and nuclear. The NZE projects these non-fossil fuel technologies to account for 98% of production by end-2050. We are monitoring our financed technology mix alongside our net zero aligned pathways.

¹³ Average weighted by loan exposure to each subsidiary's share of power generation from power plants located in developing (vs. non-developing) countries in 2020. Data provided by Asset Resolution.

Our coal policy prohibits the financing of new coal-fired power plants and places under review the financing of energy companies



reliant on thermal coal to ensure they have credible diversification plans in place.

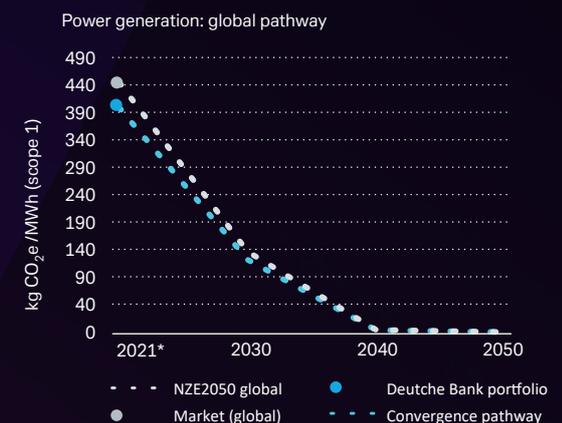


Figure 6: Physical emission intensity decarbonisation pathways, power generation

Source: PACTA, Asset Resolution and IEA NZE

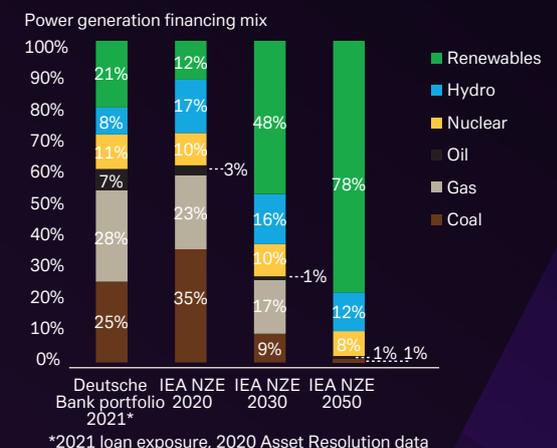


Figure 7: Deutsche Bank power generation technology financed mix vs NZE power generation mix

Source: PACTA, Asset Resolution and IEA NZE



Focus sector deep dive: steel

Background

Steel is one of the most widely used materials across construction, engineering and manufacturing with no obvious substitutes in existence today. The production of steel accounts for an estimated 7%¹⁴ of global CO₂ emissions. Furthermore, steel production is vital for the manufacture of renewable technologies such as wind turbines, solar panels, amongst others.

Achieving 1.5°C alignment will require increased operational efficiencies, electrification of the production chain and implementation of CCUS technology.

7%
of global CO₂ emissions

Steel, metal and mining portfolio:

€4.3 billion

Steel PACTA coverage:

€1.3 billion

14 IEA NZE (2021), scope 1 only, including industrial process emissions. Iron and steel CO₂ emissions (Table A.4, page 199, row 22) divided by total CO₂ emissions (Table A.4, page 199, row 1) in 2020.



Deutsche Bank portfolio in scope

Our steel, metal and mining loan portfolio of €1.3 billion is covered by PACTA and dominated by western European clients with relatively low operational intensities compared to the global average. The full portfolio is in scope of our initial net zero aligned pathway.

Decarbonisation scenario under NZE

The NZE scenario projects annual global steel demand to increase by 12% by 2050 using 2020 as a baseline, a significantly lower rate of growth than in the previous two decades.

Global emissions are reduced via a technological transformation based on a shift from conventional means such as using coal to increased electrification, usage of hydrogen based fuels, increased availability of scrap metal and adoption of CCUS technologies.

After 2030, the bulk of emissions reductions come from the use of technologies that are still under development including the use of CCUS.

NZE-aligned emission reduction pathway

Our initial metric selection is steel production intensity (kg of CO₂e per tonne of steel produced), covering both scope 1 and scope 2.

Deutsche Bank's current portfolio intensity is significantly lower than the global average. Our NZE scenario convergence path¹⁵ implies a 33% reduction in emissions intensity by 2030 and a 90% reduction by 2050.

The Steel Climate-Aligned Finance Working Group, launched in May 2021, is looking to develop a climate-alignment agreement which can enable lenders to align the carbon intensity of their steel portfolios with net zero climate targets.

Key methodological proposals, currently in the consultation process, focus on differentiation between primary and secondary steel production and their respective technologies, and providing separate decarbonisation pathways for each as well as incorporating an alternative steel decarbonisation pathway alongside the NZE leading to a concept of an alignment zone.

We have provided input in formulating the components to the agreement and will incorporate the changes into our net zero pathways methodologies if we agree that they are sound.

Scrap based 'secondary' production requires only around



of the energy of 'primary' steel production.

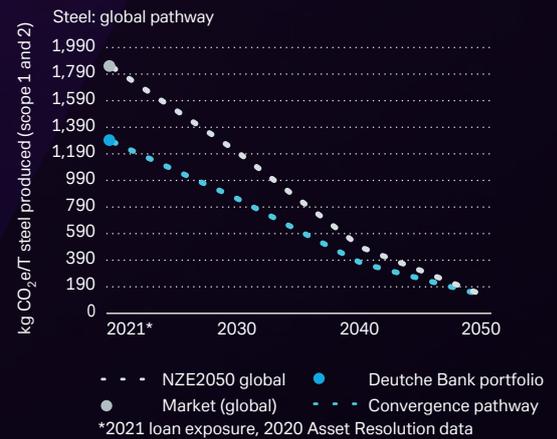


Figure 8: Physical emission intensity decarbonisation pathways for the steel production sector

Source: PACTA, Asset Resolution and IEA NZE

15 More information on the scope 1 and 2 steel IEA NZE pathway can be found in Annex 2.



Focus sector deep dive: automotives

Background

Transportation makes up an estimated 20% of global CO₂ emissions today of which an estimated 50% can be attributable to passenger cars¹⁶.

Achieving 1.5°C alignment will require significant expansion of electric vehicles and retirement of internal combustion engines. The automotive sector will become increasingly reliant on the power generation sector providing sufficient amounts of renewable energy.

8%
of global CO₂ emissions¹⁷

Automotives portfolio:

€7.3 billion

Automotive LDV PACTA coverage:

€3.0 billion

¹⁶ IEA NZE (2021).

¹⁷ IEA NZE (2021), passenger cars CO₂ emissions (Table A.4, page 199, row 27) divided by total CO₂ emissions (Table A.4, page 199, row 1) in 2020.



Deutsche Bank portfolio in scope

Our automotives loan portfolio of €7.3 billion is focused on industry leading car manufacturers and Tier 1 suppliers with smaller exposures to Tier 2 suppliers and aftermarket companies.

The portfolio in scope of our initial net zero aligned pathway is our €3.0 billion loan exposure to automotive manufacturers¹⁸ which have been matched with the physical asset level dataset provided by Asset Resolution.

Decarbonisation scenario under NZE

Electrification plays a key role in decarbonising road vehicles. The number of battery electric, plug-in hybrid and fuel cell electric passenger light duty vehicles (LDV) reaches 350 million in 2030 and almost two billion in 2050 compared to just 11 million in 2020.

Sales of electric LDV will account for 75% of the total in developed markets by 2030 and around 50% of sales in emerging markets. Almost all vehicle sales globally will be battery electric, plug-in hybrid or fuel cell electric by the mid-2030s.

NZE-aligned emission reduction pathway

Our initial metric selection is LDV tailpipe emissions intensity (g of CO₂ per vehicle km), scope 3 emissions.

Deutsche Bank's current portfolio intensity is aligned with the global sector average. Our NZE scenario convergence path implies a 46% reduction in tail pipe emissions by 2030 and a 98% reduction by 2050.

Financed technology mix

The key lever for automotive sector decarbonisation is a rapid transition away from the internal combustion engine (ICE) towards either electric, hybrid or fuel cell powertrains.

Based on Asset Resolution's physical asset database, our current financed share of electric vehicles is 6% with a further 11% in hybrid. The NZE projects electric and fuel cell powered vehicles to account for 98% of the total by end-2050.

We are monitoring our financed technology mix alongside our net zero aligned pathways.

The number of battery electric, plug-in hybrid and fuel cell electric light duty vehicles will reach



in 2030 and almost 2bn in 2050 compared to just 11m in 2020.

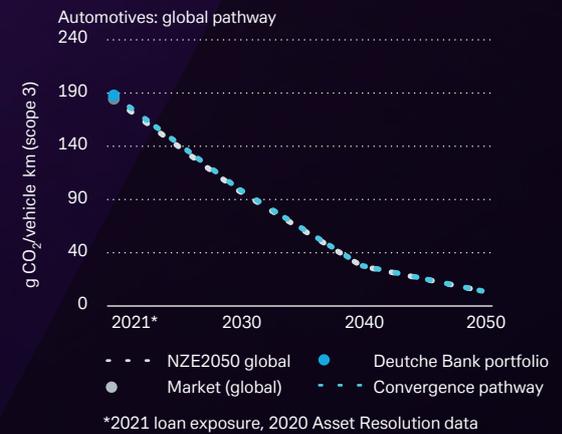


Figure 9: Physical emission intensity decarbonisation pathways for the automotive sector (LDV only)

Source: PACTA, Asset Resolution and IEA NZE

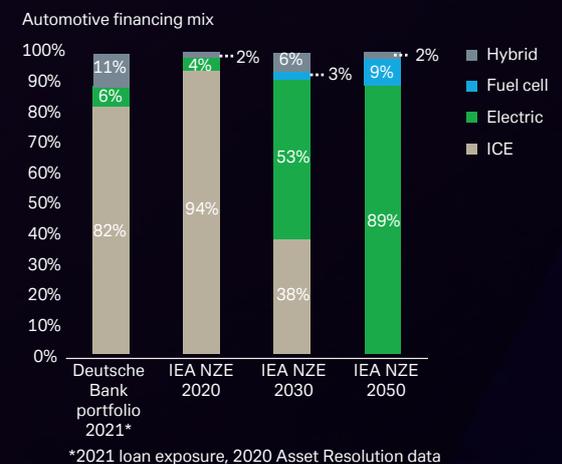


Figure 10: Deutsche Bank automotive financed technology mix vs NZE automotive mix

Source: PACTA, Asset Resolution, and IEA NZE

¹⁸ Light duty vehicles only.



Conclusion

Deutsche Bank is committed to align our activities with net zero GHG emissions.

This paper provides transparency on the absolute size, and key sources of, financed emissions within our corporate loan portfolio, and the data and methodologies that we are applying to estimate financed emissions and develop net zero aligned decarbonisation targets for sectors which are key sources of global GHG emissions.

In alignment with our commitment as a founder member of the NZBA, we will disclose intermediate and long-term emission reduction targets for these and selected other carbon intensive sectors (where data and methodologies allow) in Q4 2022.

Our commitments at a glance



Disclose financed emissions



Set and publish net zero aligned targets



Provide details on client and sectoral transition financing strategies



Work with industry partners to develop methodologies to support disclosure of emissions

Annexes





1: Methodology for calculation of financed emissions

Methodology

We follow the methodologies detailed in the *PCAF (2020) Global GHG Accounting and Reporting Standard for the Financial Industry*. First Edition. Published, November 18, 2020.

Financial portfolio scope

We focus on corporate loans at amortised cost¹⁹ as of year-end 2021. This product definition is consistent with the €467 billion total loan book that we disclosed at end-Q2 in the 2021 Non Financial Report.

Corporate lending was identified according to our internal sectoral classifications ('industry batch codes'). We exclude all lending to financial institutions, public sector, real estate and securitisation.

Loan data was broken down at client level with its respective NACE (Revision 2) code and domicile country made available for later joining with PCAF's emission factor database.

Emission data

We used a combination of client-specific data (where available) and PCAF proxies.

Client level total emissions (CO₂e) and required data to calculate EVIC were source from Refinitiv, where specifically we sourced company disclosed emissions data only.

The PCAF database of CO₂e economic emissions factors (T CO₂e/€ assets) by sector (NACE Rev 2) and country, calculated from data from EXIOBASE and average asset turnover ratios per sector and country from S&P Capital IQ, was utilised for the proxy calculations.

Calculation of client financed emissions

We focussed on scope 1 and 2 of our corporate loan portfolio only. We followed formulas 1 and 2 to calculate financed emissions at client level and aggregated up to portfolio level using formula 3.

Formula 1: Calculation of client's financed emissions using its group's disclosed emissions data and EVIC. Following page 63 of the PCAF (2020) First Edition but substituting client with group's emissions and EVIC plus rearranging the formula such that the EVIC term is under the Carbon Emissions term instead of Outstanding Amount term for ease of comparison with below formula 2. This rule is known as option '1b' (i.e. emissions are unverified) and receives a data quality score of 2 in Table 5-5, page 65, PCAF (2020).

Formula 2: Calculation of financed emissions by client, region, sector. We followed page 122 of the PCAF (2020) First edition, Annex. This rule is option '3b' and receives a data quality score of 5 in Table 5-5, PCAF (2020).

Formula 4: We follow the formula on page 104, PCAF (2020).

¹⁹ Amount for loans before considering impairment allowances.

²⁰ Outstanding amount: the value of the debt that the borrower owes to the lender (i.e. disbursed debt minus any repayments). (PCAF Standard, Chapter 5.2).

Formula 1: client specific data

$$\text{Client Financed Emissions} = \text{Outstanding Amount}_i^{20} \times \frac{\text{Carbon Emissions}_j}{\text{EVIC}_j}$$

i = counterparty level client
j = counterparty level client's group

Formula 2: PCAF proxies

$$\text{Client Financed Emissions} = \text{Outstanding Amount}_i \times \frac{\text{Carbon Emissions}_{i,c,s}}{\text{Assets}_{i,c,s}}$$

i = counterparty level client
c = country
s = sector

Formula 3: Calculation of Financed Emissions at Portfolio level

$$\text{Portfolio Financed Emissions} = \sum_{i=1}^n \text{Financed Emissions}_i$$

i = counterparty level client

Formula 4: Calculation of weighted average data quality scores

$$\text{Portfolio Data Quality Score} = \frac{\sum_{i=1}^n \text{Outstanding Amount}_i \times \text{Data Quality Score}_i}{\sum_{i=1}^n \text{Outstanding Amount}_i}$$

i = counterparty level client



Data clean up

Holding companies in our systems are assigned with the NACE (Revision 2) code of 64.2. This code is replaced with codes which are more closely aligned with the primary economic activities of the holding companies using our internal sectoral classifications ('industry batch codes').

In some cases, material loan positions in certain carbon intensive sectors were assigned with NACE (Revision 2) codes which would lead to low emission factors such as 64.91 ('Financial Leasing'), 84.13 ('Regulation of and contribution to more efficient operation of businesses'), 82.99 ('Other business support service activities n.e.c.'), 64.99 ('Other financial service activities, except insurance and pending funding n.e.c.'), and 66.19 ('Other activities auxiliary to financial services, except insurance and pension funding'). Following the precautionary principle, we re-assigned these clients' NACE code to be more closely aligned with the primary economic activity of the client.

In minor cases where a client loan was unable to map directly to a PCAF proxy emission factor, two more fallback approaches were used where the loan could be mapped to (in order of seniority): (i) an emission factor of its 'industry batch code' defined as being the loan weighted average emission factor calculated from PCAF proxy based financed emissions of clients in the same industry batch code and country; or (ii) if unsuccessful, adopting a simple arithmetic mean of PCAF proxy emission factors for either the NACE code or country only as the last resort. The end result was that each client loan had an emission factor assigned ensuring full portfolio coverage.

Aviation loans within a book in the investment banking portfolio were removed as the PCAF methodology (first edition) can not be applied to securitised vehicles which led to an overall reduction of loan exposure of €1.6 billion at the corporate loan portfolio.

Calculation of EVIC

Data was sourced from Refinitiv. Following the precautionary approach, we excluded minority interests from the calculation of EVIC calculations, as allowed by the PCAF Standard, page 62, footnote 85.

NACE Code (Revision 2): 35.11 (level 4), Electric power generation, transmission and distribution

The PCAF database of emission factors does not have a further granularity breakdown of NACE (Rev 2) code 35.11, the production of electricity, into renewables (e.g. solar, wind, hydro, nuclear) which are expected to have relatively low emission factors (compared with thermal/fossil fuels). Therefore, a proxy emission factor was calculated from a basket of power generating companies known to have the majority of their power capacity from solar, wind, hydro, and nuclear sources. Data was collected from Refinitiv and further cross-checked with data from Asset Resolution.

Data challenges

Due to current data and methodological limitations, sectors such as real estate, the public sector, as well as securitised vehicles have been excluded from this paper. However, financial institutions are working within various PCAF working groups helping to pilot emerging methodologies and datasets. Once these methodologies are established, we will disclose further sectors accordingly.



2: Methodology for net zero aligned pathways

Methodology

Calculation of Deutsche Bank's sector level physical emission factors and financed technology mixes follows the PACTA for Banks Methodology, 8 July 2021, version 1.2.0. This methodology was implemented in an open source R package named 'r2dii', version 0.1.12, downloadable from CRAN (last checked: 1 October 2021).

Financial portfolio scope

We focus on corporate loans at amortised cost as of year-end 2021. Corporate lending was identified according to our internal sectoral classifications ('industry batch codes').

We focus on four identified carbon intensive sectors: oil and gas, utilities, steel and automotives.

Loan data was broken down at client level and matched on a company name basis (i.e. via LEI code matching or matching via fuzzy logic) with a physical asset level dataset provided by Asset Resolution.

Physical asset database

The physical asset level database curated by Asset Resolution covers eight²¹ carbon intensive sectors and focuses on real physical assets (e.g. power generation plants) and their respective technologies used, expected production volumes, and emission intensity factors which is then later mapped to a financial ownership structure. For the purposes of this paper, four carbon intensive sectors were identified — power generation, oil and gas, steel and automotives (LDVs) — and with their respective value chain segments in focus found in figure 11.

Furthermore, we have decided to use the year 2020 dataset in terms of company production volumes and emission factors to calculate Deutsche Bank's portfolio level metrics. The reasons are twofold: (i) the 2020 dataset consists of actual values only as opposed to a mixture of actuals and forecasted values if we were to use the 2021 dataset, and (ii) more consistent with our financed emission calculations which uses 2020 year-end company carbon emission disclosures. Note that for loan exposures, year-end 2021 values are always used.

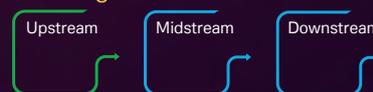
Why we chose the IEA for sectoral net zero pathways

Given the limited scope of decarbonisation scenarios available²², after careful consideration we have chosen the IEA NZE decarbonisation scenario which is consistent with the NZBA commitment of using credible, well recognised sources, with no/low overshoot, conservative reliance on negative emission technologies, and where possible minimising misalignment with other sustainable development goals (SDGs).

²¹ Power generation, oil and gas, coal, steel, cement, automotives, aviation, and shipping.

²² Others decarbonisation scenarios include Institute of Sustainable Futures, Sectoral Pathways to Net Zero Emission (2020), and NFGS Net Zero 2050 (1.5°C) (updated June 2021).

Oil and gas



Power



Automotive (LDV)



Steel

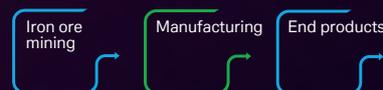


Figure 11: Segments in production value chain covered by PACTA methodology (highlighted in green)

Source: PACTA for Banks Methodology document (2021)



The IEA NZE²³

- Has a 50% chance of limiting the average global temperature rise to 1.5°C.
- Is an extension of the Sustainable Development Scenario and achieves universal energy access²⁴ by 2030 (a goal not systematically included in IPCC scenarios).
- Has no overall increase in cropland use for bioenergy production and no bioenergy crops are developed on forested land.²⁵
- Achieves net zero for the energy and industrial process sectors that only 18 scenarios achieve out of a total of 90 which were identified by the IPCC that were consistent with a 1.5°C outcome.
- Relies upon the lowest use of energy related carbon dioxide removal (CDR) (1.9 Gt by 2050) and second lowest use of CCUS (7.6 Gt by 2050) when compared with the previously mentioned 18 scenarios.

Further rationale was the desire to leverage IEA's proven experience in energy modelling which covers our first two identified carbon intensive sectors — oil and gas and power generation — while for the rest of the sectors — steel and automotives — IEA NZE decarbonisation pathways were also chosen in order to maintain overall model coherence which would not be possible if we had chosen an automotive or steel sector decarbonisation pathway from a different scenario provider which would have different modelling assumptions.

Calculation of emission intensity factors

A client's overall emission factor is the weighted average of its emission factor by 'technology' used and by its respective volume of 'production unit' for a given year. For example, in the case of automotives each powertrain's (tailpipe) emission factor (internal combustion engine, hybrid, or electric) is weighted by the number of vehicles produced for each powertrain for a given year.

In the case of the 'Market (Global)', this is similar in construction to the client's overall emission intensity factor whereby the Market (Global) is the production weighted average of all the subsidiaries and their assets by technologies which were present in the physical asset database.

In the case of a portfolio's overall emission factor, this is the weighted average loans at amortised cost exposure to each client's overall emission factor (which was in turn a production weighted average of emission factors across the technologies the client used).

Calculation of emission intensity NZE pathways

The PACTA emission intensity approach inherits from SBTi's Sectoral Decarbonisation Approach (SDA) but makes two modifications to ensure methodological soundness given the bottom up type of approach required when using the granular physical asset level dataset from Asset Resolution.

²³ <https://www.iea.org/commentaries/a-closer-look-at-the-modelling-behind-our-global-roadmap-to-net-zero-emissions-by-2050>.

²⁴ Closer alignment with UN SDG number 7: Ensure access to clean affordable, reliable, sustainable and modern energy for all. <https://sdgs.un.org/goals/goal7>.

²⁵ Closer alignment with UN SDG number 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forest, combat desertification, and halt and reverse land degradation and halt biodiversity loss. <https://sdgs.un.org/goals/goal15>.



Firstly, that the market share of the client remains the same from baseline year to year 2050, which prevents the situation whereby if a client reduces its sector market share over time it can counter-intuitively increase its emission intensity; and secondly when a sectoral emission intensity pathway is provided by an external scenario provider (say, IEA NZE), adjustments to the start and end points of the said provider's sector emission intensity pathway is required in order to be consistent with (starting) assets present in the physical asset database collected and curated by Asset Resolution at the time.

More details are on page 53 of PACTA for Bank Methodology (v1.2.0).

Calculation of client, sector and portfolio technology mixes

A client's (absolute) technology mix is a percentage breakdown of its production volume (e.g. GJ, MWh, T of steel, automotives produced) according to technology used for a given year. For example, if client A produced two automotives in a year, one with an electric powertrain and another with an internal combustion engine (ICE) powertrain, then client A's technology mix would be 50% electric and 50% internal combustion engine.

When calculating the market (global) technology mix, the approach is the same as calculating an individual client's technology mix in that it is the summation of all production volumes of all clients present in the physical asset dataset with their respective technologies used for a given year.

However, the portfolio's financed technology mix is the weighted average of loans at amortised cost exposure to each client's technology mix. Crucially, this financed technology mix should be interpreted as the financial exposure (or transition risk) to a particular technology. For example, if an automotive portfolio had a €99 loan exposure to client A with a technology mix of 50% electric, 50% internal combustion, and a €1 loan exposure to client B with a 100% electric mix, then the portfolio's financed technology mix would be:

— Electric: $(€99/€100 * 50\%) + (€1/€100 * 100\%) = 50.5\%$

— ICE: $(€99/€100 * 50\%) + (€1/€100 * 0\%) = 49.5\%$

More details can be found on page 44–46 of the PACTA for Banks Methodology (v1.2.0).

Power generation sector: conversion of installed power capacity to power generation

Installed power capacity client data (MW) in our physical asset level dataset was converted to power generation (MWh) by applying global capacity factors²⁶ used in the IEA NZE scenario and following the conversion formula:

$$\text{Power Generation}_{\text{tech},2020} = \text{Capacity Factor}_{\text{tech},2020} \times \text{Installed Power Capacity}_{\text{tech},2020} \times 8760$$

tech = technology, 8760 = hours per year

This top-down adjustment was required to improve portfolio results by accounting for the intermittent nature of renewables such as solar PV and wind which have low capacity factors as opposed to nuclear which has a higher capacity factor.

²⁶ We used the total generation and total capacity sub-tables within Table A.3, page 198 to calculate the global capacity factors for renewables, hydro, nuclear, oil, coal, and gas.



Oil and gas sector: accounting for CO₂ vs CO₂ equivalent and breakdown of scope 1 and 2 vs scope 3

In the IEA NZE dataset, a CO₂ emissions table can be found²⁷, but in order to build an oil and gas decarbonisation pathway for physical emission intensity (T CO₂e/GJ), a CO₂ equivalent is required as oil and gas operations release significant amounts of methane in the extraction process.

We used the methane data provided on pages 54 and 104 of the May edition of the NZ IEA, and built up a CO₂e decarbonisation pathway for oil and gas upstream. For end-use, we assume no methane release as it's converted into CO₂ molecules when fully combusted.

We use the below constants used both in the IEA NZE²⁸ and Katowice paper²⁹ and apply them top-down from the portfolio level to get an approximate breakdown of operational (scope 1 and 2) versus end-use (scope 3) physical emission intensities (T CO₂e/GJ):

- Oil/gas operational emission: 100kg CO₂e per BOE³⁰
- Oil end-use: 410 kg CO₂e per BOE
- Gas end-use: 310 kg CO₂e per BOE

Steel: scope 2

The IEA NZE CO₂ emissions for iron and steel (Table A.4, page 199, row 22) which includes industrial process emissions is only scope 1. To account for scope 2, we took the electricity demand (EJ) from the IEA's iron and steel final energy demand and energy intensity NZE analysis³¹ which was then cross referenced with the energy demand for iron and steel in the IEA NZE's energy demand table (Table A.2, page 196, row 33). We finally converted the electricity demand into CO₂ emissions using the CO₂ intensity of electricity generation (Table A.5, page 200, row 7).

Assessing our transition risk and portfolio alignment methodologies: our journey so far

Portfolio alignment methodologies today are still evolving of which some are of varying degrees of sophistication³² and varying degrees of industry consensus and adoption³³.

While we have chosen at this stage to apply the PACTA methodology on our identified carbon intensive sectors of our corporate portfolio, we appreciate that portfolio alignment is constantly evolving as data coverage and quality improves, methodologies advance, and working groups of banking and industry participants propose and refine their ideas and standards: we will explore initiatives which help broaden banking and industry consensus on net zero pathways, help reporting comparability across peers, build pathway alignment incentive structures which prevents unintended negative consequences, and minimise misalignment with the UN's sustainable development goals.

27 IEA NZE May edition, Annex A, page 199, Table A.4: CO₂ emissions.

28 IEA NZE May edition, page 104, GHG intensity of oil production today is just under 100 kg CO₂e per barrel.

29 Credit Portfolio Alignment: An application of the PACTA methodology by Katowice Banks in partnership with 2DII.

30 Divide by 6.12 to get kg CO₂e/GJ.

31 <https://www.iea.org/data-and-statistics/charts/iron-and-steel-final-energy-demand-and-energy-intensity-in-the-net-zero-scenario-2018-2030> (last updated: 3 Nov 2021)

32 Measuring Portfolio Alignment: Assessing the position of companies and portfolio on the path to net zero. Q4 2021.

33 Chapter 4 and 5, *A Practitioner's Guide for Banks: Consideration for banks setting a net zero strategy*, October 2021.



We have found by applying the PACTA methodology, using the physical asset dataset provided by Asset Resolution, has framed transition risk in a particularly tangible way: quantifying what transition risks our carbon intensive sectors face today as well as those which will materialise in decades to come according to the NZE decarbonisation scenario (and technology roadmaps) of the IEA.

Furthermore, we have discovered the process of understanding how our financial portfolio (with its financial indicators, e.g. euro loan) translates into the physical realm with real physical units (e.g. T CO₂e/y, MWh by technology) particularly helpful. By working with physical units, we are in control of the 'translation' process, understanding how model assumptions and technological pathways outlined in IEA's NZE sectoral decarbonisation pathways and sectoral technological roadmaps have a bearing on our company's physical emission profiles and ultimately our sector's profile³⁴ which is important as the fundamental drivers of GHG emissions are essentially the emissions of real industrial assets.

To elaborate, if a portfolio steering methodology should focus on absolute emissions only and not make explicit the technology decarbonisation road map available for the sector, this could lead to the unintended outcome whereby a company would be mistakenly incentivised to make only incremental operational efficiency improvements when the actual desired outcome is for the company to make immediate plans to make the necessary capital expenditures to leapfrog towards the newer technologies in order to achieve net zero by 2050.

We appreciate that working with physical units and physical assets means we are narrowed to certain segments of the sector's value chain (e.g. automotives manufacturing — powertrain type). But consistent with the view of the importance of having a clear line of sight on the physical emission profiles and decarbonisation levers of a particular sector, we do not find it a major disadvantage as long we focus on segments on the production value chain which is responsible for the majority of GHG emissions, and suppose that upstream and downstream segments will in time adjust accordingly.

We will continue to assess new methodologies and reassess best existing ones as and when data coverage and quality improves. We continue to work with our peers to further refine portfolio alignment methodologies.

³⁴ Which is aggregated by weighting loan exposure.



Glossary



2° Investing Initiative (2DII)

An independent, non-profit thinktank working to align financial markets and regulations with the Paris Agreement goals.

Carbon capture, utilisation and storage (CCUS)

An emissions reduction technology that involves the capture of carbon dioxide (CO₂) from fuel combustion or industrial processes and its use to create valuable products or its permanent storage deep underground in geological formations.

Carbon dioxide removal (CDR)

A process that involves removal of carbon dioxide gas (CO₂) from the atmosphere and its sequestration for long periods of time.

CO₂-equivalent (CO₂e)

A metric measure used to compare the emissions from various greenhouse gases by converting amounts of other gases to the equivalent amount of carbon dioxide.

Enterprise value including cash (EVIC)

The sum of the market capitalisation of ordinary shares at fiscal year-end, the market capitalisation of preferred shares as fiscal year-end, and the book values of total debt and minority interests. No deductions of cash or cash equivalents are made to avoid the possibility of negative enterprise values.

Economic emissions intensity

This is absolute emissions divided by the loan and investment volume expressed as e.g. t CO₂e/€m invested — the PCAF standard, page 102.

EXIOBASE

A global, detailed multi-regional environmentally extended supply-use table and input-output table.

Financed emissions

Greenhouse gas emissions that occur as a result of financing, including lending and investment activity. These activities fall within scope 3, category 15 of the GHG protocol.

Greenhouse gases (GHG)

GHGs are atmospheric gases that absorb and emit radiation within the thermal infrared range and that contribute to global climate change. The seven gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).

Greenhouse Gas (GHG) Protocol

Comprehensive global standardised frameworks to measure and manage GHG emissions from private and public sector operations, value chains, and mitigation actions. The GHG Protocol supplies the world's most widely used GHG accounting standards.

Intergovernmental Panel on Climate Change (IPCC)

An organisation of governments that are members of the United Nations or WMO. The objective of the IPCC is to provide governments at all levels with scientific information that they can use to develop climate policies.

International Energy Agency (IEA)

An intergovernmental organisation that examines the full spectrum issues related to energy and recommends policies to enhance the reliability, affordability and sustainability of energy.

NACE (Revision 2)

An industry standard classification system used in the European Union to classify economic activities. The current version is 2 which was implemented in 2008.

Network of Central Banks and Supervisors for Greening the Financial System (NFGS)

A body formed to help strengthening the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilise capital for green and low-carbon investments.

Net Zero Banking Alliance (NZBA)

The industry-led, UN-convened initiative of global banks committed to aligning their lending and investment portfolios with net-zero emissions by 2050.

Net zero emissions

A state achieved when the carbon emissions are balanced by its removal, or when anthropogenic emissions are reduced to zero.

Paris Agreement

The 2015 Paris Agreement is a legally binding international treaty on climate change aimed to hold the increase in the global average temperature to 'well below' 2°C above pre-industrial levels.



Paris Agreement Capital Transition Assessment (PACTA)

A free, open-source climate scenario analysis toolkit developed by 2° Investing Initiative with backing from UN Principles for Responsible Investment. PACTA enables users to measure the alignment of their corporate lending portfolios with climate scenarios across key climate-relevant sectors and technologies.

Partnership for Carbon Accounting Financials (PCAF)

Global partnership of financial institutions that work together to develop and implement a harmonised approach to assess and disclose the greenhouse gas emissions associated with their loans and investments.

Science-Based Targets Initiative (SBTi)

A partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). The SBTi independently assesses and approves companies' Paris Alignment targets in line with its strict criteria, defines and promotes best practice in science-based target setting.

Scope 1, 2 and 3 emissions

Scope 1 covers direct GHG emissions from owned or controlled sources. Scope 2 covers indirect GHG emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 are the remaining emissions that occur in the value chain of the reporting company which are not captured in scope 1 nor 2.

United Nations Environment Programme Finance Initiative (UNEP FI)

A partnership between the UN Environment Programme and the global financial sector aimed to identify, promote, and realise the adoption of best environmental and sustainability practice at all levels of financial institution operations.

Disclaimer

The image features a low-angle, upward-looking perspective of a modern glass skyscraper. The building's facade is composed of a grid of dark window frames, creating a strong geometric pattern. The glass reflects a vibrant green forest scene, with sunlight filtering through the trees, creating a bright, ethereal atmosphere. The overall color palette is dominated by various shades of green, from deep forest greens to bright, almost white highlights where the sun hits the glass. The word "Disclaimer" is written in a clean, white, sans-serif font in the upper left quadrant of the image.



The transition to a sustainable economy is a long-term undertaking. In its current stage, we are confronted with the limited availability of climate related data. It is inevitable to use estimates and models until improved data will become available. Our expectations on the increase of data quality are based on reporting obligations as currently developed. New regulations on reporting will likely become effective in the coming years. This report is not based on the calculation methodology provided in the draft regulatory technical standards of the Sustainable Finance Disclosure Regulation (SFDR) as it is not applicable to this report. Harmonised standards and calculation methods are expected to be developed and will also improve data quality.

This report includes metrics that are subject to measurement uncertainties resulting from limitations inherent in the underlying data and methods used for determining such metrics. The selection of different but acceptable measurement techniques can result in materially different measurements. The precision of different measurement techniques may also vary. The information set forth herein is expressed as of end of December 2021 and we reserve the right to update its measurement techniques and methodologies in the future.

We have measured the carbon footprint of our corporate loan portfolio in accordance with the standards we discuss in this report. In doing so we used in part information from third-party sources that we believe to be reliable, but which has not been independently verified by us, and we do not represent that the information is accurate or complete. The inclusion of information contained in this report should not be construed as a characterisation regarding the materiality or financial impact of that information.

If emissions have not been publicly disclosed, these emissions may be estimated according to the Partnership for Carbon Accounting Financials (PCAF) standards. For borrowers whose emissions have not been publicly disclosed, we estimate their emissions according to the PCAF emission factor database. Since there is no unified source of carbon emission factors (including sustainability-related database companies, consulting companies, international organisations, and local government agencies), the results of estimations may be inconsistent and uncertain.

Past performance and simulations of past performance are not a reliable indicator and therefore do not predict future results.

This report contains forward-looking statements. Forward-looking statements are statements that are not historical facts; they include statements about our beliefs and expectations and the assumptions underlying them. These statements are based on plans, estimates and projections as they are currently available to the management of Deutsche Bank Aktiengesellschaft. Forward-looking statements therefore speak only as of the date they are made, and we undertake no obligation to update publicly any of them in light of new information or future events. By their very nature, forward-looking statements involve risks and uncertainties. A number of important factors could therefore cause actual results to differ materially from those contained in any forward-looking statement. Such factors include the conditions in the financial markets in Germany, in Europe, in the United States and elsewhere from which we derive a substantial portion of our revenues and in which we hold a substantial portion of our assets, the development of asset prices and market volatility, potential defaults of borrowers or trading counterparties, the implementation of our strategic initiatives, the reliability of our risk management policies, procedures and methods, and other risks referenced in our filings with the U.S. Securities and Exchange Commission. Such factors are described in detail in our most recent SEC Form 20-F under the heading "Risk Factors". Copies of this document are readily available upon request or can be downloaded from our website (www.db.com/ir).

