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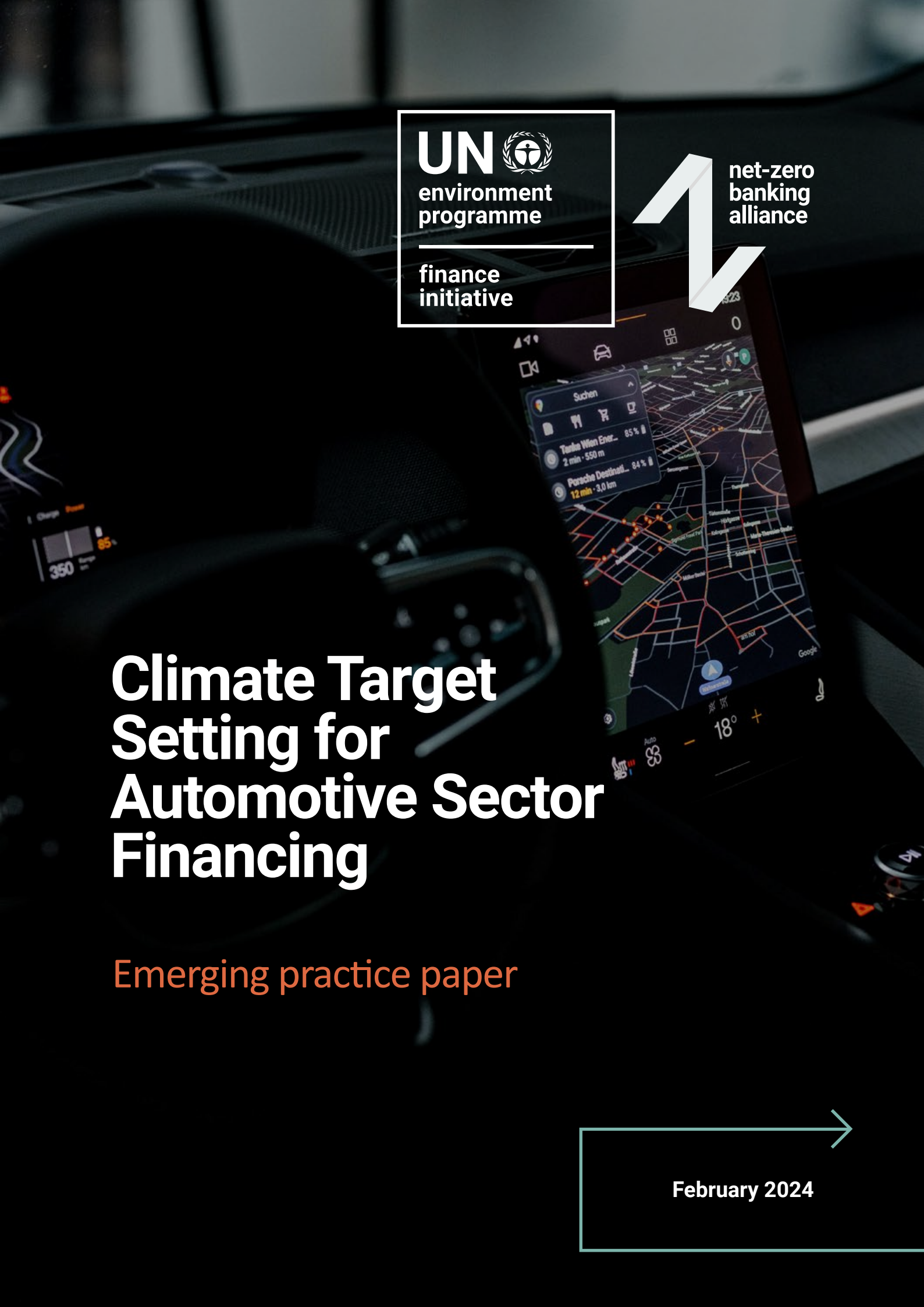

Climate Target Setting for Automotive Sector Financing

Emerging practice paper

February 2024

Disclaimer

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Purpose of this publication

This sector-specific analysis for the automotive sector is part of a series developed by members of the Net-Zero Banking Alliance (NZBA) with the purpose of outlining the choices banks make when setting climate-related targets in particular sectors of the real economy. This series identifies emerging practices and approaches to establishing emissions targets for bank financing, while also identifying prevailing trends, common challenges and policy, data, and other gaps.

The overarching goal of this analysis is to assist NZBA members in formulating or refining their own targets towards net-zero emissions going forward. It does not impose any new requirements on NZBA member banks over and above the ones they chose to commit to when becoming a signatory and is not prescriptive in terms of specifying when and how they are expected to decarbonise their sector-specific lending and investment portfolios. Due to the fast-paced environment characterised by rapidly evolving scenarios, pathways, scientific advancements, and developments in the real economy, this publication should be regarded as a review of current practices.

This sector-specific publication will focus on providing the baseline information banks can use when actively steering their portfolio towards emission reductions in the automotive sector. This paper focuses on decarbonisation and does not consider other important environmental and social issues.

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About the Net-Zero Banking Alliance

The industry-led, UN-convened Net-Zero Banking Alliance (NZBA) brings together a global group of banks, currently representing over 40% of global banking assets, which are committed to aligning their lending and investment portfolios with net-zero emissions by 2050.

Combining near-term action with accountability, this ambitious commitment sees signatory banks setting intermediate targets for 2030 or sooner using robust, science-based guidelines.

NZBA is the flagship climate initiative under the Principles for Responsible Banking to accelerate science-based climate target setting and develop common practice. As the banking alliance within the global efforts on net zero across the finance industry brought together under GFANZ, the NZBA is open to all banks globally, including banks that are not UNEP FI members and Principles for Responsible Banking signatories.

The Alliance reinforces, accelerates, and supports the implementation of decarbonisation strategies, providing an internationally coherent framework and guidelines in which to operate, supported by peer-learning from pioneering banks. It recognises the vital role of banks in supporting the global transition of the real economy to net-zero emissions.

The Alliance is convened by the UN Environment Programme Finance Initiative and is a part of the Race to Zero.

Learn more here: unepfi.org/net-zero-banking/

Abbreviations and acronyms

BEV(s)	Battery electric vehicle(s)
CNG	Compressed natural gas
EV(s)	Electric vehicle(s)
EU	The European Union
FCEV(s)	Fuel cell electric vehicle(s)
GHG	Greenhouse gases
HDV(s)	High duty vehicle(s)
HEV(s)	Hybrid electric vehicle(s)
ICE	Internal combustion engine
ICEV(s)	Internal combustion engine vehicle(s)
IEA	International Energy Agency
IEA B2DS	International Energy Agency Beyond 2° Scenario
IEA NZE	International Energy Agency Net Zero Emissions by 2050 Scenario
ISSB	International Sustainability Standards Board
LPG	Liquefied petroleum gas
NGFS	Network for Greening the Financial System
NZBA	Net-Zero Banking Alliance
OEM(s)	Original equipment manufacturer(s)
PCAF	Partnership for Carbon Accounting Financials
PHEV(s)	Plug-in hybrid electric vehicle(s)
SBTI	Science Based Targets initiative
SUV	Sport Utility Vehicle
WACI	Weighted average carbon intensity
WEO	World Energy Outlook
WLTP	Worldwide Harmonised Light Vehicle Test Procedure

Contents

Purpose of this publication ..... **iii**

Abbreviations and acronyms ..... **vi**

Summary ..... **viii**

1. Introduction **1**
1.1 Methodological approach taken by this paper 1

2. Understanding the automotive sector **3**
2.1 Greenhouse gas emissions of the transport sector 3
2.2 Strategic options for the decarbonisation of the automotive sector 4

3. Design choices for scoping the sector **5**
3.1 Scoping the automotive sector: value chain and vehicle types 6
3.2 Financial products 12
3.3 Identifying emission boundaries against a vehicle's lifecycle 17
3.4 Understanding emissions from production phase 18
3.5 Emissions from a manufacturer's perspective 23

4. Design choices for scenarios and benchmarking **27**
4.1 Interpreting net-zero-aligned pathways for the automotive sector 27
4.2 Target-setting metrics 30
4.3 Attribution and aggregation approaches 34
4.4 Benchmarking approaches 35
4.5 Data 37

Conclusion **41**
Call-to-action for policymakers 42

Bibliography **43**

Annex A: Definitions and terminology **45**

Endnotes **46**

Summary

The table below summarises the key design choices financial professionals face when setting net-zero financing targets for the automotive sector.

Design choices	Elements	Automotive Sector
Sector scoping	Financial products	Banks can set targets across their loan books as well as capital market products. Common financial products that are considered by banks include general corporate finance, captive finance (to manufacturers), loans to other finance arms, as well as direct vehicle loans (to end customers). Methodologies for setting targets on loan books are most advanced.
	Value chain stakeholders	Banks can set one or more targets for any of the value chain stakeholders, namely suppliers, vehicle manufacturers/original equipment manufacturers[1] (OEMs), distribution and sales, as well as end customers (see Annex A for more detailed definitions). This paper focuses on setting targets for financing of vehicle manufacturers. Methodologies covering direct vehicle loans are available from third parties, such as the Partnership for Carbon Accounting Financials (PCAF).
	Emissions	Emissions coverage can include operational emissions of vehicle manufacturers and component manufacturers (Scope 1 and 2), as well as tailpipe emissions (Scope 3) of the vehicle.
Target-setting metrics and data	Metric types	NZBA Guidelines direct banks to set financed emissions targets using absolute emissions metrics (e.g. annual tCO_2e) and/or emissions intensity metrics based on an activity (e.g. annual kg of CO_2 per vehicle km travelled (/v(k)m)).
	Attribution approach	Two broad attribution approaches are available to banks: the balance sheet approach and the portfolio weight approach.
	Data sources	Banks have several data sources available, including client reports, Asset Impact, Auto Forecast Solutions, European Environment Agency, World Bank Benchmarking Alliance, JATO volumes, S&P Global Mobility, Transition Pathway Tool (TPI), Trucost Environmental ESG Data Pack, PCAF Database, and Wards Intelligence.

Design choices	Elements	Automotive Sector
Pathways	Scenario choice	NZBA Guidelines direct member banks to use widely accepted, science-based decarbonisation scenarios to guide members when setting individual long-term and intermediate targets that are aligned with the temperature goals of the Paris Agreement. In addition, per the Guidelines, "scenarios selected shall be "no overshoot" or "low-overshoot" scenarios," and should have a >50% probability of limiting global warming to 1.5°C by the end of the century. Scenarios discussed in this paper are IEA Net Zero Emissions by 2050 Scenario (IEA NZE 2050) and the Network for Greening the Financial System (NGFS) Net Zero scenario. However, other 1.5°C scenarios and pathways exist (e.g. One Earth Climate Model) or are being developed at the time of publication (e.g. SBTi).
	Benchmark pathway	Three approaches are available to design the benchmark pathway:[2] ▪ **Convergence approach:** implies that all counterparties converge to net-zero-aligned industry-average emissions intensity levels. ▪ **Contraction approach or rate-of-reduction:** implies that all counterparties reduce emissions at the same net-zero-aligned, industry-average rate, irrespective of their current and past performance. ▪ **Fair share approach:** defines the average rate of reduction in absolute emissions for an industry but recognises that individual counterparties may be better- or worse-performing than average.

1. Introduction

1.1 Methodological approach taken by this paper

In this document, the Net-Zero Banking Alliance (NZBA) examines science-based approaches employed by banks to establish and measure their progress in developing individual net-zero targets for their transportation portfolios.

The publication was developed by an NZBA working group comprising 17 NZBA member banks who have already set, or are currently developing, their net-zero targets for the automotive and/or trucking sector. The working group's analysis is structured around six building blocks, as depicted in Figure 1, which form the basis of this document.

Banks setting net-zero targets for the automotive sector will make critical design choices to appropriately scope their approach, including:

- Financial products in scope: Understanding the different financial products that can be in scope for banks.
- Value chain scope: Identifying and engaging relevant stakeholders throughout the automotive value chain to promote emissions reduction efforts.
- Vehicle type considerations: Recognising the influence of different vehicle types on target setting due to their distinct emissions profiles, lifespan, and potential for decarbonisation.
- Greenhouse gas emissions and scopes: Identifying the diverse sources of emissions within the automotive industry.
- Assessing 1.5°C pathways: Banks gain insights into strengths and gaps of prominent pathways that guide the automotive sector's alignment with the 1.5°C target.
- Establishing metrics and methods: Banks select metrics and methodologies to measure progress and individually set ambitious targets in line with global climate objectives.
- Accessing relevant data sources: Banks utilise sector-specific and regional data sources to inform target setting and decision making.

Figure 1: The six building blocks considered by banks through the target-setting process

Recognising the significant regional variations in regulations, reporting requirements, data availability, and the maturity of zero-emission vehicle markets and associated infrastructure, this publication aims to provide a nuanced understanding of the multiple factors influencing a bank's assumptions underlying a bank's net-zero targets.

The following information provided is not exhaustive, and banks must navigate data limitations both at the collateral and scenario levels, necessitating reliance on the availability of national data and regional scenarios. NZBA recognises that approaches to target setting in various sectors are evolving and will continue to do so, highlighting the dynamic nature of this field. As such, this document represents a point-in-time assessment.

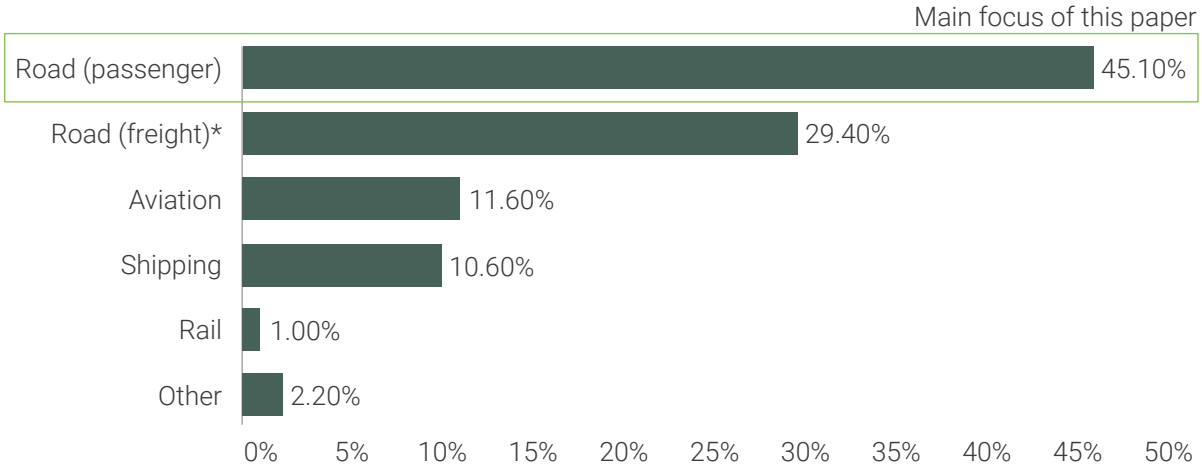
While the publication focuses on decarbonisation and does not include other environmental, social, or governmental aspects, banks need to consider the conduct implications and clients' ongoing access to financing when steering their portfolios. Adhering to these principles will also help avoid the creation of stranded assets by adapting to changes, such as shifts in regulatory or environmental policies, as well as avoiding investments in assets that later are less likely to become non-viable or obsolete.

Importantly, the paper is designed to complement the *NZBA's Guidelines for Climate Target Setting for Banks* (the Guidelines) and does not prescribe any specific methodologies for banks to adopt. It is essential, however, any action taken based on information in this publication to fulfil a bank's NZBA Commitment should adhere to all provisions of the Guidelines. Moreover, national laws and regulations should take precedent.

2. Understanding the automotive sector

2.1 Greenhouse gas emissions of the transport sector

As global greenhouse gas (GHG) emissions continue to rise, urgent action is required to address climate change and its wide-ranging consequences. Within the spectrum of sectors contributing to these emissions, the transport sector emerges as significant. Annually, it adds 8.7 Gt CO_2e emissions, accounting for 23% of global energy-related emissions.[3] Of these emissions, a significant portion (about 70%) stems from road vehicles responsible for both passenger and freight transport.



*Road (freight) is only partially covered by this paper.

Figure 2: Global CO_2 emissions from transportation [Source: "Our World in Data" (2020)]

Projections indicate a varied landscape for the global vehicle fleet. While OECD countries are expected to witness fleet volumes reaching a plateau, non-OECD countries are poised to experience significant growth, with the addition of over one billion vehicles, predominantly featuring conventional internal combustion engines.

Between now and 2030, an annual reduction of approximately 5 Gt CO_2e is needed, totalling around 25–30 Gt CO_2e over that period, across all economic sectors.[4] Looking ahead to 2050, an ambitious target of an 80% overall reduction in transportation-related emissions must be pursued to remain within 1.5°C warming.[5]

2.2 Strategic options for the decarbonisation of the automotive sector

Decarbonising the automotive sector requires exploration of multiple potential decarbonisation pathways, with the acknowledgement that these pathways are not just primarily dependent on financing but also require action from governments, industry players and customers. Banks are encouraged to set ambitious and forward-thinking targets for their financial activities, and engagement from all relevant stakeholders is crucial. The sector will need to transition towards electrifying mobility and reconsider the continued and widespread utilisation of cars as a primary means of transportation.[6] Consequently, manufacturers must carefully reconsider their business models and promotional strategies surrounding vehicle usage, facilitating the necessary shift towards a more sustainable transportation paradigm.

Overall, the transition of the sector calls for necessary achievements, ranging from the near-term to the extended long-term, namely:

1. Improving efficiency of vehicles produced;
2. Transitioning from carbon-intensive modes of transport to less carbon-intensive transportation ranging from increasing the utilisation rate of vehicles (measured as people per vehicle per kilometre) to implementing solutions better suited for urban, peri-urban, and rural environments. This can include but is not limited to: bicycles and expanding bicycle lanes, reducing speed limits, and developing infrastructure support for zero-emission vehicles[7] etc.;
3. Maximising the electrification rate of the transport sector—i.e. the shift from internal combustion engine (ICE) to electric vehicle (EV).

While the outlined decarbonisation achievements are also reliant on governmental and policy interventions, the private sector also has a role to play and has increasingly set EV targets in line with government action. Financial institutions can expedite decarbonisation goals by supporting clients' transition through targeted capital allocation and structuring. This focused financial support can drive both the innovation in sustainable vehicle design (ranging from low-carbon components to applying circular economic principles) and the consumer adoption of net-zero emission options, such as EVs, thereby reinforcing governmental efforts to decarbonise the transport sector.

A net-zero energy sector is a fundamental upstream contributor to decarbonisation efforts, as the future generation and supply of power strongly influences the decarbonisation efforts within the transport sector. Banks need to consider these dependencies when analysing their role in the context of potential impact within the transport sector.

3. Design choices for scoping the sector

This publication focuses on banks' approaches to setting targets to reduce emissions associated with clients in the automotive sector, specifically related to a vehicle's production and use phase. However, it is acknowledged that banks' design choices can help incentivise additional action in the sector to reduce GHG emissions, including:

- Using lending activities to encourage fuel-switching to net-zero fuels, development of improved manufacturing, material improvements, and extended battery life cycles.
- Implementing circularity approaches to reduce embedded emissions in materials, increase raw material recycling rates, and minimise production waste, resulting in decreased Scope 1, 2 and 3 emissions from vehicle manufacturers.
- Financing infrastructure and switching vehicles to reduce private transportation demand.

Banks' financing and target-setting focus in the automotive sector is subject to change and is influenced by transition rates, i.e. the speed at which the sector decarbonises, and by sound investment decisions to ensure capital safety. As the sector advances in its electrification journey, characterised by a significant uptake of zero-emission vehicles, banks may decide to extend their scope to encompass other interconnected components. This evolution is rooted in the changing landscape of emissions sources that accompanies the sector's electrification. Factors such as mining for elements used in batteries and the application of circular economic principles become more salient in this context. Consequently, the durability and recyclability of batteries assumes growing significance in this dynamic scenario. Although not in scope of this paper, banks can additionally consider engagement with suppliers of raw minerals (such as lithium, cobalt, or nickel) in a separate target to address these nested opportunities (such as incentivising sustainable raw material sourcing) and continue to reduce their financed emissions in related markets.[8]

Taking a cross-sectoral perspective allows for a comprehensive approach to the automotive sector, encompassing not only manufacturers but also related components and processes. However, this approach adds complexity to emissions accounting and adds risk of double-counting with other sectors such as steel, rubber, and heavy industry. Double-counting can have several unintended consequences, including portraying an inaccurate image of emissions reduction achievements or disguising counter-dependencies if one sector (e.g. upstream or downstream Scope 3 emissions) progresses at a different pace than the sector in focus. This publication addresses such cross-sectoral interfaces where needed to ensure accurate emissions accounting and avoid duplication of efforts.

3.1 Scoping the automotive sector: value chain and vehicle types

By establishing an accurate scope of the specific stakeholders within the automotive value chain, banks can understand how to incentivise their clients' design decisions to reduce emissions associated with a vehicle's use phase and lifecycle, e.g. suppliers might need different incentives than vehicle manufacturers. The value chain for vehicle production (Figure 3) encompasses four key stakeholder groups: suppliers, original equipment manufacturers (OEMs)/manufacturers, distribution and sales, and vehicle users/end customers.[9] While raw material producers are acknowledged and influence a vehicle's lifecycle emissions, they are not within the scope of this analysis.

Figure 3: Value chain of the automotive production industry

Each stakeholder group offers different opportunities to achieve a net-zero transformation within the sector. Table 1 offers a comprehensive overview of the benefits and challenges associated with the inclusion of each stakeholder group within a target, enabling a focused approach to address their unique circumstances and emissions reduction potential.

Table 1: Challenges and benefits of including the identified value chain segments within the scope of banks' target setting for the automotive sector

Value chain	Challenges (Cons)	Benefits (Pros)	Share of CO_2 emissions & downside of not including emissions from this value chain segment
Suppliers	▪ **Diversity of components:** Diversity in types of auto component (such as engines and compartments, batteries brakes, spark plugs, tires etc) can give us a wide range of emissions profiles from different stakeholders, which are covered by banks to varying degrees and might thus skew comparability of emission targets.[10] ▪ **Range of components:** The range of components and their manufacturers might lead to a convoluted identification of decarbonisation levers, thereby complicating a bank's insights to drive decision-making. ▪ **Insufficient guidance:** Lack of pathways, data, and guidance on emissions reporting from suppliers complicates systematic recording. ▪ **Granularity:** Difficulties exist in attributing emissions in a sufficiently granular manner. ▪ **Decreasing relevance:** As the sector moves towards electrification, the number of part producers (and their aggregated footprint) is likely to decrease, as EVs contain approximately 100 fewer parts than a regular ICE vehicle. EV manufacturers produce most of these parts themselves, except for batteries. The additional work of including part manufacturers in target setting will be less and less relevant over time, causing a lack of motivation to develop thorough accounting methods.	▪ Financing value chain actors who are relevant for transition, including manufacturers of EV batteries and fuel cells offers opportunities to accelerate a transition. ▪ Manufacturing emissions of auto component manufacturers (Scope 1 and 2) can be systematically tracked. ▪ Financing innovations to increase efficiency of essential components can lead to significantly reduced embedded material emissions.	▪ Suppliers contribute to the share of embedded emission of cars (Scope 3 emissions of vehicle manufacturers). ▪ Around 18%–22% of emissions can be linked to the auto supply chain, particularly the production of materials (not taking logistics into account).[11]

Value chain	Challenges (Cons)	Benefits (Pros)	Share of CO_2 emissions & downside of not including emissions from this value chain segment
Original equipment manufacturer (OEM)/ manufacturer	▪ **Accuracy of emissions reporting**: Scoping and attributing emissions coherently can potentially be challenging for auto manufacturers who rely on suppliers to manufacture components and report related emissions according to GHG accounting methodologies. The emission impact can be slightly higher for OEMs who manufacture their own batteries which will result in higher emissions.[12] ▪ **Need for political support:** While OEMs produce the end product, they still need support from governments through policies that promote charging infrastructure, encourage behavioural customer change, or accelerate the decarbonisation of the power generation sector. This might differ across regions and need to be consider when setting targets.	▪ OEMs have the greatest impact on design choices of vehicles that effect emissions when vehicles are in use. ▪ Banks typically work directly with OEM clients through financing thereby indirectly exerting considerable support to other value chain stakeholders.	▪ Credibility risk of not including OEMs is increased as OEMs are in the public eye. ▪ Manufacturers have the most influence over the end-use vehicle emissions as they control which new vehicles will be available. But they have low emissions profiles themselves (relative to the rest of the value chain, i.e., end users) ▪ Tank-to-wheel emissions are considered Scope 3 but are directly controlled by the company's manufacturing plans (they are directly related to the type of vehicle sold and its fuel economy). As such, they represent the majority of sector emissions. ▪ In total, around 80% of emissions can be linked to OEMs, including production and assembly, logistics, fuel supply and tailpipe emissions.[13]
Distribution and sales	▪ **Difficulty of engaging key players:** Sales agents are difficult for banks to reach, as the distribution/sales chain is comprised of a large, unconnected spectrum of players. ▪ **Limited influence:** These actors have less control on design choices that determine tailpipe emissions and are primarily acting as a marketplace. ▪ **Establishing dedicated financing:** Differentiating captive financing arms (which provide loans to end customers) from corporate treasury/ other financing arms can be challenging.	▪ By providing transparency and information to end customers regarding carbon footprint of products, sales agents can influence the decision-making of the end customer, i.e., which type of vehicles will be used.	▪ No emissions can be directly attributed to this stakeholder.

Value chain	Challenges (Cons)	Benefits (Pros)	Share of CO_2 emissions & downside of not including emissions from this value chain segment
End customer	▪ **Diversity of end customers:** 'End customer' represents a significant group of diverse actors (individuals, taxi companies, logistics firms, business fleets etc) influenced by different levers, related to private versus corporate users. Consumer behaviour (particularly private users) can most often only indirectly be influenced by banks through different pricing strategies. However, other factors related to the net-zero ecosystem will also play a dominant role. ▪ **Challenges for fleets:** Fleet owners or logistic companies are usually difficulty to classify as it is challenging to relate a loan to a specific Light Duty Vehicle brand or make/model. Banks need to rely on a fleet owner's own disclosures of emissions for which data is hard to source, especially for smaller actors. ▪ **Limited pathways scope:** Limited pathways, data, and guidance on emissions reporting from fleet users complicates a systematic recording.[14] ▪ **Potential for double-counting:** Double-counting of manufacturer Scope 3—downstream emissions can arise if integrated with manufacturer emissions.[15] ▪ **Realistic substitutions:** The difficulty of influencing customer behaviours and "just transition" considerations when confronted with low access to mobility can be a barrier to setting targets in that portfolio in certain jurisdictions; however, portfolio steering is a way to support OEM clients' targets.	▪ Large fleet owners and operators can influence EV demand and have the power to improve infrastructure leading to a faster transition. For example: In the EV100 initiative 127 members have made a commitment to switch their fleets to EVs and/or install charging for staff and/or customers by 2030.[16]	▪ Globally, fleets make up a quarter of all vehicles but contribute to two-thirds of all GHG emissions from road transport.[17] ▪ 65%–80% can be linked to tailpipe emissions.[18]

In addition to considering the various segments of the value chain, banks will need to make a design decision as to which type(s) of vehicle should be included in their targets. Each vehicle type has different emissions intensities associated with their technology readiness, market transformation strategies, use phase, and overall sectoral impact. Table 2 provides a categorisation of vehicle types, including 2–3 wheelers, light-duty vehicles (LDVs), and heavy-duty vehicles (HDVs).

Table 2: Overview of different types of vehicles and their potential role in target setting

Products	Definition	Reasons to include	Reasons to exclude
2–3 Wheelers	2–3 wheelers are defined as motorized vehicles with two or three wheels aimed at mobility of passengers or goods.	▪ Emissions can be material in specific regions such as China, India etc. where the overall share of 2–3 wheelers is significant. ▪ There is a higher adoption rate of electrified alternatives than other segments due to their low-cost advantage and lower dependency on large scale infrastructure development.	▪ Globally emissions from 2–3 wheelers might not be material when compared to other segments. ▪ There could be challenges related to data availability.
Light Duty Vehicles (LDVs)	Light duty vehicles (LDVs) are defined differently depending on regional market conditions and legislations (such as weight classification thresholds of vehicles). The category includes but is not exclusive to passenger cars, light commercial vehicles/light trucks/vans. For the below markets, LDVs are defined as follows: **Europe/Asia** The EU, the United Kingdom, China, India, Japan, and several other markets follow definitions of LDVs that broadly align with IEA,[19] which classifies LDVs as any vehicle under 3.5 tonnes. In the EU specifically, passenger cars and light trucks/light commercial vehicles are subject to different regulatory pressures and reduction targets, which leads to a tendency for banks to treat them separately and develop two sets of sub-targets.	▪ LDVs are the largest contributors to road transport emissions. ▪ Transition to net zero emission vehicles is crucial for emissions from road transport to reach net-zero by 2050. ▪ Data availability related to vehicles emissions is better than other segments.	
	North America The U.S. Environmental Protection Agency includes in its definition vehicles under 8500 lbs or 3.85 tonnes.[20] Passenger cars and light truck/light commercial vehicles are both defined as LDVs and classified as one vehicle scope or class—e.g. contrary to the EU. As of 2022, SUVs make up one-third of passenger vehicles. Banks thus tend to develop one set of targets.	▪ See comments above.	

Products	Definition	Reasons to include	Reasons to exclude
Heavy Duty Vehicles (HDV)	Heavy duty trucks mostly include medium-freight trucks as well as heavy-freight trucks.[21] Buses are excluded from this definition.	▪ High materiality of emissions (around 30% can be attributed to emissions from heavy duty and medium duty trucks[22]).	▪ Data availability on vehicle emissions is limited. ▪ Decarbonisation pathways for HDVs will differ fundamentally from that of LDVs so including both into one target would present challenges to choosing a pathway. ▪ While electric battery and electric fuel cell trucks remain the key alternative technologies for decarbonisation infrastructure roll out, reducing the total cost of ownership of alternative powertrains is the main barrier to adoption. Unresolved questions on net-zero energy technology adoption could raise questions on viable pathways for HDVs. ▪ Ownership/leasing model of the HDV sub-sector means it may warrant a different approach to LDVs and should therefore be considered in a separate trucking/HDV target.

3.2 Financial products

Banks can engage their client base in decarbonisation activities by focusing on their loan books and available financing mechanisms, including captive finance, other finance arms, or direct vehicle loans. Each of the products' benefits and challenges are outlined in Table 3.

Table 3: Assessment of financial products for the automotive industry

Financial products	Definition and targeted stakeholder	Reasons to include financial product	Reasons to exclude financial product
General corporate financing	General corporate financing constitutes non-specific debt financing to auto manufacturers.	▪ While only few OEMs use general corporate financing, banks can leverage their relationship with clients to incentivise emission reduction along all scopes of emission.	▪ The significant share of OEMs in the automotive sector are debt-free businesses. General financing might constitute only a small portion of financing from a bank.
Captive finance loans	The subsidiaries of auto manufacturers which provide financial services, such as vehicle loans and leases.	▪ Captive arms of OEMs can have some influence on the emission profile of the sold cars, and in cases on types of cars manufactured. ▪ Captive finance companies are enabled to structure their lending products against the same committed credit conditions that are defined by the lending financial institution.	▪ Double-counting can potentially occur if captive finance subsidiaries and OEMs (i.e. parent company of the subsidiary) are both clients of a bank and their Scope 3 emissions are accounted separately, especially if lifetime emissions are included in the emission scope of the target.
Loans to other finance arms	Financing arms of auto manufacturers (such as treasury) which handle various functions such as cash management, liquidity planning and funding, risk management etc.	▪ Direct lending or financing to auto manufacturers may be included as proceeds can be used for vehicle manufacturing purposes directly and can thus be linked to financed emissions.	▪ Auto manufacturers can use such financing arms to raise more capital without a designated purposes for net-zero vehicle which are outside of the banks can control. This could lead to under reporting of financed emissions by banks.

Financial products	Definition and targeted stake-holder	Reasons to include financial product	Reasons to exclude financial product
Direct motor vehicle loans[23] (consumer loans)	Loans issued directly to end customers. Direct motor vehicle loans can further be distinguished between consumer loans (retail offering) as well as financing to fleet owners (corporates, leasing companies, etc).	▪ Retail banks can have a significant consumer auto loan foot-print and therefore options to indirectly influence consumer behaviour and preferences. The effectiveness of influence can vary depending on the respective consumer segment. ▪ Consumer loans are often localized to any given bank's main geographies. The impact can therefore be more direct (in terms of decarbonisation) on that given region.	▪ In practice, loans to fleet owners or logistic companies (such as multi-modal logistic companies and corporate fleets) can be harder to classify due to existing data restraints which causes difficulties to match loans to specific light duty vehicle brands or make/model.[24] ▪ Leveraging multiple financial products (such as including both consumer loans and auto manufacturer Scope 3 emissions or captive finance) can lead to double-counting. ▪ For regions where EV infrastructure is not available (e.g. a grid relying on fossil fuels), vehicle loans favouring net-zero vehicles could lead to unintended consequences (such as leading to actual higher emissions) and raise just transition related issues.
Indirect financing	Indirect consumer vehicle loans that are issued by a third party, such as dealers or sellers.	▪ Indirect financing allows banks to tap into a broader customer base by leveraging the existing network of dealers or sellers. ▪ Banks can promote EV adoption and work with dealers/sellers committed to promoting sustainable transportation.	▪ The approaches can introduce challenges in maintaining quality control and managing risk of the lending activities, as well as aligning with sustainability goals due to limited control. ▪ Effective indirect financing requires seamless information sharing between the bank and the third-party dealers or sellers. Challenges may arise in establishing secure data sharing protocols, integrating systems, and maintaining data accuracy.

In addition, other sustainable finance products such as green bonds can be used as part of transition financing. For further information on including capital markets please note the ongoing developments of third-party stakeholders, such as GFANZ, PCAF, etc.

Box 1: Trends in target setting by NZBA members for the automotive sector (value chain and vehicles)

The following table (Table 4) displays a selection of NZBA member banks across North America, Europe, and Asia & Pacific, showcasing the choices made in their target-setting approach. The examples given are intended to provide an overview of the different decisions and should not be interpreted as prescriptive, representative, or recommending any specific targets. The table serves as a valuable reference for understanding the range of choices and strategies employed by banks in their pursuit of net-zero targets.

Table 4: Trends in target setting (2023): Block 1 Value chain scope and Block 2 Vehicle scope

Autos	**ING**	**Barclays**	**Lloyds Banking Group**	**Deutsche Bank**	**TD Bank Group**	**DBS Bank**
	Europe	**Europe**	**Europe**	**Europe**	**North America**	**Asia & Pacific**
Block 1: Value chain scope	Manufacturers	Manufacturers	Manufacturers; End Customer	Manufacturers	Manufacturers	Manufacturers, dedicated power-train manufacturers, Distributors
Block 2: Vehicle scope	LDV	LDV	Manufacturers (LDV, motorcycles) End Customer (LDV)	LDV	LDV	LDV

NB: The analysis is based on target submissions for the automotive sector from NZBA member banks as of July 2023 and only considered publicly available information, such as annual reports. A total of 33 members submitted targets linked to the automotive and trucking sector. Their regional distribution is uneven and included banks from Europe (55%), North America (27%), Central America & Caribbean (3%), South America (9%), Asia and Pacific (3%), and Australia (3%).

Banks represented in Table 4 were selected to showcase the different possible approaches towards automotive target setting as well as highlight regional trends.

In their initial individual target development, NZBA members primarily directed their focus towards vehicle manufacturers (60%) within their portfolio, driven by factors such as data accessibility and direct client interactions. Notably, component manufacturers are currently less represented in these targets. However, it is acknowledged that stakeholders along the supply chain are actively working to reduce the CO_2 footprint of their products. Reporting these efforts in addition to the progress made on their automotive targets can provide important insight into banks' overall client engagement strategies and impacts.

Figure 4: Trends in target setting: Block 1 Value Chain Scope of banks' targets as of 2023

NB: Targets that combine multiple stakeholders in one target are displayed as "multiple". All these targets include manufacturers and at least one other stakeholder. Targets that have been set for different value chain stakeholder respectively are also displayed separately.

This emphasis on manufacturer reflects the recognition of manufacturers' pivotal role in driving decarbonisation efforts throughout the value chain and is aligned with prominent decarbonisation pathways. Conversely, approximately 17% of the targets focus on end-use or distribution, displaying the significance of reducing emissions during the utilisation and distribution phases (Figure 4). Banks that have set targets for multiple stakeholders included both manufacturers and end user/distributors in a common target.

When it comes to the vehicle types chosen, around 97% banks have chosen to focus exclusively on LDVs in their targets while 3% of banks also set separate targets for trucking. 73% of banks have further disclosed their definitions of LDVs (Figure 5). However, 27% have not further disclosed their vehicle scope. Notably, there is a regional disparity in the focus of these targets. For example, European-based banks tend to prioritise LDVs, primarily passenger cars, aligning their targets with current EU legislation and regulations. Conversely, banks based in North America often broaden their scope of LDVs to include trucks, particularly light trucks or pick-up trucks, reflecting market realities and driving behaviours.

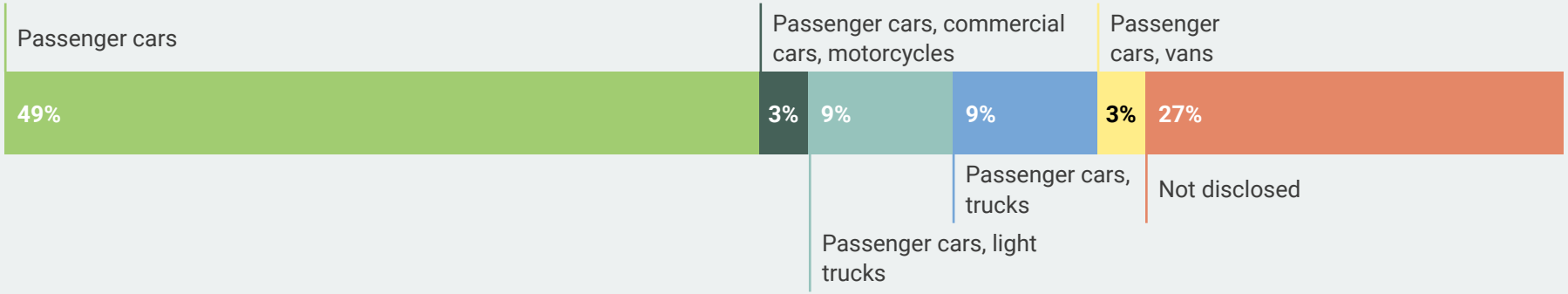


Figure 5: Trends in target setting among members: Definitions of light duty vehicles (LDVs)

NB: Pertinent to the approach to set combined or individual targets for stakeholders, banks have adjusted their vehicle scope. Banks that have set individual targets for trucking have also set targets for LDVs.

3.3 Identifying emission boundaries against a vehicle's lifecycle

GHG emissions are mainly generated throughout the automotive production and use phases, encompassing various stages from manufacturing to vehicle operation.

Use phase emissions, also known as well-to-wheel emissions, account for the majority of vehicle emissions. These emissions are directly associated with the vehicle's driving cycle, encompassing both well-to-tank and tank-to-wheel emissions (Figure 6).

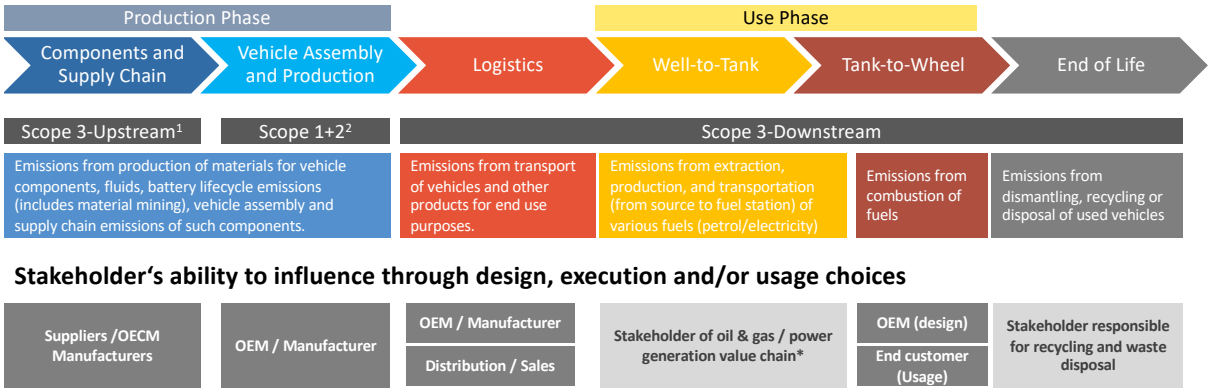


Figure 6: GHG Emissions[25] (NZBA: own depiction)

1. Vehicle component emissions can belong to both Scope 3 upstream or Scope 1 and 2 depending on who manufactures components (third party supplier versus in-house production).[26]
2. Scope 1 and 2 emissions may also include charging refrigerants with significant global warming potential in the vehicle's air conditioning system, burning hydrocarbons such as petrol and diesel during engine audit at the end of the assembly line to basically start the vehicle and examine it for any defects, during vehicle maintenance and end of life emissions if vehicle manufacturer provides such services.
3. An OEM's reported Scope 3 emissions are not reflected in this figure.
4. Emissions from extraction overlaps with oil & gas or power generation Scope 3 upstream emissions.

3.4 Understanding emissions from production phase

Table 5 further examines the emission from various production stages, providing banks with an overview to comprehend the emissions-related challenges and benefits involved in each stage. This understanding equips banks to effectively address these factors in their analysis and methodology development for target setting.

Table 5: Understanding emissions from production phase

Production phase stage	Potential sources of GHG emissions	Benefits of including	Challenges of including
Components manufacture	Emissions from extraction, processing of various materials (such as cast iron, steel, aluminium,[27] etc.) and manufacturing of vehicle components such as engine, body, transmission system etc.	▪ An inclusion of emissions increases the emissions coverage (vehicle lifecycle emissions) and encourages manufacturers to source components from greener suppliers. ▪ An inclusion does not directly punish manufacturers who manufacture more components in-house.[28]	▪ Limited data availability (reliance on annual reports) on emissions and lack of pathway complicates a systematic analysis. ▪ An inclusion can lead to double counting if both suppliers and OEMs are in-scope of target.[29]
Battery manufacture and assembly	Emissions from mining and processing of minerals (critical), cell production and pack assembly.	▪ An inclusion increases the emissions coverage. ▪ Batteries for EVs are gradually drawing interest from a legislative perspective, with some jurisdictions exploring relevant initiatives and opportunities.[30]	▪ There are not pathways available for battery manufacturers. ▪ Calculating emissions linked to battery manufacturing requires supplementary modelling which is based on third party annual reports. ▪ Vehicle manufacturers who produce their own batteries will have higher emissions.
Vehicle assembly	Emissions due to energy consumption by vehicle assembly plants of manufacturers. This can include but is not limited to charging refrigerants in the vehicle's A/C system, or burning hydrocarbons such as petrol and diesel during engine audit at the end of the assembly line (which start the vehicle and examine it for any defects).	▪ Vehicle manufacturers could be encouraged to set emissions reduction targets by switching to renewable energy sources for vehicle assembly and production processes.	▪ Calculating emissions linked to vehicle assembly requires supplementary modelling which is based on third party annual reports.

Understanding emissions from use phase

Table 6 further examines the emission from a vehicle's use phase, providing banks with an overview to comprehend the emissions-related challenges and benefits. This understanding equips banks to effectively address these factors in their analysis and methodology development for target setting.

Table 6: Understanding emissions from use phase

Emissions from use phase	Definition	Benefits	Challenges
Well-to-tank emissions	Well-to-tank emissions are emissions due to the extraction, refinement, production, and transportation of various fuels (petrol, diesel, liquefied petroleum gas (LPG), compressed natural gas (CNG), electricity, hydrogen etc.) that are used as primary energy sources for vehicles. These are typically the biggest sources of emissions for EVs and can vary regionally due to different emission intensities of electricity grids.[31]	▪ Important emissions from early stages of the value chain are encompassed. ▪ By incorporating material-embedded emissions, banks adopt a holistic approach to address all associated emissions in the zero-emission vehicle transition. ▪ Well-to-tank emissions offer proactive planning for the transition to net-zero, anticipating the significance of grid-related emissions until power generation achieves full decarbonisation. ▪ Relevant for banks who do not have oil&gas or power targets or focus on decarbonising the auto manufacturing supply chain specifically.	▪ There is a risk of double-counting as there is overlap to the scope of energy and power targets. A net-zero power sector is the focus of power generation targets, and similarly steel manufacturing will be subject to its own targets for banks where it is a material exposure. ▪ There is currently limited transparency and reported data on upstream Scope 3. ▪ When including tank-to-wheel emission, any risk of double-counting with power generation targets needs to be addressed.
Tank-to-wheel	Tank-to-wheel emissions are released due to the combustion of fuel while driving the vehicle. These are also known as tailpipe emissions and are the biggest source of emissions for ICEVs. EVs have zero tailpipe emissions.[32]	▪ Tank-to-wheel emissions are the most material emissions for an ICEV. The most immediate influence by banks is linked to tank-to-wheel and therefor banks can have the most significant impact. ▪ These are major contributors to lifetime energy use and GHG emissions. ▪ Most manufacturers report those numbers in their annual disclosure;[33] thus, data is easily accessible to banks.	▪ Reporting of tank-to-wheel related emissions varies across different regions and is dependent on regional disclosure legislation.

Emissions from use phase	Definition	Benefits	Challenges
Well-to-wheel	Well-to-wheel emissions include both well-to-tank as well as tank-to-wheel emissions. Banks in some cases might aim to try to capture all phases in one metric.	▪ Well-to-wheel is a holistic view of all emissions and includes all GHG emissions.	While feasible, aggregating well-to-wheel emissions entails several challenges which can lead to an ineffective metric: ▪ A combined metric may obscure the impact of reducing production emission. ▪ Assumptions need to be made on mileage per year and lifespan of vehicle; these can be influenced by regional market conditions and differing legislation. ▪ Intensity calculations for production phase and use phase cannot be harmonised easily due to different calculation methodologies. ▪ Obtaining data for the initial input assumptions that are required such as energy consumption, wear and tear of vehicle can be challenging and prone to error.

NB: Biofuels and renewable synthetic fuels are explored as viable alternative fuel sources to achieve decarbonisation in specific national contexts and frameworks. In some countries, biofuels can play a crucial role in the energy landscape and efforts to reduce carbon emissions. Synthetic fuels while exhibiting a high degree of efficiency losses, are considered in scientific models and pathways mainly for long distance heavy trucking, aviation and maritime. It is important to note that financial institutions may need to tailor their approach to consider the unique circumstances of each country, including value chain considerations as well as prevailing public policies and other contextual factors.

End-of-life and other emission sources

- **End-of-life emissions:** Emissions related to disposal or recycling of vehicles and components.
- **Logistics emissions:** Emissions related to transportation of vehicle components from suppliers to manufacturers and assembled vehicles from manufacturers to dealers.
- **Vehicle maintenance emissions:** Emissions from in-service replacement of consumables, including tires, exhaust/ after-treatment, coolant, oil, urea, and others.[34]

For the purpose of this analysis, emissions related to end-of-life, logistics and maintenance are deemed negligible.

The final scoping of emissions targets can be influenced by various factors, including the materiality of different emission types for ICEVs and EVs, and the OEM's ability to directly influence emissions along the value chain. Table 7 outlines these factors and their meaning for each emission type.

Table 7: Factors relating to the various emissions linked to use phase (indicative)

Factors/emission type	Components (No supply chain)	Vehicle assembly/ production	Well-to-tank	Tank-to-wheel
Are emissions material for ICEVs?	Low-Medium[1]	Low-Medium[1]	Medium	Very High
Are emissions material for EVs?	Medium-High[2]	Medium-High[2]	Medium-Low-High[3]	Low[4]
Can manufacturers influence emissions?	Partially	Yes	No	Yes
Are 1.5°C net-zero pathways available and have the respective emissions been included in pathways?	No	No	No pathways developed by recognised intermediaries [5]	Yes

1 dependent on vehicle size
2 dependent on battery production
3 dependent on intensity of regional electricity generation
4 dependent on calculation methodology of manufacturers: some manufacturers include charging from home, otherwise "not applicable"
5 can be modelled by banks

Banks may consider seeking further guidance from the Science Based Targets initiative (SBTi) on modelling "well-to-wheel" pathways.[35]

Technical comparison of life cycle GHG emissions of combustion engine and electric passenger cars

A study by ICCT[34] compares the vehicle production emission of passenger cars in Europe, the United States of America, China, and India. They take into consideration internal combustion engine vehicles (ICEVs), including hybrid electric vehicles (HEVs); plug-in hybrid electric vehicles (PHEVs); battery electric vehicles (BEVs); and fuel cell electric vehicles (FCEVs).

It concludes that life-cycle emissions of electric battery vehicles in Europe, the United States of America, China, and India are lower than a comparable gasoline vehicle by 66%–69% in Europe, 60%–68% in the United States of America, 37%–45% in China, and 19%–34% in India. With a continued decarbonisation of the grid system, the difference of life-cycle emission can change up to 10–20 percentage points. Currently, in regions with high grid intensity, an ICEV may theoretically outperform a larger EV in terms of lifecycle emissions.

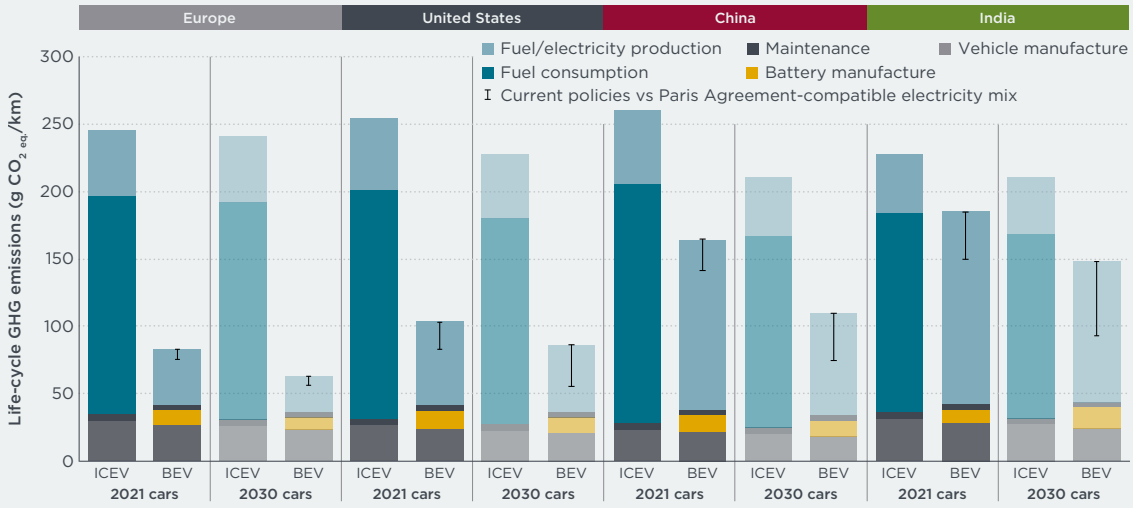


Figure 7: Life-cycle GHG emissions (source: ICCT 2021)

3.5 Emissions from a manufacturer's perspective

For a vehicle manufacturer, the above emissions can be classified in multiple ways into Scope 1, 2 or 3 emissions depending on the degree of vertical integration of the manufacturers, their subsidiaries or component suppliers (Table 8).

Table 8: Emission scopes of an OEM

Emission type	Classification	Alternative Classification
Components	Scope 1 and 2	Scope 3—Purchased goods
Battery	Scope 1 and 2	Scope 3—Purchased goods
Vehicle fluids	Scope 1 and 2	Scope 3—Purchased goods
Vehicle assembly	Scope 1 and 2	
Well-to-wheel[36]	Scope 3—Use of sold products	
Recycling / disposal	Scope 1 and 2	Scope 3—End of life treatment
Component transport	Scope 3—Upstream transport	Scope 3—Downstream transport
Vehicle transport	Scope 3—Downstream transport	
Vehicle maintenance	Scope 1 and 2	Scope 3—Purchased goods

NB: For detailed insights on addressing the scope of emissions from "leased vehicles" and the role of "well-to-tank" and "tank-to-wheel", the interested reader can refer to PCAF's Global GHG Accounting and Reporting Standard.

Box 2: Trends in target setting by NZBA members for the automotive sector (emissions and gases in scope)

The following table (Table 9) displays a selection of NZBA member banks across North America, Europe, and Asia & Pacific, showcasing their individual choices made in their target-setting approach. The examples given are intended to provide an overview of the different decisions and should not be interpreted as prescriptive or recommending any specific targets. The table serves as a valuable reference for understanding the range of choices and strategies employed by banks in their pursuit of net-zero targets.

Autos	ING	Barclays	Lloyds Banking Group	Deutsche Bank	TD Bank Group	DBS Bank
	Europe	Europe	Europe	Europe	North America	Asia & Pacific
Block 1: Value chain scope	Manufacturers	Manufacturers	Manufacturers; End Customer	Manufacturers	Manufacturers	Manufacturers, dedicated powertrain manufacturers, Distributors
Block 2: Vehicle scope	LDV	LDV	Manufacturers (LDV, motorcycles) End Customer (LDV)	LDV	LDV	LDV
Block 3: Emissions and Gases in Scope	Scope 3—downstream (tailpipe)	Scope 1,2,3	Scope 1,2,3 (OEMS), Scope 1,2 (End Customer)	Scope 3—downstream (tailpipe)	Scope 1,2,3—downstream (tailpipe)	Scope 3—downstream (tailpipe)

Table 9: Trends in target setting (2023)—extended by block 3: emissions and gases in scope

The current stocktaking does not indicate a specific preference among banks regarding the inclusion of emissions scopes in their target setting for automobile investments. The data shows that banks have chosen a variety of combinations, including focusing solely on Scope 1 and 2 emissions, solely on Scope 3 emissions, or a combination of Scope 1, 2, and 3 emissions.

Banks demonstrate a relatively equal distribution between Scope 1, 2, and 3 (40%) and Scope 3 (43%) GHG emissions in their targets (Figure 8). The choice between Scope 1 and 2 targets versus Scope 1, 2, and 3 targets reflects distinct strategies and priorities among banks: the selection of Scope 1 and 2 emissions (15%) is primarily seen when targeting end users or distributors (Figure 9).[37]

Figure 8: Trends in target setting: block 3 Emissions and Scope

Figure 9 illustrates the relationship between the selected GHG emissions scope and the respective stakeholder group that is targeted.

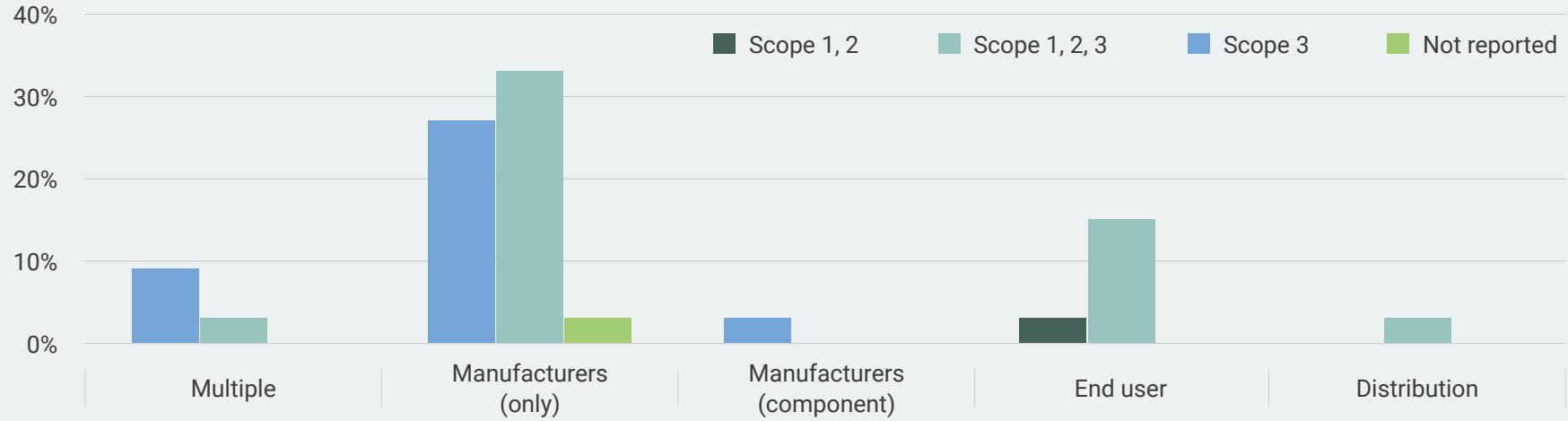


Figure 9: Trends in target setting: Block 3 Emissions and Scope for different Stakeholder groups

While OEMs' Scope 1 and 2 emissions constitute a relatively small share of their overall emissions profile, they are reported and therefore easier to consider. However, upstream Scope 3 emissions related to the supply chain, including vehicle components and fuel supply, are often excluded. This is because the primary drivers for change within the real economy lie with manufacturers producing electric and hybrid vehicles. For that reason, banks tend to focus on Scope 3 downstream emissions (tailpipe emissions) or tank-to-wheel emissions. Banks that have specified their Scope 3 emissions have chosen the tank-to-wheel approach in approximately 86% of cases (Figure 10).

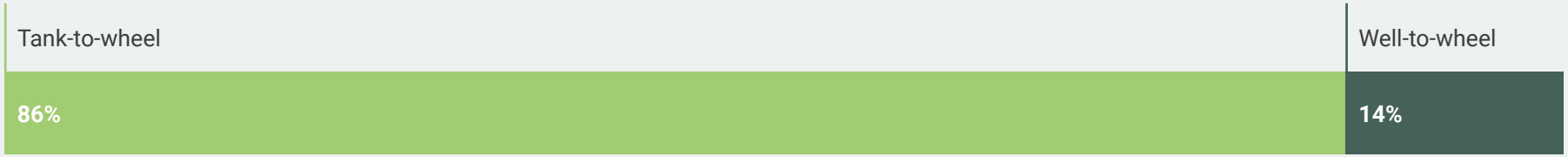


Figure 10: Trends in target setting: Block 3 Emissions and Scope—Scope 3 emissions break-down

The rationale behind including tank-to-wheel Scope 3 emissions stems from banks' indirect control through the vehicles sold in the market, making them closely linked to the type of vehicle and its fuel efficiency. Factors such as driving habits and regional consumption patterns, including average distance driven and life cycle considerations, contribute to the focus on tank-to-wheel emissions. Upstream emissions associated with consumers are largely addressed within the targets of OEMs and constitute a significant share of sector emissions.

OEMs that commit to following the Science Based Target initiative's approach are expected to report their well-to-wheel emissions. However, variations in methodologies used for measurement can present challenges for banks in processing their clients' data consistently.

4. Design choices for scenarios and benchmarking

4.1 Interpreting net-zero-aligned pathways for the automotive sector

NZBA Guidelines require member banks use widely accepted science-based decarbonisation scenarios to individually set both long-term and intermediate targets that are aligned with the temperature goals of the Paris Agreement. In addition, per the Guidelines, "scenarios selected shall be "no overshoot" or "low overshoot" scenarios,"[38] and should have a >50% probability of limiting global warming to 1.5°C by the end of the century. If banks consider alternative regional scenarios, they should still comply with the NZBA Guidelines.[39] This section provides an overview of some of the commonly used scenarios; however, the list is not exhaustive. Other 1.5°C pathways exist (such as the One Earth Climate Model) or currently being developed (SBTi).

Table 10: Overview of 1.5°C net-zero scenarios

1.5°C Pathway	Benefits	Challenges
IEA: NZE 2050	This scenario is a widely adopted benchmark against which to measure the performance of automotive manufacturers. Thus, broad adoption of the scenario will enhance comparability across loan books.	The IEA NZE 2050 entails reaching certain milestones within various time frames. One is for electric cars to compose 60% of global vehicle sales by 2030.[a] The scenario includes new both vehicle sales and stock of cars on the road. Banks may choose to adjust the scenario to cover only vehicle sales. While financial institutions may set targets in line with the IEA NZE 2050, it is unclear what actions that entails to support reaching such milestones, as vehicle sales are within a limited scope of influence of banks. Other factors, such as charging infrastructure and governmental incentives, will also play a role in a client's decision. The IEA has a set definition of light duty vehicle that it covers in the scenario, which might not correspond with regional definitions and market practice. The raw data from IEA can be difficult to use as it requires conversions for the calculation of 1.5° scenario pathways for manufacturers which in turn can lead to inconsistencies of pathways.[40]
NGFS: Orderly Transition—Net-Zero 2050 Scenario[41]	The transition pathways for NGFS scenarios have been generated with well-established integrated assessment models which combine macro-economic, agriculture and land-use, energy, water, and climate systems into a common numerical framework. NGFS scenarios provides regional emissions and activity data for stock vehicles (split by passenger and freight) in the 1.5°C aligned pathway.	The pathway requires more granular guidance on overall decarbonisation of the transport sector. Current pathways include energy demand, activities (in passenger kms, vehicle kms and tonnage kms) and emissions from combustion of fuel by different modes of transport such as road passenger LDVs, freight vehicles and buses. However, the above data is restricted to the stock of vehicles as opposed to new vehicles which is the potential scope of the required transition pathway. Additionally, there is limited publicly available information on other data points which is necessary to construct the required 1.5°C aligned pathway[42] such as: ▪ Emissions from new LDVs ▪ Estimated sales share of electric LDVs till 2050 split by BEVs, PHEVs and FCEVs. ▪ Rate of growth of new LDVs ▪ Assumed lifetime kms of a vehicle ▪ Rate of retirement of stock LDVs ▪ Load factors to convert vehicle kms to passenger or tonnage kms ▪ Rate of change of load factors[43] till 2050. ▪ Information on other emissions that are a part of vehicle life emissions. ▪ There is limited data availability on policy and infrastructure requirements over the years required to support transition in the transport sector.

NB: It is important to recognise that these scenarios are potential pathways and not forecasts, and operate on underlying assumptions and simplified models which might not consistently mirror actual progress. Banks may wish to acknowledge and address these limitations in their target setting and transition plan development.

a IEA (2022b), *World Energy Outlook 2022*. iea.org/reports/world-energy-outlook-2022

Box 3: Trends in target setting by NZBA members for the automotive sector (pathways)

The following table (Table 11) displays a selection of NZBA member banks across North America, Europe, and Asia & Pacific, showcasing their individual choices in their target setting approach. The examples given are intended to provide an overview of the different decisions and should not be interpreted as prescriptive or recommending any specific targets. The table serves as a valuable reference for understanding the range of choices and strategies employed by banks in their pursuit of net-zero targets.

Table 11: Trends in target setting (2023)—extended by block 4: pathways.

Autos	ING	Barclays	Lloyds Banking Group	Deutsche Bank	TD Bank Group	DBS Bank
	Europe	Europe	Europe	Europe	North America	Asia & Pacific
Block 1: Value chain scope	Manufacturers	Manufacturers	Manufacturers; End Customer	Manufacturers	Manufacturers	Manufacturers, dedicated powertrain manufacturers, Distributors
Block 2: Vehicle scope	LDV	LDV	Manufacturers (LDV, motorcycles) End Customer (LDV)	LDV	LDV	LDV
Block 3: Emissions and Gases in Scope	Scope 3—downstream (tailpipe)	Scope 1,2,3	Scope 1,2,3 (OEMS), Scope 1,2 (End Customer)	Scope 3—downstream (tailpipe)	Scope 1,2,3—downstream (tailpipe)	Scope 3—downstream (tailpipe)
Block 4: Pathways	IEA Net-Zero 2050	IEA Net-Zero 2050 (used for bottom end of target)	Manufacturers (IEA NZE 2050) End Customer (UK CCC BNZP)	IEA Net-Zero 2050	IEA Net-Zero 2050	IEA Net-Zero 2050

Of the 34 targets included in this analysis, the majority of banks (76%) have used the Net Zero Emissions by 2050 (IEA NZE) scenario exclusively to develop their net-zero pathways. In addition, around 12% of banks have used the scenario in a combination with other scenarios such as IEA Beyond 2° Scenario (B2DS), or SBTi frameworks.

4.2 Target-setting metrics

The NZBA Guidelines for Climate Target Setting for Banks suggest setting targets on either an absolute emissions (e.g. tCO_2e/y) and/or sector-specific emissions intensity (e.g. CO_2e/metric) basis.[44]

Absolute emissions: Using a target expressed in absolute terms preserves a direct link to the 1.5°C carbon budget, ensuring a more accurate measurement of the climate impact within the automotive sector. It avoids the risk of over- or underestimating the warming impact caused by intermediate variables, such as the total number of vehicles or vehicle mileage, which might require adjustments in emissions intensity targets as these variables change to stay below the 1.5°C target.

Banks are required to make assumptions about the usage and lifespan of vehicles, which can introduce uncertainties. While this holds true for absolute as well as emissions intensity, factors such as vehicle mileage, fuel efficiency, driving style and maintenance practices affect the actual emissions produced by vehicles over their lifetime, and when adopting cross-sectoral approaches (e.g. circularity, infrastructure etc.), measures may be taken to mitigate the risk of double counting emissions. The scale of a manufacturer's production is also not taken into consideration, which leads to larger manufacturers having inherently higher emissions based on their size, rather than their efficiency.

Further, one significant drawback when applying the attribution methodology is the variability in absolute emissions data, which is contingent upon market data. This data can be often more volatile than the physical denominators utilised in weighted average carbon intensity (WACI) targets, leading to potential fluctuations in reported emissions that do not reflect actual changes in real-world emissions. In addition, absolute emissions calculations do not align seamlessly with benchmark pathways.

Emissions intensity: Targets expressed in emissions intensity terms provide a means to assess the relative environmental impact of various aspects of the net-zero transition within the automotive sector. By comparing emissions intensity against a reference point set by a climate scenario, banks can gauge the effectiveness of their actions and those of their clients in reducing emissions and advancing towards net-zero goals.

One of the advantages of using emissions intensity metrics is that they do not disincentivise key transition activities in the same way as absolute units. Unlike absolute emissions, which may discourage certain activities due to their fixed targets, emissions intensity metrics allow for a more nuanced evaluation of progress. This is particularly relevant when considering cross-sectoral incentives, as emission intensity metrics facilitate clear distinctions between sectors and help prevent double-counting of emissions reductions.

However, a key disadvantage of intensity metrics, particularly physical intensity metrics, is that they do not preserve a direct link to the carbon budget. As a result, a company may exceed its 1.5°C carbon budget while appearing aligned based on intensity terms. It further does not allow any direct assessment of the actual or planned trajectory of emissions. Indeed, such indicators can over- or underestimate warming if the projections of sectoral physical output used as a denominator are not kept up to date.[45]

A target expressed in physical emissions intensity is calculated by dividing the total emissions of a specific vehicle category by the corresponding activity metric. For transportation, banks can use the following intensity metrics to quantify the level of activity or output in the sector:

- per (vehicle) km or miles travelled (/v(k)m)[46]
- per passenger km or miles travelled (/p(k)m)[47]
- per tonne km or miles travelled (/t(k)m)[48]
- per vehicle produced[49]
- per lifetime vehicle km or miles (/lv(k)m)

Equation 1: Automotive physical emission intensity

$$\text{Emission intensity} = \frac{\text{Total GHG emissions } (kgCO_2e/y)}{\text{Activity metric}}$$

The activity metric is a relevant metric that represents the output or scale of the automotive sector, such as vehicle production, vehicle sales, or vehicle kilometres/miles travelled (vkt/vmt).

NB: As of publication, a discussion on forward-looking metrics, such as the use of leading indicators (e.g. CAPEX), is gaining prominence. Given that emissions represent retrospective metrics, the inclusion of forward-oriented metrics could provide valuable support to banks in achieving their net-zero targets. Banks are advised to actively engage in these ongoing discussions and make informed decisions accordingly.

Box 4: Trends in target setting by NZBA members for the automotive sector (metrics and target setting)

The following table (Table 12) displays a selection of NZBA member banks across North America, Europe, and Asia & Pacific, showcasing their individual choices in their target-setting approach. The examples given are intended to provide an overview of the different decisions and should not be interpreted as prescriptive or recommending any specific targets. The table serves as a valuable reference for understanding the range of choices and strategies employed by banks in their pursuit of net-zero targets.

Table 12: Trends in target setting (2023)–extended by block 5: metrics and target setting

Autos	ING	Barclays	Lloyds Banking Group	Deutsche Bank	TD Bank Group	DBS Bank
	Europe	Europe	Europe	Europe	North America	Asia & Pacific
Block 1: Value chain scope	Manufacturers	Manufacturers	Manufacturers; End Customer	Manufacturers	Manufacturers	Manufacturers, dedicated powertrain manufacturers, Distributors
Block 2: Vehicle scope	LDV	LDV	Manufacturers (LDV, motorcycles) End Customer (LDV)	LDV	LDV	LDV
Block 3: Emissions and Gases in Scope	Scope 3—downstream (tailpipe)	Scope 1,2,3	Scope 1,2,3 (OEMS), Scope 1,2 (End Customer)	Scope 3—downstream (tailpipe)	Scope 1,2,3—downstream (tailpipe)	Scope 3—downstream (tailpipe)
Block 4: Pathways	IEA Net-Zero 2050	IEA Net-Zero 2050 (used for bottom end of target)	Manufacturers (IEA NZE 2050) End Customer (UK CCC BNZP)	IEA Net-Zero 2050	IEA Net-Zero 2050	IEA Net-Zero 2050
Block 5: Metrics and target setting	kg CO_2/km	gCO_2e/km	Manufacturers (gCO_2e/vkm) End Customer (gCO_2e/km)	gCO_2/vkm	gCO_2e/vkm	$kgCO_2$/vkm

All banks to date have selected emission intensity targets to evaluate their portfolio. 31% of banks have opted for CO_2-based calculations, while 65% are considering CO_2e emissions (Figure 12).

Figure 11: Trends in target setting: Block 5 Metrics and Targets

NB: Banks that have stated CO_2(e) /KM as their metric have been recorded as gCO_2(e)/Vkm.

The measurement of vehicle emissions, such as gCO_2e/km, differs across jurisdictions, with standards such as the Worldwide Harmonised Light Vehicle Test Procedure (WLTP) or other regional test cycles which are used to assess emissions levels of a vehicle, so called standards for testing cycles. The use of different testing cycles by different banks can complicate peer-to-peer comparisons and create variations in the overall assessment of emissions as the stringencies of the different regional standards and values measured under different boundary conditions are not directly comparable.

Similarly, OEMs use different testing cycles depending on their operating region for their annual reporting. Hence, banks would profit from using a common test-cycle (such as WLTP) to ensure consistency amongst peers and accuracy in overall assessment of their financed emissions.

4.3 Attribution and aggregation approaches

This section discusses approaches to attribution of the emissions of counterparties to a financial instrument (both as absolute emissions or emission intensity) and to aggregation of instrument-level emissions to sector-wide portfolio emissions (WACI).[50]

The following methodology principles to compute a bank's financed emission are based on the Partnership for Carbon Accounting Financials (PCAF).[51]

Absolute emissions approach

Equation 2: Absolute emission approach (PCAF approach)

$$\text{Portfolio emissions} = \sum_{\text{Company}} \left[\text{Company emissions} * \frac{\text{Bank financing (€)}}{\text{EVIC or company debt + equity (€)}} \right]$$

Portfolio indicator | Company indicator | Attribution factor

Variable for the denominator of the attribution factor is dependent on the asset class.
Variable for company emissions is based on the self-reported emission.

(Physical) emissions intensity approach

Equation 3: (Physical) Emission Intensity Approach (PCAF approach)

$$\text{Portfolio emissions intensity} = \frac{\sum_{\text{Company}} \left[\text{Company emissions} * \frac{\text{Bank financing (€)}}{\text{EVIC or company debt + equity (€)}} \right]}{\sum_{\text{Company}} \left[\text{Company output} * \frac{\text{Bank financing (€)}}{\text{EVIC or company debt + equity (€)}} \right]}$$

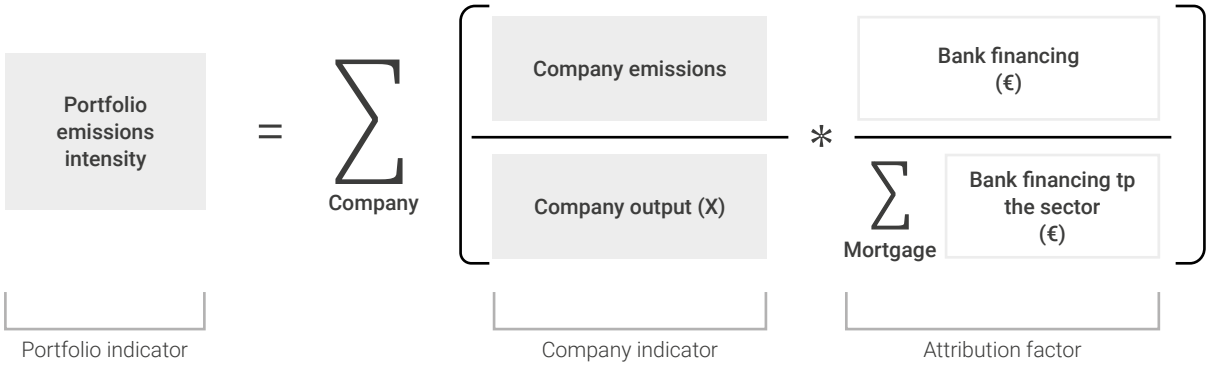
Portfolio indicator | Company indicator | Attribution factor

Variable for the denominator of the attribution factor is dependent on the asset class.
Variable for company emissions is based on the self-reported emission.
Variable for company output is a productivity-based metric such as vehicle produced.

Weighted average carbon emissions intensity (WACI) approach

The formula as presented is based on tailpipe emissions as the primary metric due to their intensity format (emissions per kilometer). For banks who have included Scope 1 and Scope 2 emissions for their target setting, a convergence is required as they are typically reported in absolute terms. Therefore, to adjust the formula for Scope 1 and 2 emissions in calculating portfolio emission intensity, it is necessary to convert the latter into an intensity metric.

Equation 4: Weighted average carbon emissions intensity (WACI) approach



4.4 Benchmarking approaches

Scenarios distribute the available global carbon budget over time and sectors along different trajectories. These macro trajectories are then distributed to create individual benchmarks for counterparties and financial institutions. Three approaches are possible; when choosing between these designs, it is important to consider the incentives they create for the counterparties being measured. In addition, a portfolio's geographic distribution is an important consideration when choosing a benchmarking approach and calibrating the benchmark.

The **convergence approach** implies that all counterparties are encouraged to converge to desired industry-average emissions levels. This metric is **applicable to emission intensity metrics only.**

The convergence approach disadvantages counterparties that are more carbon-intensive than their industry average, while reducing incentives for counterparties with below average emissions intensity to continue decarbonisation. A limitation of this approach is that it may not always be possible to extract an emissions intensity convergence pathway from available scenarios for sectors without commonly modelled homogenous units of production (such as vehicle types, manufacturing processes, and supply chain complexities).

The **contraction approach** implies that all counterparties are encouraged to reduce emissions at the same desired industry-average rate. It is applicable to metrics expressed in both intensity and absolute units. However, the contraction rate depends on the underlying metric.

The contraction approach is the reverse of the convergence approach: it disadvantages

counterparties that are less carbon-intensive, while reducing incentives for counterparties that are more carbon-intensive to decarbonise. Since the same rate of reduction is applied to all companies, irrespective of their current performance and past efforts, a company with a relatively low emission intensity today would have to reduce its emissions by the same percentage as a carbon-intensive company.

The **fair share approach** defines the average rate of reduction in emissions for an industry but recognises that individual counterparties will be better- or worse-performing than average. Based on comparing the counterparty's emissions intensity to its industry average, this approach creates a counterparty-specific rate-of-reduction benchmark for absolute emissions. Thus, with this approach, metrics are only expressed in absolute emissions units.

Since the fair share approach combines the convergence and the rate-of-reduction approaches, it preserves the benefits while eliminating the challenges of both.

However, the fair share approach has seen limited uptake so far due to underlying assumptions that drive uncertainty when operationalised. This is a particular challenge when attempting to account for a corporate's growth within the benchmark. Financial institutions have noted that this trade-off between the robustness of portfolio alignment methodologies and the ease of computation and/or comprehension is a key barrier to adoption.

The selection of one of these approaches has important implications for the data to be considered (i.e. emissions intensity, absolute emissions, or production capacity) and compatibility with forward-looking scenarios. For example, while sometimes using emissions intensity–based convergence pathways may be the preferred choice, it may not be feasible to extract an emissions intensity convergence pathway from available scenarios for sectors without standardised units of production.[52]

4.5 Data

The following list is an indicative overview of data sources to analyse the automotive industry. To maintain data integrity and accuracy, it is essential for data to remain consistent, the underlying methodology to stay uniform, and the number of data sources to be kept at a reasonable level to prevent errors in alignment and integration.

Asset Impact (asset-impact.gresb.com/)—formerly known as Asset Resolution
Data provider funded by from Climate-KIC and the European Institute of Innovation and Technology (EIT)

Auto Forecast Solutions (autoforecastsolutions.com/forecasting)
AFS Forecast is a comprehensive global automotive production forecasting database solution.

Consumption data—The World Bank Benchmarking Alliance (Automotive | World Benchmarking Alliance)

European Environment Agency (eea.europa.eu/en/analysis/indicators/co2-performance-of-new-passenger)
The European Environment Agency provides a publicly avaiable database for average CO_2 emissions from new passenger cars in Europe.

JATO volumes (jato.com/solutions/jato-volumes/)
Jato provides access to valuable historical information for trend analysis, understand market trends and provides visibility of whole market for competitive positioning.

S&P Global Mobility—Vehicle production (spglobal.com/mobility/en/products/vehicle-production.html)
S&P Global Mobility Vehicle Production covers covering light, medium and heavy vehicles, across a range of forecasts for brand, model, and powertrain production. These provide information on projected volumes, future vehicle cycle plans, plant capacity utilisation, and the rapidly changing share of powertrain options due to electrification and hydrogen technologies.

Transition Pathways Initiative (TPI)—Tool transitionpathwayinitiative.org/sectors/autos
The TPI tool provides comprehensive analysis of the Carbon Performance of the 34 largest publicly listed vehicle manufacturers.

Trucost Environmental ESG Data Pack marketplace.spglobal.com/en/datasets/trucost-environmental-(46)
Trucost Environmental data offers insights into ESG metrics, allowing users to gauge portfolio climate performance, carry out exclusionary screening, and evaluate climate risk. This dataset covers metrics from GHG emissions to natural resource usage, as well as revenue details per company sector and data on fossil fuel reserves.

Wards Intelligence (Data Center: Wards Intelligence (informa.com)
Wards Intelligence is a world leader for independent, unbiased global Automotive and AutoTech Research, Intelligence, Forecasting and Consulting.

- Several national departments of transport and vehicle licencing authorities also provide data on vehicle stocks and registrations,
- The United Kingdom (gov.uk/government/collections/vehicles-statistics)
- The European Union (http://co2cars.apps.eea.europa.eu/)
- The United States of America (one.nhtsa.gov/cafe_pic/CAFE_PIC_Mfr_LIVE.html)
- China (yhgscx.miit.gov.cn/fuel-consumption-web/mainPage)

Data limitations:
Currently, there are discrepancies in how vehicle manufacturers report their emissions, particularly regarding Scope 1, 2, and 3 Category 1 and Category 2 emissions, which banks need to consider in their analysis.

Addressing these inconsistencies by working with clients toward uniform reporting practices would substantially bolster the target-setting processes for financial institutions in future assessments.

Box 5: Trends in target setting by NZBA members for the automotive sector (data and individual targets)

The following table (Table 13) displays a selection of NZBA member banks across North America, Europe, and Asia & Pacific, showcasing their choices in their individual target-setting approach. The examples given are intended to provide an overview of the different decisions and should not be interpreted as prescriptive or recommending any specific targets. The table serves as a valuable reference for understanding the range of choices and strategies employed by banks in their pursuit of net-zero targets.

The diversity in net-zero targets, as illustrated in the provided table, reflects the unique design choices made by each bank. These choices include factors such as the selected baseline year and emission intensity, as well as the scope of emissions considered. Given these differing parameters, these targets cannot be directly compared. Each target is informed by its distinct set of criteria and strategic decisions, thereby necessitating a nuanced understanding of their respective contexts and methodologies when evaluating their implications and progress.

Table 13: Trends in target setting (2023)- extended by block 6: data

Autos	ING	Barclays	Lloyds Banking Group	Deutsche Bank	TD Bank Group	DBS Bank
	Europe	Europe	Europe	Europe	North America	Asia & Pacific
Block 1: Value chain scope	Manufacturers	Manufacturers	Manufacturers; End Customer	Manufacturers	Manufacturers	Manufacturers, dedicated powertrain manufacturers, Distributors
Block 2: Vehicle scope	LDV	LDV	Manufacturers (LDV, motorcycles) End Customer (LDV)	LDV	LDV	LDV
Block 3: Emissions and Gases in Scope	Scope 3—downstream (tailpipe)	Scope 1,2,3	Scope 1,2,3 (OEMS), Scope 1,2 (End Customer)	Scope 3—downstream (tailpipe)	Scope 1,2,3—downstream (tailpipe)	Scope 3—downstream (tailpipe)
Block 4: Pathways	IEA Net-Zero 2050	IEA Net-Zero 2050 (used for bottom end of target)	Manufacturers (IEA NZE 2050) End Customer (UK CCC BNZP)	IEA Net-Zero 2050	IEA Net-Zero 2050	IEA Net-Zero 2050
Block 5: Metrics and target setting	kg CO_2/km	gCO_2e/km	Manufacturers (gCO_2e/vkm) End Customer (gCO_2e/km)	gCO_2e/km	gCO_2e/km	kgCO_2e/km

Block 6: Data (not exhaustive)	Asset Impact and Auto Forecast Solutions	Asset Impact; S&P Trucost	Manufacturers (Corporate disclosure) End Customer (Motor leasing and financing data)	Refinitive, Asset Impact	S&P Trucost, Asset Impact, IEA	Client reported data, publicly available disclosures
Reduction Target	-49%	Range: -40%-64%	-47%	-59%	-50%	-57%
Baseline	199 gCO_2/vkm	167.2 gCO_2e/vkm	217 gCO_2e/vkm	190 gCO_2/vkm	194 gCO_2e/vkm	120 gCO_2/vkm
2030 Target	97.51 gCO_2/vkm*	Range: 100.32-66.88g CO_2e/vkm *	115 gCO_2e/vkm	77.9 gCO_2/vkm *	97 gCO_2e/vkm	52 gCO_2/vkm
Baseline year	2020	2022	2020	2020	2019	2020

* Number calculated based on disclosed information

The usage of data sources varies significantly and is dependent on the graphical target market. However, it is noted that a majority of banks do not provide details on their data sources. The most reoccurring sources that are reported are: client data, Asset Impact and S&P Trucost, S&P Global Mobility.

Conclusion

The transition of the automotive sector to net zero will require coordinated action from all players across the automotive value chain, as well as the financial sector and policy-makers. Banks can play their role by assisting clients in reducing their carbon emissions and shifting to new technologies. Banks have several levers to assist their clients, e.g. through corporate financing channels like corporate lending, captive finance, and fleet loans, as well as private financing avenues such as direct vehicle loans.

Setting net-zero-aligned sectoral targets as part of a broader strategy to transition a sector can allow banks to:

- Explore various financial mechanisms to accelerate the decarbonisation in the sector.
- Better serve different market segments with tailored products for both private and corporate clients.
- Engage corporate clients to support the development of their net-zero strategies.
- Collaborate with clients to improve data transparency and standardisation.
- Update their own internal processes like due diligence, credit criteria, and pricing.

To date, banks have adopted a range of approaches when designing emissions targets in the automotive sector. This paper sets out the design choices relevant for banks setting targets to reduce Scope 1, 2, and 3 emissions associated with their financing for vehicle manufacturer and OEM clients. It focuses on this part of the automotive value chain because decisions on vehicle design made by vehicle manufacturers and OEMs have an outsized impact on the lifecycle emissions of a vehicle. This enables banks to influence emissions arising from the inputs, manufacture, and use of LDVs.

Banks are also encouraged to work with stakeholders across the value chain, beyond what is covered in this paper, to reduce their overall financed emissions.

Banks face challenges when setting targets in this sector, but, over time, improved data availability, regulatory standards like the International Sustainability Standards Board (ISSB) and national legislation, will enable banks to improve the accuracy and comparability of target-setting approaches.

This paper aims to assist NZBA members and the wider banking sector in setting financed emissions automotive targets and starting to engage with their clients to facilitate their transition to a net-zero economy.

Call-to-action for policymakers

All actors involved in the automotive industry have the responsibility to take action to support the transition to net zero. Vehicle manufacturers in particular have the greatest influence on design choices that impact vehicles' emissions during the use phase. Banks' role is to support their clients in the automotive sectors to take the necessary steps to decarbonise and transition in line with net zero.

Governments' vital role is to ensure that policy frameworks align with developments in the automotive industry and actively enable the successful transition of the sector. Three specific areas that we encourage governments and policymakers to focus on are below:

1. Increase speed and availability of electric vehicle (EV) charging infrastructure

A key barrier to the adoption of EVs by consumers is the perceived lack of charging infrastructure and comparative time to charge an EV compared to filling up a tank of an internal combustion engine (ICE) vehicle. Governments should prioritise action to address this issue, aiming to scale up available fast-charging infrastructure, as well as innovative concepts such as battery swapping for two-wheelers. This will help drive consumer demand for EVs and accelerate the shift.

In some regions, the barrier to installing new, rapid charging infrastructure is due to an insufficient local capacity of the grid or lack of public funding as it is perceived to expand the national debt without corresponding financial gains.

2. Decarbonise and expand the capacity of the electricity grid

Action needs to be taken to transition the power generation sector towards renewable energy sources and prepare the electricity grid for the scale up of EVs. As EV adoption increases, the additional electricity consumption of an EV could range from 1.2–1.6 times the average annual household electricity consumption in Europe; 1.4–1.8 times in the United States of America; and 1.3–1.7 times in Japan. Policy action needs to further accelerate the transition of the power sector towards renewable energy sources to ensure the shift to EVs has maximum impact on addressing automotive emissions. At the same time, grid capacity needs to increase to manage the growing demand expected from the shift to EVs.

3. Promote energy reduction per vehicle and low-carbon transport infrastructure

The electrification of multiple sectors, including the automotive industry, will result in increased demand on existing power grids, which will be challenging to fully supply even if capacity is increased. Therefore, in addition to building capacity, there is also a need for policies that aim to reduce the energy demand per vehicle, e.g. by encouraging smaller, less energy-intensive vehicles, as well as incentivising sustainable transport networks, such as bike lanes, public transportation, etc. Such incentives would not only reduce the demand on the energy grid, but also reduce GHG emissions in the production process—as smaller vehicles would use less material, including transition metals.

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Annex A: Definitions and terminology

Value chain stakeholders

Vehicle users/end customers are a group of private users or corporate clients. A distinction can be made within the stakeholder group between the individuals using the end of product (e.g. private vehicle owners, corporates leasing cars) and business entities generating income through a vehicle-based business model (e.g. vehicle lease companies). The levers to influence choice and use of vehicle can be different.

Distribution and sales stakeholder entail directly linked or independent vehicle dealers who focus solely on vehicles sales to the end customers, and deal with any after-sale-services.

Original equipment manufacturers (OEMs) are the producers of a vehicle who are responsible for the final assembly and manufacturing of a vehicle.

Suppliers manufacture the inputs that become part of a vehicle or are used during the production process of a vehicle, such as batteries, tires, software, screws, or entire assemblies. These can supply directly or indirectly to an OEM and can be subdivided into parts suppliers, component suppliers, and system/module supplier.

Endnotes

1 Original equipment manufacturers (OEMs) are the producers of a vehicle who are responsible for the final assembly and manufacturing of a vehicle.

2 GFANZ (2022) "Measuring Portfolio Alignment" assets.bbhub.io/company/sites/63/2022/07/GFANZ-Portfolio-Alignment-Measurement-August2022.pdf

3 Intergovernmental Panel on Climate Change (IPCC) (2022). *Transport. In: Climate Change 2022: Mitigation of Climate Change*, p. 1052. ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter10.pdf

4 UNEP (2022) *Emissions Gap Report 2022* unep.org/resources/emissions-gap-report-2022

5 ICCT (2021) *A Global Comparison of the Life-Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars* theicct.org/wp-content/uploads/2021/07/Global-Vehicle-LCA-White-Paper-A4-revised-v2.pdf

6 IEA (2023) *An Updated Roadmap to Net Zero Emission by 2050* iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

7 The definition of zero emission vehicles is pertinent to national legislation and regulation. In this context, zero emission vehicles are defined as vehicles that do not exhaust greenhouse gases, meaning predominantly electric and hydrogen vehicles. This paper focuses mainly on electric vehicles.

8 This engagement can be reflected in individual targets specific to mining of minerals

9 For further definitions go to Annex A: Definition and Terminologies

10 Banks finance many manufacturers who may produce a single component or multiple components. The emissions from production of these components will be very different. This raises three challenges:
   a. Scoping the components to track emissions.
   b. Benchmarking performance of component manufacturers
   c. Finding a relevant metric (intensity vs absolute) and data (at a component level) to track performance.

11 europe.autonews.com/automakers/bmw-mercedes-audi-others-race-make-entire-supply-chain-greener www3.weforum.org/docs/WEF_Forging_Ahead_2020.pdf

12 This can be addressed by including Scope 3 Category 1 (Purchased good and services) in a bank's analysis. However, currently the reporting of this category is not as reliable as Scope 1 and 2 reporting.

13 www3.weforum.org/docs/WEF_Forging_Ahead_2020.pdf

14 While pathways exist for Scope 3 emissions Category 11 (Use of sold products), fleet owners (such as multimodal logistics companies, business fleets are likely to have different types of vehicles, 2 wheelers, LDVs, HDVs, Ships and Airplanes. The difference between hand ownership and vehicles purchased from secondary markets needs to use various pathways and make assumption around different kind of ownerships to benchmark progress. This includes emissions data broken down by vehicle segment (aircrafts, HDVs, LDVs ec). In contrast, direct vehicles loans to individual customers can be benchmarked against the well-established scenarios.

15 Banks can set separate targets for OEMs and consumers to accurately benchmark progress in the different business units.

16 theclimategroup.org/ev100-members

17 theclimategroup.org/sites/default/files/2021-07/Fleets%20first%20report.pdf

18 weforum.org/docs/WEF_Forging_Ahead_2020.pdf

19 The IEA in its WEO 2022 report defines light duty vehicles as "passenger cars and light commercial vehicles (gross vehicle weight <3.5 tonnes)".

20 afdc.energy.gov/data/10380#:~:text=EPA%20defines%20vehicle%20categories%2C%20also,(GVWR%20%3E%208%2C501%20lb).

21 The IEA in its WEO 2022 report defines heavy duty vehicles as "medium-freight trucks (3.5 to 15 tonnes) and heavy-freight trucks (>15 tonnes)".

22 IEA (2021) "A Roadmap to Net Zero Emission By 2050" iea.org/reports/net-zero-by-2050

23 More information can be found in PCAF (2022) The Global GHG Accounting and Reporting Standard Part A: Financed Emissions (section 5.3 Motor Vehicle Loans)

24 Data is mostly collected on a self-declaration basis, introducing potential inconsistencies and errors. Banks going forward could collect data systematically on an asset-level. For loans to retail customers or e.g. taxi companies regulatory data is available given there is clarity on new vehicle ownership and banks are aware of double counting (section 4.1 Table 1).
Those regulatory incentives are, e.g.
- the EU (http://co2cars.apps.eea.europa.eu/),
- the United States of America (one.nhtsa.gov/cafe_pic/CAFE_PIC_Mfr_LIVE.html),
- China (yhgscx.miit.gov.cn/fuel-consumption-web/mainPage); these markets account for the largest share of global vehicle sales.

For the calculation of emission intensities in other markets, methodologies such as the from the Transition Pathways Initiative (TPI 2023) can be referenced.

25 Stakeholder highlights in light grey and (*) are not part of the automotive stakeholder relationship; Scope 1,2 and 3 are classified from the auto manufacturer's perspective.

26 Note: Emissions from vehicle components overlap with heavy industry and mining Scope 3 emissions

27 Iron & steel and aluminium are also sectors that require targets under the NZBA framework.

28 Banks need to remain consistent in their methodological approach by including both upstream component production emissions (Scope 3) and components manufactured by the OEM (Scope 1).

29 To avoid double-counting banks would require data on each supplier-manufacturer as well as a consistent methodology on how vehicle manufacturers emissions were calculated. As a bank could be financing both suppliers, as well as vehicles manufacturers.

30 For additional information on information, please go to Corporate Electric Vehicle Alliance (2023) "Electric Vehicle Batteries A Guidebook for Responsible Corporate Engagement Throughout the Supply Chain", a publication led by CERES in cooperation with the UC Berkeley Center for Law, Energy and Environment (CLEE) focusing on the US market law.berkeley.edu/wp-content/uploads/2023/09/CEVA-Electric-Vehicle-Batteries_A-Guidebook-for-Responsible-Corporate-Engagement.pdf

31 Emissions from charging from home are becoming increasingly important with the adoption of EVs. Some EV manufacturers have recognised this and started to calculate and disclose these emissions.

32 It is noted that when biofuels are included, tailpipe emissions might not be considered zero. The calculation might be dependent on regional legislation.

33 Manufacturers often calculate tank-to-wheel emissions based on the fuel efficiency of the vehicles in question (test cycles), the total lifetime distance covered by the vehicles being manufactured. Alternatively, manufacturers also tend to use vehicle passenger's load factors (if intensity is calculated based on passenger / tonne kms). For further details refer to CDP reports of vehicle manufacturing companies.

34 Cf. ICCT (2021)—A Global A Global Comparison Of The Life-Cycle Greenhouse Gas Emissions Of Combustion Engine And Electric Passenger Cars Publication Link

35 SBTI (2021)—"Transport Science-Based Target Setting Guidance" sciencebasedtargets.org/sectors/transport#our-updated-oems-policy. SBTi (2023) is currently developing a 1.5°C pathway for auto manufacturers. The final version was not available at the time of publication.

36 Tank-to-wheel is included in this categorisation.

37 For additional information on scoping emissions for motor vehicle loans or leasing activities, see PCAF (2022) The Global GHG Accounting and Reporting Standard Part A: Financed Emissions.

38 Guidelines for Climate Change Target Setting for Banks can be found on UNEP FI's website: unepfi.org/net-zero-banking/commitment/

39 To support the pathway development and due to lack of granular scenarios, banks have in the past used IEA B2DS (beyond 2°C scenario) for their net-zero target setting in the automotive sector. As the NZBA Guidelines require a "low overshoot" scenarios," and should have a >50% probability of limiting global warming to 1.5°C, this analysis does not include the IEA B2DS scenario in more detail.

40 By the time of publication, different methodologies to avoid these inconsistencies are available or in the process of being developed, e.g. from the Transition Pathways Initiative (TPI 2023), which includes a 1.5°C pathway for Scope 3 Category 11 (Use of Sold Products) emissions, or SBTi (2023), who are currently developing a 1.5°C pathway for auto manufacturers.

41 The Networking for Greening the Financial System (NGFS) is a group of central banks and financial supervisors, which on a voluntary basis are willing to share best practices and contribute to development of environment and climate risk management of the financial sector, and to mobilise mainstream finance to support the transition towards a sustainable economy.

42 McKinsey (2022) "Mobility's Net-Zero Transition: A Look at Opportunities and Risks" mckinsey.com/industries/automotive-and-assembly/our-insights/mobilitys-net-zero-transition-a-look-at-opportunities-and-risks

43 Load factor refers to the ratio of the average load (or demand) on a system to its maximum capacity or peak load during a specific period, usually over a day or a year.

44 NZBA (2021) "Guidelines for Climate Target Setting for Banks" unepfi.org/wordpress/wp-content/uploads/2021/04/UNEP-FI-Guidelines-for-Climate-Change-Target-Setting.pdf

45 It is important to note that emissions intensity can be expressed as either physical or economic intensity. Using physical intensity metrics has many benefits, including a stronger link to counterparty production decisions and less exposure to volatile economic indicators. Economic intensity can be used more broadly, bearing in mind that it introduces substantial volatility and may be difficult to extract from forward-looking scenarios during benchmark construction. tcfdhub.org/wp-content/uploads/2021/10/PAT_Measuring_Portfolio_Alignment_Technical_Considerations.pdf

46 Challenges when used: The metric doesn't account for passenger or cargo load factors of different types of vehicles. Bigger vehicles such as SUVs/Light Trucks usually have a higher carrying capacity of passengers and cargo. As, vehicle sharing (such as car pooling) increases, the metric may underestimate the actual rate of decarbonisation as more passengers travel per unit distance.

47 Challenges when used: The metric requires modelling of passenger load factors in a net-zero scenario (until 2050 and beyond). Currently there is limited data availability on actual and modelled passenger load factors (in a 1.5°C aligned net-zero scenario). Moreover, "passenger kms" might not be an appropriate unit for light commercial vehicles, which usually carry cargo (and therefore might require conversion of cargo to passenger equivalent).

48 Challenges when used: The metric has similar challenges with data availability and scenario modelling to "passenger kms". Additionally, to use this metric for passenger cars, assumptions need to be made on conversion of passengers to tonne, which (if not standardized across industry) can produce a range of results.

49 Challenges when used: When used to measure tank-to-wheel emissions (especially if only metric reported), the metric can be challenging. Currently, test cycles such as WLTP measure emissions per vehicle km. Assumptions need to be made on vehicle lifetime kms to convert emissions per km to emissions per vehicle (which might not be absolutely necessary).

50 For additional explanation, please refer to Partnership for Carbon Accounting Financials (PCAF 2022).

51 Partnership for Carbon Accounting Financials PCAF (2022) "The Global GHG Accounting and Reporting Standard Part A: Financed Emissions." Second Edition carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf

52 Portfolio Alignment Team (2021) "Measuring Portfolio Alignment: Technical Considerations" tcfdhub.org/wp-content/uploads/2021/10/PAT_Measuring_Portfolio_Alignment_Technical_Considerations-9.8.pdf