Credit Portfolio Alignment

An application of the PACTA methodology by Katowice Banks in partnership with the 2 Degrees Investing Initiative

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BBVA ING Standard Chartered

SOCIETE GENERALE BNP PARIBAS

2i investing initiative

Introduction

The **concept of aligning** finance with the UNFCCC 2015 Paris Agreement has emerged recently as the new paradigm for operationalising and increasing climate action within the financial community. This concept captures the fact that financial flows need to be "consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (article 2.1.c) so as to hold "the increase in the global average temperature to below 2°C above pre-industrial levels" and if possible 1.5°C (article 2.1.a).

At the 2018 COP24 in Katowice, five international banks - **BBVA, BNP Paribas, ING, Société Générale and Standard Chartered** - publicly pledged to develop an open-source methodology to progressively steer (or 'align') our lending portfolios with the goals of the Paris Agreement. This pledge is known as the Katowice commitment. This commitment was echoed by the Collective Commitment on Climate Action (CCCA) launched in September 2019 on the signing of the UNEP-FI Principles for Responsible Banking as a first example of how the Principles can be made actionable. The CCCA was signed by 36 international banks, including the five 'Katowice Banks'(KB).[1]

Since 2018, in addition to undertaking individual efforts, the Katowice Banks as a group has worked collectively with a think tank- **the 2 Degree Investing Initiative** (2DII), which has developed an approach to measure the alignment of lending portfolios with climate scenarios. This approach, the Paris Alignment Capital Transition Assessment (**PACTA**) for Corporate Lending Portfolio takes the form of a methodology[2] and an open-source tool which can be applied by any interested bank. Close to twenty "systemically important" banks have taken part in this pilot and the ambition is to expand this coalition further.

This document provides an **overview of the application of the PACTA methodology and the options viewed as most useful by the Katowice Banks.** As far as possible, we have sought to align our application of PACTA to make results comparable across banks for the benefit of our stakeholders. Sometimes, we have suggested improvements to the PACTA methodology to ensure that the indicators developed are enablers of the transition. Our goal is to develop indicators that are fit for taking portfolio-reallocation decisions; indicators that help us work with existing clients and accompany them towards lower carbon practices, thereby reducing emissions on the ground.

By sharing our insights and learning, we are willing to help and inspire other banks to use PACTA and contribute further to its development and consistent use. The aim of this document is also to help banks get started by making use of the countless hours we have spent applying and refining this methodology with internal sector experts, clients and stakeholders. With the climate crisis, time is of the essence and it is our hope that this document will help catalyse adoption and decision-making internally. To this end, we are also contributing individually to the working groups established under the PRB CCCA and look forward to sharing our efforts with and learning from the 36 signatory banks.

Of course, while significant steps forward have been made, this is the beginning of a journey. We as peers will continue to collaborate to refine methodologies, develop new potential indicators and push for more accessible and better quality climate data and scenarios. We welcome comments, questions and suggestions from all our stakeholders (clients, peers, regulators and civil society) so that we can continue to improve the methodology and ensure that we contribute to the goals of the Paris Agreement. We are convinced that our collaborative work will continue in an iterative process and we welcome the feedback of our partners and peers. This is the way forward to enable convergence in methodologies, while doing justice to the wide range of views and options available and continuously evolving.

This document is structured as follows:

- Sections 1 and 2 present the general approach and methodology used by the Katowice Banks based on 2DII's PACTA approach.
- Sections 3, 4, 5 offer details of the application of the methodology to the Automotive, Power Generation and Fossil Fuel (oil & gas and coal extraction) sectors. For Automotive and Power, we applied closely the PACTA methodology without major alterations. However, for fossil fuels, KB have built on the PACTA indicators which were under development and are suggesting new alignment indicators for the sector. This process and the proposed indicators have been prepared in close collaboration with 2DII.

1 UNEPFI Collective Commitment on Climate Action https://www.unepfi.org/news/industries/banking/collective-commitment-to-climate-action/

2 Final PACTA methodology https://www.transitionmonitor.com/pacta-for-banks-2020/

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1.1. Alignment as a concept and a process

THE DEFINITION OF ALIGNMENT

Article 2.1(c) of the Paris Agreement mandates country parties to "make financial flows **consistent** with a pathway towards low greenhouse gas emissions and climate-resilient development".[3]

Aligning with the Paris Agreement is a concept that implies that companies, irrespective of sector, are reducing or stopping activities that are harmful to the goals of the Paris Agreement and are supporting activities that contribute to it in line with the required speed and volume established by climate science.

For financial market participants, alignment implies engaging clients to reorient their investment plans to ensure consistency with the Paris Agreement and reorienting financial flows away from non-consistent activities and/or scaling-up consistent activities.[4] **'Financial flows' can take the form of any financial instrument product or portfolio. 'Activities' can refer to anything from an asset, a company, an industry or a country.**

AN APPROACH TO ALIGNMENT

Alignment can also be defined as a **process** that requires:

Measuring

The performance of a portfolio compared with the scenario metrics (e.g. CO_2 intensity of the sector portfolio at a point in time).

Setting targets

Based on the end goal and trajectory for the portfolio to be consistent with the Paris Agreement's goals

Reorienting or steering

The financial flows so that they stay on track with the trajectory[5] and the end goal.

Tracking progress

Ensuring that the portfolio remains on track to meet the end target.

The next sub-sections discuss how this is done.

MEASURING ALIGNMENT

Measuring alignment requires drawing links between **financial instruments**, the **clients' activities** being financed, and the **goals of the Paris Agreement**. Drawing those links involves:

- An understanding of what 'Paris-aligned activities' entail: How should the 'less than 2°C goal' be translated into operational indicators at the level of a specific economic activity?
- An assessment of the contribution of clients' activities with the Paris Agreement: What is the positive or negative contribution of a clients' activity compared with the Paris goal?
- Allocating the contribution of a client-specific activity to the financial institution: How should the client's activities be allocated to the instrument that finances them?

3 United Nations (2015) Paris Agreement https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

4 I4CE (2019) A Framework for Alignment with the Paris Agreement: Why, What and How for Financial Institutions? https://www.i4ce.org/wp-core/wp-content/uploads/2019/09/I4CE%E2%80%A2Framework_Alignment_Financial_Paris_Agreement_52p.pdf

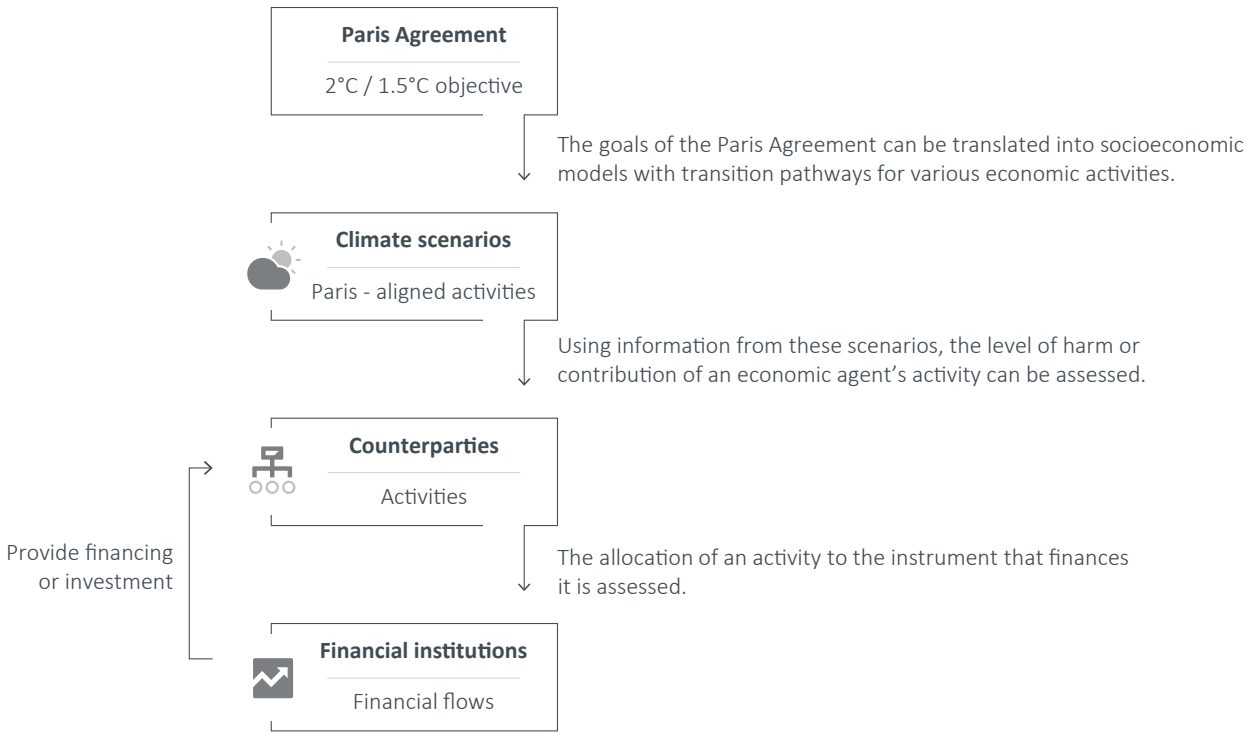
5 See 2.4 scenario benchmarks for further details of this issue

First, the 'goals' of the Paris Agreement (achieve well below 2°C and if possible 1.5°C increase in average temperatures relative to pre-industrial levels) can be translated into usable data and indicators using a **climate scenario**. Such socioeconomic scenarios outline the potential pathways needed to reach the Paris goals. They operationalises the Paris Agreement into carbon budgets and sector-specific transition pathways or 'technology roadmaps' using the shift in types of physical asset (e.g. from brown to green power plants) over time and financial metrics to show a potential pathway to achieve the global warming target. In this document, we refer to these physical and financial metrics as **scenario benchmarks:** they reflect the specific transition pathways for a given activity (a technology, a commodity, a process or an industrial sector), depending on the sector and activity (e.g. in automotive, a shift to zero-tailpipe emission propulsion technology, while in steel the focus would be on a shift in the industrial process of steelmaking).

Financial institutions participate in such activities indirectly through the investment or financial services provided to their clients (or counterparties), which can be anything from an asset, an individual, a company, an industry or a country. The negative or positive contribution (or impact) of the counterparties' operations is captured using an **indicator**, for instance, using the counterparty electricity production mix for the power sector or emission intensity of oil & gas production for the fossil fuel sector, etc. Several types of indicators may be used to represent various features of the transition: some indicators may capture technological **substitutions** (i.e. decrease in brown and increase in green, such as switching from conventional to electric cars), while others may capture the technological **improvement** (e.g. increasing the energy efficiency/decreasing the CO_2 intensity). And for sector where a phase out is needed, for example, the coal sector, **a change in the total financing provided** can also be adequate.

Lastly, a critical question to address is how a client activity is allocated to the instrument that finances the development and operation of that activity. This is often referred to as the **allocation rule.** Allocations can be made at client or portfolio level. FIGURE 1 summarises these three steps

FIGURE 1 | *Approach to measuring alignment*

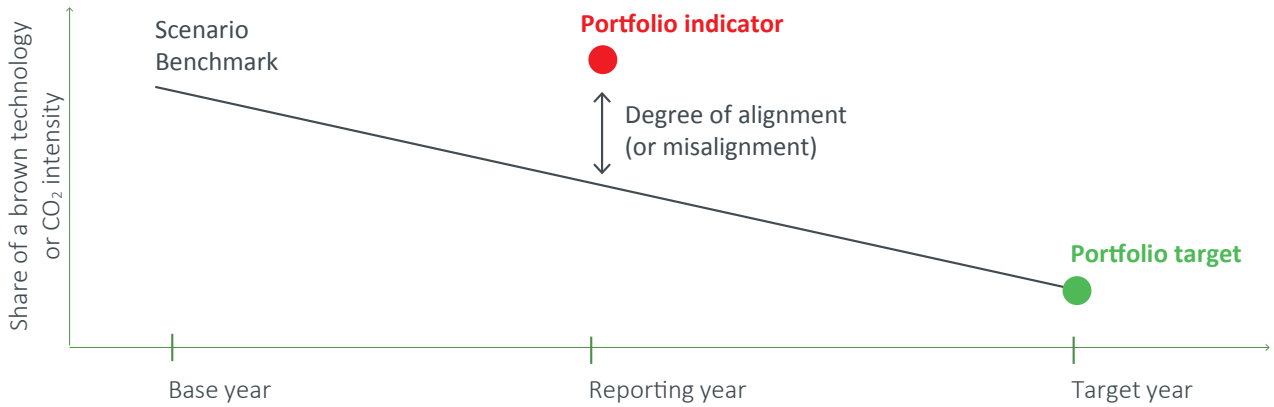


TARGET-SETTING

Target-setting means defining which benchmark is being used, what long-term **target** can be set and what is the **trajectory** the portfolio should follow to be consistent with a transition pathway to reach the Paris goal.

The degree of alignment between the financial instrument **indicator** can be assessed against the level of a **benchmark** from a climate scenario. The financial instrument is considered **'aligned'** if the **level** of the indicator is below that of the benchmark for decreasing benchmarks (brown activities) or above for increasing benchmarks (green activities). **FIGURE 2** shows an illustration of a portfolio being misaligned with a benchmark. Alignment can also be measured at portfolio, client or asset level. For assets and clients, it provides information that can be used to inform and eventually accompany clients where there is the greatest misalignment.

FIGURE 2 | *Illustration of alignment at portfolio level*



STEERING

Steering is the process of reorienting the financial instrument so that it stays on track with the trajectory.[6] It can be achieved at portfolio level, either by accompanying existing counterparties to align their activities, or by adjusting the customer base (ending relationship with less aligned clients or starting relationships with better aligned companies).

6 See 2.4 Scenario benchmarks for further details on this issue.

SUMMARY OF TERMS AND DEFINITIONS

For the sake of clarity, the key terms used in this document are summarised here:

Activity
An economic activity is the output of an asset.

Allocation rule
The assumption (or rule) used to allocate an economic activity (physical asset) to a financial activity (financial instrument).

Alignment
The concept and process of "making financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

Asset
A physical means of production developed and operated by counterparties.

Counterparty
The opposite party in a contract or financial transaction, typically a bank's clients.

Climate scenario
A plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g. rate of technological change, prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are useful to provide a view of the implications of developments and actions[7].

Financial instrument
Can be any sort of banking products, which can be considered at counterparty or portfolio level.

Indicator
A quantitative metric that gives an approximation for financial institutions of the level of harm or contribution of their financial instrument to global warming. It can be expressed in physical units (fossil fuel production volume, total power capacity in each technology, emission intensity of each technology/ sector…) or in financial units (capex investments in each power technology…). It can be used at portfolio, counterparty or asset level (although often called 'portfolio indicator' for simplicity).

Steering
The process of capital allocation decisions to ensure the financial instrument indicator remains on-track with the trajectory and the target defined.

Target
The portfolio's end target to demonstrate alignment with the scenario benchmark.

Target-setting
The process of setting an end target and intermediate trajectory for the indicator to reach alignment with the Paris goal.

Trajectory
The path an indicator should follow to demonstrate alignment with the scenario benchmark.

7 https://www.ipcc-data.org/guidelines/pages/glossary/glossary_s.html

1.2. Distinctive features of the application of PACTA by Katowice Banks

KEY PRINCIPLES OF THE APPROACH

The PACTA methodology used by the Katowice Banks, which is also similar to the Poseidon Principles for measuring alignment in the shipping sector[8], maintains the following key methodological principles:

1. As described in the Paris Agreement, financial flows can be aligned with either or both mitigation and adaptation objectives. Mitigation is about reducing the impact of climate change, while adaptation is about adaptating to its effects. The approach focuses the measure of **mitigation objectives but not on adaptation objectives at this stage.** Indeed, the state of knowledge on adaptation objectives and pathways is such that there is still not the same breadth of scenarios and data to measure adaptation alignment.
2. The approach is **scenario-agnostic** in the sense that it can adapt to various climate transition[9] scenarios and thus various transition pathways; provided it is developed in a rigorous manner and meets the objectives of the Paris Agreement.
3. The approach is **data-agnostic,** meaning any input data (provided it comes from a quality-assured source) can be used in the model. Climate-related data may suffer from number of limitations, including data coverage, matching and quality. Annex B provides an illustration of Katowice Banks' experience with climate data.
4. **The approach can be applied to any financial instrument** (financial product or portfolio) for credit activities as well as asset management. However, in this document, the focus is largely on **corporate credit portfolios,** as opposed to asset management or other financial services.
5. **Each economic sector/activity is described by its own set of indicators and refers to its own benchmark and targets.** Climate scenarios show there is not one but a set of transitions that vary across sectors, regions and timeframes. To capture these nuances, it is therefore important to have sector-specific targets (as opposed to a global one, such as total CO_2 emissions). For consistency, Katowice Banks aim to rely on a single climate scenario for all sectors. However, in practice this can be difficult as some scenarios do not provide indicators for all industries. In this case, Katowice Banks may therefore adopt a benchmark from a variety of climate scenarios. In doing so, the sector-specific scenario needs to have as consistent a temperature ambition as the other benchmarks.
6. Katowice Banks believe it is more meaningful climate-wise to work with existing clients and accompany them towards lower carbon practices, thereby attempting to reduce emissions on the ground. An approach of **engagement over divestment** is prioritised. The Katowice Banks realise that this approach, although more meaningful, may require a long-term engagement strategy, while immediate divestment may be viewed by some as producing faster alignment 'results' in the shorter term. While this is recognised, we still feel that encouraging transition through our support will ultimately be more beneficial to climate change mitigation than only reshuffling our portfolios. That being said, divestment is not ruled out if no other options remain and clients do not show signs of transitioning.
7. To track the impact associated with a bank's financing and to enable steering, this approach focuses on **asset-level data.** Measuring alignment is also by essence a **forward-looking** exercise. Whenever possible, the selected data sources feature production and emission forecasts. Likewise, banks may choose to consider the maturity profile of their lending portfolio, therefore enabling a forward-looking alignment analysis.

8 Poseidon Principles (2019) https://www.poseidonprinciples.org/download/Poseidon_Principles.pdf

9 For target-setting, only "below 2°c" scenarios are used, but for measuring misalignment any climate scenario can be used.

DISTINCT FROM CARBON ACCOUNTING

PACTA, and its application by Katowice Banks, is **quite distinct from a carbon footprint approach.**[10] A carbon footprint approach involves estimating the total amount of CO_2 emissions associated with a portfolio. As an output, carbon footprinting gives a single-figure indicator (CO_2 emission of the portfolio) and an estimate of which sectors are carbon-intensive versus those that are not. While this approach is useful to help a bank to identify the 'hotpots' in the portfolio that need action first, the top-down estimates make the approach a means to arrive at an estimated measurement, not a methodology for target-setting or portfolio steering. Target-setting for portfolio climate alignment requires a sector-based approach like that of the Science Based Targets Initiative's Sectoral Decarbonisation Approach (SDA) or PACTA (PCAF, 2018 p. 94-97).

Katowice Banks find the PACTA and Poseidon Principles approaches more suitable for steering portfolios because they are more closely connected to a client's strategy and operations. These approaches seek to identify the technological drivers for change for each sector (e.g. the most promising steelmaking technology) and find out how their customer base and financing compare with the scenario technology roadmap. It is therefore adapted to sectors where there is a specific homogeneous technology, process or infrastructure that drives clients' strategic decisions. By defining sector-specific indicators and relying on asset-level data, the PACTA approach gives an insight into the possible transition pathways companies could make and how banks can help them follow these pathways.

There is no perfect approach, and carbon footprint methodologies may be more suited to specific portfolios depending on financial institutions' needs. However, the Katowice Banks and 2DII have identified several limitations inherent in carbon footprint approaches for credit portfolios that concern the aggregation of absolute emissions (or volumes of emissions) at portfolio level:

- Aggregating absolute emissions across portfolios is challenging and often time incomplete: Carbon footprint measures are frequently limited to scope 1 and 2, although they typically represent a fraction of some industries' emissions[11]. Scope 3 emissions data typically results from estimations rather than measurements. And carbon footprint approaches often face the difficult challenge of allocating the responsibility for scope 3 emissions across industries without double counting. For example, are emissions associated with oil consumption the responsibility of the oil & gas industry or the automotive sector? In contrast, because it focuses on transition pathways, the PACTA approach focuses on the technology indicators that can be acted upon for any possible transition pathway as long as there is a scenario and data available.
- Allocating absolute emissions to a portfolio introduces volatility, which makes it unfit for steering: To find out how much of a company's absolute emissions can be attributed to a financial instrument, carbon footprint approaches define an allocation rule. This allocation rule typically posits that the share of absolute emissions attributable to a financial instrument is equal to the ratio of the financial instrument's value and the company's total debt or asset's value:

Financial instrument's absolute emissions =
*Company's absolute emissions * Financial instrument's value / Company's total debt or asset value.*

10 For examples of carbon footprinting approaches see for P9XCA or PCAF. PCAF (2018) Harmonising and implementing a carbon accounting approach for the financial sector https://carbonaccountingfinancials.com/files/downloads/PCAF-report-2018.pdf

11 2ii (2017) "Hit and Miss: Feedback on the TCFD recommendations" http://www.tragedyofthehorizon.com/Hit-and-Miss-About-TCFD-Disclosure-Guidance-for-Financial-Institutions.pdf

But a company's total debt or asset value are financial indicators that fluctuate over time. Hence, the level of emissions attributed to the portfolio may vary depending on the financial health of a company, independently of any changes in emissions in the real economy or independently of any financing provided. Katowice Banks are keen to rely on an alignment approach that can easily be monitored and steered. It means an approach that is not volatile or dependent upon changes except for changes in the counterparty's alignment or the bank's portfolio decisions.

- Using absolute emissions at portfolio level tends to favour simple (but not necessarily impactful) decarbonisation strategies: Banks can reduce their total carbon footprint simply by lending more to certain sectors or subsectors with lower sector intensity or companies with a larger 'enterprise value' that artificially depresses the carbon footprint. For example, a carbon footprint approach might identify that emissions from the steel industry are higher than the pharmaceutical sector. As a result, the steering decision might be to divest away from the former in favour of the latter. The associated marketing suggests an emissions reduction that is entirely virtual and can be achieved without any meaningful climate action by the bank.

COMPLEMENTARY TO THE EU TAXONOMY

Finally, **alignment is not a taxonomy,** although it is a complementary exercise. A classification system, such as the EU Taxonomy[12], defines **what is green** (as well as transition and enabling activities), **but does not define what is brown** at this stage. In contrast, measuring alignment implies defining what green, transitioning and brown activities are. Moreover, a taxonomy does not say **how much and at which speed** green activities should be developed or financed. It provides information about the quality of an activity in relation to a climate objective but does not define the volume of that activity to be developed.

Alignment, however, determines how much green, transitioning and brown activities should be developed by a counterparty and by when. Likewise, it points to a scientifically defined transition pathway from brown, to transition, to green.

12 TEG (2020) TEG final report on the EU Taxonomy
https://ec.europa.eu/knowledge4policy/publication/sustainable-finance-teg-final-report-eu-taxonomy_en

SECTION 2

Methodology to measure alignment

2.1. Overview

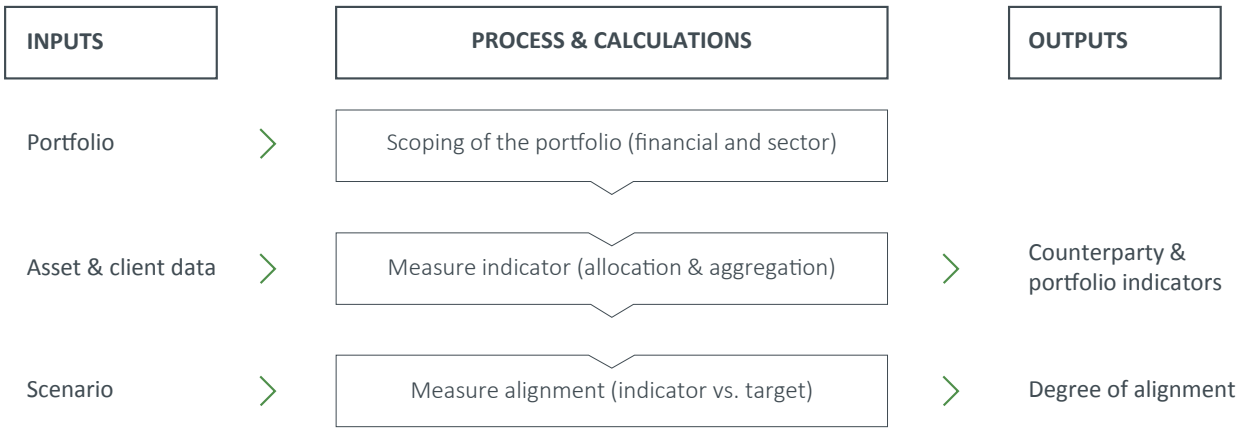
When it comes to measuring alignment, two types of output can be expected:

- The portfolio indicator; e.g. power mix, emission intensity of vehicle, etc. It can also be measured at counterparty level.
- The portfolio target and trajectory to be followed to remain on track with the Paris-consistent scenario.

Producing these two outputs requires combining portfolio data with counterparty data and scenario information. As illustrated in FIGURE 3, three steps help produce alignment figures. These steps are applicable to each of the sectors covered:

- Identifying the financial activities and sectors in scope.
- Measuring portfolio indicators, which may imply reconciling physical assets with financial assets at counterparty level and aggregating it at portfolio level.
- Measuring alignment between the portfolio and a scenario benchmark, as well as setting a target and trajectory for the portfolio.

FIGURE 3 | *Process to measure alignment*



2.2. Scope

FINANCIAL ACTIVITIES SELECTED

Katowice Banks have opted to measure alignment, accounting for the relative weight of counterparties' credit exposures in the loan book when measuring alignment at portfolio level; i.e. this is referred to as the 'capital exposure' approach in the PACTA methodology[13].

In principle, PACTA can be applied to any financial instrument between a company and a financial institution. The scope covered by the approach chosen by the Katowice Banks focuses at this stage on financing activities and includes corporate loans; i.e. banks' core lending[14]. Corporate loans represent a significant part of banks' activities. However, we recognise the importance of including underwriting, debt capital market and guarantees in the measurement of alignment and hence, these financial services and products will be explored at a later stage.

FINANCIAL INDICATORS SELECTED

Capital exposure can be measured using a variety of financial indicators, such as accounting or risk indicators. There are pros and cons for each financial indicator and the choice is left to the discretion of each bank based on factors, such as standard reporting metrics for financial disclosure and use case. The three main indicators used at this stage are listed in TABLE 1, along with a summary of why a bank may or may not apply that indicator.

TABLE 1 | *Advantages and limitations of different financial indicators*

	✚ PROS	▬ CONS
Gross commitment Drawn amount + confirmed undrawn amount, excluding for guarantees.	Considers the full support offered by a bank to a company. It considers the potential increase in the future of the drawn amount, and in the case of a revolving credit facility, a bank is obliged to provide the entire undrawn amount if a company asks for it. It also enables a comparison with standard financial reporting.	May overstate the amount a client might draw. If a client draws multiple times on its RCF in between two periods of time and repays, the commitment indicator will not change.
Exposure at Default The amount drawn + confirmed undrawn amount * credit conversion factor (a probability that the amount will be drawn)	Can reflect a risk perspective and is a proxy for the bank's capital allocation. It accounts for the probability that a client will draw on a credit line. Enables comparison with standard financial reporting.	EAD is a metric used typically for risk models, and it is typically calculated in different ways by different banks. Hence is it is not comparable.
Drawn amount The amount drawn by the client	Is the most intuitive metric as it represents the real economy impacts and therefore, funds that have or will result in direct or indirect support of economic activities within a given period. Enables comparison with standard financial reporting.	Excludes the full extent of potential financial support of a client. May be unstable, especially in times of adverse economic crisis.

13 Under the PACTA approach, two alignment exposure frameworks are possible: the 'capital exposure' and 'client relationship' exposure. Katowice Banks have opted for the former. See PACTA methodology for more details.

14 Corporate loans are defined as short-term or long-term loans granted to companies. They are mostly used as working capital for day-to-day operations and are particularly useful to finance expansion plans. They may be used for a specific development (a loan that is earmarked for a specific project) or for general corporate purposes or working capital. See PACTA methodology for more details.

SECTORS PRIORITISED

The Katowice Banks prioritise economic sectors that hold the bulk of the impact on the climate system and where the decision-making power or capacity to reduce carbon emissions directly or indirectly resides. This includes 'carbon-intensive sectors' such as the fossil fuel sector and 'green' sectors such as renewable power generation as shown in FIGURE 4.

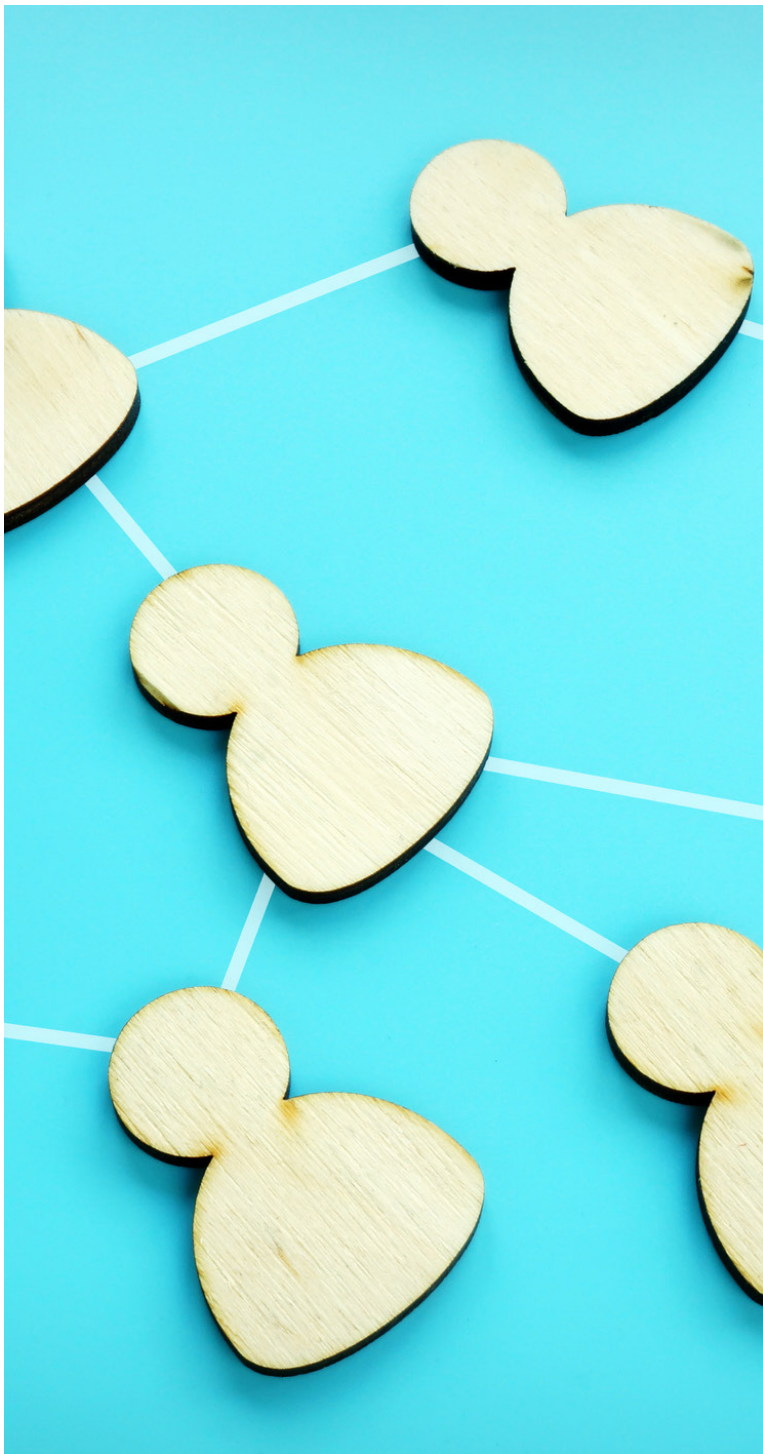
FIGURE 4 | *Priority sector and segments. Source: PACTA*

SEGMENTATION METHODOLOGY

To identify the loans that fall within the sector's perimeter, Katowice Banks use a mix of sector classifications in the bank's loan book and asset-level data matched to this loan book.

- Any sector classification can be used, either a standard one (NACE, ISIC, BICS, GICS, etc.) or a bank's internal classification. The precise definition of sectors in scope is provided in the section on sector-specific approaches.
- Using asset-level data also helps identify counterparties with exposure to a climate-relevant sector that may fall outside internal sector classifications. Along with the PACTA methodology, 2DII has developed a matching algorithm that enables the reconciliation of names of counterparties on a loan book with names on third-party databases. This matching exercise enables the identification of counterparties with assets belonging to a sector that may not have been in the correct sector classification.

For sectors related to energy supply (coal mining, oil & gas and power generation), a sub-sector segmentation is used to account for the clients' activity across segments. Indeed, several companies are increasingly active across multiple energy-related sectors; e.g. some oil & gas majors are transitioning into renewable energy production. It is therefore important to account for this granularity in order to properly capture this transition. Otherwise, banks would allocate 100% of the loans granted to the client's primary activity, and therefore miscount clients' transition efforts. In the energy sector, for example, this segmentation approach enables banks to leverage the client relationship to support a reduction in fossil fuel production as the client transitions more towards renewables. This segmentation approach, as detailed in BOX 1, is a deviation from the original PACTA methodology, although it is supported by 2DII.



BOX 1 | *Segmentation for energy sector*

This approach is applicable, depending on the type of instrument being used:

- For dedicated loans, where the precise use of proceeds is known, we consider the whole value of that loan in scope for this sector. We also consider project-related corporate loans to be in scope[15].
- For undedicated loans, where the use of proceeds is unknown, their value is allocated to sectors based on the company's activity distribution. For example, for a €10 million loan granted to a client generating 90% of its revenue in oil & gas and 10% in power, the loan amount should be split into two: a €90 million tranche allocated to the oil & gas sector and a €10 million tranche to the power portfolio. This does not apply to dedicated loans that are by their very nature granted for a single activity. This gives a more granular estimate of a bank's exposure to a sector and means that clients can be accompanied in their transition while preserving the relationship. This is formalised in EQUATION 1.

EQUATION 1 | *Revenue share segmentation (for the energy sector only)*

$$LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + Undedicated\ LA_c \times Revenue\ share_{\ c,s}$$

Where: LA = loan amount; c = counterparty; s = sector; t = technology

A limitation of this approach is data quality. The quality of the 'revenue by segment' data may be subject to questions due to various reporting approaches and periods. There is no standard reporting on 'fossil fuels' and 'low-carbon activities' at this stage (the EU taxonomy and NFRD reporting directive will improve corporate reporting for EU companies, but it only covers 'green' activities) and clients do not systemically report revenue in this way, if at all. This data is, however, likely to become more standardised and of better quality in the future.

However, for this exercise, we are interested in the distribution of revenue across activities (not so much in the precise value of the revenue by segment). Put differently, the revenue split should be understood as a proxy for the clients' progress in the transition towards a low-carbon business model, and not taken at face value. The Katowice Banks and 2DII recognise the difficulty of collecting information about the distribution of the clients' activity. This approach remains an option and will be applied when possible. An annex gives details on the rules used for segmentation.

15 These loans include Project Finance and Project-Related Corporate Loans (PRCL) (including Export Finance in the form of Buyer Credit), where most of the loan is related to a single Project over which the client has effective operational control. To ensure that the information channelled on PRCL meets this requirement, each bank's Environmental and Social procedures in line with the Equator Principles are used. This is to ensure that the client provides a sufficient guarantee that the financing is channelled to that project. Of note: for the facilities not linked to a specific entity, it is difficult to associate them with a specific asset. Indeed, as money is fungible, this line could be used to finance other activities of the company. Moreover, we seldom see our clients' facilities audited to demonstrate that 'non-green projects' are financed through other facilities. In addition, in order to avoid double counting the 'green project', 'non-green line' should be recalculated at the corporate level. A new global mix should be defined by deducing the green asset already financed. This calculation seems very difficult to apply within a bank and not considering lines dedicated to green in a general-purpose facility is indeed more conservative (we consider having a share of each fuel in the mix and not 100% green) and will probably worsen the mix overall but it is more transparent.

2.3. Portfolio indicators

This section describes the use of two types of indicators:

1 Indicators expressed in **physical units**; e.g. MWh of power generation. For this type of indicator, a critical question is how the counterparty activity is allocated to the instrument that finances the development and operation of that activity.

2 The second type of indicator is measured without physical asset data and is directly expressed in **monetary units**. This indicator is a deviation from the PACTA approach and proposed here by the Katowice Banks for the fossil fuels sector.

ALLOCATING PHYSICAL ASSETS TO FINANCIAL ASSETS

The **PACTA approach relies on an assessment of physical assets** linked to financial instruments and the alignment of such assets with climate scenarios. Most of the required input data is provided by external data providers, limiting the need for manual data collection. Where gaps exist, data can be collected manually from corporate reporting, such as extra-financial performance reporting or annual reporting.

For data sourced from a data provider, the assets' production or capacity figures are aggregated along the ownership tree based on the following scheme: assets' production figures are allocated to the companies that own them and are based on the 'equity share approach', i.e. a company is attributed the same share of the asset's production as the share of the asset owned. Regarding subsidiaries, their production figures are allocated in full to the Group that owns most of the subsidiary, unless matched at subsidiary level.

The PACTA tool comes with a text-matching algorithm that enables it to reconcile portfolio client names with company names in third-party databases.[16] Legal Entity Identifiers (LEI) and other unique identifiers can be used to reconcile data without requiring text matching.

The central question then is **how to allocate an economic activity (physical assets) to a financial activity (financial instruments).** This stage can be referred to as the allocation rule. Katowice Banks have retained PACTA's 'portfolio-weighted approach', which allocates economic assets based on the weight of the financial asset in the portfolio. Two broad options are possible depending on the unit in which the economic activity is expressed:

When working with **indicators expressed in volumes** (e.g. power generation capacity or oil production), the allocation rule requires **finding out the share of that activity that is being financed by the instrument**. For example, if a bank grants €1 million to a company that has 10 MW of installed power capacity, what proportion of the 10MW can be attributed to the bank? After careful examination of the possible allocation rules for indicators expressed in volumes, Katowice Banks have not yet identified a satisfactory way of allocating volumes of production associated with an asset or client to a financial instrument.

16 The 2°C Investing Initiative (2020) PACTA toolbox https://github.com/2DegreesInvesting/pacta/issues/2

When working with **indicators expressed as ratios** (e.g. technology mix or emission intensity), there is **no need to find a share of that activity that is being financed by the instrument.** For example, a company's power production has an average emission intensity of 500gCO_2e/kWh. Whether a bank granted a €1, €10 or €100 million loan to this company, the emission intensity of the company remains the same and this value can be attributed to the financial instrument. **This is the approach favoured by Katowice Banks.**

To allocate multiple counterparties' climate indicators at portfolio level, the Katowice Banks apply PACTA's portfolio weight approach, which is simply an average of the counterparties' indicators weighted by their loan size. The Poseidon Principles stipulate the same approach. This is formalised in EQUATION 2.

EQUATION 2 | *Allocating physical assets at portfolio level*

$$\text{Indicator}_{p,s} = \frac{\sum_c (\text{Indicator}_{c,s} \times Loan_{c,s})}{\sum_c Loan_{c,s}}$$

Where: p = portfolio, c = counterparty, s = sector

INDICATOR IN THE ABSENCE OF PHYSICAL ASSET DATA OR ALLOCATION RULES

Working with indicators expressed as ratios does not help address questions regarding the volume of financing that should be provided to a sector. It works well for sectors where there is a clear substitution between technologies or processes. However, the question of how much financing should (or should not) be provided is particularly important in sectors where scenarios indicate the need for a clear decrease in the financing provided, while no green alternatives exist. This is particularly true of the fossil fuel sector.

In this case, the Katowice Banks propose using the nominal value of the portfolio as an indicator and comparing this indicator directly with a scenario benchmark; i.e. without translating financial assets into physical assets. This type of indicator is a deviation from the original PACTA methodology, though it has the support of 2DII.

The alignment with such indicators can be evaluated by finding a suitable proxy in the scenario. For example, if coal production decreases by 100% by 2050, an aligned coal portfolio would see its financial commitment decrease by 100% in 2050.

The advantage of this approach is that no asset data is needed to measure in the evaluation of this portfolio indicator. It makes it easy for other financial institutions to adapt it.

The limitation, however, is that a financial indicator is an imprecise proxy for the underlying real world impact. The question then is to determine the most appropriate scenario benchmark with which to compare the financial indicator. Another limitation is that the capital intensity of a given activity may change over time – i.e. the financing needed to extract a barrel of oil is volatile. Therefore, there could be situations in which the amount of financing for a given activity decreases, but the real world impact does not change in the same proportion.

Although this is a deviation from the PACTA methodology, given that the first edition of the PACTA methodology only considers physical indicators, 2DII supports this approach. Going forward, Katowice Banks and 2DII will conduct further research to address the capital intensity limitation highlighted here.

2.4. Measuring alignment and target-setting

IDENTIFYING SCENARIO BENCHMARKS

As a final step, **portfolio indicators** are compared with **scenario benchmarks** to measure alignment. As a reminder, the PACTA methodology can accept different climate scenarios, assuming they are scientifically defined and Paris-aligned and that the desired indicators are provided (i.e. CO_2 intensity per economic outcome, technology mix, absolute technology capacity trends).

We select scenario benchmarks in relation to the portfolio indicators (and obviously the choice of portfolio indicator is also made in relation to the availability of scenarios). As shown in TABLE 2, if the portfolio indicator is expressed or derived from a physical unit, we choose a scenario benchmark expressed in the same unit. If the portfolio indicator is purely expressed in financial units, a scenario proxy is used.

TABLE 2 | *Types of scenario benchmarks by portfolio indicator type*

TYPE OF PORTFOLIO INDICATOR	TYPE OF SCENARIO BENCHMARK
Physical indicator expressed as a ratio (e.g. technology mix or CO_2 intensity)	**Physical indicator** expressed in the same unit
Financial indicator (e.g. total loan amount granted to a sector in €)	**Proxy** indicator expressed in physical or financial units (e.g. sector production or emissions)

ALIGNING PORTFOLIO PHYSICAL INDICATORS

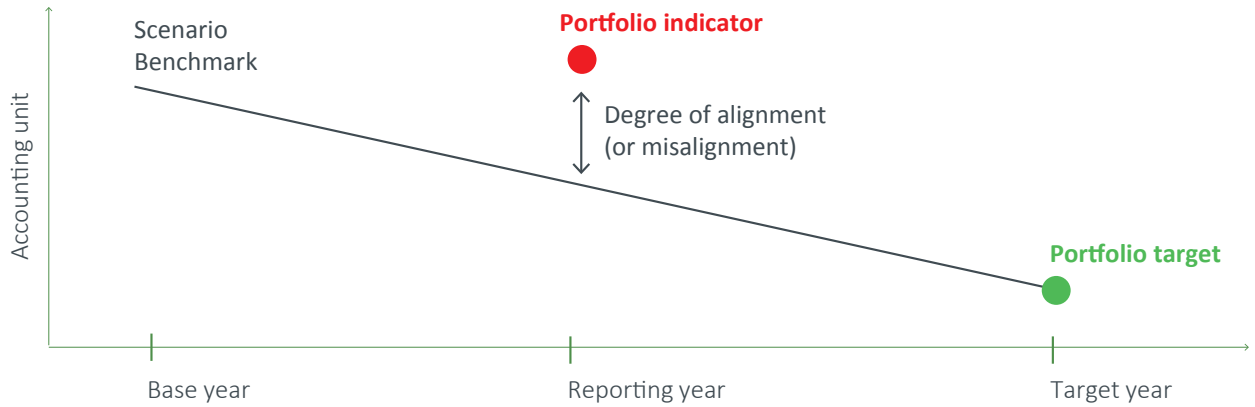
The portfolio indicator, whether it is at counterparty or portfolio level, can be compared with a scenario benchmark to assess whether it is aligned. To do so, banks calculate the **degree of alignment** or percentage distance between the portfolio indicator and the scenario benchmark at any point up until the portfolio reaches the target year. It is defined as follows and illustrated in FIGURE 5.

$$Degree\ of\ alignment_{p,s,t} = \left(\frac{Indicator_{p,s,t} - Scenario\ Benchmark_{,s,t}}{Scenario\ Benchmark_{,s,t}}\right) \times 100$$

Where p is for portfolio, s for sector and t for time, multiplied by 100 to convert into percentage terms.

For **decarbonisation indicators** (i.e. indicators whose value should decrease over time, such as carbon intensity), a positive alignment score means the portfolio is misaligned (above the decarbonisation benchmark), whereas a zero or negative score means the portfolio is aligned (or outperforms the benchmark). The opposite is applicable to **low-carbon indicators** (i.e. indicators whose value should increase over time, such as share of electric vehicles).

FIGURE 5 | *Illustration of degree of alignment*



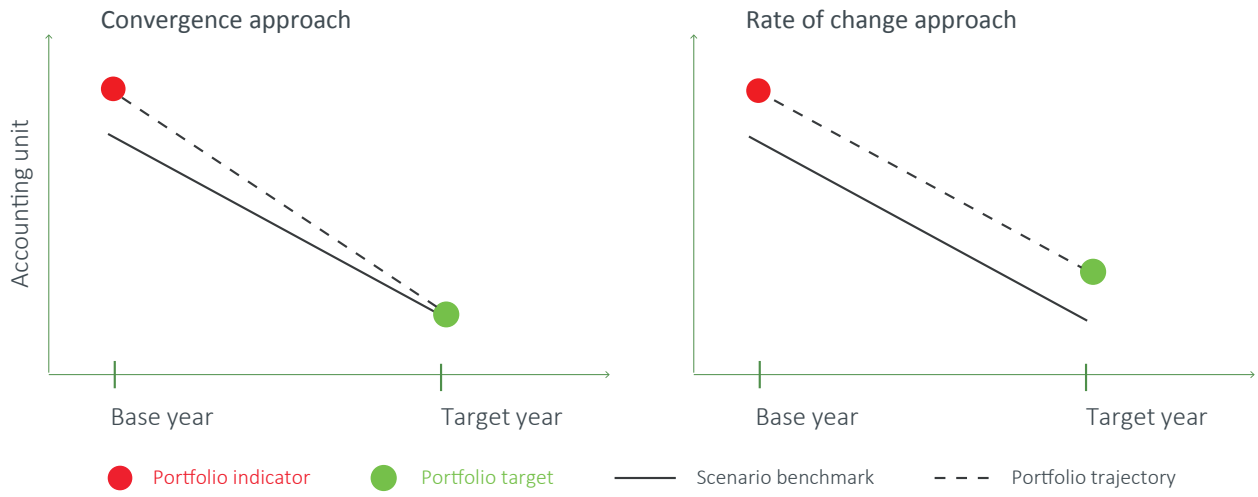
Depending on their starting point, Katowice Banks can also track their level of alignment on a forward-looking basis; i.e. by reporting whether the portfolio is 'on track' to meet the scenario benchmark at a future point in time. If at base year the portfolio is quite distant from the scenario benchmark, it is useful to signal whether efforts are being targeted at the right pace.

To do so, we can define the **trajectory** the portfolio should follow to meet the end target. The PACTA methodology proposes two approaches:

- The 'convergence approach' (or SDA approach) is a type of application of the convergence approach, which specifies that the portfolio indicator needs to adjust at the same level as the scenario benchmark, independent of the indicator level at baseline.
- The 'rate of change approach', where the level of the indicator is not compared with the benchmark, but rather the portfolio indicator needs to adjust at the same rate of change as the scenario benchmark.

Out of the two, Katowice Banks favour the convergence approach as it is easier to communicate and is connected directly with the level of the benchmark.[17] **FIGURE 6** gives an illustration of the two alignment approaches.

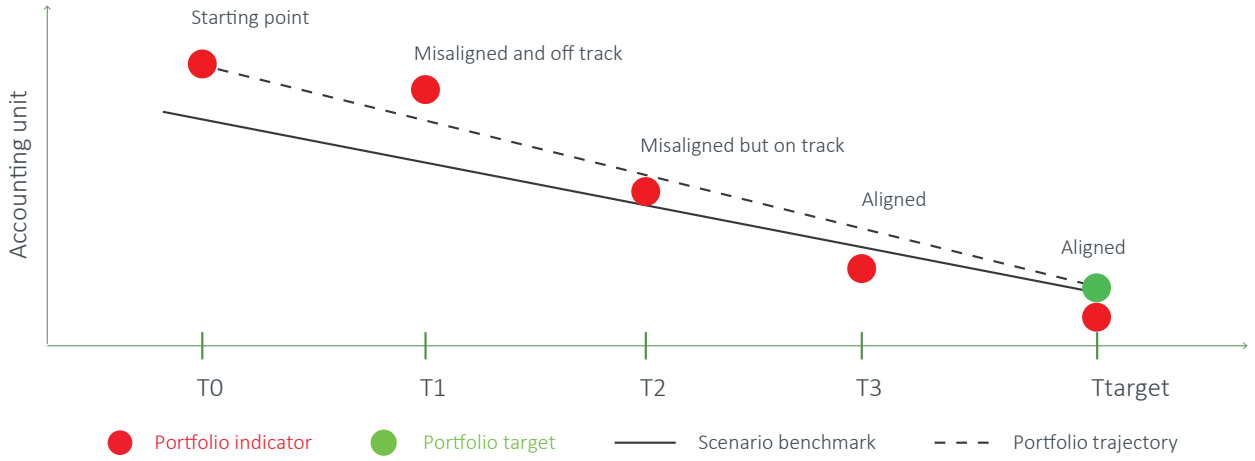
FIGURE 6 | *Setting a portfolio target/trajectory for physical indicators*



17 However, if the portfolio is already properly aligned with the benchmark, the convergence approach may signal that the financing of high-carbon activities could increase while still being considered aligned. In this context, KB advocate setting more ambitious targets.

As a result, Banks can report their 'degree of alignment' and 'track the trajectory of their alignment', by specifying whether their degree of misalignment is 'on track' or 'off track' with the pathway. Importantly, Katowice Banks consider that a portfolio can only be defined as 'aligned' at a present point in time. FIGURE 7 provides an illustration of the type of wording that can be used to describe those nuances.

FIGURE 7 | *Distinguishing between 'alignment' and 'tracking alignment'*

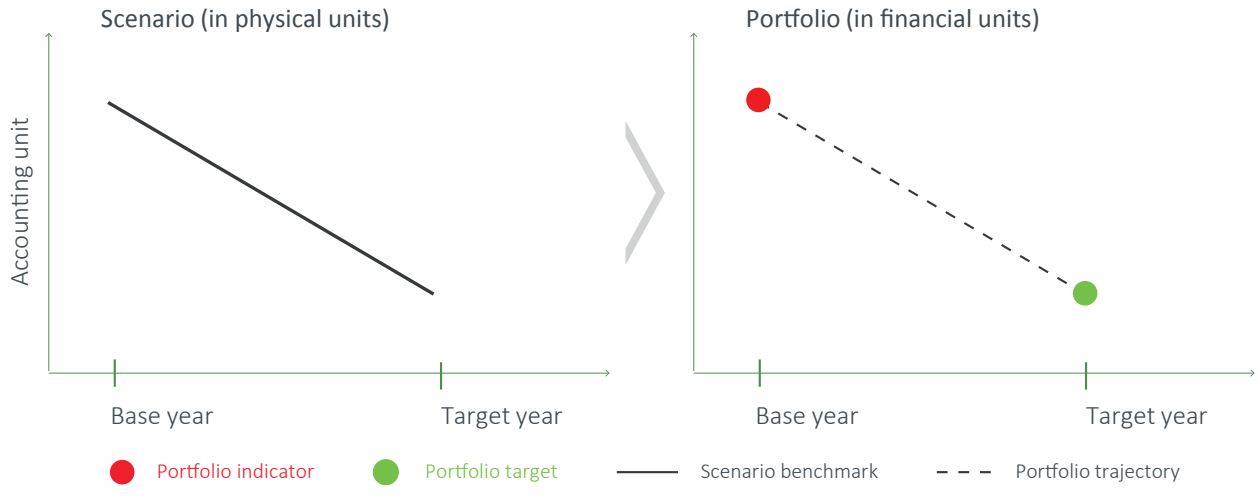


ALIGNING PORTFOLIO FINANCIAL INDICATORS

It is not possible to compare financial indicators with scenarios directly, as scenarios are only expressed in physical units and not in financial units (except for investment scenarios). In this setting, we apply the scenario's implied rate of change to define a trajectory for the portfolio, where the **portfolio indicator adjusts at the same rate as the scenario benchmark.** This is equivalent to PACTA's rate of change approach. The key is then to identify the most suitable **scenario proxy to define the rate of change.** For example, if we measure the total amount of financing granted to the coal sector, a potential candidate trajectory could be the coal production trajectory scenario. The selection of proxy is discussed in the sector sections. FIGURE 8 offers an illustration.

It is worth pointing out that the degree of alignment is calculated in the same way as explained above; by looking at the differences year-on-year between the portfolio position and the trajectory defined in the base year.

FIGURE 8 | *Setting a portfolio target/trajectory for financial indicators*



SELECTION OF SCENARIO BENCHMARK

As detailed in the PACTA methodology, two types of benchmark scenarios are possible:

- Institutional subset: The scenario is set at the level of the economy as a whole or at the level of an institutional subset. If the scenario target is set at the level of the economy as a whole, we are simply taking the 'raw' values from a scenario (for example, the global target emission intensity for power). If a bank finances only part of the economy (for example, corporate clients), the scenario can be calibrated to apply only to a set of corporates in the 'lendable' universe, including listed and unlisted corporates but excluding households. The scenario defined for the Poseidon Principles, for example, is set for a subset of vessels in the shipping sector.
- Regional subset: The scenario is set at a regional level. This is only in the case of the power portfolio, where the characteristics of the power markets may differ widely from one region to the next. For example, the power scenario for the EU would be expected to be quite different from China. In contrast, regional characteristics are less important for scenarios dealing with globally traded commodities or goods (oil & gas, coal, automotive, cement, etc.).

At the time of writing this report, the PACTA software only measures alignment at the institutional subset for groups of institutions – and not for the economy as a whole. This means that most Katowice Banks are expected to use this type of benchmark.

As the approach is scenario-agnostic, banks are free to use any benchmarking approach available. Likewise, more ambitious targets than the scenario can be set, although this is left to the discretion of each individual bank. While there could be differences in the benchmarks used, a comparison can still be made between banks by examining indicator differences.

MEASURING ALIGNMENT AT A FUTURE POINT IN TIME (FOR STEERING AND CLIENT ENGAGEMENT)

For certain sectors, forward-looking data can be used to give an understanding of the future level of alignment. Such data is typically based on companies' disclosure of the construction and retirement of assets. However, given uncertainty and quality, not all Katowice Banks plan to rely on forward-looking data for alignment measurement but rather for internal steering purposes.

Likewise, the PACTA approach currently assumes the credit portfolio remains constant for forward-looking alignment. For the purpose of steering, it is also useful to understand how precisely the portfolio will evolve. Some Katowice Banks support the inclusion in PACTA of an option that considers the amortization profile of the credit portfolio. However, at this stage, due to data availability, this is still a 'nice to have' feature. For this approach, some assumptions could be made, depending on the type of loan:

- For undedicated loans, where the use of proceeds is unknown: we assume that the credit facility will be renewed and therefore the credit stock remains constant (as in the PACTA model). In the case of a divestment strategy, we could assume that these facilities are not renewed.
- For dedicated loans: the amortization profile (maturity) of the loan could be integrated into the model.

MONITORING AND STEERING

A long-term target will only carry weight in communication and be operational to steer transition if it is accompanied by regular monitoring and continuous alignment. Katowice Banks advocate for measuring alignment on a yearly basis (as per the Principles for Responsible Banking[18]) to monitor whether the portfolio is on track or off track to meet the end target. Although we intend to report annually, some deviations from the trajectory may be expected and can be explained by the fact that clients in the portfolio will not align at a regular pace as they will make their decisions independently.

Portfolio alignment, or steering, can be achieved either by accompanying existing clients to align their activities, or through shifting our client base. As a principle, KB believe it is more productive from a climate and business standpoint to work with existing clients and accompany them towards lower carbon practices. Therefore, an approach of engagement over divestment is favoured, as previously mentioned, although divestment is not ruled out in some circumstances.

Moreover, as the scenarios inevitably evolve, the long-term target and trajectory will need to be updated. Indeed, climate scenarios are defined at a specific point in time and informed by the past evolution, prospective information available at the time and constraints of the diminishing carbon budget. Thus, the reference climate scenario will be updated regularly or may be discontinued and replaced with another scenario. Depending on the selected indicator, a long-term target and intermediate points on the trajectory as set today may also have to be revisited along with the reference scenario. That being said, updated scenarios only affect the forward-looking alignment and not the historical alignment of the portfolio since such a scenario was not previously available.

REPORTING AT PORTFOLIO LEVEL USING A SINGLE INDICATOR

One should not attempt to combine the 'degree of alignment' of different portfolios at the aggregate balance sheet level since the relative carbon materiality of each sector-level portfolio is not known. For example, consider two portfolios of equal size: a power portfolio with a -30% alignment and an automotive one with a 10% alignment (in this case a misalignment). It would be misleading to conclude that the combined alignment of the two is -20%. The reason this would be misleading is that communicating cross-sector portfolio alignment via a single indicator (especially in °C) suggests a scientific re-modelling of the economy based on the bank's portfolio while this is simply not the case.

In addition, each sector must transition in order to reach the Paris Agreement goals. If the automotive sector were to transition fully to EVs while the power sector remained significantly dependent upon coal, the lack of transition in power would negate the positive effect on the climate of the automotive sector's transition. However, the single-indicator approach would imply that the automotive sector's transition makes up for the power sector's lack. This is also misleading.

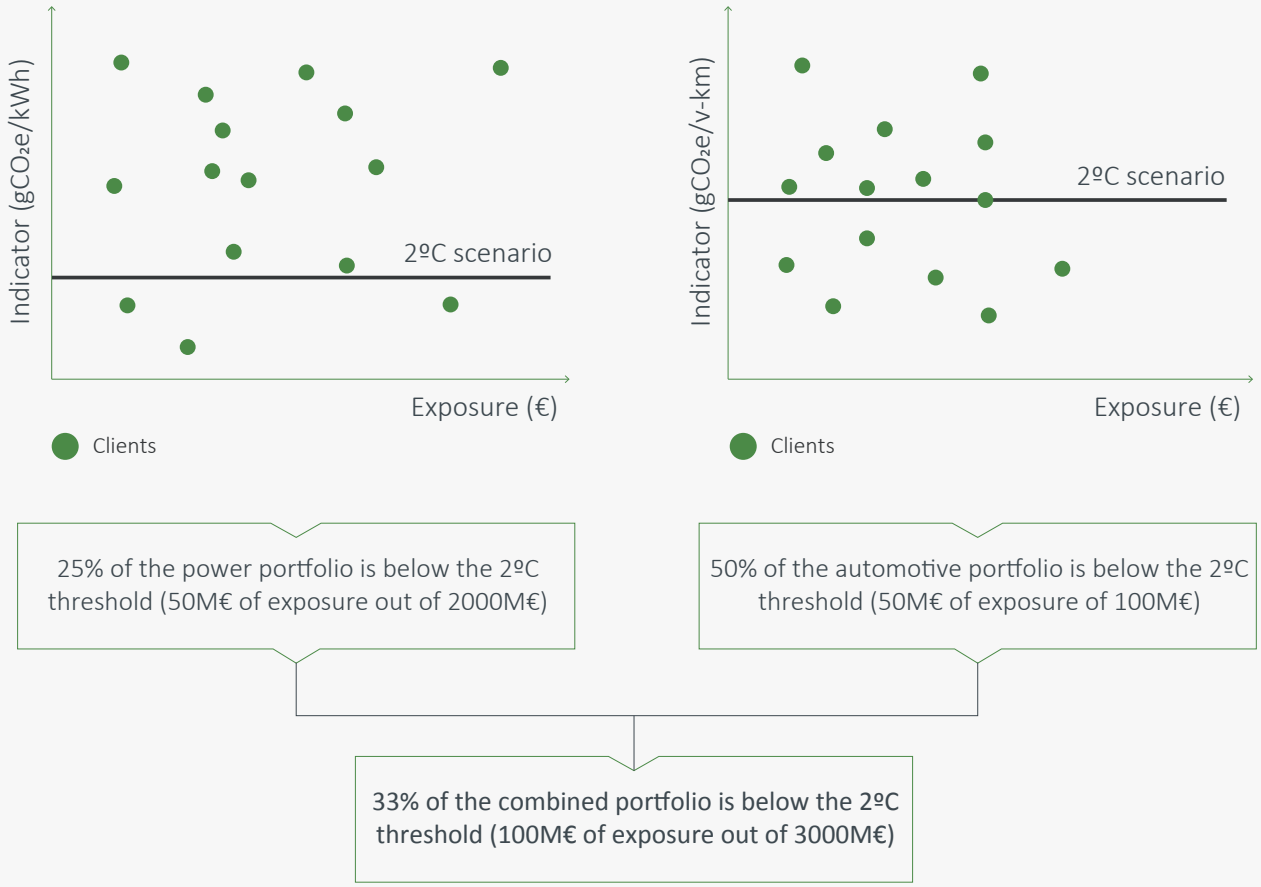
The PACTA methodology does not make reference to a portfolio's *'temperature'*. However, the concept of portfolio temperature has been gaining ground in the sustainable finance community, with regulators and investors paying attention to it. Katowice Banks propose a way of expressing the PACTA methodology as a temperature-like indicator that is clearer and does not suggest compensation between sectors. Importantly, this is being explored for reporting purposes but this indicator does not prevent sector level monitoring and steering where the key added value of PACTA lies.

18 UNEPFI (2019) Principles for Responsible Banking https://www.unepfi.org/wordpress/wp-content/uploads/2019/09/PRB-Guidance-Document-Final-19092019.pdf

BOX 2 | *Box 2: Reporting at portfolio-level using a single temperature indicator*

Despite the flaws inherent to a single (temperature) indicator, it is possible to report the distribution of exposure along scenario temperature thresholds at the level of a global portfolio. This can be done by aggregating the share of exposure above or below scenario thresholds of individual portfolios at the level of a global portfolio. Consider, for example, FIGURE 9, which shows two illustrative power and automotive portfolios where clients are positioned vis-à-vis scenario benchmarks. It can be said that for each portfolio the exposure is distributed below or above a temperature threshold and aggregated into a combined portfolio.

FIGURE 9 | *Distribution of exposure by scenario bands - illustrative example*



2.5. Summary of choices made by Katowice Banks

TABLE 3 summarises the choices made by Katowice Banks and also underlines where deviations or propositions have been made to the PACTA methodology.

TABLE 3 | *Summary of choices available in PACTA made by Katowice Banks*

METHODOLOGY STEPS	OPTIONS IN PACTA	KATOWICE BANKS CHOICE
Scoping		
Financial products & services	In principle, the methodology is applicable to all financial products. But for some products (e.g. derivatives), the link with the real economy can be more tenuous and requires more thought about its application at this stage.	– Corporate loans to start with
Exposure type	– Capital exposure – Client relationship	– Capital exposure
Financial indicators	– Net commitment/nominal amount – Gross commitment, including guarantees – Gross commitment – Drawn amount – Exposure at Default (EAD) – Credit limit	– Gross commitment (Drawn + undrawn) – Drawn amount – Exposure at Default
Sector segmentation	– Primary activity – Revenue weighted (not automatic)	– Primary activity – Revenue weighted for the energy sector if data is available
Measuring indicators		
Types of indicator	– Volume – Technology mix – Emission intensity	– All used + – Financing indicator (trend and mix)
Allocation rule	– Unweighted approach – Portfolio weight approach – Ownership approach	– Portfolio weight approach
Benchmarking		
Alignment approach	– Convergence approach – Rate of change approach	– Convergence approach for physical indicators and rate of change approach for financial indicators
Choice of benchmark	– Economy as a whole – Regional subset – Institutional subset	– Economy as a whole – Regional subset – Institutional subset
Aggregate result across several portfolios		
	– PACTA does not propose any aggregated result	– Proposal to express result using the “share of exposure below a temperature threshold”

SECTION 3

Automotive

3.1. Challenges for the sector

The automotive sector has been highly pressured in the past few years due to the dominance of oil-based fuels in the transport energy mix. The transportation sector still accounts for approximately 14% of global CO_2 emissions. In 2018, there were over five million electric cars on the road, representing an increase of 63% from 2017[19]. Despite the rate of increase, the sector must continue to accelerate in order to achieve the goals of the Paris Agreement and balance the continued growth in the global car fleet.

Various Original Equipment Manufacturers (OEMs) have already rolled out or announced plans to release new electric car models. Many governments have also announced policies to support the development of electric vehicles. Consumers are expressing more concerns about climate change and it has become a decision factor when purchasing a new car.

Electrification of road transport seems set to continue to grow and the shift from carbon-intensive technologies to transition technologies should persist in the coming decades to significantly reduce the automotive sector's contribution to GHG emissions.

3.2. Scoping

KB prioritise economic sectors that hold the bulk of the impact on the climate system and where the decision-making power or capacity to reduce carbon emissions resides directly or indirectly. Within the automotive sector, the scope is limited to the Light-Duty Car Manufacturing segment. Unlike automotive suppliers/ contractors, parts distributors, dealerships, workshops and car rental companies and car manufacturers play a major role in the design of less carbon-intensive vehicles.

3.3. Indicators

For the automotive sector, as shown in TABLE 4, the KB apply all three of the PACTA indicators, although emission intensity is the main indicator used to report alignment. The others may be used for internal steering.

TABLE 4 | *Indicators for the automotive sector*

INDICATORS	ALIGNMENT DRIVERS	KATOWICE APPLICATION
Emission intensity (PACTA)	Relative reduction in exhaust emission financing compared with high-carbon one.	Main alignment indicator as it gives a single estimate for the portfolio.
Technology mix (PACTA)	Relative reduction in internal combustion engine compared with hybrid and electric engines.	Second selected alignment indicator.
Production-volume trajectory (PACTA)	Increase in projected absolute volume of hybrid and electric vehicle production.	Optional indicator used for internal steering, primarily at client level.

19 Global EV Outlook 2019, www.iea.org

EMISSION INTENSITY

Sector scope	Automotive – Light-Duty Vehicles Manufacturer
Portfolio indicator	Tailpipe Emission Intensity (EI) of new light-duty vehicle produced in WLTP test cycle protocol (gCO_2/v-km). Hence, alignment is a measure of the production of new vehicles (flow) and not historical vehicle fleets (stock). This indicator only captures tailpipe emissions, not the entire lifecycle emissions.
Objective / Alignment driver	Demonstrate a transition towards low-carbon vehicles using a single estimate as opposed to a mix. This indicator is preferred over a technology mix as it is broadly reported by car manufacturers, especially given the regulatory requirements, and allows for a comparison between non-electric vehicles and shows efforts of car manufacturers to reduce their emissions from ICE models. While it makes it easier to report on a single data point, it is recommended to use technology mix or volume indicators for steering as there is a limit to the emission intensity decrease of ICE to avoid locked-in effects.
Input data	Vehicle production data (AFS) Vehicle production data was purchased from Auto Forecast Solutions (AFS, 2019). The AFS covers 60 countries and over 370 different vehicle manufactures. AFS provides production information dating back to 2005 and production forecasts up to 2025. In addition, AFS conducts regular ex-post analysis of its forecast error and retroactive modifications. Exhaust emission intensity per car model and region (various government organisations) To map the emissions of the automotive sector, the AFS vehicles production database connected to several vehicle CO_2 emissions data sources. The test cycle data was sourced from five different supranational and national data sources. While the aggregated test cycle data does not represent every potential regulatory regime, it provides comprehensive coverage for most major manufacturing markets. In the future, 2DII plans to expand its test cycle data.

Segment	Cars, Vans				
Region	EU	US States	Mexico	Japan	UK
Period	2010/19	1984/19	2011/19	2014	2002/17
Test-Cycle	NEDC/WLTC	FTP	FTP	JC08	NDEC
	> Source	> Source	> Source	> Source	> Source

Test-cycle conversion factors (ICCT)

To enable a comparison across manufacturers and countries, the test cycle datasets are converted to the WLTP standard using conversion factors developed by the International Council on Clean Transportation (ICCT, 2014). There are strong variations underlying the testing conditions under these different test cycles: driving patterns, ambient conditions, start conditions, road loads, masses, etc. The ICCT has developed different types of regression analyses to model the CO_2 emissions data into a WLTP standard. The different models applied imply different margins of error. The ICCT has assessed the levels of accuracy and usability of the models and potential margin of error of each association of conversion factors.

Contrary to the energy sector, the automotive sector does not require the revenue share of counterparties in the automotive sector to be collected, as most of the counterparties operate in this sector only (except for a few Asian groups such as Mitsubishi, for example).

Test cycle conversion factors are available here.

Counterparty level calculations	As a first step, the test cycle datasets are converted to the WLTP standard. For that purpose, we rely on the ICCT's single regression model with intercept, sections 5.3.2 Universal approach — weighted by diesel/gasoline market share[20], which is a linear test cycle conversion model. Emissions data converted to WLTP is then connected to production data using 2DII algorithm. The counterparty Emission Intensity is the average of regional emission intensities per model, weighted by the production volume. $$EI_c = \frac{\sum(EI_{WLTP,c,m,r} * Production_{c,m,r})}{\sum Production_{c,m,r}}$$ Where: c = counterparty, m = model, r = region Compared with other sectors, automotive has the least complicated emissions models. Since regulatory agencies collect test cycle results for new vehicles in large markets, 2DII simply connects the test cycle data to production data.
Portfolio level calculations	$$EI_p = \frac{\sum(EI_c * LA_c)}{\sum LA_c}$$ Where: LA = loan amount, p = portfolio
Scenario benchmark	Tailpipe emission intensity of new light-duty vehicle sales (gCO_2/v-km).
Portfolio target	Target is set at the intersection between the target year (2050) and the scenario benchmark (or below).
Portfolio trajectory	Convergence approach: the portfolio trajectory needs to be consistent with the scenario benchmark, independent of the position of the portfolio at baseline.

20 https://theicct.org/sites/default/files/publications/ICCT_LDV-test-cycle-conversion-factors_sept2014.pdf

TECHNOLOGY MIX

Sector scope	Automotive – Light-Duty Vehicles Manufacturer
Portfolio indicator	Portfolio technology mix of new light-duty vehicle produced, i.e. mix of portfolio exposure to each vehicle type/ technology produced (electric, hybrid, ICE, fuel cell). Alignment is a measure of the production of new vehicles (flow) and not historical vehicle fleets (stock). Most car manufacturers report their technology mix, or at least partially (share of electric vehicles only, for example). Contrary to the emission intensity indicator, the technology mix indicator provides less granular information on the portfolio automotive emissions. For instance, a portfolio that finances only energy-efficient ICE vehicles may be less carbon-intensive than a portfolio that finances electric vehicles and high-carbon ICE vehicles. The technology mix does not reflect the efforts to improve the energy efficiency of ICE vehicles. Moreover, monitoring the technology mix of an automotive portfolio requires the monitoring of many sub-indicators: shares of electric, hybrid, ICE and fuel cell vehicles. It may be decided to follow only the share of electric vehicles of the portfolio (possibly including plug-in hybrid electric vehicles as well). On the other hand, an advantage of using the technology mix is assessing the most relevant part of the transition, which is the transition towards electric vehicles and not the improvement of ICE.
Objective / Alignment driver	Demonstrate a transition towards low-carbon vehicle.
Input data	Vehicle production data per energy type (AFS): Vehicle production data was purchased from Auto Forecast Solutions (AFS, 2019). The AFS covers 60 countries and over 370 different vehicle manufactures. AFS provides production information dating back to 2005 and production forecasts up to 2025. In addition, AFS conducts regular ex-post analysis of its forecast error and retroactive modifications. Contrary to the emission intensity indicator, the technology mix does not require the AFS production database to be matched with another external database. The technology mix of the portfolio can be calculated easily using the AFS database only. In addition, it does not require a conversion that may lead to approximate values. It remains more reliable than the emission intensity at portfolio level and will remain until the test cycle protocols are harmonised at a worldwide level. Contrary to the energy sector, the automotive sector does not require the revenue share of counterparties in the automotive sector to be collected, as most of the counterparties operate in this sector only (except for a few Asian groups such as Mitsubishi, for example).
Counterparty level calculations	$$EV\ Share_{c,t} = \frac{Production_{c,t}}{\sum Production_{c,t}}$$ Where: c = counterparty, t = technology (ICE, EV, etc)
Portfolio level calculations	$$EV\ Share_{p,t} = \frac{\sum(Share_{c,t} * LA_c)}{\sum LA_c}$$ Where: LA = loan amount, p = portfolio
Scenario benchmark	The whole mix or a share of a given technology; e.g. BEV, etc.
Portfolio target	Target is set at the intersection between the target year (2050) and the scenario benchmark (or below).
Portfolio trajectory	Convergence approach: the portfolio trajectory needs to be consistent with the scenario benchmark, independent of the position of the portfolio at baseline.

PRODUCTION-VOLUME TRAJECTORY

Sector scope	**Automotive – Light-Duty Vehicles Manufacturers**
Portfolio indicator	Growth of the volume of electric vehicles (EV) production financed by the portfolio. A limitation of this indicator is that companies with little production to start with are overweighted in the results.
Objective	Demonstrate an increase in absolute volume of financed low-carbon vehicle production. This is an optional indicator used for internal steering.
Input data	Counterparty-level projection of EV production volume
Counterparty level calculations	We calculate the EV production scaled proxy (EV increase as a percentage of initial total production) for each counterparty c using the following formula: $$X_{c,EV,t_\beta} = \frac{Production_{c,EV,t_\beta} - \text{Production}_{c,EV,t_0}}{\sum_{t'=1}^{m} (Production_{c,t',t_0})}$$ Where: t0 is the start year of the analysis (current year) and t_β is the time index of the horizon (in years) at which the portfolio target is calculated, X = Proxy for EV production, t'= Automotive technology, m= number of automotive technologies.
Portfolio level calculations	$$X_{portfolio,EV,t_\beta} = \frac{\sum_c (X_{c,EV,t_\beta} * LA_c)}{\sum_{c'} LA_{c'}}$$ Where: LA = loan amount; c and c' = counterparty; t_β is the time index of the horizon (in years) at which the portfolio target is calculated.
Scenario benchmark	Scenario of volume of electric vehicles produced.
Alignment drivers	The transition to a greener portfolio could be achieved through the following drivers: – Bank-level action: financing more EV manufacturers – Client-level action: Clients increasing their EV production.

SECTION 4

Power

4.1. Challenges for the sector

4.2. Scoping

4.3. Indicators

Emission intensity

Technology mix

Production-volume trajectory

4.1. Challenges for the sector

The power sector includes the generation, transmission, distribution, storage and supply of electricity to end users. This sector plays a key role in energy transition, with more than 40% of global CO_2e emissions according to the International Energy Agency. The key to the transition of this sector is on the one hand the decarbonisation of generation, and on the other hand the integration of intermittent renewable generation through various network flexibility tools (electricity storage, smart grid solutions and peaking capacity).

4.2. Scoping

KB prioritise economic sectors that hold the bulk of the impact on the climate system and where the decision-making power or capacity to reduce carbon emissions directly or indirectly resides. For the power sector, the scope is limited to the power generation segment, where the majority of emissions take place. For this sector, a segmentation by revenue is being made.

4.3. Indicators

For the power sector, as shown in TABLE 5, the KB apply all three of the PACTA indicators, although emission intensity is the main indicator used for reporting alignment, the others may be used for internal steering.

TABLE 5 | *Indicators for the Power sector*

INDICATORS	ALIGNMENT DRIVERS	KATOWICE APPLICATION
Emission intensity (PACTA)	Relative reduction in fossil power generation financing compared with low-carbon power generation	Main alignment indicators, with a preference for the emission intensity indicator as it provides a single estimate of alignment as opposed to a mix
Technology mix (PACTA)	Relative reduction in fossil power generation financing compared with low-carbon alternatives.	Second selected alignment indicator.
Production-volume trajectory (PACTA)	Increase in projected absolute volume of renewable power production.	Optional indicators used for internally steering at client level.

EMISSION INTENSITY

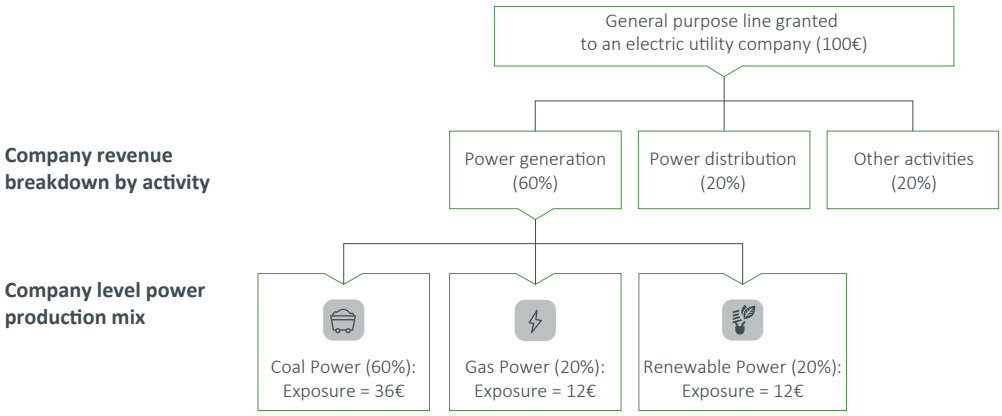
Sector scope	Power generation
Portfolio indicator	Direct Emission Intensity (DEI) (gCO_2e/kWh). This indicator measures the direct emissions per unit of electricity produced (kWh). Direct emissions refer to emissions arising from the burning of fossil fuels in the power plants. It incentivises a switch to low-carbon generation. Indirect emissions come from the construction of power plants and other associated emissions, such as the transport of raw fuels. It incentivises the selection of technology sources that emit less (e.g. solar PV from certain regions have a higher carbon footprint). Indirect emissions are not measured but future research will assess the potential of including these emissions. This indicator is preferred over a power mix despite requiring more assumptions (and therefore more uncertainty) because the portfolio can be piloted using a single indicator (as opposed to piloting individual shares of the portfolio's power mix.
Objective / Alignment driver	Demonstrate a transition towards low-carbon generation: – Bank-level action: financing more renewable energy plants; financing fewer fossil power projects or clients; or financing clients' transition from fossil to renewable production capacity. – Client-level action: Clients transition from fossil to green power generation.
Input data	Revenue share upstream (annual reports, Bloomberg) Counterparty-level power installed capacity (Global data, annual reports) Capacity factors and emission factors by technology and region (IEA)
Counterparty level calculations	First, we calculate the precise amount granted to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector: $LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share_{c,s})$ Where LA = loan amount; c = counterparty; s = sector; t = technology Second, the DEI is modelled using counterparties asset-level capacity data multiplied by regional and average technology capacity factors and emission intensity factors by technologies. $\mathrm{DEI}_c = \frac{\sum(Capacity_{c,t,r} * Capacity\ factor_{t,r} * \mathrm{DEI}_{t,r})}{\sum Capacity_{c,t} * Capacity\ factor_{t,r}}$ Where r = region
Portfolio level calculations	$\mathrm{DEI}_p = \frac{\sum(LCEI_c * LA_{c,s})}{\sum LA_{c,s}}$
Scenario benchmark	Direct emission intensity of power production (gCO_2e/kWh).
Portfolio target	Target is set at the intersection between the target year (2050) and the scenario benchmark (or below).
Portfolio trajectory	Convergence approach: the portfolio trajectory needs to be consistent with the scenario benchmark, independent of the position of the portfolio at baseline, but the end point is the same as the scenario end point.

TECHNOLOGY MIX

Sector scope	Power generation sector
Portfolio indicator	Portfolio power financing mix, i.e., mix of portfolio exposure to each technology of secondary energy expressed as a percentage of portfolio exposure.
Objective / Alignment driver	The transition to a greener portfolio could be achieved through the following drivers: – Bank-level action: financing more renewable energy plants; financing fewer fossil power projects or clients; or financing clients' transition from fossil to renewable production capacity. – Client-level action: Clients transition from fossil to green power generation.
Input data	Revenue share upstream (annual reports, Bloomberg) Counterparty-level power installed capacity (Global data, annual reports).
Counterparty level calculations	First, we calculate the precise amount granted to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector: $LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share_{\ c,s})$ Where: LA = loan amount; c = counterparty; s = sector; t = type of power generation technology Second, we calculate the power mix of each counterparty, regardless of whether it is a dedicated or undedicated transaction: $Capacity\ Share_{c,Power,t} = \frac{Capacity_{c,t}}{\sum Capacity_{c,t'}}$ Where: Share = share of a given technology in the power mix (%MW), c = counterparty, t and t'= technology
Indicator calculation at portfolio level	The share of the power portfolio exposed to a given power generation technology is shown by the following formula: $Share_{p,t} = \frac{\sum\left((Capacity\ Share_{c,,t} \times Undedicated\ LA_c \times Revenue\ share_{\ c,s}) + Dedicated\ LA_{c,s,t}\right)}{LA_{c,s}}$ Where: LA = loan amount; p = portfolio Of note; Dedicated LA can be both Special Purpose Vehicle (SPV) and Project-Related Corporate Loans (PRCL).
Benchmark	The whole mix or a share of a given technology; e.g. renewables, etc. It should be noted that if a power generation or power demand scenario is used, in order to ensure consistency between the computation of portfolio exposure and its target, portfolio exposure to a given power technology should be computed using the production rather than the capacity in that technology. For that purpose, average capacity factors by technology may be used to convert power capacity into power production. **In a complementary analysis, the capex investment mix could be used to assess "roughly" the alignment of investment flows with well below 2°C scenarios. See the Primary and Secondary energy-financing mix indicator for more details.**
Portfolio target	Target is set at the intersection between the target year (2050) and the scenario benchmark (or below). In this case, the target is a share of a given technology; e.g. renewables.
Portfolio trajectory	Convergence approach: the portfolio trajectory needs to be consistent with the scenario benchmark, independent of the position of the portfolio at baseline.

PRODUCTION-VOLUME TRAJECTORY

Sector scope	Power generation sector
Portfolio indicator	Growth of the absolute volume of renewable capacity financed by the portfolio.
Objective / Alignment driver	Demonstrate the increase in the projected absolute volume of the financed renewable power production.
Input data	Revenue share upstream (annual reports, Bloomberg). Counterparty-level power installed capacity (Global data, annual reports).
Counterparty level calculations	First, we calculate the precise amount granted to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector: $LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share\ _{c,s})$ Where: LA = loan amount; c = counterparty; s = sector; t = type of power generation technology



Second, we calculate the renewable power production scaled proxy for each counterparty c, regardless of whether it is a dedicated or undedicated transaction.

Renewable power production scaled proxy computation formula:

$$X_{c,Renewables,t_\beta} = \frac{Capacity_{c,Renewables,t_\beta} - Capacity_{c,Renewables,t_0}}{\sum_{t'=1}^{m} (Capacity_{c,t',t_0})}$$

Where: t_0 is the start year of the analysis (current year), t_β is the time index of the horizon (in years) at which the portfolio target is calculated, t' is power technology and m is the number of power technologies.

Indicator calculation at portfolio level	The portfolio-level renewable power production scaled proxy (Renewable capacity increase as a percentage of initial total capacity) is shown by the following formula: $X_{portfolio,Renewables,t_\beta} = \frac{\sum_C (X_{c,Renewables,t_\beta} * LA_{c,s})}{\sum_{c'} LA_{C',s}}$ Where: X = Proxy portfolio production, c and c' = counterparty, LA : Loan Amount, s= power sector, t_β is the time index of the horizon (in years) at which the portfolio target is calculated

Benchmark	Renewable power capacity scenario.
Alignment drivers	The transition to a greener portfolio could be achieved through the following drivers: – Bank-level action: financing more renewable energy plants; financing fewer fossil power projects or clients; or financing clients' transition from fossil to renewable production capacity. – Client-level action: Clients increasing their renewable power capacity.

SECTION 5

Fossil Fuels

5.1. Challenges for the sector

5.2. Scoping

Sector selected and segmentation

Treatment of Carbon Capture and storage loans (CCS loans)

5.3. Indicators

Portfolio financing trend

Primary and secondary energy financing mix

Emission intensity

5.1. Challenges for the sector

The fossil fuels sector plays a major role in addressing the climate challenge, and even more so in the context of rapid global growth of primary energy demand related to global population growth, development of access to energy and industrialisation on the rise in emerging markets.

5.2. Scoping

SECTOR SELECTED AND SEGMENTATION

As a reminder, a specific segmentation applies to the fossil fuel sector: we consider that a loan granted to a company should be allocated to the company's sectors based on the company's activity distribution. This gives a more granular estimate of a bank's exposure to a sector and enables a bank to accompany its clients through their transition while preserving the relationship. The fossil fuel sector splits into two subsectors:

- For oil&gas, in line with the 'economic activity'-based approach for all sectors covered by PACTA and the need for suitable reference scenarios, the methodology concentrates on the upstream segment as the leading indicator for the whole sector value chain. Katowice Banks will consider the treatment of other parts of the value chain (midstream and downstream) at a later stage. Here, a revenue segmentation is used, splitting upstream activities against all others (midstream, downstream and non-oil & gas activities).
- For coal mining, we only cover the thermal coal mining sector given our focus on the energy sector. Indeed, metallurgical coal is used mainly for steel production and, for now, there is little alternative to this kind of coal in steel production. As several large coal producers are miners that produce a wide range of minerals, the share of coal should be allocated based on the coal share of revenue. This means that we filter by thermal vs metallurgical coal using the available data.[21]

TREATMENT OF CARBON CAPTURE UTILISATION AND STORAGE LOANS (CCUS)

With this approach, we want to ensure that if clients start deploying TREATMENT OF CARBON DIOXIDE REMOVAL (CDR) technologies, their actions will be considered. It will be accounted for in different ways based on where in the value chain the carbon capture takes place:

- If it takes place inside the client's value chain (for example, CCS is applied during the oil & gas extraction process for an upstream producer), it would be accounted for and reflected in the emission intensity of the production process (providing this is reported in the client's data). If it takes place in the client's value chain but in the midstream or downstream segment, the credit line associated with this activity would be counted outside of the upstream oil & gas sector.[22]

21 This is confused slightly by the fact that some metallurgical and thermal coal is extracted in the same place, so production figures can be complex. In this event, Katowice Banks always choose the most conservative value: we account for metallurgical coal to make sure we do not undercount thermal.

22 When CCS is considered in the upstream, a full life cycle assessment of the emissions should be considered. If the CCS is being used for enhanced recovery and hence it results in more oil & gas being extracted from the ground, a mass balance equation should be considered. It could be argued that this is improving efficiency as it is extracting every last drop while replacing some. However, this mass balance should be reported to avoid green wash claims.

- If it takes place outside its value chain, for example, by offering CCS services to a third party, e.g. cement plant, thermal power plant, etc., the credit line associated with this activity would be counted outside of the oil & gas sector. This can be done in two ways:
  - If it is a dedicated loan, the CCS loan is counted in the CCS portfolio and no longer in the oil & gas portfolio.
  - If it is an undedicated loan, and the clients start drawing revenue from CCS activities, this would be reflected in the sector segmentation approach as described above; i.e. the credit line for this corporate is split between the upstream oil & gas portfolio and a CCS portfolio.

Importantly, carbon offsetting should not be confused or treated similarly to CCS. CCS is the process of capturing waste carbon dioxide and can contribute to reducing a corporate's own carbon footprint. By contrast, offsetting is the process of paying a third party to reduce or capture emissions. It is used as a communication device to demonstrate climate engagement but it cannot be said to reduce a corporate's own carbon footprint. The GHG protocol, which is the internationally accepted GHG accounting and reporting standard for business, is extremely clear on this and argues that carbon offsetting products and credits should not be used to quantify the reductions associated with GHG mitigation.[23]

5.3. Indicators

The fossil fuel sector has presented unique challenges in the context of PACTA. Whereas PACTA's technology mix and volume approaches are available for application, Katowice Banks and 2DII have found none of the two indicators could overcome the following challenges: The technology mix (share of oil vs gas vs coal) does not incentivise a transition towards low-carbon activities and the volume indicator would incentivise banks to finance fossil fuel producers whose production is in decline. This could well be higher-risk clients who would not meet the requirements of most banks' risk models.

Katowice Banks and 2DII have therefore defined new indicators for the fossil fuel sector. It started with the definition of **key alignment pathways**. These indicators should reflect:

1. **An absolute reduction in fossil fuel financing:** Carbon emissions must peak in 2020 and decrease at a significant rate according most 'below 2°C' scenarios (e.g. the IEA SDS) if we are to meet the objectives of the Paris Agreement. As a result, a net reduction in fossil fuel activities is advised for thermal coal, oil and gas albeit at different speeds.
2. **A relative reduction in fossil fuel financing compared with low-carbon alternatives:** In parallel, alignment should demonstrate a transition from high-carbon activities to low-carbon alternatives such as low-carbon power, low-carbon hydrogen, bioenergy or Carbon Capture, Utilisation and Storage (CCUS).
3. **A transition towards lower carbon fossil fuel extractive processes:** A reduction in the fossil fuel envelope does not ensure that the portfolio's emissions will be lower; i.e. the bank could grant less financing but for more carbon-intensive clients. It is therefore important to demonstrate a shift towards less carbon-intensive oil&gas fuels and extractive technologies.

The Katowice Banks, together with 2DII, have conducted an in-depth analysis of ten possible indicators that meet the above three transition pathways for the fossil fuel sector. Of the ten indicators analysed, three were shortlisted as viable indicators.

23 https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

KB have agreed upon these three indicators: each of them gives a specific understanding of the portfolio, a potential steering approach and the combination of the selected indicators should allow all three purposes highlighted above to be served. It may nevertheless also be necessary or even meaningful for each bank to use all three indicators given the necessary data or methodologies applicable today. Every bank is advised to choose from the following indicators the set of indicators that is the most appropriate to its strategy and business model.

The sections that follow discuss how these indicators can be applied and TABLE 6 summarises the indicators selected.

TABLE 6 | *Indicator for the fossil fuel sector*

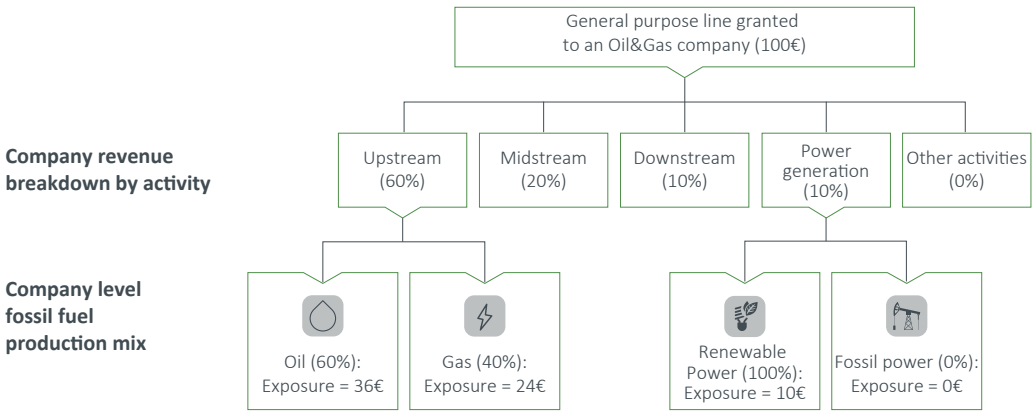
INDICATORS	ALIGNMENT DRIVERS	KATOWICE APPLICATION
Portfolio financing trend (Proposed by Katowice Banks)	Absolute reduction in fossil fuel financing	Main set of alignment indicators
Energy financing mix (Proposed by Katowice Banks)	Relative reduction in fossil fuels financing compared with low-carbon alternatives	
Emissions intensity (PACTA)	Transition from high-carbon oil & gas to low-carbon oil & gas operations	
Technology mix (PACTA)	Relative shift in fossil fuel production between oil, gas and coal.	Not used: does not incentivise a transition towards low-carbon activities.
Production-Volume trajectory (PACTA)	Decrease in projected absolute volume of fossil fuel production at client and portfolio level.	Not used: would incentivise banks to finance fossil fuel producers whose production is decreasing, putting them outside the scope of commercial banks' risk frameworks. In addition, the allocation rule for this indicator has limitations. As described page 18, Katowice Banks have not yet identified a satisfactory way of allocating volumes of production associated with an asset or client to a financial instrument.

PORTFOLIO FINANCING TREND

Sector scope	Upstream oil&gas or thermal coal mining
Portfolio indicator	Portfolio Exposure (e.g. € gross commitment, EAD or drawn amount)
Objective / Alignment driver	Demonstrate an absolute reduction in fossil fuel financing
Input data	Revenue share upstream (annual reports, Bloomberg)
Counterparty level calculations	We calculate the precise amount granted to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector: $LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share\ _{c,s})$ Where: LA = loan amount; c = counterparty; s = sector; t = technology
Portfolio level calculations	$\mathrm{LA}_{p,s} = \sum LA_{c,s}$
Scenario benchmark	Oil & gas production trend (% change in Mtoe) or Coal production trend (% change in Mtoe) The choice of coal or oil & gas production as a scenario benchmark is the most obvious proxy for the sector's change in indirect emissions (scope 3); i.e. the emissions that arise when coal, oil or gas is combusted at the end use.
Portfolio target	Target is set at the intersection between the trajectory and the target year (2050).
Portfolio trajectory	Rate of change approach: the portfolio indicator adjusts at the same rate as the scenario benchmark.

PRIMARY AND SECONDARY ENERGY FINANCING MIX

Sector scope	**Primary and secondary energy production sectors (upstream fossil fuel + power generation (fossil power generation + Nuclear power generation + renewable power generation))**
Portfolio indicator	Portfolio energy-financing mix, i.e., mix of portfolio Exposure to each type/technology of primary and secondary energy expressed as a percentage of portfolio exposure.
Objective / Alignment driver	Demonstrate the transition towards a greener portfolio energy mix in line with the climate scenario proxy. The transition to a greener portfolio could be achieved through the following drivers: – Bank-level action: financing more renewable energy plants; financing fewer fossil fuel projects or clients; or financing clients' transition from fossil to renewable production capacity. – Client-level action: Clients transition from fossil extraction activities to green power generation and from gas extraction to oil extraction.
Input data	Revenue share upstream (annual reports, Bloomberg): used primarily to compute the general-purpose lines breakdown between the in and out of scope activities across the fossil fuel and power value chain. Counterparty-level technology mixes are then used to break down the oil & gas and Power exposures into Oil, Gas and the various power technologies exposures. See below an example of a general-purpose line breakdown process.



Indicator calculation at counterparty level

First, we calculate the precise amount grant to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector:

$$LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share\ _{c,s})$$

Where: LA = loan amount; c = counterparty; s = sector; t = technology

Second, we calculate the power mix and the fossil mix of each counterparty, regardless of whether it is a dedicated or undedicated transaction.

Power mix computation formula:

$$Share_{c,Power,t} = \frac{Capacity_{c,t}}{\sum Capacity_{c,t'}} (2)$$

Where: Share = share of a given technology in the power mix (%MW), t and t'= technology

Fossil mix computation formula:

$$Share_{c,Fossil,t} = \frac{Production_{c,t}}{\sum Production_{c,t'}} (3)$$

Where: Share = share of a given type of fossil fuel in the fossil fuel mix (% MTOE), t and t' = type of fossil fuel

Indicator calculation at portfolio level	The share of the energy portfolio exposed to a given power generation technology or a given fossil fuel type is shown by the following formula: $$Share_{p,s,t} = \frac{\sum(Share_{c,s,t} \times \mathrm{LA}_{c,s})}{\sum LA_{c,power} + \sum LA_{c,fossil}} (4)$$ Where: p = portfolio, s = sector (Power generation or upstream fossil), t = type of fossil fuel or power generation technology, LA = loan amount
Benchmark/ target mix	Primary and secondary energy demand mix expressed in joule equivalent. It should be noted that if this benchmark is used, in order to ensure consistency between the computation of portfolio exposure and its target, portfolio exposure to a given power technology should be computed using the production[24] rather than the capacity in that technology in the above-mentioned formula (2). Production is used when the scoped portfolio includes fossil fuel extraction for which the final use is not energy production: non thermal coal or oil refined products other than fuel. Convergence approach[25] is preferred over the trajectory approach to measure Katowice Banks portfolio alignment with Paris Agreement goals. Indeed, under the Convergence approach, the portfolio target is the same for all the market players. Hence, past efforts are valued, and laggards are expected to put further effort into transition. Using the capex investment mix is another option that is being researched. It could be used to assess reference alignment of investment flows with well below 2°C scenarios. Indeed, it may look like the most intuitive option since the portfolio indicator and the capex investment mix benchmark are expressed in the same unit. However, it presents several important drawbacks: – Additional assumptions are required in order to be able to compare a stock variable (the proposed indicator) with a flow variable (the CAPEX investment targets proposed by the scenario). – Further, the investment scenario takes into scope the global investment trajectory which moves beyond the scope of the corporate lending universe. For this reason, there is no comparable investment universe for benchmarking bank lending. Moreover, the choice of scenarios would be limited (PACTA is a scenario-agnostic approach), because the required data is not available in all climate scenarios.
Portfolio target	The whole primary and secondary energy mix or a share; e.g. coal, oil & gas, etc.
Portfolio trajectory	Convergence approach: specifies that the portfolio indicator needs to be consistent with the scenario benchmark at a future point in time, independent of the indicator level at baseline.

24 Average capacity factors by technology may be used to convert Power capacity into power production.

25 Under the Market approach, the portfolio mix needs to be consistent with the required mix at a future point in time, independent of the technology mix in t = 0. The market exposure under a 2°C transition here represents the expected evolution of the defined market, which can be scoped in various ways (economy, regional market, asset class, a set of peer portfolios) under a 2°C transition..

EMISSION INTENSITY

Sector scope	Upstream oil&gas
Objective / Alignment driver	Demonstrate a transition towards lower carbon extractive processes.
Portfolio indicator	Life Cycle Emission Intensity (LCEI) of oil & gas operation ($kgCO_2e$/boe). LCEI means that we estimate the direct and indirect emission associated with each barrel of oil and cubic metre of gas produced. Direct emissions arise all along the oil & gas supply chain, at the extraction, transport and refining stages. Direct emissions are about $100kgCO_2e$/boe for both oil and gas, but this value varies significantly by fuel type and regions (due to varying energy-intensive extraction, transport and refining processes). Accounting for direct emissions intensity helps us to identify our upstream oil & gas clients producing fuels that are the least carbon-intensive to extract, transport and refine. Indirect emissions arise at the end use (e.g. in a car or a gas boiler). Indirect emissions are more significant for oil (~410 $kgCO_2e$/boe) compared with gas (~310 $kgCO_2e$/boe) and this value is relatively constant; i.e. whether gas is burnt in a boiler or a power plant has the same global warming effect. Accounting for indirect emission incentivises a steering towards natural gas, which has a lower CO_2 footprint than oil, and much less than coal, when burnt.
Input data	Revenue share upstream (annual reports, Bloomberg, etc.) Counterparty-level oil & gas production by fuel type and regions (Asset Resolution, etc.) LCEI by fuel & regions (IEA, OGI, energy data & research providers, etc.)
Counterparty level calculations	First, we calculate the precise amount granted to a client for this specific scoping using the sum of dedicated and undedicated loan amounts weighted by the revenue share of the client for that sector: $LA_{c,s} = \sum Dedicated\ LA_{c,s,t} + (Undedicated\ LA_c \times Revenue\ share_{\ c,s})$ Where LA = loan amount; c = counterparty; s = sector; t = technologyy Second, we calculate the LCEI of oil & gas extraction.. $LCEI_c = \frac{\sum(Production_{c,t,r} \times LCEI_{\ t,r})}{\sum Production_c}$ Where: r = regionn
Portfolio level calculations	$\mathrm{LCEI}_p = \frac{\sum LCEI_c \times LA_{c,s})}{\sum LA_{c,s}}$ Where: LA = loan amount, c = counterparty, s = sectorr
Scenario benchmark	LCEI of oil & gas operations ($kgCO_2e$/boe).
Portfolio target	Target is set at the intersection between the target year (2050) and the scenario benchmark (or below).
Portfolio trajectory	Convergence approach: specifies that the portfolio indicator needs to be consistent with the scenario benchmark at a future point in time, independent of the indicator level at baseline.

ANNEX

A. Revenue segmentation rules

B. Limitations on data coverage, matching and quality

A. Revenue segmentation rules

This segmentation applies to the energy sector (fossil fuel extraction & power generation) only, where transition takes place across sectors.

SOURCES OF INFORMATION

Currently, companies' revenue shares are collected manually from companies' websites, annual reports or financial reports, and by asking clients directly. When information is available from those two sources, our approach favours public information as it ensures traceability of the information collected. Also, depending on the contact within the company, the information provided may vary (differences between perimeters, periods, or calculation methods). Future development would involve contracting the information from third-party data providers with robust quality assurance processes.

SEGMENTATION PRIORITIZED AT SUBSIDIARY-LEVEL

The revenue segmentation should be applied at **subsidiary or borrower level** rather than at group level whenever possible. This is to ensure that only relevant subsidiaries are accounted for.

If resources available to collect revenue segmentation are limited, and data is collected at group level, it is assumed that all the subsidiaries are active in the same economic sector as the parent company and therefore have the same revenue segmentation.

MATERIALITY THRESHOLD

The segmentation is applied to corporate clients accounting for 80% of the portfolio to minimise workload.

REVENUE SPLIT DOES NOT EXIST

Not all companies publish their financial reports and not all report on their revenue by segment. In the absence of quantitative information, we can take simplifying assumptions on activity share using expert judgement. Two cases:

- The annual report shows that the company has most of its activities in a given sector, for example, oil & gas exploration and production. In this case, we assume that 100% of its revenues comes from this segment.
- If a company operates across multiple business activities as described in its public documents, in the absence of better information, we assume that its revenues are equally distributed across all the business segments.

ANNEX

REVENUE SPLIT EXISTS BUT SEGMENT DEFINITIONS DO NOT MATCH

Many companies report under their own segment nomenclature, and these segment names may differ from those used for the purpose of climate alignment. For example, a company may report activity of an 'upstream' segment that includes midstream assets and another company may report an 'oil & gas' segments that includes refining activities only. In most cases, companies report on a broader perimeter than the segment considered for climate alignment. Segmentation in this case is done using expert judgement and industry knowledge.

SEGMENTATION USING ALTERNATIVE INDICATORS

Companies may report the distribution of their activities using financial indicators other than revenue. They can use EBITDA, net income or even balance sheet measures. In the absence of revenue split data, we rely on these indicators.

DEALING WITH INTERSEGMENT REVENUES

Many corporates report intersegment sales. Not considering the intersegment sales of an integrated company may understate the involvement of a company in the sector. Therefore, we consider the company's revenue share in upstream segment, including the intersegment sales.

B. Limitations on data coverage, matching and quality

The PACTA methodology is data-agnostic. It can therefore be used with a different dataset if it is deemed more relevant. During the pilot, Katowice Banks have identified a number of issues working with climate-related datasets to measure alignment. The KBs are jointly and individually committed to resolving some of these challenges over time, as approaches and data mature.

A first challenge has to do with the coverage of climate-related company data that is currently available from the market:

- Data coverage varies by company size: typically, the data coverage prioritises larger corporates, as the largest emissions are concentrated there. Over time, coverage for smaller entities needs to increase to provide more meaningful baseline and comparable outputs.
- Data coverage varies across datasets: We were unable to reconcile the datasets provided by different data providers for some industrial sectors.

Along with the PACTA methodology, 2DII has developed a matching algorithm that allows for the reconciliation of names of counterparties on a loan book with names on third-party databases. This matching exercise allows for the identification of counterparties with assets belonging to a sector that may not have been in the correct sector classification.

- Match rate varies by sectors: as part of the road test or when piloting the methodology, match rates for some sectors were typically much lower across all banks, meaning there are clients on our books for whom we could not find any data in the PACTA solution (therefore each bank has to approximate the data from other sources, leading to potential variance).
- Match rate varies by entity level: match rates at client entity level were generally lower, often meaning that the client assessment is aggregated at the group level, factoring in various parts of the client's business.
- Match rate varies by geographies: typically match rates for companies operating in the emerging markets were lower.

And some issues also arise in relation to data quality:

- Quality of historical data: As PACTA calculates the metrics using a bottom-up asset level approach, there may be a mismatch against client-reported numbers. Indeed, when it deals with emission factors, for instance, modelled data is often preferred over reported data to ensure the consistency of the measurement among the different companies. More generally, when comparing multiple data sources, it is common to find discrepancies across data provided for the same basic indicators.
- Quality of forward-looking data: KB also noticed that prospective data (future values different from spot values) are available for only around 35% of the dataset. This is mainly because not all companies disclose their production forecast precisely. Work is ongoing to enhance the data quality checks and explain the differences where they exist.

An application of the PACTA methodology by Katowice Banks in partnership with the 2 Degrees Investing Initiative

September 2020