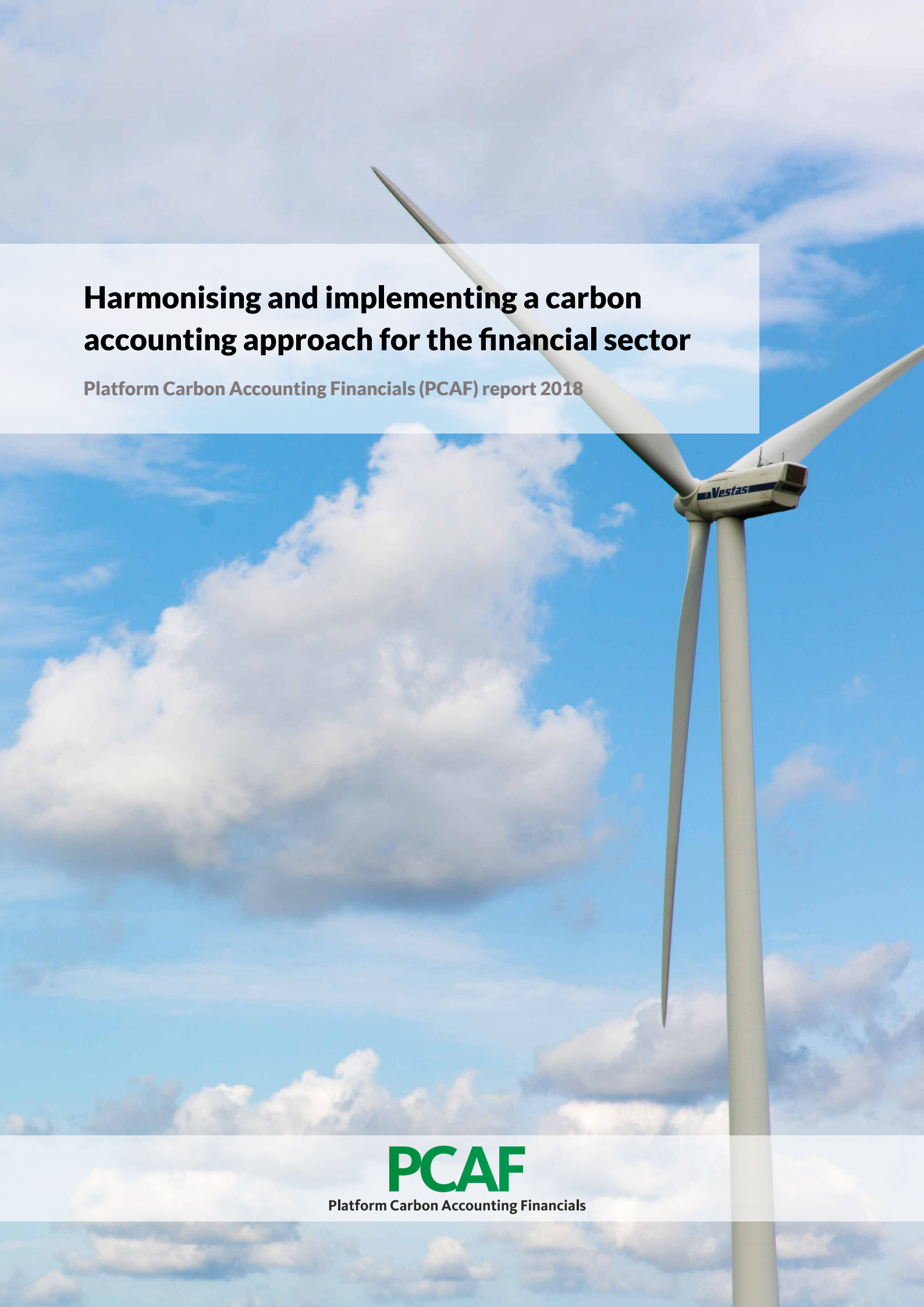

Harmonising and implementing a carbon accounting approach for the financial sector

Platform Carbon Accounting Financials (PCAF) report 2018

PCAF

Platform Carbon Accounting Financials

The Platform Carbon Accounting Financials, or PCAF, was created by a group of Dutch financial institutions which have joined forces to improve carbon accounting in the financial sector and to create a harmonised carbon accounting approach. At COP21 in Paris, these members co-authored the Dutch Carbon Pledge, urging global leaders to take effective measures to keep global warming within safe levels. The group shares its findings with other interested parties to encourage others to adopt carbon accounting as a positive step towards a low carbon economy.

Today, PCAF consists of the following members:

ABN AMRO

Achmea Investment Management

ACTIAM

ROBECO

ASN Bank[1]

FMO

MN

Rabobank

Van Lanschot Kempen

a.s.r.

Triodos Bank

de Volksbank

Stichting Pensioenfonds Metaal en Techniek (PMT)

Stichting Pensioenfonds van de Metalektro (PME)

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NAVIGANT

[1] ASN Bank is part of de Volksbank N.V.

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The latest IPCC report is a stark reminder of the role we all have to play in the rapid transition of the global economy in order to keep global warming to 1.5 degrees. Financial institutions play an instrumental role in achieving this global warming goal, since they control the capital needed for this transition. Defining effective metrics and target setting approaches for financial institutions is a critical step. The Science Based Targets Initiative is working towards a platform for financial sector targets aligned with the Paris Agreement's goals, and collaborations such as PCAF are an important way for institutions to get started.
- Chris Weber, Global Climate & Energy Lead Scientist WWF

The proverb 'measuring is knowing' applies to the financial sector too. And this can be fairly simple. One who sets goals, needs to know where one actually stands today. An adequate plan-do-check-act-cycle is of crucial importance for the success of climate action.
During the past decades organisations became more transparent about a variety of non-financial information, including carbon emission disclosure. Only reliable information is relevant information. From that perspective, many organisations ask their auditors to add assurance to the sustainability and/or integrated reports. Auditors are independent experts in verification and familiar with the organisation's internal control and information systems. Therefore it is obvious to start including carbon emission disclosure in the mandatory annual reporting cycle, making this information publicly available and subject to verification of external auditors.
If this process is implemented well, governments will be able to collect tangible and reliable information on emissions - providing insight in the emission profiles of sectors, industries as well as tracking progress towards climate goals. This, then, will provide useful input for governments for further climate policy refinement.
- Dick de Waard, professor Auditing, University of Groningen and professor Sustainability at University of Curaçao

For us, as an asset manager, we see great added value for our clients from the harmonized methodology proposed by PCAF. It serves as an important next step for Robeco to operationalize the TCFD recommendations and enhance our and our clients' awareness of our investments' resilience to climate change-related risks
- Peter Ferket, Head of Investments, Robeco

The earth's ecosystem is on the brink of catastrophe and we need to radically alter the way we consume, produce, grow, generate energy and conserve our resources. Because climate change affects all but developing countries most, FMO set itself the ambition of aligning our total portfolio with a 1.5°C emissions pathway. To that end, we developed a methodology to establish a 1.5°C emissions reduction pathway, as well as a GHG accounting approach for absolute emissions. Common measurement standards like PCAF and globally accepted reporting rules and definitions are essential in the fight against climate change. They allow us to work together to bring the world to a solution on this topic.
- Pieter van Mierlo, CEO FMO

The transition to a low carbon society matters now more than ever. Like governments, business and civil society, the financial industry needs to take responsibility for what its decisions mean for the climate we depend on. Every financial decision we make has impact. There are no neutral investments. We have to act to avoid and reduce greenhouse gas emissions.
To do this, we need to understand the carbon footprint of our loans and investments so we can monitor portfolios over time and steer on the basis of credible data. The PCAF initiative helps to do just that. It provides an effective approach to assessing the carbon footprint of loans and investments that's built from an open, collaborative partnership. We believe PCAF can play an important role helping to change finance. It can help shift the industry so it's fit for a positive, low carbon future. We're delighted to be a part of it.
- Jellie Banga, COO, Triodos Bank

The strength of PCAF lies in the number of parties that have committed and the fact that they use scientific methods to provide insight into the climate impact of their financing and investments. Insights are needed to take the necessary steps to action. The financial sector is capable of making a big difference and thus contribute greatly to the Dutch climate goals. At ASN Bank we've discovered that big and ambitious goals are achievable. Every person and organization can make a difference. Combined these actions will make a difference. We owe it to future generations to take action, so let's get started.
- Arie Koornneef, CEO ASN Bank

Carbon Footprint is an important tool that helps identify part of the climate risk an investor is exposed to. PCAF provides investors with a suite of methodologies for different asset classes that can easily be adapted for carbon footprinting purposes. The platform aims to harmonize disclosure and reporting of carbon footprints which contributes to comparability amongst investors and a common understanding of what the footprint actually constitutes.
- Gerald Cartigny, CIO MN

We welcome this report as a meaningful step forward towards a systematic measurement of the carbon footprint of banks' balance sheets. We believe that the report provides valuable lessons and many practical suggestions. At the same time we acknowledge that more work needs to be done. That is why it is important that we already started and experiment with various approaches.
- Bas Ruter, Director Sustainability, Rabobank

We fully support this initiative as it is part of the road towards a low carbon economy.
- Lars Dijkstra, CIO Kempen

Although the number of technological opportunities (like electrification of mobility) for reducing carbon emissions is growing, the urgency to address climate change is still rising as confirmed by the latest IPCC report, which calls for more ambition to reach a global 1,5°C scenario. In light of this, ACTIAM has set the target to reduce the carbon emissions of its assets under management with 40% in 2040 compared to 2010. Carbon footprint reduction of our assets is calculated and reported in line with the PCAF methodology. At the same time, sector-wide action is required to reach the reduction in carbon emissions we need to achieve. By collaborating with PCAF members on standardization and internationalization of carbon footprinting methodologies, we are convinced more action and change will come about. Still, to ensure next steps are being made, I strongly encourage PCAF's collaboration with the Science-Based Target Initiative to develop forward-looking climate risk metrics. This way, investment decisions will be more future-proof and engagements with investees can be further optimized. Ultimately, by joint efforts, the financial sector can play an instrumental role in the alignment with a 1,5°C scenario.
- Hans van Houwelingen, CEO ACTIAM

It is ABN Amro's ambition to support our clients on their sustainability journey. Together with them we can have a large impact through our mortgage, commercial real estate and investment portfolio. Measuring and reporting on the carbon impact of our banking activities is an essential aspect of our sustainability approach. By doing this we can monitor the progress of our various initiatives in a transparent way and take further action where necessary. I am proud that ABN AMRO is one of the founding partners of the PCAF initiative and we will actively support the further development of carbon accounting in the financial sector.
- Kees van Dijkhuizen, CEO ABN-AMRO

Achmea Investment Management is aware of the important role that the investment community plays in combatting climate change and achieving the ambitious objectives of the energy transition. We accept our responsibility to engage with the companies that we invest in and are committed to support measures to enable clarity about the footprint of our investments. Our participation in PCAF has been a valuable opportunity to learn and at the same time be at the forefront of carbon footprinting for financial institutions.
- Rogier Krens, CIO Achmea Investment Management

With the commitment of ASR Nederland to contribute to the goals of the Paris Agreement, we've made significant progress to include Climate Change and Energy Transition in our long term corporate strategy for insurance underwriting and asset management. Therefore a.s.r. has committed to measure the carbon footprint for at least 95% of the internally managed investment portfolio for the own account in 2021. Thanks to the PCAF work, that provides a better understanding and consistent framework for carbon accounting, a.s.r. and other financial institutions have an essential tool to avoid climate related risks and maximize their enabling potential to transform towards a low-carbon world.
- Jack Julicher, CEO a.s.r. asset management

De Volksbank wants to make a positive contribution to society. Based on our core activities we believe that we can have a significant positive impact on the financial resilience of our customers and the sustainability of our loans and investments. We seek to reduce the negative impact and increase the positive impact of our activities on the climate. Our objective is to achieve climate neutrality in both our business operations and our balance sheet by 2030 and to be a front-runner by fully integrating climate policy into our core business.

Climate change should be tackled most urgently and we are able to achieve more by collaborating with other organisations.

One example of collaboration is PCAF. After the 2015 Paris Agreement, ASN Bank – the platform's chair – started developing a uniform carbon accounting methodology in concert with eleven other Dutch financial institutions. The PCAF participants agreed to be transparent about the climate impact of their investments and their objective to reduce this impact.

The collaboration will be continued in order to implement, further fine-tune the methodology and promote it internationally. We therefore welcome the initiative of Amalgamated Bank, which has committed to leading a process of adapting the PCAF methodology for North American banks.
- Maurice Oostendorp, CEO de Volksbank

Executive summary

The 2015 Paris Agreement demonstrated the increased commitment of leaders worldwide to effectively address the issue of climate change. Both from a risk management and a sustainable development perspective, increasingly, financial institutions assess the environmental impact they have through their investing and lending activities. We see regulators asking financial institutions to provide transparency on climate-related risks. We also see consumers asking for their banks and insurers to contribute to sustainable development. Footprinting of investments contributes to meeting both of these needs.

Comparability and transparency of footprinting requires uniform disclosure, following the same guidelines and ideally using the same metrics.

Leading up to the Paris agreement, eleven Dutch financial institutions joined forces to improve carbon accounting through the Platform Carbon Accounting Financials (PCAF). Last year, PCAF launched their first report. Providing a set of common principles, they proposed harmonised guidelines for investments along several different asset classes – and solicited feedback from the global financial community.

Last year PCAF promised to, for at least two years, share best practices, continue to develop their methodologies and report on these efforts on an annual basis. This report serves as both an update to their guidelines; extending methodologies to more asset classes and providing insight through lessons learned in implementation. To date, PCAF methodologies cover:

1. Sovereign bonds
2. Listed Equity
3. Project Finance
4. Mortgages
5. Commercial Real Estate
6. Corporate Debt: bonds
7. Corporate/SME loans
8. Indirect investments

PCAF members started experimenting with footprinting and disclosure of the results. Today, PCAF members calculate the carbon footprint of over one trillion euro of assets under management. This figure represents almost half of their total assets under management – showing the full potential of Carbon Accounting for Financials.

Ultimately, footprinting is a means to an end. The latest IPCC special report on the impacts of global warming is a stark reminder of the vast transformation of our economy needed to get a low-carbon pathway. To help financial institutions align investment and lending portfolios with the global 2°C climate goal and support the transition to a low-carbon world, a number of PCAF members contribute the Science Based Targets (SBT) for financials: developing target-setting methods and implementation guidance for financial institutions to set SBTs for their investing and lending activities.

1. Introduction

1.1 Foreword:

"There are three kinds of lies: lies, damned lies and statistics". An encouraging opening sentence for this progress report of the Platform Carbon Accounting Financials (PCAF). Because isn't that what this is? Writing down business as usual in such a way that it can now be seen as green business? I would not have written this sentence down if I were not convinced of the contrary.

As a representative of my country in international climate negotiations I do underscore the importance of finance in general and of the financial sector in particular. Article 2.1c of the Paris Agreement states that we have to make 'finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.' In my opinion a key sentence of the agreement. Article 4 deals with accounting, transparency and comparability of information. It underpins my conviction that we should put a lot of effort into involving financials in the implementation of the Paris Agreement. Efforts that should make sure that no one gets the opportunity to greenwash (the negative interpretation) and that we use the potential of finance to get us on course to a 1,5 degree world (the positive interpretation).

PCAF is a genuine example of the latter, the positive interpretation. Policymakers and leaders in the private sector, including the financial sector, do need proper information to take the right decisions. Transparency, comparability and accountability are core values of this initiative. I would also like to add realism to this list. The Platform takes the modest stance that it is working on a 'means to an end'. The methodology that has been developed is a tool for decisionmakers. Once we have better knowledge of the carbon footprint of our assets and portfolios, we can take better informed decisions to reduce that same footprint.

One year ago, in the margins of the One Planet Summit in Paris, I had the privilege to receive the result of two years of hard work: the report 'Paving the way towards a harmonized Carbon Accounting Approach for the Financial Sector'. This report got a lot of (international) attention because it filled an existing gap. It provided the tools that could help those institutions that wanted to make their finance flows consistent with a pathway as meant in article 2.1c of the Paris Agreement. However, with the publication of the report we could also witness the birth of the next excuse from those that cannot or do not want to change. They said the presented methodology is fine, but we now need an international standard.

My answer to them is that the PCAF methodology can be used irrespective of a global standard. Because it is a tool that is fit for its task. A Dutch hammer can hit a nail on its head, just as an Australian or a Chinese one. Let PCAF be an inspiration for others to use this methodology, or to develop something similar. As long as we keep on hitting the nail on its head and hammer Paris home!

Marcel Beukeboom

Climate Envoy
Kingdom of the Netherlands

Portrait by Jose van Riele

1.2 PCAF Governance

PCAF is facilitated by the ASN Bank with Piet Sprengers as Chair, Freek Geurts as Secretary and Jeroen Loots as Project Manager for the project. PCAF consists of eight working groups , chaired by different financial institutions: Listed Equity (Nando van Kleeff, MN), Project Finance (Albert van Leeuwen, FMO), Government Bonds (Kees Ouboter, Actiam), Mortgages (Tjeerd Krumpelman, ABN AMRO), Corporate Debt (Thierry Oeljee, Achmea Investment Management), Corporate/SME Loans (Josée van den Wijngaart, Triodos), Real Estate (Tjeerd Krumpelman, ABN AMRO) and Indirect Investments (Jos Gijsbers, a.s.r.). PCAF engages regularly with a Sounding Board that consists of the following organisations: Aegon, APG, ING, Dutch Municipal Bank (BNG), the Dutch Association of Insurers and the Dutch Banking Association (NVB). PCAF is part of the Dutch Sustainable Finance Platform, chaired by the Dutch Central Bank[2].

1.3 Purpose, scope and structure of this document

PCAF's work is open source. PCAF actively welcomes external suggestions and recommendations to improve the methodology it has developed. This document is intended to provide a clear overview of the work that has been executed by PCAF. It should provide insight into what the next steps should be and what gaps in methodology or data have emerged. The report provides an overview of carbon footprinting methodologies per asset class and is a step toward harmonised accounting methods for these asset classes. This document contains footprinting guidance for the following asset classes: sovereign bonds, listed equity, project finance, mortgages, commercial real estate, indirect investments, corporate debt and corporate loans.

Chapter 2 gives an overview of PCAF's journey. It provides a brief account of how PCAF was founded, where PCAF stands today and what next steps will be required. This is supported by views from a regulatory, legislative and more global harmonisation perspective. Chapter 3 contains more technical content on footprinting guidelines and lessons learned during implementation. Chapter 4 provides an account of PCAF's next steps.

PCAF group photo, from left to right: Thierry Oeljee (Achmea Investment Management), James Niven (Triodos Bank), Mikkel Kallesoe (FMO), Sharon Visser (de Volksbank), Jeroen Loots (ASN Bank), Danny Dekker (Van Lanschot Kempen), Cristina Cedillo Torres (Robeco), Bouke de Vries (Rabobank), Nando van Kleeff (MN), Josée van den Wijngaart (Triodos Bank), Jos Gijsbers (a.s.r.), Tjeerd Krumpelman (ABN AMRO), Alexandra Dumitru (Rabobank), Kees Ouboter (Actiam), Piet Sprengers (ASN Bank), Freek Geurts (ASN Bank), Albert van Leeuwen (FMO).

[2] The Sustainable Finance Platform is a cooperative venture of De Nederlandsche Bank (chair), the Dutch Banking Association, the Dutch Association of Insurers, the Federation of the Dutch Pension Funds, the Dutch Fund and Asset Management Association, the Netherlands Authority for the Financial Markets, the Ministry of Finance, the Ministry of Infrastructure and the Environment, and the Sustainable Finance Lab. The aim of this platform, set up by DNB in 2016, is to promote and encourage a dialogue on sustainable finance in the financial sector.

2. The PCAF journey: viewpoints on carbon footprinting for financials

2.1 The role for sustainable finance in the transition to a carbon neutral economy

The Paris Agreement sets out a clear timetable for the transition to a carbon neutral economy. It is an enormous task, and one in which the role of the financial sector cannot be underestimated. After all, the projects and infrastructure needed for this transition will have to be financed for which a substantial redeployment of capital is needed.

Climate change and the transition to a carbon-neutral economy also entails risks for the financial sector. As a supervisory authority, we want institutions to effectively identify and manage these risks. If financial institutions properly manage these risks, we expect this will result in a redeployment of capital to green activities.

Disclosure of climate-related information by the financial sector is key in these processes. It is a sine qua non for the functioning of the pricing mechanisms for climate related risks. It also enables market players to seize the associated opportunities. Moreover, the discipline of public disclosure of climate-related information can lead to better risk management.

The PCAF disclosure method enables financial institutions to measure the carbon impact of their portfolio and to set targets: it offers a conduit for the redeployment of capital to green activities. Disclosure of this information will also engender discussion with clients and society as a whole. This will help financial institutions gain a better understanding of clients' preferences regarding climate impact.

I am very proud of the immense amount of work done by PCAF, and its contribution to the work of the Sustainable Finance Platform. When we set up this Platform around two years ago, we wanted to create a forum where banks, pension funds, insurers and asset managers could work together on initiatives that would further develop the market for sustainable finance. PCAF is a prime example of such an initiative.

Frank Elderson is executive director supervision at De Nederlandsche Bank, the Dutch financial regulator

2.2 Our journey from footprinting investments to reducing financed emissions

In the early 2010's, a group of pioneering financial institutions in The Netherlands started their journey towards carbon footprinting of their investments.

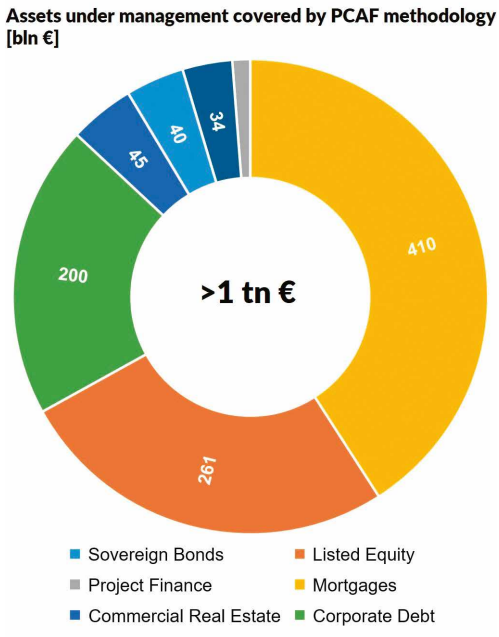
In the months leading up to the COP21 in December 2015, several Dutch institutions came together and committed to climate action to support the outcome of an ambitious Paris Agreement. This resulted in the Dutch Carbon Pledge. Essentially this is how PCAF was founded: several financials committing to disclosing their carbon footprint and subsequently setting emission targets in line with the Paris Agreement.

In December 2017 PCAF published its first report describing harmonised footprinting principles and methodologies for five major asset classes, and solicited feedback from the international financial and accounting communities. Now, one year later, we are pleased to publish an updated report with additional asset classes, improved method descriptions and lessons learned from implementation. PCAF continues to be open source and we are keen to receive feedback to improve what is presented in this report.

PCAF members started measuring and disclosing their footprint in a harmonised way. Today, PCAF methods cover over one trillion euros of Assets under Management (AuM), or roughly half of the total AuM of all members combined. Per asset class, they ran into different issues, ranging from different scopes to take into account to data availability. For PCAF hurdles and uncertainties are no reason to delay action. Rather, this report is an effort to overcome these hurdles and reduce uncertainties; by sharing our lessons learned we hope to move carbon accounting for financials forward internationally.

The relevance of our efforts is growing. With climate action higher on the international agenda, the financial sector needs to be equipped with tools to disclose their footprint and know how to act to reduce this footprint in the real economy. We also see increasing pressure from the regulators to provide transparency on climate-related risk exposure. Harmonised footprinting will allow us to do both: to report on exposure as well as to urgently steer our portfolios towards a resilient, low-carbon future.

Footprinting is a means to an end. It's the first step to manage climate risks and reduce adverse climate impact. To take these steps an investor needs to understand where in their portfolio climate impact is greatest, where reduction will be most material – and to develop appropriate targets. I see three main levers to reduce emissions: reduce emissions from existing assets, avoid emissions by investing in green technology such as renewables and thirdly realise negative emissions. PCAF methodologies should evolve to describe all three to allow financials to reduce their footprint – in line with the Paris Agreement.



Of course, work remains to be done to get there. Implementation of PCAF guidelines is essential for our own credibility as participants as well as to create the necessary innovations for increased footprint accuracy, target setting and effective strategies.

We see international developments that have the same goals as we have. The Taskforce for Climate-related Financial Disclosure (TCFD) I believe is a great fit with our work: where TCFD describes metrics to disclose impact and risk for sectors, PCAF allows harmonised accounting for the financial sector at the detailed level of asset classes. It is important to ensure coordination and aim for consistency with these developments if we all want to ensure methodologies will be more widely adopted and harmonised. In the technical part of this report we will explore several international initiatives and how they can align with PCAF guidelines.

Several PCAF members contribute to the development of Science-based Targets for financials[3]. Our goal is to develop target-setting methodologies for our portfolios that are demonstrably in line with the Paris Agreement and that will lead to effective strategies that have real impact. Some of our members are expected to be road testing these methodologies next year.

PCAF remains open to new members. We invite financials to join our bottom-up initiative. Together we can both improve our work so far and create the necessary momentum in our sector to combat climate change.

Piet Sprengers is Head of Sustainability at ASN Bank and chair of PCAF

[3] https://sciencebasedtargets.org/financial-institutions/

2.3 Carbon disclosure for financials: ahead of EU legislation?

Under the banner of 'sustainable finance', EU legislators finally give serious thought as to how to implement the Paris Agreement in the financial sector. Discussions on sustainability in the financial sector EU level are at a low point because legislators fear committing to definitions, metrics, models and methodologies that have yet to prove themselves, aren't perfect or are simply unknown to them. But if we don't start somewhere, we will never get anywhere. PCAF's strong suit is that financial institutions have started before they are obliged to do so. This shows legislators policies on sustainable investments can actually work. This may persuade those that have doubt to really start implementing legislation.

We simply do not have the time to discuss methodologies before moving to real, tangible action to green the financial sector. The example of PCAF hopefully moves the needle in the sustainable finance discourse: enthusiasm is on the rise to define and propel green investments. But I sense less enthusiasm around defining and discouraging 'brown' investments. Thanks to initiatives such as PCAF, we finally receive better insight into total emissions – and can widen the debate beyond just green investments. Ultimately, sustainable finance will only work if we not just define green investments, but also highlight those investments that are prone to (carbon-related) risk and therefor need to be avoided. Only then can we speak of a financial sector which is truly Paris-proof. 2019 will teach us whether EU legislation will succeed to do this.

Bas Eickhout is Member of the European Parliament and Rapporteur Taxonomy sustainable investments

2.4 Carbon disclosure for financials: an international perspective

The financial sector is critical as it controls the capital which can shift the economy to align with the low-carbon transition.

Different actors within the sector have different roles to play. We need to get them thinking longer term and more sustainably as they support the needs of the real economy. Insurance companies have focused more on the long-term physical risks related to climate change - that knowledge needs to be transferred to the investing side of their business. That's often been secondary in the discussion to date, but it's starting to come to the fore.

Banks - having a much closer and more direct relationship with their clients than investors - have the potential to influence sustainable, strategic decision-making by company management, perhaps even more so than asset owners do as shareholders.

CDP already does a lot with the financial sector. CDP has over 650 investors with more than $87 trillion in assets requesting and using environmental data from over 7000 companies. CDP data underpins the environmental data used by the market through data providers such as Bloomberg, MSCI and S&P Trucost and is the basis of financial products such as the STOXX Low Carbon Indices and the New York State Common Retirement Fund's low carbon index created by Goldman Sachs. Our Investor team has developed Climetrics, the world's first fund rating which enables investors to integrate climate impact into their investment decisions. Additionally, CDP is a partner in the Science Based Targets initiative which is developing a framework for financials to set an SBT. We are also working with the EU's Technical Expert Group to develop disclosure metrics for sustainable finance.

CDP: CARBON DISCLOSURE PROJECT

CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. Over the past 15 years CDP have created a system that has resulted in unparalleled engagement on environmental issues worldwide.
Their vision is for a thriving economy that works for both people and planet.

Crucially, we are developing a new reporting framework for financial institutions, focused on the climate-related impacts of their financial activities, including portfolio emissions impact. We really need to focus on the financial sector to close the loop and understand how financial flows are impacting global climate goals.

Footprinting is one of the metrics that can be useful in understanding risks and opportunities that are faced by a financial institution. There has been criticism that footprinting is merely historical; a snapshot in time. But that's also its power. When viewed as a time series, footprinting can measure the progress an institution is making in decarbonizing its portfolios and that's when it could become really powerful. Tracking the decarbonization of the financial sector is a proxy for measuring the progress being made in decarbonising our economies.

When I read the first PCAF report, it struck me as the most comprehensive methodology that I'd read for the sector. The fact that it's an industry-led development makes it well-placed to be used as a standard across the industry. I like how it addresses more asset classes than other methodologies I've seen. We see a lot of metrics around the energy sector, but PCAF is something that can be applied across all asset classes and sectors that financial institutions have a stake in. It's a really solid start.

Fundamentally, PCAF fits perfectly with the TCFD recommendations, providing a framework for financial institutions to disclose their relevant Scope 3 emissions. My advice is to start looking at partnering with TCFD implementation initiatives and look at whether this method is appropriate for their framework. For example, the UNEP FI TCFD pilot has been focused on scenario-analysis to date. PCAF could feed into their work as it develops across the other TCFD recommendations. The sector needs a global standard, or at least a few methodologies that institutions can adopt globally to report. For PCAF to gain influence, it really needs to globalize. I find it encouraging to hear that US-based institutions are looking to do just that.

GLOBALISATION OF PCAF?

"With the long-term goal of being able to track and set targets for emissions reduction, Amalgamated Bank has committed to leading a process of adapting the Carbon Accounting Platform for Financials developed by our European colleagues for North American banks so that we too can measure the emissions financed through our lending. We believe this is a logical next step that follows from our prior commitments of being 100% renewable energy and net-zero carbon in our operations. It is also an essential step in order for our economies to meet the goals of the Paris Climate Agreement.

We believe a collaborative experience is critical to the success of this work. For there to be real progress, we know measuring impact in this way has to be adopted broadly. First by our partner banks in the North America, as it has been in parts of Europe, and then more broadly by the larger institutions around the world."

Keith Mestrich, CEO Amalgamated Bank

Over 300 global financial institutions disclose their environmental performance to CDP. We hope PCAF will support these companies in disclosing the emissions associated with their investment and lending portfolios, as opposed to just their direct operational emissions. Currently, only 12% of reporting companies disclose this information to us and we need to see that grow. We'd like to see more institutions understand the emissions related to their portfolio, and PCAF is an excellent tool to feed into that.

Leanne Bouvet is Senior Technical Manager, Financial Services CDP

3. Technical report

3.1 State of implementation: refinement and lessons learned

The GHG Protocol, developed by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), is the leading standard on carbon accounting. To increase the accessibility and legibility of this report, we have used the layout and structure of the GHG Protocol as a guideline. To make it easy to find relevant topics for interested financial institutions, we provide results per asset class and present the findings in easy-to-read tables. Finally, it is important to realise that the PCAF 'project' is work in progress. Any methodological gaps and data will be completed as our work progresses.

The 2018 technical report provides an update to last year's footprinting methodologies and lessons learned during the implementation of these methodologies. It serves as a new version of last year's report and can be read separately from it. This document contains footprinting guidance for the following asset classes: sovereign bonds, listed equity, project finance, mortgages, commercial real estate, indirect investments, corporate debt and corporate loans. This chapter starts with an overview of international initiatives related to footprinting of investments to set the scene and provide some context. Next the reasons for calculating the carbon footprint of these asset classes are explored in more detail. The next section describes the principles that underpin this type of carbon footprinting. The final section details methodologies arising from these principles per asset class. This is done in accordance with the thematic working group order of PCAF.

With climate change at centre stage of the international agenda, there are a great number of related activities that look to measure, disclose and reduce the environmental impact of financial activities. To see what that relationship is with PCAF methodologies, Table 1 provides a (non-exhaustive) overview. PCAF's work remains open source. PCAF actively welcomes external suggestions and recommendations to improve the methodology it has developed.

Table 1: Inventory of international initiatives related to footprinting of investments

Initiative	Purpose for financials	Asset class Coverage	Progress	Footprinting Metrics	Relation to PCAF methodologies
CDP Financial Services Sector Disclosures approach	Extend questionnaires to focus on financing and investing initiatives	All	Initiative started early 2018	Not yet known	Ensure harmonization, important to internationalisation of standards proposed.
Climate Action in Financial Institutions	Systematic pathway to integrate climate change considerations across their strategies, programs and operations	All	Initiated at COP21 (2015)	Voluntary principles for mainstreaming climate action, no metrics suggested directly	PCAF enables disclosing in accordance with voluntary principles
Climate Disclosure Standards Board (CDSB)	Aligning and harmonising global corporate reporting model to disclose environmental, natural and financial capital	Not asset-class specific	Updated following TCDF April 2018	No prescribed metrics for financials	PCAF enables disclosing according to CDSB recommendations
Equator Principles	Benchmark for determining, assessing and managing environmental and social risk in projects	Project finance	Published June 2013	No prescribed metrics other than total annual operations emissions	PCAF enables disclosing in accordance with Equator Principles

International Financial Institution framework (IFI)	GHG accounting methodologies including output indicators used, baselines, boundaries and scope of emissions considered	Project finance	Updated in 2015	Absolute metrics described, attribution unclear.	
Institutional Investors Group on Climate Change (IIGCC): Carbon Compass	Guide to available footprinting methods and considerations	Listed equity, provides considerations for sovereign bonds, fixed income, project finance and real estate.	Published November 2015	Aggregate footprint metrics for listed equity such as WACI	Recommends market cap as denominator as opposed to enterprise value. For sovereign bonds, country level emissions recommended for scope 3 as opposed to governments' purchased goods & services.
ISO 14097	Framework and principles	All	Initiative started November 2017	Will develop benchmarks on decarbonisation pathways and metrics for tracking targets' progress.	Metrics likely will be more technology-driven than footprint driven
Paris Agreement Capital Transition Assessment (PACTA)	Framework to measure alignment of financial markets with climate goals.	Listed Equity, corporate bonds	Web-based tool is live	No direct footprinting, but measures technology exposures	Complementary. Metrics are technology driven, not footprint driven.
Portfolio Carbon Initiative (PCI)	Indicators for disclosure of climate-related risk exposures and alignment with low-carbon economy.	All	Published November 2015	Assesses landscape of metrics available; not one approach recommended.	PCAF methods in line with some of the metrics described at a higher level by PCI.
Taskforce Climate-related Financial Disclosure (TCFD)	Disclosure of climate-related financial risk, footprinting is one tool recommended	Not all asset classes are explicitly covered. Focus on listed equity & corporate loans.	Report delivered.	Weighted Average Carbon Intensity (WACI) Total Carbon Emissions of portfolio	PCAF methods enable disclosing according to TCFD recommendations.
UNEP FI pilot	Implementing TCFD, focus on scenario analysis	Corporate loans	Report delivered.	N/A	N/A

3.2 Business goals

Before exploring the methods and key assumptions in more detail, the objectives financial institutions could have for determining the carbon footprint of their assets should be assessed. PCAF identifies the following objectives for carbon footprinting:

	Risk Management and Steering	Value creation
Internal (steering purpose)	Risks management: a high carbon footprint could imply a potentially high risk in an increasingly decarbonised economy. Steering: Meaningful carbon footprint data enables institutions to understand, monitor and steer more intentionally on impact goals within and between sectors.	Active ownership: at a granular levell, relative carbon footprint data are indicators of (carbon) efficiency of a given organisation, sovereign or asset when compared with their peer group, or over time. Data acts as supporting material for engaging with investees on their carbon footprint.
External (reporting purpose only)	Stakeholder management: clients and beneficiaries increasingly demand that their savings are managed in a way that is resilient to climate change. They may withdraw money (if they can) and entrust their savings with another financial institution if they feel that climate risks are not managed properly.	Broader responsibility, long term stability and impact management: by reducing the carbon footprint, financial institutions reduce the likelihood and impact of climate change and contribute to a better world by taking effective measures to keep global warming within safe levels. Insight in the carbon footprint is a prerequisite to this type of target-setting.

These objectives may sometimes determine the choice of metrics used. For instance, if an organisation's main objective is to generate a positive impact, accuracy and completeness are important. For strategies aimed at external reporting, simplicity and comparability may dominate. A financial institution which steers on its carbon footprint may wish to keep external factors – such as asset prices – constant. An alternative approach could be that a financial institution announces intentions and manages expectations by explaining that external factors are out of its control. Furthermore, a financial institution that wants to assess its climate-related risks can use the carbon footprint data and metrics differently. For instance in relation to policy regulations on emission reductions and carbon pricing per sector.

In general, PCAF members support the ultimate objective that financial institutions should use their influence (through asset allocation and active ownership) to accelerate the transition to a low carbon economy.

3.3 Principles of carbon accounting for financials

3.3.1 GHG Protocol

The basis for carbon accounting is the GHG Protocol, as explained in chapter 1. This protocol defines three distinct different scopes that all entities may report separately, see Figure 2. In the next section, these scopes are used from the perspective of the reporting of a financial institution (FI). In the next chapter, where asset classes are detailed further, these asset classes are part of the FI scope 3 category 15 (Investments) or financed emissions. In the carbon footprint methodology description per asset class, scope 1, 2 and 3 refer to the scopes from the viewpoint of the investee, being a project, company, person or a country.

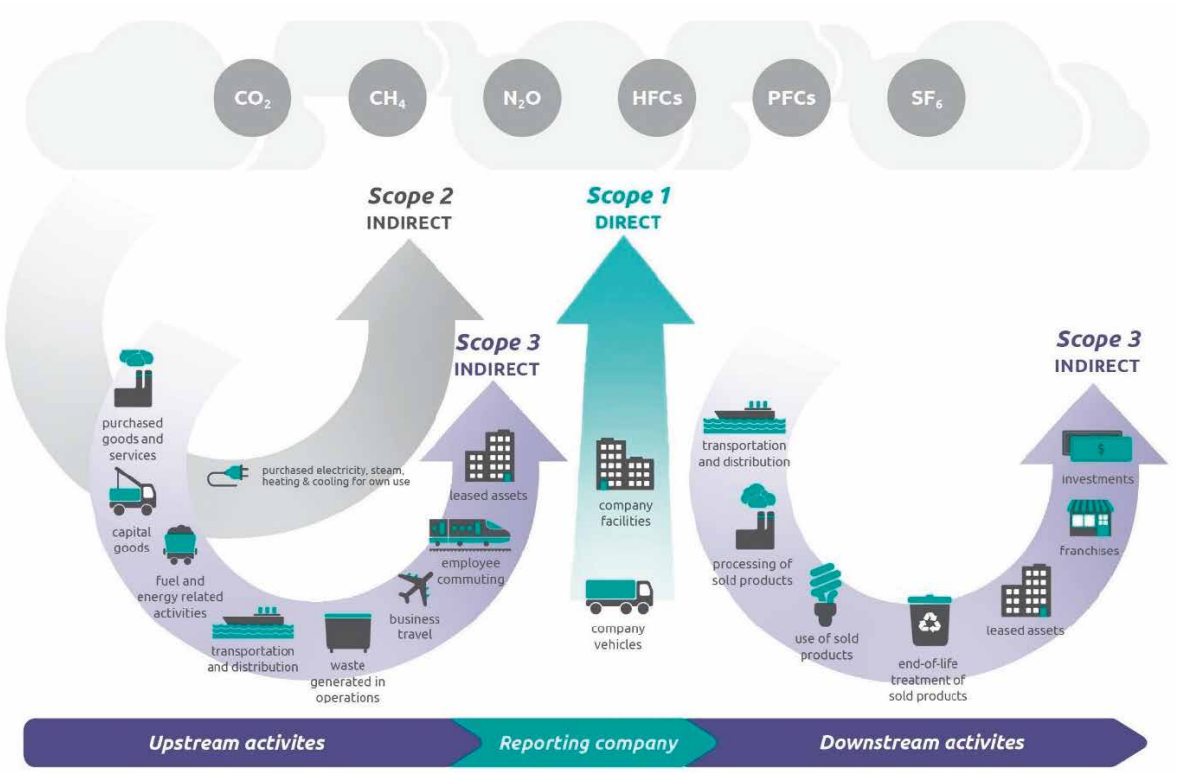


Figure 2. The scope definitions from the GHG Protocol (Image from GHG Protocol).

3.3.2 Overarching principles

This section lists common sets of basic design and accounting principles for carbon accounting for financial institutions, regardless of the type of investment. These principles will provide guidance on how to account for, and report on financed emissions / avoided emissions by a financial institution. In order to distil a set of overarching principles, PCAF members rely on work already done on this topic. For an overview of work that served as inspiration, see Appendix B.

To define basic design and accounting principles, PCAF members made a practical selection from principles for carbon accounting that are already available and combined them with generally accepted accounting principles.

3.3.2.1 Recognition

The carbon footprint of any financial institution should, according to the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, include:

- Scope 1 of the reporting financial institution: all direct GHG emissions
- Scope 2 of the reporting financial institution: indirect emissions from the consumption of purchased electricity, heat or steam
- Scope 3 categories that are relevant or material for the reporting financial institution. Scope 3 covers other indirect emissions such as the extraction and production of purchased materials and fuels, outsourced activities, business travel, waste disposal etc.

Scope 3 category 15 (Investment) is highly relevant for financial institutions and the focus of this report.

3.3.2.2 Presentation and disclosure

Financed emissions should be accounted for, and be reported, at least annually. PCAF proposes the following disclosure requirements:

Purpose:

- Ensure the carbon footprint appropriately reflects the GHG emissions of the financial institution and serves the decision-making needs of users – both internal and external.
- Meet the specific carbon footprint goals of the financial institution; for instance, because the financial institution is working towards a specific carbon footprint target or to monitor the effectiveness of its wider strategic goals in this area.

Coverage:

- The completeness of the financial institution's carbon footprint; disclose and justify any specific exclusions.
- Coverage of asset classes; disclose if the footprint is cross-asset or only for the relevant asset classes.
- Coverage of the assets that are included; disclose the percentage of the assets included in the carbon footprint per asset class, preferably all assets per asset class but at least the majority.
- Past performance; disclose the carbon footprint of multiple comparable time periods (e.g. years).

Transparency:

- Assumptions; disclose any relevant assumptions and make appropriate references to the accounting methodologies and data sources used.
- Metrics: disclose the financial institution's absolute and/or relative emissions plus an explanation of their difference
- Recalculations of previous reporting years; a recalculation can be made of the financial institution's previous reports using the most recent, most relevant or most accurate data to be able to make a more reliable comparison between the current report and previous years. The recalculation steps should be made transparent.
- Reporting; provide an explanation of scope 1 (direct), 2 and 3 (indirect) in a simple and precise manner.
- Prudence; show scope 1, 2 and 3 separately to ensure comparability, avoid understating financed emissions and provide transparency on potential areas of double counting.

3.3.2.3 Measurement

PCAF recommends measuring the carbon footprint according to these general principles:

Gases and units:

- The seven GHGs listed in the Kyoto protocol are measured: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). These seven gases can be expressed in Carbon Dioxide equivalents (CO_2e).
- Absolute emissions are expressed in metric tonnes of carbon dioxide equivalents: tCO_2e.
- Relative emissions are expressed in metric tonnes of carbon dioxide equivalents per million Euro invested: $tCO_2e/M€$.

Attribution:

- Follow the money is a key principle for footprinting of financial assets, i.e. the money should be followed as far as possible to understand and account for the carbon impact in the real economy.
- In principle scope 1, 2 and relevant categories of scope 3 of the investee should be included in the carbon footprint. When deviating from this (e.g. when scope 3 is not relevant), it should be made clear why.
- Influence of the financial institutions on steering the investment, if the influence is bigger, also the proportional share for accounting the footprint to the investment is larger.
- The denominator, i.e. the financial value of the asset that, in relation to the investment, determine the proportional share for accounting the carbon footprint, should include all financial flows (i.e. equity and debt) to the investee as much as possible. When deviating from this, it should be made clear why.

These overarching principles were applied consistently to design and agree upon the carbon footprinting methodology per asset class.

3.3.3 General limitations

3.3.3.1 Double counting

Double counting occurs when GHG emission or emission reduction is counted more than once towards attaining mitigation pledges or financial pledges for the purpose of mitigating climate change.

Apart from the double counting that intrinsically occurs between the different scopes, double counting can take place at five levels:

- Between financial institutions
- Co-financing of the same entity or activity
- Between transactions within the same financial institutions
- Across different asset classes
- Within the same asset class

PCAF recognises that double counting of GHG emissions can't be avoided completely, but it should be avoided as much as possible. Double counting between co-financing institutions, and between transactions within the same asset class of a financial institution, may be avoided by appropriate attribution rules.

3.3.3.2 Flow versus stock

When measuring GHG emissions we use a flow variable to assess how much GHGs is emitted over a specific period, typically during a year. However, when we determine the contribution of the investor to these emissions we consider an investor's portfolio at a specific point in time (stock). This can give the wrong information about what an investor actually contributed during the whole year.

For example, if an investor owns 100% of company X during the entire year but sells all his shares on December 30th. The calculation on December 31st wouldn't show the shares of company X anymore and the influence the investor exerted on the company during the year is not expressed correctly in the carbon footprint.

A solution could be to include the number of days in the attribution factor, as in this example, a factor of 364/365. This would provide a more balanced opinion about the investors contribution. This is, however, more data intensive and complex.

In the formulas in chapter 4, it should be noted that the subscript t (time) has different meanings for emissions (flow) and portfolio value (stock).

3.3.4 Avoided emissions

In this context, avoided emissions are investments in, for example, renewable energy projects or energy efficiency products leading to lower GHG emissions elsewhere in the economy. Reporting on avoided emissions is a way to quantify and demonstrate a positive contribution to preventing climate change.

For the financial sector, which provides finance for projects and products that lead to avoided emissions, quantifying this effect could be interesting as well. Avoided emissions are most relevant for project finance, where there is a direct link between the involvement of the financial institution and a reduction in GHG emissions. It is important to quantify and report avoided emissions separately from actual emissions. Otherwise financial institutions could "cherry pick"; i.e. only focusing on the positive impact of a portfolio and purposefully ignoring negative impacts.

In calculating these avoided emissions, it is important to select the right baseline (i.e. average product or technology on the market) and to be conservative to limit the chance of overstating avoided emissions. This baseline represents emissions that would have occurred if the project had not been implemented. The difference between emissions from the baseline and emissions from the project are avoided emissions.

3.3.5 Principles for emissions data

An important element of carbon footprinting is the availability of high quality data on emissions of investments. Different asset classes present unique challenges and opportunities with respect to emissions data. This section gives a few overarching principles on the quality and desired hierarchy of emissions data, with more detailed guidance provided on specific asset classes in chapter 4.

High quality emissions data is defined as follows:

- Emissions data is consistent, both across entities and across time;
- Emissions data reflects the underlying emissions generating activities of the entity, and are not impacted by unrelated factors;
- Emissions data is accompanied by some form of assurance.

It is unlikely that emissions data meet all the criteria listed above, and that this is dependent on the specific properties of the investment, such as: type of investment, the sector or market best practice. Therefore, broadly speaking, the following hierarchy of preference is proposed:

1. Emissions data as disclosed by the entity itself accompanied by some form of assurance on the disclosed data by a credible independent institution. This source is the preferred source for emissions data as it captures the specific characteristics of the investment (e.g. technology, geography, activities) in the best way. Assurance provided (e.g. through additional disclosure on methodology, certifications or external audit/validation) gives the financial institution additional comfort that the data offers a fair representation of its underlying emissions-generating activities.
2. Emissions data calculated on the basis of verifiable non-GHG source data, using credible calculation tools. This is preferred if the entity does not disclose emissions data directly but is able to provide or disclose non-GHG source data. From this data (e.g. mining/industry/power production, fuel use), emissions data can be estimated, and the resulting estimate should give a reasonable approximation of emissions generated on the basis of the underlying activity.
3. Emissions data as disclosed by the entity itself without assurance, and/or emission estimates obtained from environmental input/output models or intensity-based models. The advantage of these estimation models is that they require relatively limited input data and can therefore be used in the absence of detailed data on the specific investment.

3.4 Asset class methodologies

This section covers the methodologies as detailed by the working groups of PCAF. All methodologies reflect the overarching principles outlined in Appendix B: Accounting principles. This work can be read as a stand-alone publication, fully replacing the 2017 input. Any changes to this previous version are not made explicit. The asset classes covered are:

1. **Sovereign bonds**
2. **Listed Equity**
3. **Project Finance**
4. **Mortgages**
5. **Commercial Real Estate**
6. **Corporate Debt**
7. **Corporate/SME loans**
8. **Indirect investments**

All paragraphs below use the same form of table for clarity and to enable a direct comparison between asset classes. Empty parts of a table indicate that no decision has been made on this aspect yet or the item is not relevant for this asset class. Each asset class also lists a calculation example. These examples have merits and limitations. Alternative approaches are possible.

	Outcome
Scopes covered	Decision on minimum requirements.
Portfolio coverage	Decision on minimum requirements.
Attribution	How is the investor's share of the total emissions of the investee attributed?
Data	What data to use? What data considerations are important for this decision?
Absolute vs. relative emissions	What type of emission metric needs to be presented and how should the reporting institution arrive at this?
Avoided emissions	A description of how to account for avoided emissions when applicable.
Asset class specific considerations	Room for additional, asset class-specific considerations.
Limitations	The limitations of the proposed methodology are discussed.

Besides this table, every working group reports on activities and outcomes of work done in 2018. Case studies following implementation work discuss successes as well as challenges.

3.4.1 Sovereign bonds

Topic	Outcome
Scopes covered	According to the follow the money principle, scopes 1, 2 and scope 3 purchased goods and services of the government are covered. PCAF considers a sovereign bond to be a debt security issued by a central government to support government spending. As such, the emissions caused by a sovereign bond not only lead to emissions caused by the central government's own operations, but predominantly by how the government finances other sectors within the country. No clear guidance exists on minimum requirements yet. Calculate and report the different scopes separately. For steering and risk mapping purposes it is useful to see what steps of the governmental spending are most exposed to carbon emissions. For reporting purposes, the separation of scopes is necessary to allow separate government decision makers to draw informed conclusions.
Portfolio coverage	All bonds should be covered.
Attribution	Attribution is proportional to the exposure of the financial institutions (i.e. the sum invested in a sovereign bond) in relation to the government debt+equity. As government equity is often not disclosed and a financial institution can't invest in government equity, PCAF proposed to use only government debt as denominator.
Data	Eurostat provides up to date and credible input-output and emission tables, which have been used to calculate the carbon footprint of European sovereign bonds. However, for many non-European bonds, it is more difficult to find reliable and accurate data sources. Ideally, the calculation would be based on uniform global input-output tables coupled with emission sources for the economic sectors per country. Based on the principles for emissions data, only data from input/output models can be derived so far.
Absolute vs. relative emissions	(1) $absolute\ footprint_t = \sum_{asset \in portfolio} \frac{exposure_t}{denominator_t} \quad emissions_{t-delay}$ (2) $relative\ footprint_t = \frac{absolute\ footprint_t}{AuM_t}$ In equation (1), the variable *emissions* refer to the emissions of a portfolio asset in period *t*. In this case these are the emissions of sovereign bonds, hence of governments (scope 1, 2 and 3). The *exposure* is the amount of euros invested in a specific sovereign bond. The *denominator* (government debt) can be seen as the value that defines which part of CO_2e emissions can be attributed to the portfolio or as the value that normalises the CO_2e emissions. Countries can be compared by their normalised CO_2e which cancels out the size bias of a country. The delay mentioned arises from a typical delay in emissions reporting by governments. A way to go about this is to use valid estimates. Under ideal circumstances, the delay in data reported should be zero.
Avoided emissions	Green Bonds issued by a government could lead to avoided emissions. How this should be accounted for depends on the type of ring-fenced asset classes.

3.4.1.1 Asset class specific considerations

Comparability with listed equity in mixed funds	The decision on the denominator is, like the decision on scope, dependent on the purpose of carbon accounting. Because there is an advantage in comparing the GHG emissions of sovereign bonds with the GHG emissions of other classes, the choice of denominator is important. For steering on carbon in mixed funds that include sovereigns and other assets or bonds, PCAF members want to keep the denominators of different asset classes as similar as possible. In an ideal scenario the government debt + equity would be use as denominator, describing the government balance. PCAF members urge governments to be more transparent about their data as governmental equity is often not disclosed.
State owned companies	State-owned companies are not included in this analysis. Their emissions could be attributed to scope 3 of government but it is not certain if state-owned companies are already taken into account in the money flows of economic input-output tables. There is also no publicly available database with state-owned enterprises per country. Including state-owned enterprises is recommended, but requires governments to disclose this information.
Energy imports and exports in I/O tables	Input-output tables do not account for energy imports and exports.

3.4.1.2 Limitations

Government debt as denominator	Central government debt is chosen as denominator as this is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. Moreover, the information on government debt is readily available in databases for practically all governments. However, the absolute level of a country's debt influences the indicator and makes comparison between countries difficult. If government debt is low, a large proportion of emissions is allocated to a sovereign bond. A bond may therefore have high emissions despite the fact that the government itself has an emphasis on energy efficiency and renewable energy and may have effectively realised energy efficiency measures. The reverse is also true: this metric implies a positive bias to high-debt governments. If government equity is also taken into account in the denominator, we expect the problem would be less prevalent. However, data on government equity is not readily available.

3.4.1.3 Calculation example

Description of example

actiam

In 2015 ACTIAM started out by setting a long term target to reduce climate change in line with the IPCC projections; a 25% reduction by 2025 and a 40% reduction by 2040 (since 2010). To track progress on this target ACTIAM started to calculate a carbon footprint of all its equity funds in 2016. These funds contain global listed equity large cap companies (around 3000) and cover ~EUR 9 billion in assets. In its annual report of 2016 ACTIAM also covered other asset categories like sovereign bonds and corporate bonds. In 2017 ACTIAM managed to give insight in the carbon footprint of all funds (~EUR 55 billion calculated). With these numbers, ACTIAM could track the performance of its funds in relation to the target it had set on CO_2-emisson reduction.

Kees Ouboter (Responsible Investment Officer): "A very important development in calculating the carbon footprint was the collaboration with other financial institutions in PCAF. The method development in the working groups of sovereign – and corporate bonds helped ACTIAM in calculating the footprint of the non-equity portfolios."

ACTIAM uses MSCI data on carbon emissions scope 1 and scope 2 to calculate the footprint as input data and then conducts the calculation itself using the methods prescribed by PCAF. ACTIAM recognizes that the outcomes of the footprinting exercise have an uncertainty bandwidth. E.g. different data providers use different estimation techniques and data sets to estimate missing data which will cause an uncertainty in the outcomes. However, ACTIAM believes that by following the PCAF methodology, by being transparent on the data sources used and the assumptions made, carbon footprinting for financials can be of added value for reporting of and steering on non-financial information.

For the asset class sovereigns data availability and quality is a challenge. Since carbon emission data for countries is not available for recent years, it is necessary to make assumptions on the trends in the carbon emission of countries to estimate the carbon emissions of current bond holdings. Also the indicator "government debt" is somewhat limited, since it leaves out the equity stake governments have in carbon emissions. For the sovereign bond asset class the results will have more uncertainty. However, in mixed portfolios (with corporates and sovereigns) the sovereign carbon footprint is relatively immaterial when compared with the corporate contribution.
ACTIAM has several plans to improve its performance on its target. Amongst others, contributing to developments on carbon scope 3 emissions, which are material in some sectors, and improving the data quality for sovereigns. Also, since carbon footprinting is a backward-looking indicator, ACTIAM uses the carbon footprint as non-financial performance indicator. To measure the financial risk associated with carbon emissions also forward-looking analyses are required. The current carbon footprint can serve as a first step in this analysis.

In this example we show the carbon footprint calculation for investments in a Dutch sovereign bond. This calculation example is used to calculate the carbon footprint of the ACTIAM funds that contain sovereign bonds (as described in the case study and is reported in the annual report of ACTIAM investment funds). ACTIAM used the PCAF method to calculate the sovereign bonds contribution to the total financed carbon footprint scope 1 and 2 of ACTIAM investment funds.

Used data

- Central Government Debt, 2015, derived from Eurostat table: *Government deficit/surplus, debt and associated data [gov_10dd_edpt1]*
- Share of government spending per NACE activity, 2014, derived from Eurostat table: *Symmetric input-output table at basic prices (industry by industry) [naio_10_cp1750]*
- GHG emission account per NACE activity, 2014, derived from Eurostat table: *GHG/Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_ainah_r2]*
- Gross Domestic Product (GDP), derived from Eurostat table: GDP and main components (output, expenditure and income) *[nama_10_gdp]*

Calculation and results

The central government of the Netherlands had a debt of €409,8 billion in 2015. The direct emissions of the Dutch government are extracted directly from Eurostat by summing the emissions of economic activity (NACE) category O (Public administration and defense; compulsory social security).

The following table shows the direct emissions of the Dutch government:

Direct emissions by the Dutch government	
Carbon dioxide (tCO_2)	1,637,881
Methane (tCO_2e)	182,727
Nitrous oxide (tCO_2e)	28,358
Hydrofluorocarbones (tCO_2e)	-
Perfluorocarbones (tCO_2e)	-
Sulphur hexafluoride (tCO_2e)	-
Total direct emissions in tCO_2e	**1,848,966**

The indirect emissions for energy use, scope 2, are calculated by following government expenses to the energy sector and determining the financed emissions accordingly. The financed emissions in NACE category D (electricity, gas, steam and air conditioning supply), comprise Scope 2 emissions of the central government.

By summing the direct and indirect emissions and dividing this by the central government debt, the relative emissions for the Dutch sovereign bond are calculated, as shown in the table below. The absolute carbon footprint for the financial institution can be derived by multiplying the relative emissions with the financed amount.

	GHG Emissions (tCO_2e)	Government debt (Million euro)	Emission factor (tCO_2e/M€)
Scope 1 emissions	1,848,966		4.51
Scope 2 emissions	1,555,326		3.79
Total emissions	**3,304,292**	**409,883**	**8,30**

Since this emission factor is calculated for 2015, we prorate this factor to 2017 by dividing it by the Dutch GDP in 2015 (~690.000 million euro) and multiplying it by the GDP in 2017 (~740.000 million euro). The Emission factor becomes: $\frac{740.000\ (million)}{690.000\ (million)}$ x 8,30 = 8,9 (tCO_2e/M€)

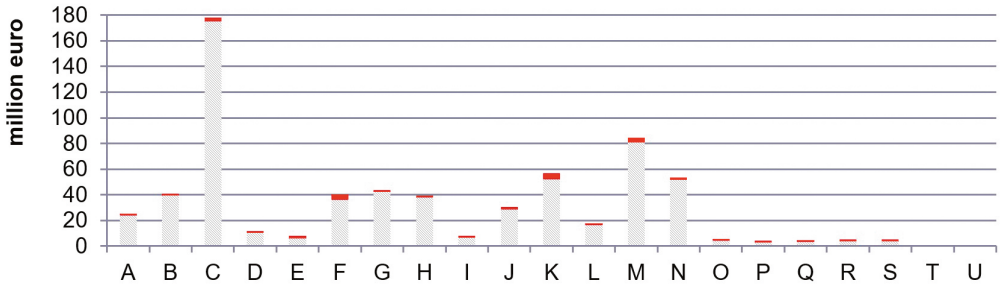
On 30 June 2017 ACTIAM owned through the Obligatiepool 98 million euro of Dutch sovereign bonds. Therefore, the attributed carbon footprint of Dutch Government bonds to ACTIAM's Obligatiepool is 872 tonnes CO_2e.

ACTIAM decided to leave out the scope 3 calculations for government bonds to keep consistency with the other asset classes where ACTIAM couldn't include scope 3 due to a lack of data availability and reliability. Please refer to the case study below for an example where these scope 3 emissions are taken into account, consistent with PCAF guidelines for this asset class.

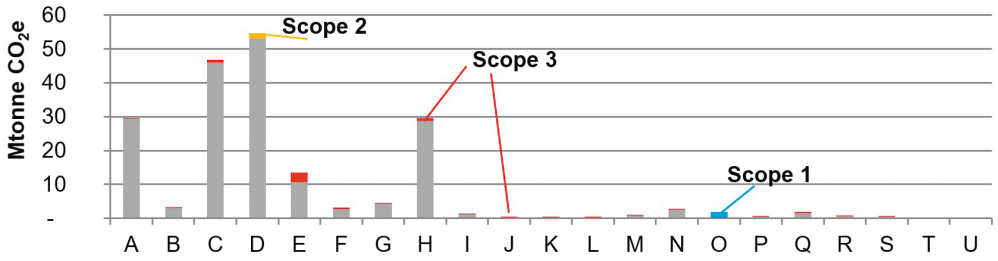
3.4.1.4 Case Study: de Volksbank sovereign bonds footprinting

de volksbank

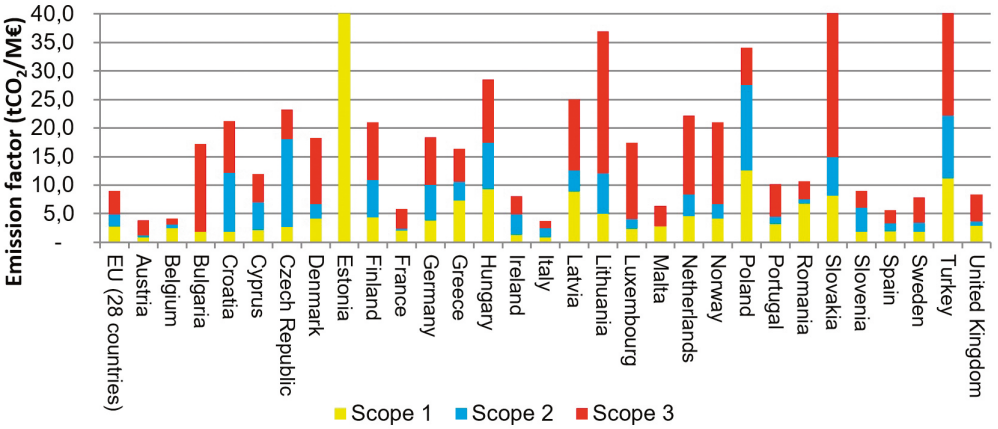
The government share of sector emissions can be approximated by taking the total expenses within a sector and seeing what share the government amounts in the total expenses within each sector.



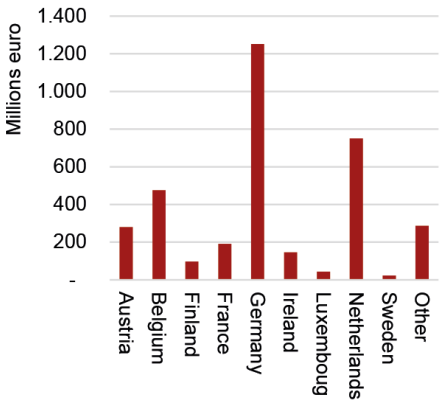
By multiplying the share of the government with the sector emissions we can derive the government share of the sector emissions. NACE category O represents scope 1 emissions. The financed emissions in sector D are scope 2 emissions, and the sum of the financed emissions within all remaining sectors comprise scope 3 emissions.

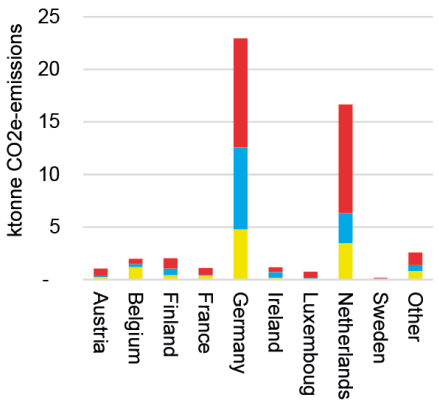


This can be done for all European countries using Eurostat. By dividing the scope 1, 2 and 3 emissions of a sovereign by the central government debt, we can calculate the emissions per million euro for each sovereign bond.



De Volksbank has 3.5 billion euro in sovereign bonds per Q2 2018 in ten different countries. Scope 3 is also taken into account by de Volksbank as it better reflects the nature of the sovereign bond than just scope 1 and 2. For 9 countries an emission factor was available through the calculation with Eurostat data; one country lacked this data and the emission factor for 'EU (28 countries)' was used to reflect a European average. The total scope 1, 2 and 3 emissions for the sovereign bonds were 50,5 ktonne CO_2e-emissions.





3.4.1.5 2018 update of Working Group Sovereign bonds

Implementation	In 2018, the members of the PCAF working group sovereign bonds worked on the implementation of the method for sovereign bonds. The working group aimed to overcome certain challenges in implementation. The most important areas of attention were: missing carbon and financial data, the reliability of government debt as denominator for CO_2 emissions and calculation of the (sub-)asset class sub-sovereigns.
Practicalities and insights	1) Missing data and estimation techniques To calculate the carbon footprint of a sovereign bond, one encounters several types of missing data. Firstly, timeseries data can be unavailable, e.g. in government emission data the last two years of emission data is often missing, plus data may not be available for several consecutive years. Data gathering is time consuming for governments and therefore the CO_2-emission data is often not up-to-date. Therefore, recent year government emission data needs to be estimated. In order to conduct the estimation, it is good practice to use an indicator that is most related to the economic production of a country and therefore the carbon emissions, namely the Gross Domestic Product (GDP). This is in line with the estimations that can be done for companies by using sales (which is also an indicator related to production. *Example:* The government of Romania had a reported carbon emissions scope 1 of 453.170 tonnes in 2014. To estimate the carbon emissions scope 1 of Romania in 2017 the ratio between the GDP of Romania in 2014 of EUR 150.358 mln and in 2017 of EUR 169.772 mln was used. This results in a carbon emissions scope 1 estimation of 511.683 tonnes in 2017. Another type of data that can be missing is cross-sectional data. By using Eurostat for input data CO_2-emission data of certain countries (especially outside of the European Union) can be missing. To address this, it is possible to use alternative datasets like the World Input Output Data (WIOD) that cover more countries. Another option is to estimate the missing data points (in line with the estimation method that is done for companies). It is recommended to use the carbon intensity CO_2 emissions/GDP of a region or continent that is similar to the country for which data is missing. Still this can have limitations if data of countries with a similar profile is highly limited. In that case, the estimations will significantly over- or underestimate the CO_2 emissions of a country. Thus, improvement on data quality and availability in that regard is required. *Example*: for a certain year the carbon emissions data for Ireland in the period 2010-2014 was missing from the input data of Eurostat. Where the estimation is based on the average carbon / debt figures of a group of European countries. 2) Calculating the footprint for Sub-Sovereigns Sub-Sovereigns is a (sub-)asset class of entities that like sovereigns give out bonds. To calculate the carbon footprint for this (sub-)asset class one ideally uses data on the CO_2-emissions and debt of the specific entities. Since this is not often the case it is advised to use the CO_2 emissions/government debt of the related Sub-Sovereign.
Agenda for 2019	For 2019, the sovereigns working group will aim to address some of the challenges in terms of data availability and quality, for example by searching and combining multiple databases. Next to that, the group will look into other ways of estimating carbon intensity for sovereigns to address the inclusion of equity stake in the calculation.

3.4.2 Listed equity

Topic	Outcome
Scopes covered	Scope 1 and scope 2 minimum. Scope 3 if available and relevant. Report scope 1, 2 and 3 separately. The reason to measure these scopes separately, even though this will require greater effort, is that scope 1 eliminates double counting and measures direct impact, also of a potential carbon tax. The reason to not include scope 3 as a mandatory requirement is that this would require better accounting and disclosure. To date, the comparability, coverage, transparency and reliability of scope 3 data is insufficient.
Portfolio coverage	Ideally, 100% of the portfolio should be covered. At least the majority of the portfolio should be covered and an indication should be provided for a pathway to full coverage. Provide an explanation of which product type (futures, ETFs, fund of funds, external mandates, prefs) were included or excluded and what the main method was for estimating missing data. Cash positions can be considered as having zero emissions. Short positions can be ignored.
Attribution	PCAF proposes that emissions are proportionally attributed to the providers of the company's total capital. In order to prevent double counting from this perspective, emissions are attributed proportionally to the exposure divided by the sum of enterprise value (total debt and equity). In case a financial institution only invests in equity and undertakes carbon footprinting from a risks perspective, emissions can also be attributed to the total market capitalisation (market value of all of a company's outstanding shares) of this company. This follows the so-called ownership approach and is aligned with financial reporting and consolidation rules. It also aligns voting rights and rules for reporting substantial interest in listed companies.
Data	Due to the potentially large universe of listed equity portfolios, the data source will likely be a designated data vendor. PCAF does not recommend a preferred data vendor. Analysis of Kepler Cheuvreux for IIGCC demonstrates that for scope 1 and 2 emissions differences between data vendors are 12-24%. It is encouraged to use the most recent available data and to mention the data source, reporting period or 'time stamp' of these data. Data vendors collect emissions data as reported by listed companies themselves, either through a standardised framework such as CDP or through a company's own disclosures in official filings and (environmental) reports. Disclosure through CDP has the advantage that the disclosed data are accompanied by additional information on the scope and methodology used. PCAF has a preference for data reported by companies, given that the data fully covers the emissions generating activities of the company. Not all companies disclose data on their emissions. Reporting in emerging markets lags behind developed markets. To maximise the coverage of emissions data, the remaining gaps are often filled with estimates. Preferably, estimation models used are consistent and reflect the underlying emissions generating activities of the entity. Production-based models are preferred over revenue-based models from a consistency point of view as they are less sensitive to exchange rate or commodity price fluctuations. Production-based models are especially useful for carbon intensive industries like utilities, materials, energy and industrials. Revenue-based models (e.g. intensity-based or environmental input-output models) have the advantage of requiring less detailed data.
Absolute vs. relative emissions	As a minimum, PCAF suggests to disclose both absolute and relative emissions. For relative emissions, we propose to divide the absolute carbon footprint with the total assets under management.
Avoided emissions	Avoided emissions are not appropriate for this asset class

3.4.2.1 Asset class specific considerations

Aggregation of output	A financial institution may choose an appropriate level of aggregation of outputs; for instance, should the overall portfolio footprint be reported, or is aggregation at more homogenous sub-levels more relevant, for instance advanced and emerging markets?
Challenges in steering carbon footprint	In addition, PCAF will further investigate the challenges linked to steering a carbon footprint and describe the metrics currently in use by investors as emerging practice[4].

[4] ABP/APG use normalised invested value. This is a metric that corrects for market fluctuations but does account for capital allocations. The metric is calculated as the number of participation that a client has in the fund multiplied by the price of a participation in a reference year. It represents the invested value at this year's market price levels. The advantage of the metric is that achieving the target becomes independent of market volatility. Disadvantage is that the normal economic growth is also neutralised which makes the target more ambitious in case of economic growth.

3.4.2.2 Limitations

Market price fluctuations	When using market value as denominator it is important to realise that assets under management change as a result of a fluctuating market price. An objective to reduce a relative footprint by a certain percentage becomes a moving target under the influence of this fluctuation.[5]
Company identifiers	For larger portfolios, it is important to have unique company identifiers in order to combine information from various sources. Examples of such identifiers are: SEDOLs, ISINs, CUSIPs, Bloomberg Tickers. For large portfolios, matching external data sources can be a challenge when for example two companies merge; the company identifiers will be adjusted immediately while carbon data providers might only update such information on an annual basis.

3.4.2.3 Calculation example

Description of example

The **absolute footprint** of an investment in a company is calculated by multiplying the total emissions by the proportional share in the company. The absolute footprint of a portfolio of companies is calculated as the sum over all footprints over time period *t*.

$$(1)\ absolute\ footprint_t = \sum_{company \in portfolio} \frac{invested\ value_t}{enterprise\ value_t}\ emissions_t$$

$$(2)\qquad relative\ footprint_t = \frac{absolute\ footprint_t}{AuM_t}$$

When using market capitalisation as denominator instead of enterprise value the absolute footprint is calculated as follows:

$$(1, 2)\ absolute\ footprint_t = \sum_{company \in portfolio} \frac{invested\ value_t}{market\ cap_t}\ emissions_t$$

Used data

The information required for these calculations is:

Emissions: can be taken from company reports if available but for large portfolios external data providers are often used. Examples of data sources include: CDP, Bloomberg, MSCI, Trucost and Southpole. In the choice of data source, asset managers will have to compare the various options (for example on coverage, data quality, transparency, service, costs, etc.).

Market capitalisation, Total Borrowings, Customer Deposits: this information is widely available in commercial market intelligence tools and commercial providers of financial data that are used by investors.

Invested value: this information is normally available in the internal systems used by investors for portfolio management and performance monitoring.

[5] A possibility to overcome this would be to use normalised assets under management, whereby prices are held constant over the target period. Such adjustments should be made transparent.

Calculation and results

Fund I is composed of two listed companies and contains a bit of cash (5 million).

Company	Market cap	Total Borrowings	Customer Deposits	Enterprise value	Invested	Total emissions
A	37.5 billion	14.5 billion	0	52 billion	100 million in a-shares and 50 million in b-shares	500 ton CO_2e
B	18 billion	4 billion	0	22 billion	90 million	400 ton CO_2e
Cash					5 million	
Total invested					245 million	

Using Enterprise Value as denominator:
Total emissions company * (invested value / (market cap + total borrowings + customer deposits))
For company B: 400 * (90mln / (18bln+4bln+0bln)) = 400 * 0.41% = 1.64 ton CO_2e
For company A: 500 * (150mln / (37.5bln+14.5bln+0bln) = 500 * 0.29% = 1.44 ton CO_2e
For cash no emissions are attributed
Total absolute carbon footprint = 1.64+1.44 = 3.08 ton CO_2e

The relative carbon footprint is calculated by dividing the absolute carbon footprint over the invested value (per million).
Total relative carbon footprint = absolute footprint / invested value per million invested
Total relative carbon footprint = 3.08 ton CO_2e / 240 = 12.8 kg CO_2e per million invested

Using only market cap as denominator:
Total emissions company * (invested value / market cap)
For company B: 400 * (90mln / 18bln) = 400 * 0.5% = 2 ton CO_2e
For company A: 500 * (150mln / 37.5bln) = 500 * 0.4% = 2 ton CO_2e
For cash no emissions are attributed
Total absolute carbon footprint = 2+2 = 4 ton CO_2e

The relative carbon footprint is calculated by dividing the absolute carbon footprint over the invested value (per million).
Total relative carbon footprint = absolute footprint / invested value per million invested
Total relative carbon footprint = 4 ton CO_2e / 240 = 16.7 kg CO_2e per million invested

Make sure to use:

- Emissions (GHG) data and company revenue (for carbon intensity) of the same year;
- Enterprise or Market Cap value and portfolio composition data from the same cut-off date (e.g. end of reporting period).

For example, when calculating the carbon footprint per end 2018, you will probably use:
- 2017 company GHG emissions data, and end-2017 company revenues;
- 31 dec. 2018 EV / Market Cap, and portfolio composition data

3.4.2.4 Case Study: Triodos IM listed equity footprinting

Triodos Investment Management started in 2018 with preparation of carbon footprinting for its Sicav I funds (SRI) funds. These are the global listed equity, large cap focused Triodos Sustainable Equity Fund, the more mid / small-cap oriented Triodos Sustainable Equity Fund, and the equity part of the Triodos Sustainable Mixed Fund. Together these funds invest in some 130 listed corporates.

A crucial step in the preparation process was obtaining the GHG emissions data. A number of leading data providers was invited to present their offering, and ISS-Oekom (recently acquired by Southpole) was selected as data provider. 'The RFP-process was an interesting learning experience' says Arthur van Mansvelt, the investment analyst leading the process. 'When it comes to the key data, scope 1 and 2, most providers' offerings are pretty similar. However, for scope 3 methodology - what is actually included in this scope - varies considerably. All in all, much of the methodology of the data providers remains a black box. So it would be good to challenge them to become more transparent and make sure differences in data are reduced, allowing for better comparison of footprint results.

'A final observation', says van Mansvelt, 'is that all data providers offer additional services that combine emissions data with advanced climate risk analysis aiming also to align with the Paris Climate Agreement and related initiatives.'

Once the data was available, Triodos IM built a footprint calculation spreadsheet, combining emissions data with the fund portfolio composition and revenue, market cap and enterprise value data from Bloomberg. 'As for listed equity, the ISIN code is a convenient identifier to match all the data, and the formulae are quite simple. The footprint calculation for this type of funds with relatively small portfolios is, in the end, not very complex,' concludes Van Mansvelt. The conclusion on availability (coverage) of listed equity is that large numbers of regular stocks in regular markets are covered, but coverage is lower in more remote markets or with regard to mid and small caps.

3.4.2.5 Case Study: ROBECO listed equity footprinting

Robeco has been measuring the environmental footprint of its Sustainability branded funds since 2016. "By measuring the portfolio's footprint on a series of tangible environmental indicators, we can gain an understanding of the magnitude of its environmental impact per invested dollar and per revenue generated", says Cristina Cedillo, Environmental Specialist at Robeco.

Robeco's collaboration with RobecoSAM is essential to our carbon footprint assessments. Robeco uses data from RobecoSAM corporate sustainability assessments, which measure – among others – the portfolio's environmental footprint on greenhouse gas emissions in scopes 1 and 2. The emissions data is gathered either via companies providing it directly to RobecoSAM, or is collected from company public disclosures. "Still, availability of data and data quality remain two of the biggest challenges", according to Cedillo, adding that "typically, the data gathered covers less than half of our investment universe". For the remaining companies where data is unavailable, emissions are estimated based on regressions by peer groups. With regards to data quality, emissions data reported by companies is also corrected by coverage relative to their total emissions. This step is important because the emissions reported may only cover a percentage of the company's operations. We typically exclude from our assessments data that is not consistent and/or audited and replace it with estimated data based on peer group regression models. Besides our efforts to collect corporate data and build a consistent database, Robeco actively encourages companies to disclose and enhance the quality of their greenhouse gas emissions data by entering into a dialogue with them as part of our engagement work.

In the near future, we are planning to also include scope 3 emissions data in our carbon footprint assessments. Cedillo concludes that "including this data in our assessments will be an important step towards assessing the full extent of our funds' exposure to risks related to the decarbonization of the economy".

3.4.2.6 Case Study: TCFD implementation at MN

The focus on climate related risks has led to numerous initiatives that enable companies assessing climate related risks and opportunities. The framework created by the Taskforce on Climate Related Financial Disclosure (TCFD) is the most widely adopted framework across industries. Where PCAF focusses on a standardized methodology for carbon footprinting, TCFD has delivered a holistic framework that strives to capture a wide array of risks, opportunities and impacts.

"In its 2017 annual report MN piloted its TCFD report", says Nando van Kleeff, Senior Advisor Responsible Investment & Governance at MN. "The report gives insight to stakeholders on how MN approaches climate change. Within the TCFD framework risk assessment is split between physical and transition risk (see graph). Where physical risk deals with the effects climate change can have on tangible assets, transition risk deals with the effects climate change could have on business models".

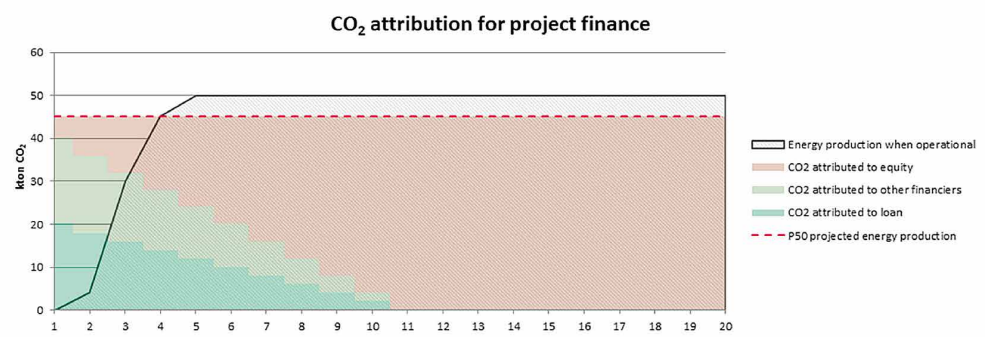
One of the metrics used by MN to asses transition risk is the carbon footprint of its listed equity portfolio. MN believes that a carbon footprint is an excellent tool to capture which companies are most sensitive to a changing regulatory environment (Policy and Legal Risk within TCFD) or technological risks. By applying the PCAF methodology MN reports along transparent guidelines. Even though MN uses the ownership approach, which is not recommended by TCFD, its footprint enables MN and its clients to gain insight into the carbon risk profile of its portfolio (companies). The ownership approach also supports tracking the absolute emissions generated by the investment portfolio for target setting purposes.

The methodology developed by PCAF aligns with TCFD and helps investors with specifying transitions risks.

3.4.2.7 2018 update of Working Group Listed Equity

Implementation	In 2018, the members of the PCAF working group on listed equities, worked on the implementation of the guidelines, exchanged views, experience and practices and looked into the alignment of PCAF and TCFD. The working group had the intention to look in more detail into quality and comparability of data from different GHG-emissions data providers, but this was postponed as priority was given to members' own implementation of the PCAF guidance, to get more footprints reported. Once more members have published listed equity footprints, we will look further into comparability, and quality of emissions data, and new developments around quality and availability of emissions data.
Practicalities and insights	3) Scope 1 & 2 data are widely available from a range of data providers, such as Trucost, Southpole, MSCI; however, comparability of data (quality) can only be looked into by comparing footprinting results, or looking at individual company data, from different providers. This is a step we may consider for 2019; 4) Scope 3 is still very much in development, with different providers offering different approaches to the 'scope' of the Scope data, and the modelling (modelling is essential due to lack of reporting real data by companies); More transparency on methodology of data providers is desirable, as consistency / standardization in data contributes to comparability of footprinting results; 5) Comparability of footprint data depends on consistency of data used. Several factors can cause differences in results. Therefore, transparency adds to understanding of the data and comparability: a. Company emissions data (source, year); b. Company financial data (source, date and definition of values used); 6) TCFD: As discussed at the beginning of this chapter, the carbon intensity metric that TCFD recommends, the Weighted Average Carbon Intensity (WACI), can be considered an additional relevant metric, adding to the metrics proposed by PCAF, and allowing for further comparability of different investment portfolios.
Agenda for 2019	**Challenges in steering carbon footprint** We will further investigate the challenges linked to steering a carbon footprint and describe the metrics currently in use by investors as emerging practice; **Data quality and consistency** We hope to open dialogue with data providers on their methods for data and estimates, to contribute to better comparability of data (standardization), and to learn more about new developments; **From equity to corporate credits** How can we move quickly from footprinting listed equity to corporate credits?

3.4.3 *Project finance*

Topic	Outcome
Scopes covered	Scope 1 and scope 2 minimum. Scope 3 if relevant.
Portfolio coverage	Ideally, 100% of the project portfolio should be covered. The coverage of the project portfolio should be clearly indicated. The coverage of security types should also be stated clearly.
Attribution	Ratio to proportionate the part of the total project GHG emissions to be accounted by the individual providers of debt, equity and/or mezzanine. Guarantees have no attribution, until they are called and turned into loan. Initially, (before any debt repayments have been made) the attribution factor is the amount of debt and/or equity provided by the individual financier divided by the total project size (total debt plus equity to realize the project). As debt is gradually paid back, GHG emissions can be attributed using the actual remaining outstanding exposure. For debt, this means adjusting the numerator of the attribution factor annually (for instance reflecting the end-of-year exposure), resulting in this numerator (and consequently the attribution factor) to decrease to 0 at the end of the lifetime of the loan (when it is fully repaid). As the debt decreases over time, and with it the attribution to debt providers, more of the (avoided) emissions will need to be attributed to the equity providers. One way to annually arrive at the attribution factors for the debt and for the equity providers would be to annually recalculate the denominator, applying the outstanding debt and the actual value of the equity at that moment. Unfortunately, the latter is not easy to establish, as these will typically not be listed companies, and it is likely that the debt providers and equity providers will arrive at different assumptions. Therefore, a simplified approach could be used, in which the gradual decrease of debt is balanced out by a gradual increase of the attribution to the equity holders, without needing to know how the actual equity value develops over time. This can be achieved by keeping the denominator constant over time (unless additional debt and/or equity is invested to pay for cost-overruns or the like) and by attributing the part of the debt that has been paid back pro rata to the equity holders.  Using this approach, the attribution factor for a debt provider would be calculated as follows: (1) $attribution\ factor = \frac{remaining\ outstanding\ debt\ of\ the\ debt\ provider}{total\ debt + equity\ invested}$ The attribution factor for an equity provider would be calculated as follows: (2) $attribution\ factor = Equity\ share\ of\ equity\ holder \times \left(\frac{total\ debt + equity\ invested - remaining\ outstanding\ debt\ of\ the\ debt\ provider}{total\ debt + equity\ invested}\right)$ In which '(total debt + equity invested)' means the total debt plus equity invested to realize the project, staying constant over time, unless additional debt and/or equity is raised. As an alternative, using 'total balance sheet value' as the numerator is worth considering, as this might enable harmonizing the attribution rules among asset classes. Proposed to use the coming year to test these alternatives and adopting the best fitting alternative.

Data	Within the due diligence and monitoring of a project finance transaction, the availability of project-specific data is generally good. As a result, higher quality GHG data can be obtained than would be available through generic input/output models, without adding an unrealistic amount of additional work to the process. Therefore, it is proposed that GHG data for project finance should not be based on generic input-output models, but on project-specific source data. Project finance is being applied to a broad range of sectors, activities, project sizes and geographies, and there is not one broadly accepted and universally applicable set of source data and calculations available. One can however distinguish a hierarchy of preference, providing guidance in selecting the highest quality level within the limitations of availability. Project-specific independently validated GHG data ranks highest in quality and consistency but will not always be available. The next best level of data quality and consistency that can be obtained in a practical way, is to calculate the GHG emissions from relevant non-GHG source data provided by the client (like the consumption of electricity, of fuels and of certain sector-specific raw materials), using credible standardized calculation tools. Only if neither of these options work, it is acceptable to use non-validated GHG data provided by the client or to use data from sector average input/output models. Therefore, the following hierarchy of preference is proposed: 1. Project-specific GHG data, validated by independent expert in accordance with the GHG Protocol and/or UNFCC or another credible certification scheme. 2. GHG data calculated from verifiable non-GHG source data, using pre-approved calculation tools (such as the IFC-CEET or the AFD carbon tool for industry or power production, FAO EX-ACT tool for agriculture). 3. Client provided GHG data, not validated by independent expert in accordance with the GHG Protocol and/or UNFCC or another credible certification scheme, or sector average input/output model based GHG data. When estimating the expected carbon footprint of a project already at the time the investment is made (when the project is not yet operational), it is essential that the methodology provides guidance on the way the annual production is estimated (conservative/neutral/aggressive scenario). For renewable energy projects it is customary to have experts calculate percentile production predictions based on an analysis of historic data resource data (wind, irradiation, hydraulic flow etc.). The P50 value is the predicted annual production for which there is a 50% probability that it will be exceeded in a given year. The P90 value is the predicted value that has a probability of 90% of being exceeded in a given year (the 1 year P90), or of being exceeded in an average year over a 10 year period (the 10 year P90). The WG proposes to use the P50 predicted production.
Absolute vs. relative emissions	Please note that in this context, relative emissions are not the emissions per unit of production, but per monetary unit of finance. Standard approach should be reporting absolute as well as relative emissions. PCAF states that the methodology depends on the goal, e.g. monitoring and communication purposes or steering portfolios against a carbon target.
Avoided emissions	Avoided emissions are the emissions that the financed project emits less than would have been emitted in the absence of the project. For energy efficiency projects this is emission reduction caused by the project; for renewable energy projects, this is the difference between de project emissions and the emissions from the production of the same amount of electricity in the most likely alternative scenario in the absence of the project. The latter is expressed in a grid emission factor (tCO_2eq/MWh), from which the emission factor of the project subtracted to arrive at the avoided emission per MWh produced. PCAF proposes to adopt a more sophisticated methodology than using the average grid emission factor to account for avoided emissions. Such a methodology is still being developed by a harmonisation initiative of international finance institutions in collaboration with the UNFCCC. In the meantime, PCAF proposes the following hierarchy of preferred sources for the baseline emission factors: 1. UNFCCC validated reports (CDM or otherwise) 2. Emission factors and calculation methodology from the IFI Approaches to GHG Accounting for Renewable Energy Projects and for Energy Efficiency Projects 3. For projects involving forestry, biomass or (other) carbon sequestration: dedicated carbon balance studies performed by independent experts.

3.4.3.1 Asset class specific considerations

Lifecycle emissions	Lifecycle emissions, such as manufacturing, transporting and installing equipment should be accounted for to incentivise more efficient production in the future. When this is not possible, this should be clearly stated. PCAF will investigate accounting for the emissions from the construction and decommissioning of projects for renewable energy projects. PCAF foresees using an agreed estimation model. These emissions could be neglected when they are below a 5%; a *de minimis* threshold often used by the GHG Protocol.
Accounting timeframe	The most commonly adopted accounting principle for GHG emission and other ESG data is to account for and report on the actual emissions that have taken place in the portfolio during the most recently completed reporting period (usually a calendar year). This approach is also proposed for project finance. However, project finance inherently relates to an activity that will only start after development, construction and commissioning have been completed, which is often years later, and may even be after the institution having provided the project finance is no longer exposed because it has been sold or otherwise refinanced. In order to be able to account for the impacts of investment decisions in the year that these investments are being made, several (development) finance institutions calculate and report on estimated future ('ex-ante') annual GHG emissions for all new investments in a given year. PCAF proposes that the methodology provides for both ex-ante (estimated) and ex-post (actual) emissions.
Boundary setting	The boundaries (both for the GHG emission calculation and for the attribution) are set around the project; if the project is not fully greenfield (i.e. a newly build project) this means that only the financed extensions are included and the emissions and financials related to the existing activities and/or installations are not considered.

3.4.3.2 Limitations

Emission data	Although in project finance the availability of relevant project-specific data is high relative to some of the other asset classes, expert GHG emission reports, specific to the project will often not be available. Instead, the emission data will be based on project-specific source data, being calculated into emission data using sector- and country-specific factors.
Lifecycle emissions	As mentioned before, it is proposed to neglect lifecycle emissions if these are smaller than 5% of total lifetime (avoided) emissions. If bigger than 5% these emissions should be accounted for, but in most cases this must be based on generic model-based data. PCAF proposes to account and report for the emissions related to e.g. construction only in the years in which they occur, so only during the construction period. In case the lifecycle emissions may not be neglected, it's not agreed yet how to attribute them over the reporting years.

3.4.3.3 Case Study: Triodos Bank Project finance footprinting

Triodos Bank

"Triodos Bank acts as a catalyst for the transition to a sustainable economy where people, the environment they depend on, and the culture that sustains them are valued," says Itske Lulof, Director Energy and Climate at Triodos Bank. "To that end Triodos Bank only finances companies that contribute to a sustainable society. This approach includes an active role in sustainable energy where the bank's policy is not to finance fossil fuels and exclusively to finance renewable energy initiatives in the energy sector."

Triodos Bank has played this role since the mid-1980sand has financed more renewable energy initiatives in Europe than any other financial institution, for the last three years. Active in the Netherlands, Belgium, France, UK, Spain and Germany this has led to finance for projects like Greensky, the largest onshore wind park in Belgium. The power it produces is directly injected into the rail network and supplies 170 trains daily.

For several years, its finance has also extended to renewable energy projects in emerging markets too, such as hydro projects in Nepal, Ecuador; wind in Kenya and solar in Mongolia.

Assessing the carbon emissions of loans and investments in the sustainable energy sector (the bank itself is both carbon neutral and uses 100% renewable energy in its buildings) can be relatively straightforward compared to other sustainable sectors it finances, because these projects report on the energy they generate. However, in practice, delivering good quality data can be challenging. To date Triodos Bank has used a contribution approach, accounting for the entire carbon emissions of a project regardless of its stake in it. In 2017 this meant Triodos Bank and Triodos Investment Management reported that its projects contributed to the avoidance of over 2.4 million tonnes of CO_2 emissions (2016: 1.7 million tonnes).
PCAF demands, and we welcome, an attribution approach, equating the proportion of finance with the actual emissions avoided. Triodos Bank will implement this in its 2018 annual report.

PCAF also favours P50 projections, which more closely reflect actual energy production, rather than P90 projections which are more conservative and used to underpin financial judgements of projects. The criteria for avoided emissions have also developed during the year, using existing best practice, and will require more granular assessments of Triodos Bank projects.

Implementing PCAF will build on changes made in the organisation in 2017. During that year we used updated emission factors from one external source for all countries we invest in. This is a more granular and more standardised approach throughout all branches, compared to 2016.
We learned over 2017 that within Triodos Bank's countries there is a different approach, balancing data accuracy, data availability, and efficient data processing. Some branches apply yearly P90 projections, other use P50 or use as much actual energy production data per project and combine that with monthly P90 projections for the missing months and apply national wind indexes. We are yet to determine the optimal approach.

A particular challenge is how to deal with funds or energy efficiency projects that source green energy for their energy use, through buying guarantees of origin and/or compensating their emissions through buying emission rights (through the voluntary Emission Reduction system – Gold standard), and how to include this in our PCAF reports.

3.4.3.4 2018 update of Working Group Project Finance

Implementation	For project finance, the experience with emission accounting is still limited, with the exception of the accounting of avoided emissions from renewable energy projects, which many development finance institutions have implemented. At present, no clear implementation example for project finance GHG footprinting has been published among the PCAF members. But the methodology is being worked out in more detail, incorporating the implications at the level of procedures, systems, tools and data requirements and Triodos Bank expects to publish details in its 2018 annual report. It has become clear that further guidance is needed on the attribution of GHG emissions to the providers of equity and of debt to a project, especially as it changes over time, as the debt is gradually being repaid. The guidance provided in the previous report addresses the attribution of debt exposure and equity share in isolation, but it leads to inconsistencies when added up. Refinements are needed to arrive at an attribution rule that (i) remains consistent for the debt and equity providers over time, as the debt for the project is gradually being repaid, and (ii) can be practically calculated both by debt and equity providers on the basis of the information that they can expect to have available, at least on an annual basis. In the updated 'Attribution' section (further below) an approach is suggested discussed to that can address this, but other options will be explored and tested in the coming years, to arrive at more alignment between asset classes.
Practicalities and insights	With regard to the accounting of avoided GHG emissions for project finance, the International Finance Institutes Technical Working Group for GHG Accounting Harmonization ('IFI GHG TWG') remains the most important peer initiative. Its relevance has further increased since the UNFCCC has become a formal partner of the initiative, endorsing their adopted methodologies. Particularly, their work on electricity grid emission factors (the baseline to compare power projects with) is of importance for renewable energy finance. Since the previous PCAF report, the IFI GHG TWG has updated their list of grid emission factors. The previous version used the simple national grid average, whereas in the new (interim) list an attempt is made to reflect the effects of the so-called merit order (renewable energy delivered to the grid will push out the power producer with the highest marginal costs, which typically will have a higher emission factor than the overall grid average), and of generation expansion (the additional electricity production not replacing existing production, but meeting new demand). A further improvement of the grid emission factor methodology is currently being discussed (hence the current list being called 'interim').
Agenda for 2019	In 2019, the PCAF project finance TWG will continue to improve and refine the GHG accounting methodology and start to make experience as one of the members plans to start an implementation pilot. The most important topics to cover will be: • Testing alternative attribution rules, resulting in the formal adoption of the preferred methodology • Identifying (improved) tools and guidance for sector-specific calculations allowing to convert transaction-specific (production/consumption) data into consistent GHG emission estimates • Reviewing the significance of lifecycle-emissions and developing guidance on this • Adopting improved electricity grid emission factors as they become available

3.4.4 *Mortgages*

Topic	Outcome
Scopes covered	Energy use of financed buildings (scope 1 and 2).
Portfolio coverage	100% of the on-balance mortgages.
Attribution	As the financial institution is often the only provider of a mortgage, it is proposed to fully attribute the emissions to the provider of the mortgage. Even if the loan-to-value is relatively low. Mortgages are one of the few asset classes where a financial institution can directly engage with its customers and take responsibility for a societal challenge. The energetic characteristics of the financed properties are taken into account in investment decisions regardless of the size of the mortgages. Also, PCAF is not in favour of using loan-to-value (LTV) ratio as this leads to emissions fluctuating with property value.
Data	The data availability on energy consumption of properties has improved considerably due to policy regulations within the built environment (like EPC norms and energy labels). Within the Netherlands The available data are usually averaged over a number of households in the same peer group to anonymise the data. Various sources are available, dividing energy consumption by for instance energy label, type of household/sector and type of property. When applying these data on a large number of financed properties it is possible to get a reasonable approximation of the CO_2e-emissions. Based on the data available, the following data hierarchy is proposed: 1. Actual energy consumption from a grid operator, converted to CO_2e-emissions using verified emission factors specific to the type of energy consumed. 2. Actual energy consumption from a grid operator, converted to CO_2e-emissions using grid emission factors for energy from undefined fuel source. 3. Average energy consumption per postal code regions, converted to CO_2e-emissions using grid emission factors for energy from undefined fuel source. 4. Average energy consumption sector and/or energy label specific, converted to CO_2e-emissions using general grid emission factors. PCAF suggests to work with actual data on the energy consumption of the properties, if available. For the Netherlands, PCAF is in contact with the national association of grid operators, Netbeheer Nederland, to provide actual energy consumption data.
Grid emission factors	The consumed gas and electricity on household level can be converted to CO_2e-emissions using grid emission factors. Within the Netherlands, www.co$_2$emissiefactoren.nl gives a list of widely accepted and uniform grid emission factors. PCAF has chosen to use the grid emission factor related to direct emissions, expressed under column TTW-value on www.co$_2$emissiefactoren.nl. Whenever the origin of the consumed electricity is unknown, the emission factor for electricity from undefined energy source should be used. The factor for electricity is updated regularly to reflect changes in the Dutch electricity mix. For 2017 measurements this leads to the following emission factors: 0.301 kg CO_2/kWh for electricity, and 1.788 kg CO_2/m^3 for natural gas.
Absolute vs. relative emissions	The methodology results in absolute emissions per household/building. This information can be further specified and translated into relative emissions based on preferred disclosure on the portfolio.
Avoided emissions	A mortgage on a house that is climate-positive, i.e. generating more energy than it consumes, could be seen as avoided emissions. However, this is not covered yet in this report.

3.4.4.1 Asset class specific considerations

Obtaining data on energy consumption	Actual consumption data, made anonymous, but specific for a certain mortgage portfolio is preferred. The actual energy consumption will be more accurate than working with the average energy consumption per energy label.
Off-balance mortgages and subsidiaries	The scope of this methodology is on-balance mortgages, therefore off-balance are not included. If relevant, additional metrics can be included to disclose on off-balance mortgages.
Distinguishing between private and corporate mortgage	No distinction is made between private or corporate mortgages.

3.4.4.2 Limitations

Result dependent of data quality	Many assumptions must be made in order to calculate the emissions of mortgages as data are often difficult to retrieve due to privacy reasons. Even though the calculation method does not differ greatly, the data sources used can yield different results, for instance when average consumption data are replaced by actual consumption data coming from grid operators. Furthermore, if actual consumption data are used, it is not clear if all the energy consumption is applicable solely for the house or for instance also for an electric car. The actual energy consumption data can be further refined using the type of electricity used.
Country specific assumptions	Some country specific adjustments need to be made to make the calculation applicable for a certain country. The Dutch energy label, for instance, is the result of a European directive and differs from ways to categorise energy efficiency of houses in other EU countries and countries outside of Europe. Country specific adjustments need to be considered depending on the data availability and standards in each country.
Double counting	As 100% of the emissions per mortgage is attributed to the mortgage provider, it is possible that in some cases houses with mortgages at multiple providers get double counted.

3.4.4.3 Calculation example: de Volksbank mortgages footprinting

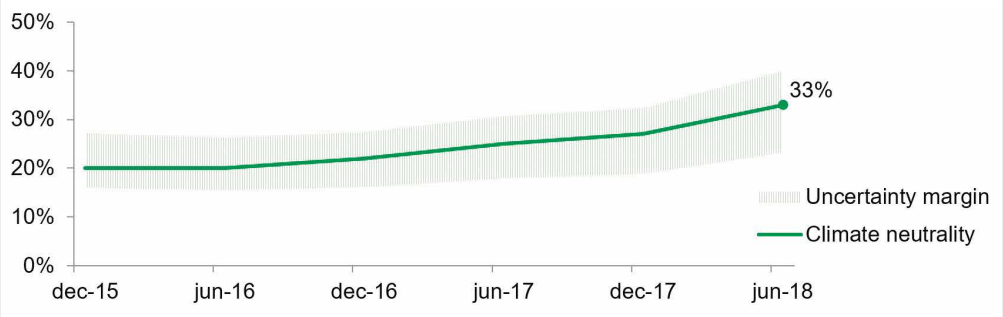
Description of example

de volksbank

De Volksbank provides about 290,000 mortgages, primarily in the Netherlands, through its brands ASN Bank, BLG, RegioBank and SNS. The mortgage portfolio comprises about 46 billion euro of assets on de Volksbank balance sheet, which is about 80% of assets under management.

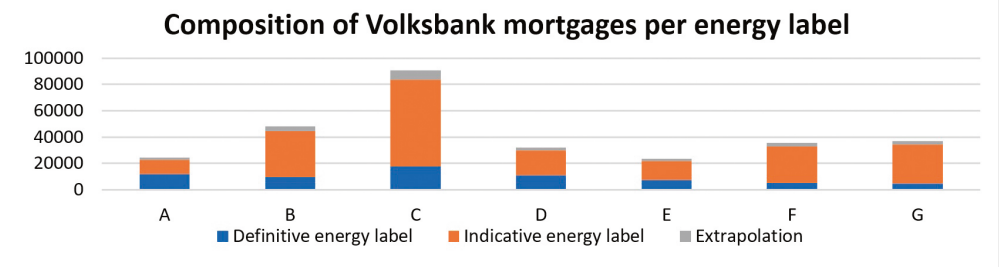
"Our long term goal is to become climate neutral by 2030 if avoided emissions are equal or larger than the emissions resulting from the activities we finance. At year end 2020 we aim to be 45% climate neutral," says Freek Geurts, Climate impact advisor at de Volksbank. "After a materiality analysis three asset classes appeared to have the biggest influence on our climate neutral balance sheet: mortgages, project finance and green bonds. Mortgages are at the core of the Volksbank's business model and comprise almost 80% of our financial balance. The complete mortgage portfolio also lead to 80% of total financed emissions."

To achieve a climate neutral balance sheet, KPI's on absolute emissions are formulated for mortgages, project finance and green bonds, and are included in the operational plans of the involved business units. The progress is monitored quarterly and the results are published biannual. The opportunities and dilemmas are discussed within the climate neutral committee with chairmanship of the CFO of de Volksbank, who bears responsibility for the long term goal. De Volksbank's climate neutrality has improved from 16% at the end of 2014 to 33% halfway through 2018.

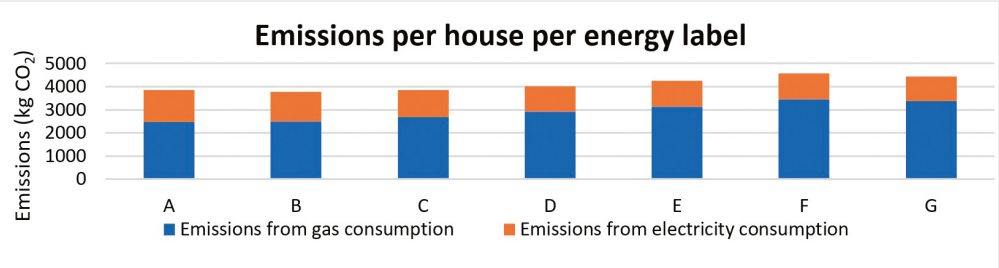


All households in the Netherlands have an indicative energy label based on general information that the authorities have about your home, such as the type of building, floor area and the year of construction. Home owners can request a definitive energy label for their house which is a more reliable measure of the energy performance of houses. The Netherlands Enterprise Agency (RVO) registers all indicative and definitive energy labels within the Netherlands.

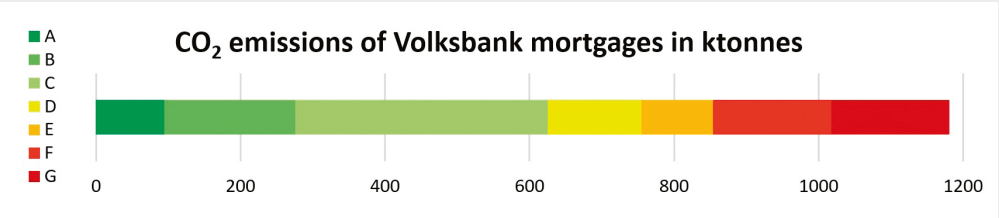
Used data	• Emission factors for electricity of undefined fuel source and natural gas are derived from the Dutch CO_2-database available at www.co$_2$emissiefactoren.nl • Energy labels are provided by the Netherlands Enterprise Agency (RVO). • The average natural gas and electricity consumption for Dutch households per energy label are derived from 'Energiemodule WoON 2012'.[6]
Calculation and results	On a quarterly basis, the RVO energy label database is matched on addresses to the mortgage portfolio of de Volksbank. About 25% of matched addresses has a definitive energy label. If no definitive energy label is present, the provisional label is linked to a household. There is a small portion of the mortgage portfolio for which no energy label exists, like monuments, or the match could not be made due to data quality issues, for instance due to differences in suffix notation in addresses. For this small portion, the same composition of energy labels is assumed as for the rest of the mortgage portfolio.



The average gas and electricity consumption per energy label were researched in the WoON2012 report and published in 'Cijfers over wonen en bouwen 2013', a report by Rijksoverheid summarizing the state of housing in the Netherlands. The average consumption per energy label can be converted to CO_2-emissions by multiplying with emission factors from www.co$_2$emissiefactoren.nl. This is 1,791 kg CO_2/m^3 for natural gas and 0,361 kg CO_2/kWh for electricity of unknown origin (both TTW value).



The portfolio emissions are calculated by multiplying the number of houses per energy label with the average CO_2-emissions per energy label. This was 1181 ktonne CO_2-emissions for Q2 2018.



Aside from absolute and relative emissions, de Volksbank also monitors the average energy label of the mortgage portfolio. The average label is calculated by converted energy labels A through G to consecutive numbers 1 through 7 and taking the weighted average for the whole mortgage portfolio. This meant an 3,8 or average energy label D for Q2 2018.

[6] In the meantime we are constantly looking for a better single data source that is publicly available and accessible for FIs.

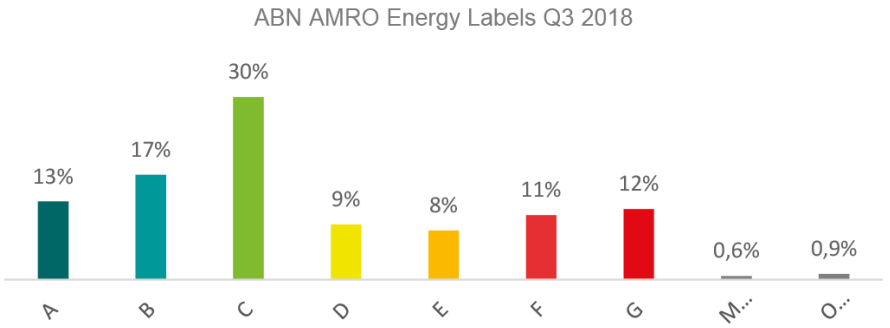
3.4.4.4 Case Study: ABN AMRO mortgages footprinting

In 2017, ABN AMRO launched its bank-wide 'Mission 2030' ambition to ensure that all of the homes and offices the bank financed or will finance, have an average energy label 'A' by 2030. This represents a reduction of two megatons of carbon emissions in the Netherlands. The properties the bank uses will have an energy label A by 2023 already.

"Executing our Mission 2030 isn't about excluding homes and offices with a carbon intensive energy label, but it is about helping our new and existing customers to make their real estate energy efficient," says Tjeerd Krumpelman, Head of Advisory, Reporting & Engagement.

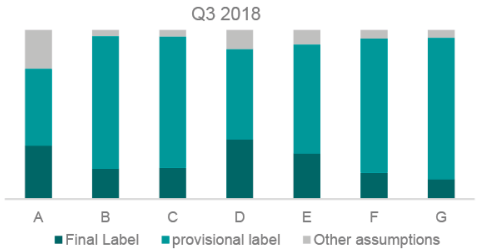
ABN AMRO provides over 800,000 mortgages in the Netherlands, through its brands ABN AMRO, Florius and Moneyou. The mortgage portfolio comprises about 150 billion euro of assets on ABN AMRO's balance sheet, which represents a Dutch market share of approximately 20%. ABN AMRO can have a substantial impact by taking responsibility to climate mitigation.

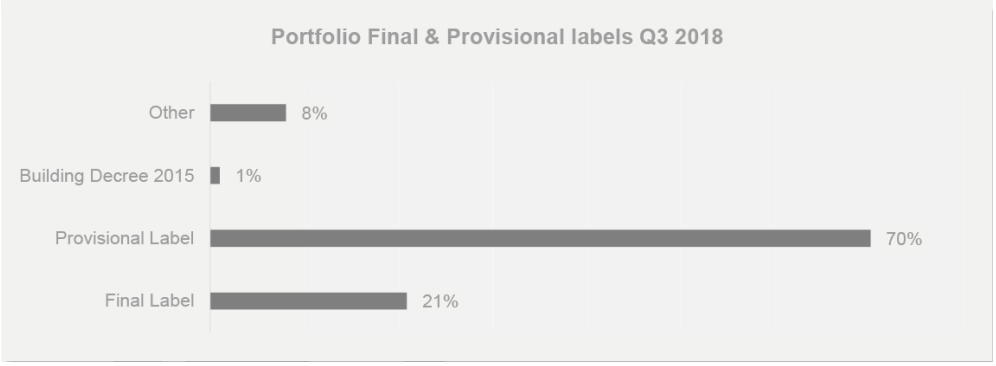
On a monthly basis, the RVO (Netherlands Enterprise Agency) energy label database is matched on addresses to the mortgage portfolio of ABN AMRO. Currently, 21% has a final energy label. If no final energy label is present, a provisional label is linked to a house. If no label is assigned, we also look at the year of construction of the collateral and other characteristics. There is a small portion of the mortgage portfolio for which no energy label exists, like monuments, recreation homes, buildings that do not use energy to regulate the climate (such as barns or garages), (agricultural) business premises intended for storage or processing and some other exceptions.



Provisional versus final labels

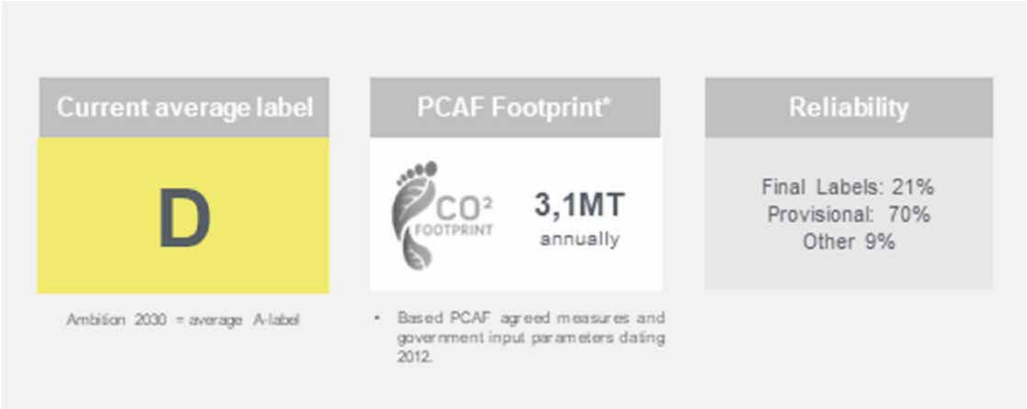
Provisional labels have been issued by our government and are known to be conservative. If customers convert their provisional label into a final label, that label will generally become better. In our 2030 forecast this conversion is forecasted over the next years, since not all customers convert their label at once. If all labels are converted, our portfolio is assumed to be more greener.





Results in 2017

In 2017, the average energy label in the mortgage portfolio was D (year-end). Year-end 2017 our energy labels distribution for the Mortgage portfolio shows that the majority of our labels is in the C label class. Inflow in red labels like F and G has reduced. Our A label and sub A-labels saw an increase in absolute numbers compared to the start of 2017. In percentage the total A labels increased from 9,6% at the start of 2017 to 10,3% year-end compared to the whole Mortgage portfolio. Furthermore, since the start in early 2017, we have been able to reduce the number of unknown collateral from 15% to about 1% By, among other things, data quality improvements.



Business proposition for mortgage customers

By partnering with De Energiebespaarders, ABN AMRO launched a new proposition to engage our mortgage customers to take energy-efficient measures. This not only gives home owners an instant overview of specific measures via the Energy Saving Check, but also help them with the actual execution of these energy-efficient measures. With a broad risk policy our mortgage customers also have the opportunity to finance these measures. Until October 2018 more than 13,000 customers have performed the Energy Saving Check. We have launched a campaign in October 2017 for three months, resulting in approximately 1.000 actions by home owners. ABN AMRO also has a mortgage discount if houses have a certain energy performance.

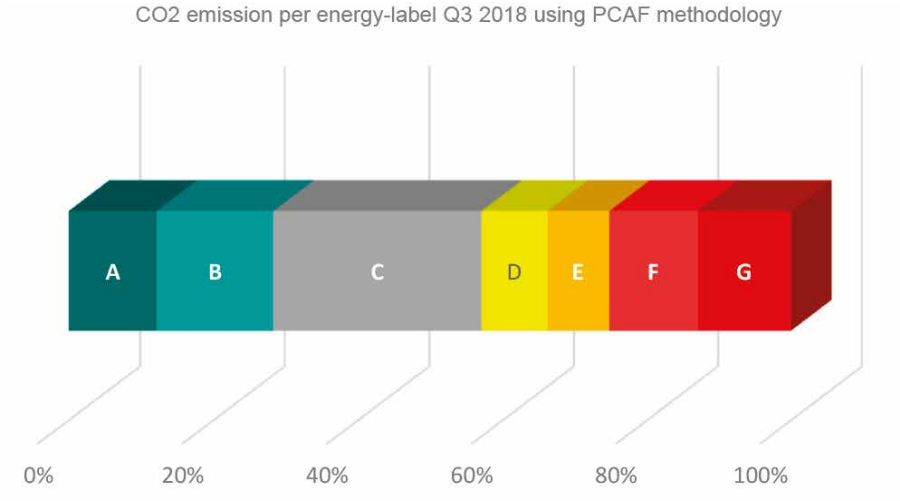
In addition, ABN AMRO is constantly experimenting in teams to develop new propositions and explore ways in which we can activate customers in this area. At this moment we're developing a new mortgage product in this area that we will introduce in 2019.

What do our mortgage customers do?

We see that customers take energy-saving measures and there is also potential to make larger label jumps. The last 19 months over 1,450 mortgage customers financed energy-saving measures via a mortgage loan. For customers this is often driven by savings in monthly costs for, for example, energy consumption and more comfort. More and more customers are also realizing that a better energy label is possible at a higher value of their home. Up to now, a lot of customers waiting for clarity our government needs to give about gasless living in 2030.

Developments and results in 2018

In 2018 there has been a strong increase in the number of green energy labels. This increase can mainly be seen in the number of collaterals with an "A" label. An increase that can be explained by good propositions, a piece of new construction and customers that have become more sustainable. What is striking here, is that the new construction production is under strong pressure. Existing permits for new buildings are not yet ready for construction, there are too few skilled workers and in some parts of our country there must be a good search for available building land. What is noticeable in addition to the increase in A labels is the sharp decline in red labels such as F and G. The decline has accelerated since 2017 in 2018. Our average portfolio label in Q3 2018 was "D".



Looking forward

We are fully committed to all kinds of ways to make our customers and society more sustainable. We actively and proactively improve the average label of the portfolio. In our most recent forecast and assumptions, in 2020 we hope to achieve the average label C in our portfolio.

	201809	2019	2020
Estimated average Portfolio Label forecast	D	D	C

3.4.4.5 2018 update of Working Group Mortgages

Implementation	In 2018, Rabobank, ASR, Van Lanschot Kempen, de Volksbank and ABN AMRO have adopted PCAF methodology for mortgages.
Practicalities and insights	Aside from a methodology to calculate emissions from mortgages, the working group has started discussions on how to calculate the 'average energy label' as the energy label plays a central role in the carbon footprint methodology. It has been agreed in PCAF that using the energy index to calculate 'average energy lables' does not always work well for Mortgages because the Energy Index cannot be adequately translated into an energy label. That is why we decided to work with values per energy label, where an A label has a value of 1 and a G label has a 7 (worse) value.
Agenda for 2019	**Actual energy consumption data** The working group has been working on acquiring actual energy consumption data and has been in discussion with CBS[7] on if and how this could be done while taking privacy considerations into account. The discussions were very constructive and the working group expects consumption data of specific mortgage portfolios could be published next year. **Looking beyond Energy-labels only** Improvement in label can sometimes be realized quite simply by some improvements in the house. Sometimes this implies that consumption of gas is converted into a higher consumption of electricity. And sometimes there is still insufficient insulation available to further reduce the total heat and energy consumption. In methodology and sustainability we therefore look at further incentives and indicators to also take the reduction of CO_2, energy and heat seriously.

[7] Dutch Central Bureau of Statistics

3.4.5 Commercial real estate

Topic	Outcome
Scopes covered	Energy use of financed buildings (scope 1 and 2).
Portfolio coverage	100% of the on-balance finance (loans, mortgage) to commercial real estate.
Attribution	Proportional in relation to the total project costs in case of newly developed building or property value (i.e. market value) for existing buildings at time of investment
Data	The data availability on energy consumption of properties has improved considerably due to policy regulations on the built environment (like buildings codes and energy labels). The available data are usually averaged over a number of properties in the same street/region to anonymise the data. Various sources and commercial databases are available, dividing energy consumption by for instance energy label, type of property, floor area of property. When applying these data on a large number of financed properties it is possible to get a reasonable approximation of the CO_2e-emissions. The consumed energy can be converted to CO_2e-emissions using conversion factors, ideally specified according to the type of energy consumed. Based on the data available, the following data hierarchy is proposed: 1. Actual energy consumption from a property, converted to CO_2e-emissions using verified emission factors specific to the type of energy consumed. 2. Actual energy consumption from a property or grid operator, converted to CO_2e-emissions using grid emission factors for energy from undefined energy source. 3. Average energy consumption building type per country/region and/or energy label specific, converted to CO_2e-emissions using general grid emission factors. PCAF suggests to work with actual data on the energy consumption of the properties, if available.
Grid emission factors	The consumed gas and electricity on household level can be converted to CO_2e-emissions using grid emission factors. Within the Netherlands, www.co$_2$emissiefactoren.nl gives a list of widely accepted and uniform grid emission factors. PCAF has chosen to use the grid emission factor related to direct emissions, expressed under column TTW-value on www.co$_2$emissiefactoren.nl. Whenever the origin of the consumed electricity is unknown, the emission factor for electricity from undefined energy source should be used. The factor for electricity is updated regularly to reflect changes in the Dutch electricity mix. For 2017 measurements this leads to the following emission factors: 0.301 kg CO_2/kWh for electricity, and 1.788 kg CO_2/m^3 for natural gas.
Absolute vs. relative emissions	The methodology results in absolute emissions for the commercial real estate in the portfolio. This information can be further specified and translated into relative emissions based on preferred disclosure on the portfolio.
Avoided emissions	Real estate finance that is climate-positive, i.e. a property generating more energy than it consumes, could be seen as avoided emissions. However, this is not covered yet in this report.

3.4.5.1 Asset class specific considerations

Obtaining data on energy consumption	Actual energy consumption data of the commercial real estate in the portfolio is preferred, as the actual energy consumption will be more accurate than working with the average energy consumption per energy label.
Off-balance real estate finance and subsidiaries	The scope of this methodology is on-balance real estate finance, therefore off-balance real estate finance is not included. If relevant, additional metrics can be included to disclose on off-balance real estate.
Distinguishing between private and corporate commercial real estate	No distinction is made between private or corporate commercial real estate.

3.4.5.2 Limitations

Country specific assumptions	Some country specific adjustments need to be made to make the calculation applicable for a certain country. The Dutch energy label, for instance, is the result of a European directive and differs from ways to categorise energy efficiency of houses in other EU countries and countries outside of Europe. Country specific adjustments need to be considered depending on the data availability and standards in each country.
Property value	When using property value (i.e. market value) for attributing the emissions of an existing commercial building, this value could change over time due to market developments. This will affect the attributed share of emissions to the investments. PCAF proposes to apply the property value at time of investing.

3.4.5.3 Calculation example

Description of example	The emissions of a real estate investment for a fictional school in a real estate portfolio.
Used data	• Emission factors for electricity of undefined energy source and natural gas are derived from the Dutch CO_2-database available at www.co2emissiefactoren.nl • The energy intensity per building type and sector are derived from 'Ontwikkeling energiekentallen utiliteitsgebouwen (2016)'.
Calculation and results	Example calculation for a fictional real estate property A loan of €5,000,000 is provided for a high school with a floor space of 6,000 m^2 and total property value of €20,000,000, at time of investing. According to 'Ontwikkeling energiekentallen utiliteitsgebouwen (2016)' the gas intensity is 13 m^3/m^2 floor area, and an electricity intensity of 37 kWh/m^2. The gas consumption is estimated on: *gas consumption = floor surface x gas intensity$_{sector}$* *gas consumption = 6,000 x 13* *gas consumption = 78,000 m^3* The electricity consumption is estimated on: *electricity consumption = floor surface x electricity intensity$_{sector}$* *electricity consumption = 6,000 x 37* *electricity consumption = 222,000 kWh* The gas and electricity consumption are then expressed in CO_2e emissions using direct emission factors for electricity from undefined energy source in the Netherlands and direct emission factor for natural gas; 0.301 kg CO_2/kWh, and 1.788 kg CO_2/m^3 for natural gas. *CO_2 emissions = (gas consumption x EF_{gas}) + (electricity consumption x $EF_{electricity}$)* *CO_2 emissions$_{high\ school}$ = (78,000 x 1.788) + (222,000 x 0.301)* *CO_2 emissions$_{high\ school}$ = (139,464) + (66,822)* *CO_2 emissions$_{high\ school}$ = 206,286 kg CO_2e* Attributing these emissions to the loan provided result in the carbon footprint for this investment: *Attributed CO_2 emissions$_{high\ school}$ = $\frac{5{,}000{,}000}{20{,}000{,}000}$ x 206,286 kg CO2e = 51,571 kg CO_2e*

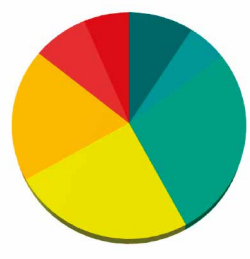
3.4.5.4 Case Study: ABN AMRO real estate footprinting

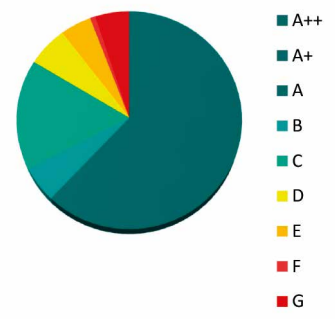
'The real estate market is challenged by CO_2 emissions and lack of sustainable innovation. Our ambition is to accelerate the sustainability shift by supporting our clients' transition to sustainability. We believe data collection, data enhancement and digital capabilities are key in being successful' says Tjeerd Krumpelman, Head of Advisory, Reporting & Engagement. Therefore we have developed several tools in the past years to track implementation, like:

1. ABN AMRO Sustainable Investment Tool (including the BREEAM Quick-scan), which gives detailed insight for objects and portfolios on current situation and possible measures to improve. The tool is populated with data such as building type, age, location and floor area for each building, and provides a desktop assessment of investment costs, financial returns and carbon reductions for the top-5 applicable measures to the building. (https://www.duurzameinvesteringstool.nl)
2. Our pipeline tool, which keep track on financed green landmarks, transformation projects and energy upgrades.
3. Our 100% financing program for sustainable measures.
4. Our annual portfolio check on energy label improvement based on PCAF method (see charts below)
5. Sustainability indicators are mandatory in the valuation report. Each valuation of commercial property for ABN AMRO has a sustainability clause. The section has been developed in close cooperation with valuators; The criteria for assessing the assessor are based on the guidelines of the RICS. The entire life cycle of objects, including by year of construction, renovations, operating costs, energy costs, CO_2 emissions and economic life are included.
6. Our label C action tool for offices. As of 2023 every office building is required to have a minimum energy label C. We only (re)finance offices with an energy label C of better. We have recorded which object meet the minimum requirement. Which objects haven a plan to up-grade or redeveloped to a different use (mostly housing).

Total loan amount Commercial Real Estate: € 9.4 billion (annual report 2017). Residential 32,5%, non-residential/ commercial 67,5%.

Eligible objects with an official Energy Label





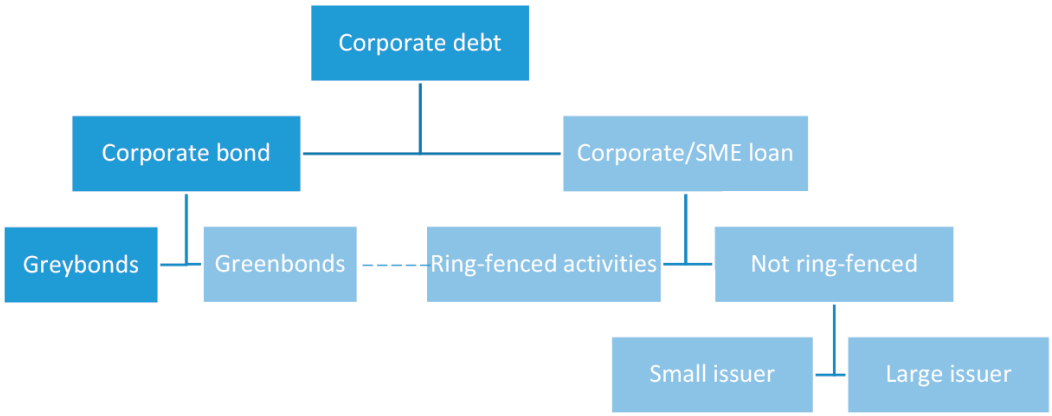
Residential total CO_2 in kilograms: 50.709.085

non-residential/commercial total CO_2 in kilograms: 39.469.468

3.4.6 Corporate debt

This section covers credits investments as discussed and concluded by PCAF. Given the variety of debt instruments available we distinguish between various categories that each requires its own approach.

The corporate debt working group considers the following highlighted categorie[8] to be in scope of its work:



Topic	Outcome
Scopes covered	Scope 1 and scope 2 data as a minimum. Including Scope 3 if available and relevant. Report scope 1, 2 and 3 separately. The reason to measure these scopes separately, even though this will require greater effort, is that scope 1 eliminates double counting and measures direct impact, also of a potential carbon tax. The reason to not include scope 3 as a mandatory requirement is that this would require better accounting and disclosure. To date, the comparability, coverage, transparency and reliability of scope 3 data is generally insufficient.
Portfolio coverage	Ideally, 100% of the portfolio should be covered. At least the majority of the portfolio should be covered and an indication should be provided for a pathway to full coverage. Provide an explanation of which product types were included or excluded and what the main method was for estimating missing data. Cash positions can be considered as having zero emissions. Short positions can be ignored.
Attribution	Emissions are proportionally attributed to the providers of the company's total capital. In order to prevent double counting from this perspective, emissions are attributed proportionally to the exposure divided by the sum of total debt and equity (enterprise value). In instances where the equity share is unavailable, PCAF encourages the use of an estimate or, if impossible, to ignore the equity share and divide by debt only. If alternatives are applied, this requires further clarification of the steps taken.
Data	PCAF does not recommend a specific source. Analysis of Kepler Cheuvreux[9] for IIGCC demonstrates that for scope 1 and 2 emissions differences between data vendors are 12-24%. It is encouraged to use the most recent available data and to mention the data source, reporting period or 'time stamp' of these data.
Absolute vs. relative emissions	As a minimum, PCAF suggests to disclose both absolute and relative emissions. For relative emissions, we propose to divide the absolute footprint with the total assets under management.
Avoided emissions	Avoided emissions are not appropriate for this asset class

[8] For the corporate bond method we assume the bond is a grey bond. We see the carbon accounting method for Greenbonds closely aligned with the ring-fenced activities of the corporate loans section and that of avoided emissions in the project finance section. Therefore we left it out of scope for the section on corporate bonds.

[9] Kepler Cheuvreux , 2015: Carbon Compass: Investor guide to carbon footprinting. http://www.iigcc.org/publications/publication/investor-guideto-carbon-footprinting

3.4.6.1 Asset class specific considerations

Aggregation of output	A decision needs to be made on the aggregation of outputs; should the total portfolio be enough or should a division be made between for instance advanced and emerging markets?
Challenges	Given the strong similarities between the calculation methods recommended for listed equities s, please refer to the challenges listed in the listed equities paragraph. One additional general comment is that one should be aware of the potentially undesired side-effect related to attributing the issuer's absolute carbon footprint to its total equity and debt position. Whilst a lower carbon footprint would typically be achieved by (encouraging) issuers to reduce their absolute carbon emissions (numerator), the recommended calculation methods implies that a similar effect could be achieved by increasing the denominator, either the issuer's equity or debt position.

3.4.6.2 Limitations

Market price fluctuations	When using the enterprise value as denominator, it is important to realise that assets under management change as a result of a fluctuating market price. An objective to reduce a relative footprint by a certain percentage becomes a moving target under the influence of this fluctuation.[10]
Company identifiers	For larger portfolios it is important to have unique company identifiers in order to combine information from various sources. Examples of such identifiers are: SEDOLs, ISINs, CUSIPs, Bloomberg Tickers. For large portfolios match external data sources can be a challenge, when for example two companies merge in market intelligence tools the company identifiers will be adjusted immediately while carbon data providers might only update such information on an annual basis.

3.4.6.3 Calculation example

Description of example	The **absolute footprint** of a loan to a company is calculated by multiplying the total emissions by the proportional share of the enterprise value of a company. The absolute footprint of a portfolio of companies is calculated as the sum over all footprints. $$(1)\ \text{absolute footprint}_t = \sum_{\text{company} \in \text{portfolio}} \frac{\text{invested value}_t}{\text{enterprise value}_t}\ \text{emissions}_t$$ $$(2)\qquad \text{relative footprint}_t = \frac{\text{absolute footprint}_t}{AuM_t}$$
Used data	The information required for these calculations are: **Emissions**: emissions can be taken from company reports if available but for large portfolios external data providers are often used. Examples of data sources include: CDP, Bloomberg, MSCI, Trucost and Southpole. In the choice of data source asset managers will have to compare the various options (for example on coverage, data quality, transparency, service, costs etc.). **Enterprise value**: this information is widely available in commercial market intelligence tools and commercial providers of financial data that are used by investors. **Invested value**: this information is normally available in the internal systems used by investors for portfolio management and performance monitoring.

[10] A possibility to overcome this would be to use normalised assets under management, whereby prices are held constant over the target period. Such adjustments should be made transparent.

Calculation and results

Fund I is composed of two listed companies and contains a bit of cash (2.5 million).

Company	Enterprise value	Invested	Total emissions
A	62.5 billion	77.5 million in bonds with maturity (3yrs)	700 tonnes CO_2e
B	12 billion	90 million in bonds with maturity (9yrs)	250 tonnes CO_2e
Cash		2.5 million	
Total invested		170 million	

Total emissions company * (invested value / enterprise value)
For company B: 250 * (90mln / 12bln) = 250 * 0.75% = 1.9 tCO_2e
For company A: 700 * (77.5mln / 62.5bln) = 700 * 0.12% = 0.8 tCO_2e
For cash no emissions are attributed
Total absolute carbon footprint = 1.9+ 0.8 = 2.7 tCO_2e

The relative carbon footprint is calculated by dividing the absolute carbon footprint over the invested value (per million).
Total relative carbon footprint = absolute footprint / invested value per million invested
Total relative carbon footprint = 2.7 tCO_2e /167.5 million = 15.9 tCO_2e per billion invested

3.4.6.4 Case Study: Achmea Investment Management corporate debt footprinting

achmea
Achmea Investment Management

In 2015 Achmea Investment Management started to calculate the carbon footprints of listed equity portfolios and has extended this to corporate and sovereign bonds portfolios in 2018. Although we found that many of the companies that we were looking for have reported their carbon footprint, some are still behind on transparency. Data vendors can be a necessary step to provide us with the coverage that we need. Companies that do not report or report only parts of their footprint publicly should be flagged by the data vendor and have their data amended. A comparison of data vendors methodologies learned that important differences can be found in how missing data is modelled. This can be done by using anything between straight forward sector averages and complex proprietary models. However this is done, as users we needed to be able to generally understand the model and have clarity on how the data vendor would treat missing or flawed data. We find that not all parties in the market have been able to provide clarity on this aspect. While data vendors have a responsibility to be clear about their approaches and models, it is up to individual companies to be clear about their footprint and report accordingly.

"The footprint calculation is not an end in itself. The process has not only provided us with a high level view on emissions in credit portfolios. It has helped us understand which issuers are important and where we should be focussing our engagement. Achmea IM is actively addressing improved transparency and reduced carbon footprint as part of company engagement" says Thierry Oeljee, Senior Engagement Specialist at Achmea IM.

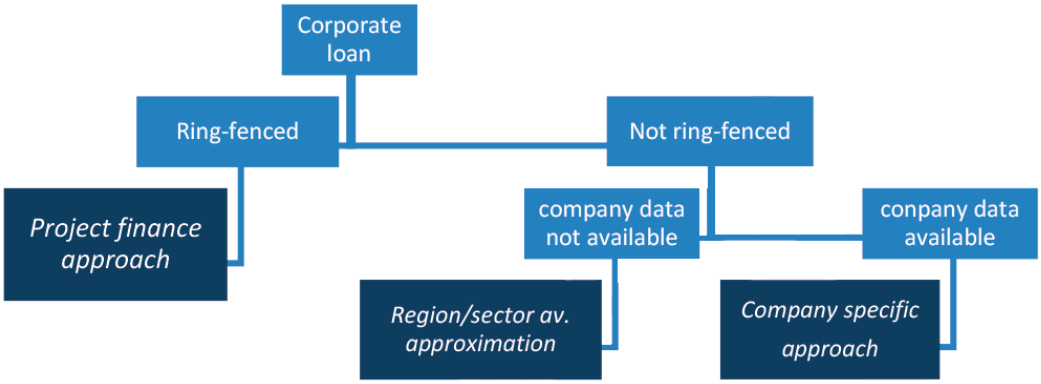
Achmea Investment Management held a pilot aiming to find out if and where we would experience issues or challenges when following the corporate bond calculation methodology and take a first general look at the carbon footprint. One question emerges from the PCAF recommendation to use the enterprise value (EV) metric to determine ownership, a figure that would include both the equity and debt components of an issuer's capital. Since none of our existing data feeds included this metric for our investments, we were faced with a challenge. Our solution was to apply a similar metric offered by Bloomberg, being currency adjusted enterprise value. Another question related to EV came up when we found that our manually calculated EV was negative in the case of several financial institutions, which needed further tweaking in a handful cases to prevent undesired tilts in the results. Ultimately, our calculation covers 88.5% of investments by portfolio weight and 92.7% by benchmark weight.

3.4.6.5 2018 update of Working Group Corporate debt

Practicalities and insights	2018 has been a year of sharing experiences and finding out about the practical use of applying the methodology in real portfolios. One example is about our choice to use averages to complete missing data in the corporate loans section of our methodology. Practical use of the method has pointed the working group to a number of potential issues that emerge when searching for and applying averages to complete missing emissions data.
Agenda for 2019	The Corporate Debt working group aims to continue its work for PCAF in 2019. We anticipate further improvements to be made in the coming year. The example above is only one example of the challenges ahead for this class. Therefor the decision was made to look for methodological improvements under the heading of a separate sub group which will focus on corporate loans and the specific questions pertaining to this category.

3.4.7 Corporate/SME Loans

This section covers corporate loans. For the purpose of this protocol, corporate loans are limited to the loans that are on the balance sheet of the financing institution.
For corporate loans different accounting approaches may be followed, depending on the characteristics of the loan. This differentiation is visualised below and is further explained in the table.



Topic	Outcome
Scopes covered	Scope 1 and scope 2 minimum. Scope 3 if relevant and available.
Portfolio coverage	As stipulated in the introduction, off-balance credit products do not need to be covered. Ideally, 100% of the portfolio should be covered. For practical reasons, credit facilities linked to current accounts may be exempted, as the credit exposure is relatively small, highly volatile and not structural. Revolving credit facilities may also be excluded, unless they are significant or material (i.e. if they account for more than 10% of outstanding credit). The coverage of the corporate/SME loan portfolio should be clearly communicated (both the criteria and the relative coverage of the outstanding exposure).
Attribution	As a basic attribution principle, the lender accounts for a portion of the GHG emission of the financed company determined by the ratio between the lender's exposure and the enterprise value of the company (in this asset class total balance sheet of the company): the attribution factor. For this, the actual outstanding exposure is used. This means adjusting the numerator of the attribution factor annually (for instance reflecting the end-of-year exposure), resulting in the attribution to decline to 0 at the end of the lifetime of the loan (when it is fully repaid). Institutions are free to use either year-end exposure or average exposure throughout the year, as long as the approach is communicated clearly and used consistently. As is further explained in the Data section, two GHG emission approaches are applied, one relying on region/sector average data, and one on actual source data provided by the borrower. While the basic attribution principle should apply to both, the practical way to arrive at the correct attribution differs. **Approach 1: region/sector average-based calculation** When using the region/sector average data method the attribution is done by multiplying the loan exposure with the average GHG emission intensity for the applicable region/sector, i.e. GHG emissions per million euro on the financial balance (total balance sheet). It is important to ensure that the GHG intensity is calculated using an estimate for the sector size that reflects the principles of enterprise value, to avoid an attribution bias between the two approaches.

	Approach 2: emission calculation based on source data provided by the borrower For loans that are designated for a clearly ring-fenced activity, use the protocol for project finance, even if these loans are not structured as project finance (see section 4.3). In this case, the attribution factor should be calculated by dividing the exposure of the lender by the total investment needed for the ring-fenced activity (total balance sheet). It is important to make sure that the boundaries used to ring-fence the total investment amount of this activity are same as the boundaries used to ring-fence the GHG emissions of this activity. In other cases the attribution factor is calculated by dividing the exposure of the lender by the total balance sheet of the company. Similar as above, the boundaries used to delineate the enterprise value should be similar as the boundaries used to delineate the GHG emissions.
Data	For corporate/SME loans a twofold approach is taken to estimate and account for emissions and carbon intensity. The first approach is based on region/sector specific average emissions data, using public data sources or data from third party data providers for market and emissions data. The second approach builds on company-specific source data, provided by the borrower. When reporting aggregated GHG data, it should be made clear which percentage of the reported emissions data is based on approach 1 and 2 and which criteria have been applied to decide on which approach to use when. **Approach 1: region/sector average based emission calculation** The region/sector average approach is used when the borrower does not report on GHG emissions and the transaction does not involve detailed due diligence and monitoring. This is typically the case with small exposures and/or smaller (SME) companies. Financial institutions are allowed to determine the threshold in loan-type/size and company type/size themselves, but it should be used consistently and communicated clearly with emissions data and it should not be set higher than a maximum prescribed under this carbon accounting approach. PCAF proposes to start by setting the maximum for this threshold at 5 million euro initial exposure and reconsider this threshold when evaluating the carbon accounting approach at a later stage. The region/sector average approach may also be acceptable for small and/or short term (like bridge finance), non-ring-fenced credit facilities to larger companies, as these types of credit will usually not involve a detailed due diligence analysis process. This approach is not preferred for high-emission industry sectors (such as extractive industries, heavy industries and large-scale thermal power generation). It should only be used if all the other criteria for using this approach are met and if the total exposure to such sectors is below a certain percentage of the total corporate/SME debt exposure. In other cases, the GHG emissions data from exposure to these high impact sectors should be calculated using approach 2. PCAF proposes to apply approach 2 to high-emission industry if the exposure to these sectors exceeds 20% of the total portfolio. PCAF will reconsider this threshold when evaluating the protocol at a later stage. The financing institution may also choose not to apply approach 1, if it is specifically financing best-in class players, or specifically financing GHG-related improvements, as obviously such impacts would not become visible using region/sector averages. Following region/sector average approach, the emissions for each loan are calculated with the help of region/sector-based emissions data[11], using ISIC, NACE or another internationally accepted sector classification. The region/sector-based database provides the average GHG emission intensity of the financed activity. Multiplying this with the exposure amount provides an estimate for the financed emission. Sampling tests based on actual data on company level which is extrapolated to portfolio level can help to test the accuracy of calculations based on region/sector averages. This may also be used to refine the average data for specific sectors or regions, if the institution has a strong presence in and specific knowledge of this sector and/or region.

[11] It is proposed to use credible (public) data sources such as EuroStat, CBS and the International Energy Agency, or input/output models data (list may be provided at a later stage)

Approach 2: emission calculation based on source data provided by the borrower

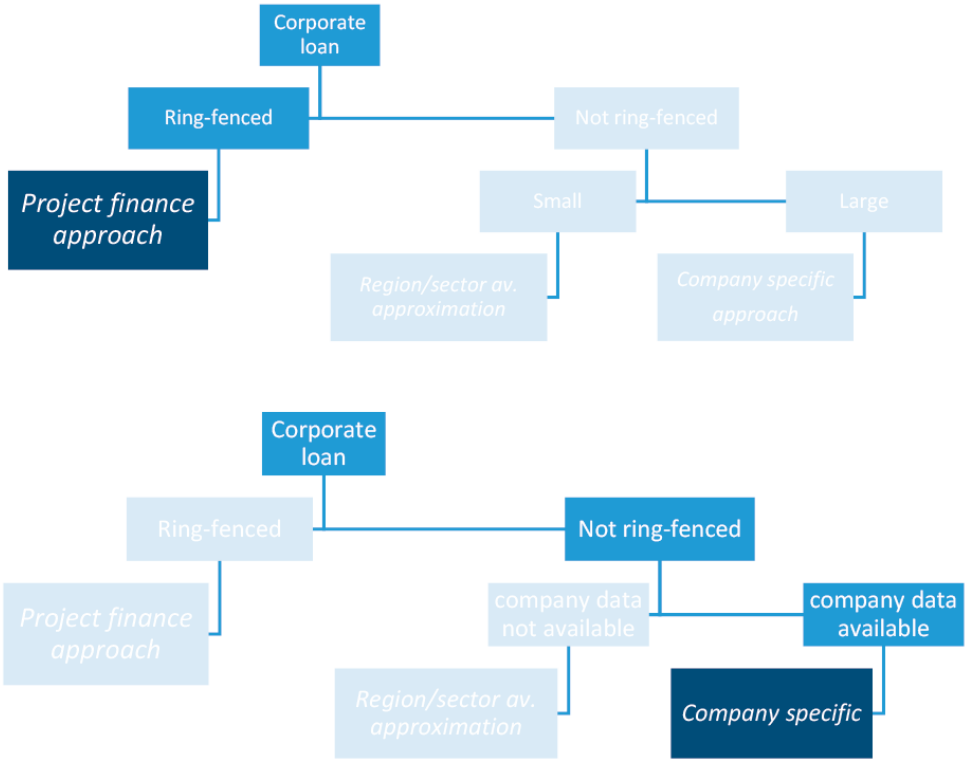
Approach 2 makes use of company-specific data provided by the borrower. This can either be GHG emissions data, or other source data from which GHG emissions data can be calculated, using an appropriate calculation methodology/tool, issued or approved by a credible independent institution.

Approach 2 is preferred from a data quality perspective, but not always realistic or practical. It is most suited for larger loans to bigger companies, as these are usually involve in a detailed diligence and monitoring and/or target companies that have good GHG emissions data available. If this is the case and the emissions of the activity to be financed are significant, company-specific data, provided by the borrower should be used, rather than region/ sector averages.

As explained in the previous section, approach 2 should also be applied for exposure to high-emission industry sectors (such as extractive industries, heavy industries and large-scale thermal power generation), regardless if the other criteria are being triggered, if the total exposure to such sectors exceeds the minimum percentage of the portfolio (see earlier remark).

The financial institution may also choose approach 2 if it is specifically financing best-in class players, or specifically financing GHG-related improvements.

For loans that are designated for a clearly ring-fenced activity, the protocol for project finance should be used (see section 4.3 of the interim report), even if they may not be structured as project finance.



In other cases, PCAF proposes to follow carbon accounting approach 2 for corporate/SME loans, applying the following hierarchy of preference for the data sources:

1. Audited GHG data from the company, in accordance with the GHG Protocol;
2. GHG data calculated by a credible external expert, in accordance with the GHG Protocol or comparable credible principles;
3. Sector-specific non-GHG source data, used to calculate GHG emissions with an approved GHG calculation tool such as IFC-CEET, the AFD carbon calculation tool, or comparable sector-specific tools issued by credible institutions such as the FAO (for agriculture).

Absolute vs. relative emissions	Standard approach should be reporting absolute as well as relative emissions. PCAF states that the methodology depends on the goal, e.g. monitoring and communication purposes or steering portfolios against a carbon target.

3.4.7.1 Asset class specific considerations

Considerations that are specifically relevant to certain aspects of categories of debt instruments are discussed in the respective sections.
For carbon footprints related to loans that are designated to finance specifically ring-fenced activities are calculated based on the approach recommended for project finance as described in the paragraph on project finance of this report. There is a small difference regarding the type of emissions that are associated with ring-fenced corporate loans. Project finance is mostly associated with avoided emissions. For ring-fenced corporate loans however, these emissions can also be emitted during the lifetime of the activity.

3.4.7.2 Limitations

A limitation of the calculation method recommended for smaller corporate/SME loans exposures that are not ring-fenced is that it largely depends on assumptions and approximations that are derived from region and sector averages. This makes calculations based on this approach generally less robust and more uncertain than those that are based on company data. It is however a necessary evil to address the large number of smaller loans that are often given out this way.

3.4.7.3 Calculation example: Triodos Bank footprinting organic dairy sector in The Netherlands

Description of example

Triodos Bank

Triodos Bank calculated the GHG-emissions of three loans to non-listed companies. These case studies were meant to test how the PCAF-methodology works in practice, in this asset class. The selected case study below concerns an organic dairy farm in the Netherlands.

Josée van den Wijngaart, relationship manager in Triodos Bank's loans department, says: "While primary data is preferable and possible in some cases, it is not in all. We assess asset classes on the basis of the quality of data available and identify opportunities to improve this in the future where we can. We tailor our approach based on available data and plan to report on the differences in quality of data and the methodology used."

Used data

Triodos Bank used two possible methodologies to calculate the associated GHG footprint of Triodos Bank's loan to the company:

1. Sector-based methodology based on databases with sector average emissions per revenue (used database: EXIOBASE, raw milk).
2. Detailed methodology based on primary data of the company (litres of milk produced).

Calculation and results

Approach 1:

- step 1: Perform Triodos client's sector match with EXIOBASE sectors, in this case Organic Farming (Dairy) matched with EXIOBASE (Raw milk non-organic).
- step 2: Add scope 1 and 2 emission factors (tCO_2/revenue) for each matched sector from EXIOBASE
- step 3: EXIOBASE emissions factor X revenue Triodos client X = $\frac{\textit{Triodos outstanding credit}}{\textit{Balance sheet total client}}$

→ Total emissions attributed to Triodos Bank

Approach 2:

- step 1: Milk yield in May 2018 x 12 months = Annual yield
- step 2: Annual yield X Organic milk emissions factor[12] = Total emissions
- step 3: Total emissions X $\frac{\textit{Triodos outstanding credit}}{\textit{Balance sheet total client}}$

→ Total emissions attributed to Triodos Bank

The total attributed emissions (tCO_2) calculated with the detailed data (approach 2) amounted to 239,64. The total attributed emissions (tCO_2) based on sector average amounted to 135,49, a substantial difference of 43%.

[12] M.A. THOMASSEN. Life cycle assessment of conventional and organic milk production in the Netherlands. Taken from ELSEVIER – Sciences Po Bibliotéque.

For all calculations Triodos Bank was able to assess the GHG emissions associated with Triodos Bank's corporate debt by applying a detailed method based on primary data and a sector-based method based on revenue. Results differ 40-50%, on average, between the detailed method and the sector-based method. In all cases the sector-based method resulted in lower emissions because each sector has been broadly defined in the Input/Output model and also incorporates lower emitting subsectors, bringing the average down. In addition, some scientific literature on GHG emissions of livestock tells us that organic dairy farming results in higher GHG emissions per litre of milk compared to conventional dairy farming, mainly due to lower yields. Triodos Bank is currently exploring other model providers who might have specific GHG-emissions data for various organic sectors.

This individual example is indicative of a much broader application of the PCAF methodology to Triodos Bank's corporate debt portfolio. Triodos is applying the PCAF methodology across its international business and expect to report on this in our 2018 annual report. This work is expected to cover around 60% of Triodos Bank's assets under management and approximately 80% of its probable actual and avoided emissions.

From this broader perspective there are particular challenges around quality of data. While some enterprises, and even sectors, provide primary greenhouse gas data, most do not. And this is a dynamic area of work. Improving data quality is good news but it will also make reporting comparable, verified data over time more difficult - both within and between institutions.

"Despite the challenges around data quality in particular, there is a great deal we can do to understand the carbon footprint of our loans and investments," says Josée van den Wijngaart. "We want to share what we learn, listen to and learn from other practitioners inside and outside PCAF, and benefit from the insights of other carbon accounting methodologies. Together we can refine and improve these approaches for the benefit of our industry, institutions and wider society."

3.4.7.4 Case Study: Rabobank dairy loans footprinting

Rabobank

Rabobank started in 2017 a pilot project to estimate the carbon footprint of the dairy sector. Because data unavailability made the process very resource intensive, it was decided to focus on the bank's largest exposures in the sector: the Netherlands, the US and New Zealand. Since bottom-up carbon footprint data of borrowers is often not available for a large international loan portfolio that also contains many non-listed companies, top-down approach in line with the first method was employed. To calculate the financed emissions the emissions of borrowers were multiplied with the lender's share in the borrower's balance sheet total as a proxy for the company value. The main data required for the calculation was GHG emissions and the financial balance sheet of the loan portfolio. Obtaining this data proved fairly challenging because: 1) Macroeconomic data turned out not to be useful for assumptions in respect to balance sheet totals. Some approaches look into the possibility of using data from economic input-output databases, like Exiobase. The advantage of using such databases is that all data is available in a central place and therefore easily accessible and internally consistent. However, in- depth analysis of the definition of data in the database makes it clear that the macroeconomic data such as Gross Fixed Capital Formation or Value added is not useful for estimating the value of companies (balance sheet total) at the sector level. 2) Data on emissions and financial information (balance sheet total) are often only available on a very aggregated level and are not always sub-sector specific. While country specific sectoral databases both emissions data and financial balance sheet data are preferable, their availability is limited to certain sectors and countries. There are initiatives that provide balance sheet data per sector for multiple countries but there are large data gaps. The BACH database for example contains data for only 12 developed countries (mostly European) and the definition of sectors is relatively broad. Therefore further assumptions need to be made. For instance, using the emission intensity per Euro of balance sheet total for a sector in a certain country as a proxy for a sector in a country for which no data exists, and/or assume a much wider sector definition.

The main takeaway from this exercise was that data availability is the main challenge for carbon footprint estimations as there are huge data gaps that limit a proper analysis to a few countries or sectors. Another takeaway was that attribution is a not only challenging as the data gaps are larger than for carbon emissions, but it is also a tricky exercise which can lead to biased conclusions. The most important conclusion was that for strategy steering purposes a bottom-up approach is to be preferred. Namely, a top-down approach like the first method proposed, leads to rough estimates of the carbon footprint of the loan portfolio and, thus, does not reflect the specific carbon characteristics of the lender's portfolio. This is useful for comparison purposes and an important first step, but is insufficient for steering strategy. Ideally, the sectoral country estimation should be based on a bottom-up approach like the second method proposed so that the lender can also distinguish frontrunners from laggards at this level, which can be used for benchmarking and steering strategy accordingly.

Such an approach requires a surmountable effort invested in developing the necessary harmonized taxonomy, internal infrastructure and public databases. Also, to collect data that is consistent, clients need to be educated and get access to tools that properly and consistently measure the carbon footprint.

Some lessons were also learned with regard to the process. For example, the fact that several departments need to be involved to get carbon footprint information in the bank's systems. Carbon footprint estimating is still pioneering work and that requires more effort and time than other projects to accommodate learning by doing. In addition this top down method provides some insight in the total level of GHG footprint but it does not yet tell you how well or badly the performance of individual businesses is within sectors. Therefore we should get more granular data. "Ideally you have access to consistent data at the company level which you then integrate in your credit and risk models and use that to price in climate transition risk. Such data can allow you to steer strategy towards financing to the most efficient carbon-reducing solutions and facilitate the transition to a low carbon economy in the most cost effective way." (Alexandra Dumitru, Economist Climate). Bouke de Vries (Advisor to the Board on Climate Change) adds: 'To speed this up businesses may choose to provide more data on their own. In this way they may be able to prove to us that they are emitting less than the sector average, or that they perform better in another respect, such as protection of biodiversity. We will offer these clients more advantageous financing conditions. At first in projects with a limited scope to gain experience, but I expect this to increase in the future'.

3.4.7.5 2018 update of Working Group Corporate/SME loans

Practicalities and insights & Agenda for 2019	Main goal for 2019 is sharing experiences and finding out about the practical use of applying the methodology in real loan portfolios on portfolio level as well as on individual debtor level. In 2018 we defined two approaches: 1) region/sector average-based emission calculation and 2) emission calculation based on source date provided by the borrower. Regarding the first approach we will, in 2019, explore the use of several data providers such as CBS, Eurostat and the use of models from parties such as South Pole, EXIOBASE and Trucost. We will define the pros and cons of these date providers and make suggestions what should be the best way to use it. Regarding the second approach we made some case studies on debtor level. Although we expect the first approach as more applicable for now, in some situations the second approach is preferable for larger loans to bigger companies, as these are usually involved in a detailed diligence and monitoring and/or target companies that have good GHG emission data available. In general, a top-down approach like the first method leads to a rough estimate of the carbon footprint of the loan portfolio and, thus, not the specific carbon characteristics of the lender's portfolio. One should be mindful of these aspects when interpreting the result, which are useful as a starting point and for comparison purposes, but insufficient for steering strategy. Ideally, the sectoral country estimation should be based on a bottom-up approach like second method so that the lender can also distinguish frontrunners from laggards at this level, which can be used for benchmarking and steering strategy accordingly. Therefore, a lot of effort needs to be invested in developing the necessary harmonized taxonomy and advice on company level carbon calculations, internal and public databases. Furthermore, we aim to analyse different ways of the attribution principle. For example: 1) the lender accounts for a portion of the GHG emission of the financed company determined by the ratio between the lender's exposure and the enterprise value of the company (debt + equity), or 2) the GHG per sector divided by the financial balance per sector. In 2019 we aim to continue making several case studies and best practices as well as on debtor level as on loan portfolio level of a financial institution. Adjacent to that we will sum up dilemma's we face during those case studies and will define the next steps to take in 2019. Current dilemma's we already face are the use of local data versus international data; the use of unrefined available sector average data versus real/accurate customer data (often not available). The availability of highly granular data is a major challenge, particularly at the international level.

3.4.8 Indirect investments

Topic	Outcome
Scopes covered	Indirect Investments are characterized by having an investment exposure through a 'vehicle', ideally with look through for the underlying or ring-fenced assets where the financial institution is ultimately invested in. Therefor the exposure can consist of a broad, local or international universe, as well in listed as in private markets. As the nature of the underlying assets can vary, also the scopes covered will depend on the relevant metrics, according to existing PCAF guidelines per asset class and data availability.
Portfolio coverage	Ideally, 100% of the portfolio should be covered, although we anticipate that it will be challenging to cover the majority of the portfolio and therefore we promote a best effort approach. For a better understanding of the Indirect Investments universe, the following examples of instrument types could qualify: Equity vehicles, like investment funds (including ETF's and fund of funds) in public and private markets Bond vehicles, like Asset Backed securities and Green Bonds Derivatives, like futures, options (single issues or baskets), CDS, total return swaps Collateral, like pledged for derivates (cleared and OTC), securities lending or reinsurance These Indirect investments can have a portfolio with long and/or short positions. Cash holdings are considered as having zero emissions. We start to define a methodology in this PCAF interim report for investment funds targeting public markets, as this is the most common used Indirect investment product, to provide more insight and a comprehensive methodology. The majority of investment funds targeting public markets should be covered and an indication should be provided for a pathway to full coverage.
Attribution	Emissions of the underlying assets in an investment fund are proportionally attributed to the investor's share in the total investment fund. The emissions of the underlying assets in an investments fund should be aggregated and calculated according to the existing PCAF methodology for each specific asset class, such as sovereign bonds, corporate bonds, commercial real estate or mortgages.
Data	The first and most reliable source for the emissions of an investment fund should be the asset manager, via a designated data vendor or own research and according to the existing PCAF guidelines. Investors should engage with asset managers to disclose the emissions of their investment funds. If not provided by the asset manager, carbon emissions for an investment fund could be made available by other providers, like public data sources or designated data vendors. Investors could engage with data vendors to provide the emissions of investment funds. Finally, the investor could assess the investment fund emissions by capturing the underlying portfolio (look through) and calculating the pro rata emissions with his own PCAF models and data. Investors should engage with asset managers to fully disclose the holdings of their investment funds.
Absolute vs. relative emissions	As a minimum, PCAF suggests to disclose both absolute and relative emissions, depending on the asset class. For investment funds with a benchmark approach, disclosure of the relevant benchmark emissions are recommended.
Avoided emissions	Avoided emissions can be appropriate for investment funds targeting certain asset classes.

3.4.8.1 Asset class specific considerations

Data delivery	Providers of indirect investments should report PCAF compliant numbers to their investors. We can engage with Dutch providers to do so and promote this approach for the international providers.
Challenges	Green bonds methodology is still under discussions, as a ring-fenced approach would exclude the green bonds in the denominator for sovereign bonds and companies (enterprise value). Derivates have optionality, how can we combine that with the ownership approach? Or will the market value of the derivate and look through to the underlying assets reflect the fair ownership? There are long and short exposures in derivates, will that contribute to an equal positive and negative carbon footprint?

3.4.8.2 Limitations

Data disclosure	Not all providers of indirect investments disclose their full investment portfolio, so investors can't calculate the emissions themselves. Indirect investments will have an international universe, part of that in private markets, so it will be challenging (or impossible) for the investor to make the PCAF calculation with a look through approach, because of the required carbon data for the underlying assets.
Green bonds	Green bond reporting is not yet in line with PCAF requirements/methodology. Green bonds are characterized by specific requirements for the underlying assets, but typically don't disclose (yet) the (avoided) carbon emissions for these projects in line with PCAF requirements/methodology.

3.4.8.3 Calculation examples

Description of example *Investment funds*

"Kempen started measuring carbon intensity of our own funds a few years ago and since last year we for the first time published the numbers externally. We see a lot of value in having a harmonized carbon accounting methodology that can help us implement TCFD recommendations and make us and our clients more aware of climate related risks and opportunities in our investments," says Narina Mnatsakanian, director Impact & Responsible Investment for Kempen.

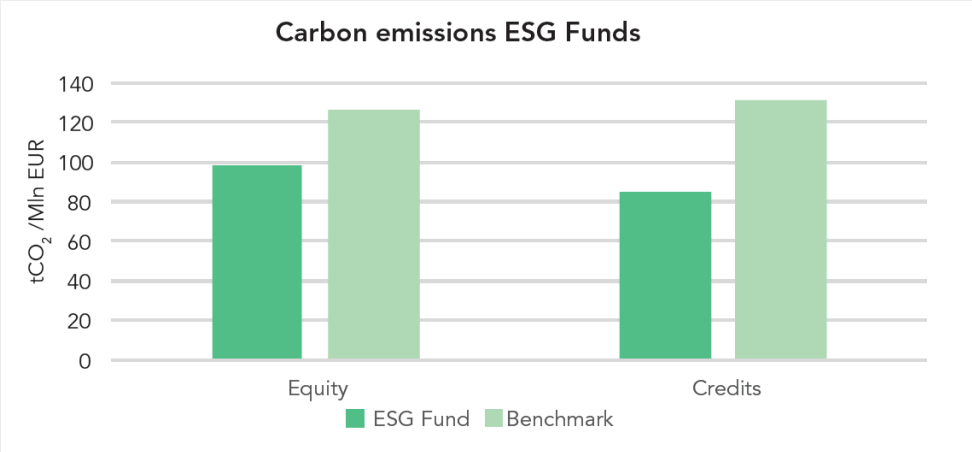
For the Kempen funds the carbon emissions were calculated per fund via two metrics:
(1) carbon emissions per EUR million invested; and
(2) carbon footprint per EUR million revenues (weighted average carbon intensity). Both metrics can be found in the table below.

	Emissions per million invested tCO_2e / MILLION EUR EV	Weighted average carbon intensity tCO_2e/MILLION EUR REVENUE	Intensity compared to benchmark
Kempen (Lux) Euro Credit Fund	106.9	147.9	LOWER
Kempen (Lux) Euro Credit Fund Plus	111.4	151.9	LOWER
Kempen (Lux) Euro Sustainable Credit Fund	81.6	138.8	LOWER
Kempen European High Dividend Fund	143.8	235.5	HIGHER
Kempen (Lux) Global High Dividend Fund	197.2	329	HIGHER
Kempen (Lux) European Smallcap Fund	53.8	62.1	LOWER
Kempen (Lux) Sustainable Smallcap Fund	55.8	65.8	LOWER
Kempen (Lux) Euro High Grade Government Fund	54.1	31.7	LOWER
Kempen (Lux) Global Sovereign Fundamental Index Fund	100.1	57.4	HIGHER
Kempen Orange Fund N.V.	92.9	142.7	LOWER
Kempen Oranje Participaties	109.6	65.5	LOWER
Kempen Global Sustainable Equity Fund N.V.	34.7	60.6	LOWER
Kempen Value Creation	34.2	62.4	LOWER
Kempen (Lux) Global Property Fund	10	109	LOWER
Kempen European Property Fund	5.9	87	HIGHER
Kempen (Lux) Global Small-cap Fund	97.3	108.9	LOWER
Kempen Global Property Fundamental Index Fund	12.6	116.2	HIGHER

Data as of Feb 2017 due to a significant change in the portfolio composition, source: ISS Etnix, Kempen

Source: Kempen Annual Responsible Investment Report 2017-2018, see: https://www.kempen.com/en/asset-management/responsible-investment

The a.s.r. ESG funds investing in corporates report their carbon footprint (scope 1 + 2) compared to their respective benchmark quarterly, these are the published emissions at the end of 2018 Q2:



Source: a.s.r. Carbon Footprint Investment Portfolio Q2 2018, see: https://asrnederland.nl/duurzaam-ondernemen/duurzame-belegger/duurzaam-beleggingsbeleid

Used data	Kempen (the asset manager) used the investment portfolio in their general ledger and the carbon data from a specialized climate data vendor (ISS Ethix/South Pole) for the calculations. a.s.r. (the asset manager) used the investment portfolio in their general ledger and the carbon data from a specialized climate data vendor (Vigeo Eiris as per 31-12-2017) for the calculations.
Calculation and results	An investor participates for € 15 mln in the Kempen Orange fund and for € 25 mln in the a.s.r. ESG Credits fund. Given the provided data by the asset managers it's possible to calculate the total absolute and relative emissions for the € 40 mln investment portfolio of this investor. Total absolute carbon footprint is calculated by multiplying each fund investment exposure with the emission per € 1 mln and aggregate all fund investments: 15 x 92.90 + 25 x 84.64 = 3,509.50 ton CO_2e The relative carbon footprint is calculated by dividing the total absolute carbon footprint by the total invested value: 3,509.50 ton CO_2e / € 40 mln = 87.74 ton CO_2e per € million invested

3.4.8.4 Case Study a.s.r.: footprinting ASR ESG Euro Credit fund

a.s.r.
de nederlandse
verzekerings
maatschappij
voor alle
verzekeringen

Protection of the environment and efforts to limit the impacts of climate change are of the utmost importance to preserve our planet for future generations. For ASR Insurance, climate change is a direct risk to our business, both to the claims we pay out and to the value of our investments. Therefore, a.s.r. asset management has integrated Climate change and Energy transition as an explicit theme/driver into its strategic asset allocation and has taken measures to implement its commitment to the Paris Agreement across the investment portfolio.

Thanks to the extensive work of PCAF, a.s.r. has started periodical measurements, reporting and evaluations for the carbon footprint of the investment portfolio in 2017.

Jos Gijsbers, Senior Portfolio Manager: "Since data quality is still challenging, we've implemented an enhanced approach for the carbon footprint measurement to increase transparency, using total assets instead of enterprise value for listed equity and corporate bonds. The quarterly a.s.r. carbon footprint reporting is highly appreciated by the investors in the a.s.r. ESG funds and other stakeholders."

3.4.8.5 2018 update of Working Group Indirect Investments

Implementation	For investment funds we've provided a practical approach for carbon accounting, which can be implemented when investment funds start disclosing their carbon footprint.
Practicalities and insights	There are different instruments with underlying assets and indirect carbon exposure. Disclosure of the underlying assets (look through) is often in place, the carbon footprint of the underlying assets is typically not reported.
Agenda for 2019	We hope to get feedback from the investor community on this PCAF approach for indirect investments. Also additional work for asset backed securities, especially RMBS, is planned in 2019 and a specific approach for green bonds to get rewarded for their positive contribution to avoid greenhouse gas emissions.

4. Next steps

PCAF has become an effective, collaborative initiative. We will continue to build on this positive start.

The group of carbon accounting front-runners have committed to work together for another year as practitioners sharing best practices, addressing shared dilemmas and collaborating on improvements to the methodology. The group will publish an updated report at least once more, to keep stakeholders informed about its progress. An overview of the activities PCAF will perform over the coming year follows below. When and how this is done is at the discretion of the PCAF members, recognising the urgent need to transition to a low carbon economy.

4.1 Continuation of implementing carbon accounting and sharing best practices

By implementing carbon accounting with each organisation, the group will address questions such as:

- Data quality, including questions of how to evaluate quality, what sources of data to use and the timing of updates
- Disclosure, including whether and how to aggregate across asset classes and which metrics to use when doing so
- Identifying and finding shared solutions to challenges in applying the methodology in practice

4.2 Avoided emissions

Referencing section 3.4, there remains work to be done on harmonising a methodology to account for avoided emissions. Several International Financial Institutions (IFIs) have developed a methodology for quantifying the GHG impact of projects, which can also be used to calculate the avoided or 'net' emissions of, for example, renewable energy investments, investments in energy efficiency and investment in less carbon-intensive transportation solutions. Others have their own methodology for calculating the (avoided) impact of a project. In 2019, PCAF will examine the most appropriate avoided emissions calculation methodology.

4.3 Target setting

With a reference to section 2.2, PCAF's position is that a financial institution's footprint reporting is a means to an end. The ultimate purpose is to allow steering towards a low-carbon portfolio in line with the Paris Agreement; holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to no more than 1.5 °C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change. Contributing to the development of a framework for SBTs could help institutions to achieve this goal. To this end, several PCAF members co-sponsor and engage with the Science-based Targets for Financials initiative[11].

4.4 Steering towards low-carbon portfolio

Finally, PCAF members will apply several measures to reduce the footprint of a portfolio. An overview of possible measures, as discussed during the PCAF meetings, follows below. It reflects ongoing work rather than a firm conclusion.

4.4.1 Portfolio composition

One way of steering towards a low-carbon portfolio is by changing its composition. This can be achieved through divesting from certain relatively high-carbon intensity assets and replacing them with low-carbon alternatives. This can be done by applying one, or more, of the following measures:

- Limit exposure to high-carbon intensity assets, increase exposure to low-carbon intensity assets and green bonds
- Set a minimum low-carbon intensity assets target
- Implement a negative screen for high-carbon projects, bonds or other assets
- Explore activities that provide preferential financing conditions for low-carbon intensity assets or higher transaction costs (through reporting, monitoring and verification) for high-carbon intensity assets.

4.4.2 Engagement

Another way of steering is by actively engaging with investees in order to lower their footprint. The asset or investee does not change ownership. This 'active ownership' approach can be executed through one or more of the following measures:

- Engage with investee companies or asset operators to increase energy efficiency and reduce emissions.
- Engage on reducing high-carbon capital expenditure and increase climate friendly investment.
- Engage on corporate GHG emission targets and strategies including disclosure and transparency.

11 See https://sciencebasedtargets.org/financial-institutions/ for further information

5. Glossary

Absolute emissions	Emissions attributed to an investor. Expressed in tonnes CO_2.
Avoided emissions	Emission reductions that occur outside of a product's life cycle but result from the use of that product when compared to a baseline where that product is not used.
CO_2-equivalent (CO_2e)	The amount of carbon dioxide (CO_2) that would cause the same integrated radiative forcing (a measure for the strength of climate change drivers) over a given time horizon as an emitted amount of another greenhouse gas or mixture of greenhouse gases.
Corporate debt	The debt owed by a corporate entity.
Direct emissions	Emissions from sources that are owned or controlled by the reporting entity and/or investee.
Double counting	Occurs when a single GHG emission reduction or removal, achieved through a mechanism issuing units, is counted more than once towards attaining mitigation pledges or financial pledges for the purpose of mitigating climate change.
Sovereign bond	A debt security issued by a government to support government spending.
Government debt	The debt owed by a central government.
Indirect emissions	Emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity.
Investment	The term "investment" (unless explicitly stated otherwise) is used in the broad sense: 'putting money into activities or organisations' with the expectation of making a profit'. This in contradiction to the more narrow definition sometimes used within for example a bank: as one of several financing options, besides e.g. debt finance, equity finance. Most forms of investment involve some form of risk taking, such as investment in equities, debt, property, projects, and even fixed interest securities which are subject to inflation risk, amongst other risks.
Project finance	The long-term financing of infrastructure and industrial projects.
Relative emissions: per invested value	Emissions attributed to an investor (absolute emissions) normalised for the amount invested. Expressed in tons CO_2e / M€ invested.

Appendix A: Dutch Carbon Pledge

Dutch Carbon Pledge

November 28th 2015

We ask global leaders during the 21st session of the Conference of the Parties to the UNFCCC to take effective measures to keep global warming under safe levels. As financial institutions we want to take responsibility as well and come with new and meaningful steps.
The annual measuring and disclosure of the carbon footprint of investments*, with the aim of using this information to identify and set carbon footprint reduction targets, is still at an early stage. Our initiative, consisting of leaders of different segments of the Dutch financial sector, intends to experiment with annual carbon foot printing, disclosure and target setting for investments. These elements are key in planning and developing investment strategies towards a low carbon society. We want to share and learn from practice and find solutions for dilemma's.
We hope this will stimulate the development and adaptation of carbon foot printing and target setting in the financial sector on a larger scale for all their investments. Our goal is to form a group of leading financial institutions that cooperate in a bottom up initiative on achieving transparency and uniformity in carbon foot printing and target setting.

** investments defined in their broadest sense*

ABN·AMRO · MN · apg · asn bank · actiam · achmea · Achmea Investment Management · de volksbank · FMO Entrepreneurial Development Bank · PME Pensioenfonds van de Metalektro · PMT pensioenfonds Metaal & Techniek · PGGM · Triodos Bank

Appendix B: Accounting principles

Existing accounting principles

Accounting principles are the rules and guidelines that companies must follow when reporting financial data. The common set of accounting principles is the generally accepted accounting principles (GAAP). Accounting principles differ around the world. Countries usually have their own, slightly different, versions of GAAP.

GAAP includes principles on:

- Recognition; what items should be recognised in the financial statements (for example as assets, liabilities, revenues, and expenses)
- Measurement; what amounts should be reported for each of the elements included in financial statements,
- Presentation; what line items, subtotals and totals should be displayed in the financial statements and how might items be aggregated within the financial statements
- Disclosure; what specific information is most important to the users of the financial statements. Disclosures both supplement and explain amounts in the statements.

The GHG protocol identifies five GHG accounting and reporting principles in its corporate accounting and reporting standard:

- Relevance; Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
- Completeness; Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.
- Consistency; Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
- Transparency; Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
- Accuracy; Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

For a more practical example, the ASN Bank has been footprinting their portfolio for many years and has drafted a list of nine principles from experience, with the assistance of Navigant. These principles form the backbone of their carbon profit and loss calculations. De Volksbank has also adopted the methodology and its principles in the beginning of 2016.

- Compatibility with existing and future standards;
- Consistency between different types of investment;
- Prevention of double counting;
- Prudence;
- Target setting;
- Workability and level of data quality;
- Reporting absolute emissions;
- Allocating emissions proportionally;
- Annual accounting and reporting of emissions.

Organisational boundaries and consolidation approach

As described in the GHG Protocol, first the organisational boundaries have to be defined to be able to determine which parts of the emissions from the organisation and its value chain need to be included in the carbon footprint of a company. Furthermore, the selection of a consolidation approach affects which activities in the company's value chain are categorised as direct emissions and as indirect emissions (Scope 1, 2 and 3 emissions).
In line with the GHG Protocol Corporate Standard, ASN Bank, for example, has chosen for an operational control approach, which means that it accounts for all the emissions from operations over which it has control, either as Scope 1 (direct) or Scope 2 (indirect) emissions. Examples of Scope 2 emissions are emissions from electricity and heat consumption. ASN Bank invests in a lot of other organisations through different kinds of financial instruments and vehicles as part of its portfolio.

Other consolidation approaches are equity share and financial control. In the equity share approach, a company accounts for GHG emissions from operations according to the share of equity in the operation. In the financial control approach, a company accounts for GHG emissions from operations over which it has financial control. This means it does not account for GHG emissions from operations in which it owns an interest but does not have financial control. Operational control is the most frequently used consolidation approach.

The operational control approach was selected, for example, by ASN Bank because it allocates the emissions most accurately to the parties which can influence them. In addition, the operational control is flexible enough to do justice to the activities of a bank. Using the operational control approach, conventional investments, over which the bank has limited control, can be included under indirect emissions, whereas more strategic investments, such as separate entities which manage funds on the bank's behalf, can be included under direct emissions.

Harmonising and implementing a carbon accounting approach for the financial sector

PCAF
Platform Carbon Accounting Financials