As of 12/2023

MuniFin Financed Emissions Report

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MuniFin

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MuniFin

Introduction

About MuniFin

Municipality Finance Plc ("MuniFin") is one of Finland's largest credit institutions and the only credit institution in Finland that specialises in financing the public sector. We help secure Finland's operational reliability and boost sustainable development.

MuniFin is 100 per cent owned by the Finnish public sector: Finnish municipalities, the State of Finland, and Keva, a public sector pension fund. Due to the shareholder base, MuniFin does not aim to maximise profit, but to serve efficiently and profitably as the best financing expert in the field, providing its customers with solutions that are the best fit for their needs. MuniFin's customers include Finnish mainland municipalities, joint municipal authorities, wellbeing services counties, joint county authorities and corporate entities under their control, and non-profit organisations and projects nominated by tthe Centre for State-Subsidised Housing Construction (VARKE). MuniFin does not finance operations in competitive markets, and all its financed projects and customers are in Finland.

Projects financed by the group include schools, day care centres, hospitals, healthcare centres, libraries, community centres, roads, bridges, sewerage, rental apartments, and housing for people with special needs, inter alia. Through general lending, MuniFin also finances municipalities' operating expenses within their annual budget. Finland´s municipal sector, wellbeing services counties and affordable social housing organisations have a key role in both social and ecological sustainability in Finland. The decisions, actions and investments of our customers significantly influence Finland's ability to achieve of Finland's sustainability goals and the progress of the green transition.

Towards a greener future with our customers

In the OECD's report titled "Well-Being in Finland: Bringing together people, economy and planet", Finland is regarded as "an established international leader in well-being and sustainability, with good outcomes for people, the economy and the planet in a wide range of well-being aspects". However, the report also mentions key future challenges that Finland must address in order to meet the conditions for maintaining a sustainable welfare society.

Climate change is expected to impact Finland in multiple ways. Due to our country's geographical location, temperatures in Finland are expected to rise faster than the global average. Heat waves, increasing droughts, shorter winters and extreme weather events will affect all natural ecosystems. Rainfall is predicted to increase, and its distribution remains uncertain. Moreover, rising sea levels could pose new environmental risks for coastal regions. Given these looming changes, there is an amplified urgency across all sectors to adapt, intensify efforts to mitigate climate change and actively combat biodiversity loss.

In order to prepare for the challenges of climate change and to do its part in solving the climate crisis, Finland has written down one of the world's most ambitious climate goals in its Climate Act, aiming for climate neutrality by 2035 and further emission reductions after that. The Act also has a stated objective that national measures are taken to adapt to climate change by promoting climate change resilience. In addition to sustainability, Finland's climate policy aims to ensure the fairness of climate actions.

The decisions, investments and financial standing of our customers, such as municipalities and the entities under their control, are pivotal in determining Finland's ability to respond to the challenges and goals of the green transition. Municipalities play a crucial role in achieving both international and national environmental goals and especially in creating conditions for sustainable life locally. The municipal and affordable social housing production sectors impact Finland's sustainability through energy production, buildings, transportation, land use planning, forestry, waste management, circular economy solutions and water and wastewater management. As a public sector lender, MuniFin is committed to advancing these objectives and aims to be a partner for all our customers in enabling and speeding up their climate work.

Sustainability is one of MuniFin's core values and is reflected in the company's strategy and sustainability policy[1]. As a vital part of the group strategy MuniFin has published its first Sustainability agenda[2] in autumn 2023 which aims to clarify MuniFin's key role as one of the enablers of sustainable welfare in society. This agenda clarifies MuniFin's role as an enabler of sustainable welfare in society and sets the framework and goals for our impactful, long-term sustainability work.

1 *https://www.kuntarahoitus.fi/en/reports/munifin-sustainability-policy*
2 *https://www.kuntarahoitus.fi/en/sustainability/sustainability-agenda*

Our sustainability agenda (Figure 1) is entitled 'Enabler of sustainable welfare in society', and it focuses especially on our business operations and the impact achieved through them. The financial and municipal sectors play a pivotal role in advancing both national and international sustainable development goals.

- The agenda is built around two main themes: foundation of the Finnish welfare society and driver of the green transition. As the themes are closely interlinked, both must be addressed for basic social needs to be met within the limits of the planet's carrying capacity and for the transition to sustainable economy to be carried out in a way that is fair to everyone.
- In our sustainability agenda, we set a goal of increasing the proportion of green finance to 25% of our long-term customer finance portfolio by 2030. We are making swift progress, as this figure was 19% in 2024. Please see our Green impact report 2024 here.
- Our goal is for social finance to make up 8% of our long-term customer finance portfolio by 2030. In 2024, the figure stood at 7.1%. Please see our Social Impact report 2024 here.
- Our sustainability agenda also includes our first goal of reducing financed emissions – the target for our residential real estate portfolio intensity is 8 kg CO2/m2 by 2035. Please see more from page 16 onwards.

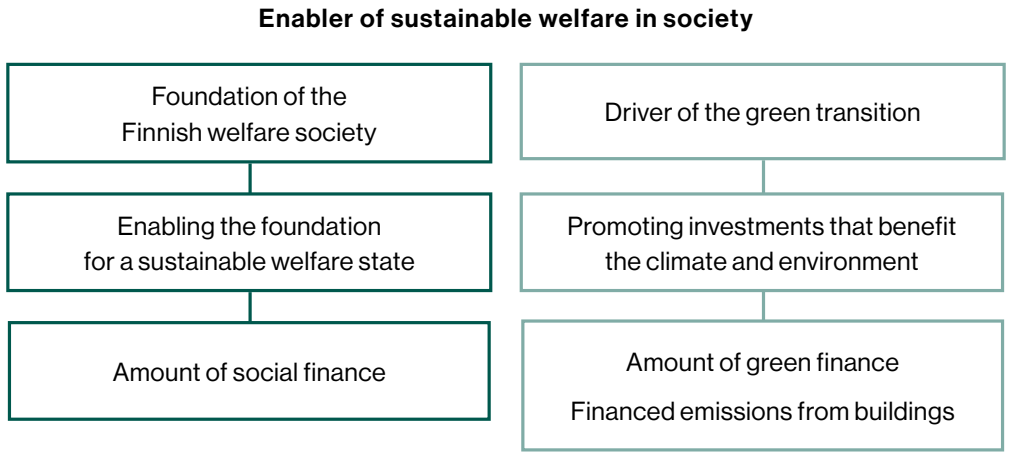

Figure 1: Enabler of sustainable welfare in society

MuniFin's approach and PCAF methodology

MuniFin joined the Partnership for Carbon Accounting Financials (PCAF) in 2022. Membership of the initiative requires the company to report its financed emissions 3 years after joining. This industry led initiative aims to develop and implement a standardised method for greenhouse gas emissions (GHG) accounting for the financial industry to align financial portfolios with the Paris Agreement.

PCAF is a partnership of financial institutions with over 400 members worldwide that work together to implement a harmonised and transparent method for GHG accounting. By joining, MuniFin commits to measure and disclose GHG associated with its lending and liquidity portfolios.

PCAF has proven to be the most widely adapted standard in the financial sector for calculating financed emissions. By joining PCAF MuniFin wanted to be able to better understand its financed emissions which are the most significant emissions for the financial industry. By doing the calculations and improving them each time the group is in better position to make informed decisions in the future. MuniFin has applied the PCAF standard where applicable and the calculations so far include the financial data from years 2020-2023.

With this report, MuniFin publishes its financed emissions for the second time and is committed to do this annually going forward. Possible changes in the methodology will be presented in the report and recalculations are conducted if change in the results turn out to be material and/or have a significant effect to the targets the company has set. MuniFin is committed to develop and improve its calculations yearly to correspond to the best market practices available. For the asset classes, which PCAF does not provide a methodology to, MuniFin has used external help to come up with a methodology which in best effort basis describes the financed emissions. MuniFin is open for any suggestions to further develop its calculations which are essential in further target setting. MuniFin also seeks ways to systematically improve the data quality score.

The calculations in this report are based on the data at the time of calculation. Please note that emission calculations usually lack behind financial reporting, due to updates in the underlaying data such as emissions factors. So far, MuniFin has decided to do the emission calculations separately from the financial statement process. This is due the fact that some of the data used (e.g. financial statement or emission data from counterparties are not available at the beginning of the year). For this reason, it is possible that small and not material reconciliation differences with the financial statement information occur in figures denominated in euros. Please also note that financed emission calculations may also have exclusions due to asset class type and a selection of available methodology.

Currently, MuniFin discloses its financed emissions in this separate report. The latest emissions calculations were performed using 2023 data, and this report also includes scope 3 emissions for asset classes which have a methodology available. MuniFin is currently working on calculations with the 2024 data and the next report will be released in the first half of 2026. MuniFin has used an external partner for PCAF expertise and calculations.

Emission scopes

Estimations were made based on the Global Standard, developed by the Principles for Carbon Accounting Financials (PCAF), which provides detailed guidelines to calculate GHG emissions, depending on asset class and data availability.

PCAF's Standard follows the GHG accounting methodology from The Greenhouse Gas Protocol (GHG Protocol), which divides emissions into direct and indirect emissions. Direct emissions are those originating from sources owned or controlled by the reporting entity. Indirect emissions are generated as a result of the reporting entity's activities but occur at sources owned or controlled by another entity. The direct and indirect emissions are divided into three scopes as shown below (Figure 2).

Scope 1: includes all carbon emissions that can be directly managed by the organisation (direct GHG emissions). This includes the emissions from the combustion of fossil fuels in mobile and stationary sources and carbon emissions generated by chemical and physical processes, as well as fugitive emissions from the use of cooling and air-conditioning (AC) equipment.

Scope 2: includes indirect GHG emissions from the generation of purchased electricity, steam, heat or cooling purchased by the organisation from external energy providers.

Scope 3: includes other indirect emissions, such as emissions from the extraction and production of purchased materials and services, vehicles not owned or controlled by the reporting entity, outsourced activities, or investments/lending (category 15). Category 15 in scope 3 is referred as "financed emissions" and it's the most relevant category for financial institutions, since it usually represents 99% of its footprint.

The footprint analysis of financed emissions for a financial entity entails calculating the Scope 3 emissions of the investor or financier, which are the Scope 1 and 2 emissions of borrowers or investees, as outlined by the GHG Protocol Category 15: investments and the Global Standard. As methodologies develop it might be possible to add scope 3 emissions of borrowers or investees for some asset classes in the future. These emissions would be presented separately from Scope 1 and 2 emissions.

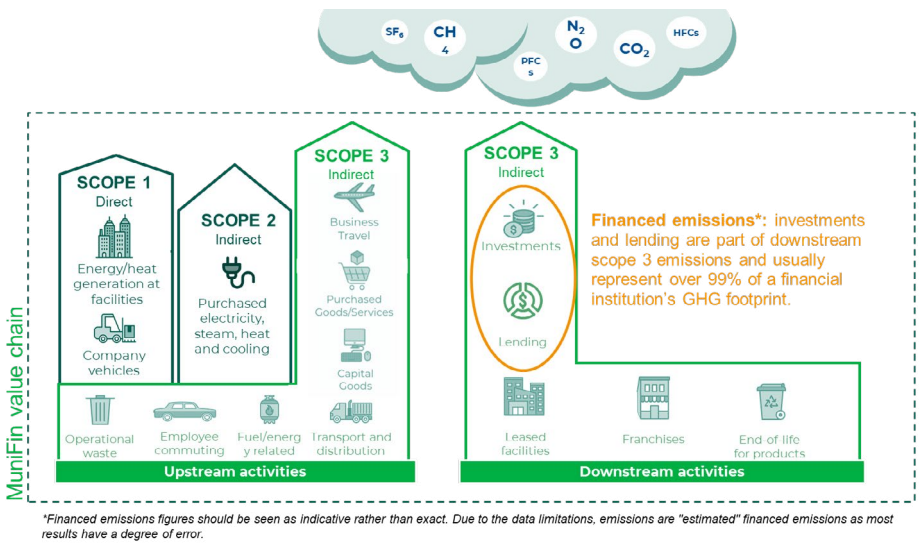

Figure 2: Scopes

PCAF Methodology

The PCAF Standard provides a carbon inventory for financial institutions based on the various levels of data availability and quality. It delivers absolute and intensity metrics, which enables MuniFin to understand the carbon exposure of its portfolio and provide a platform from which future climate action can take place.

Under the 'GHG Protocol Category 15 'Investments'', carbon accounting of investment activities focuses on measuring or estimating the Scope 1 and Scope 2 emissions of borrowers and investees. In relation, the protocol outlines two overarching methods to conduct a portfolio footprint and assess the total financed emissions: the investment-specific method and averaged-data method. The selected method is based on the data availability per investment or loan.

Investment-specific method

The investment-specific method collects and uses reported and/or audited Scope 1, Scope 2, and Scope 3 emissions data from the investee or borrower based on publicly available disclosure. The emissions of each investee or borrower are then attributed to MuniFin based on the ownership principle and represent MuniFin's financed emissions.

Averaged data method

For investments where the company-level Scope 1, Scope 2, and Scope 3 emissions data or physical activity data needed to carry out a GHG accounting are not attainable, investee's emissions were estimated using averaged data, including calibrated industry proxies or environmentally extended input-output (EEIO) data. The Global Standard provides guidelines detailing various options to carry out estimations, including the type and source of averaged data needed based on the granularity and quality of the investee or borrower data available.

It is worth noting that due to the nature of estimates based on averaged data, the lower the quality and granularity of the data used to estimate emissions, the more indicative the resulting emissions figures become. As part of the results, the data quality scores for calculations are communicated.

Attribution

In line with the GHG Protocol's 'ownership principle', investee emissions are allocated to the investors who 'own' them and are therefore in the position to change them. GHG emissions from equity investments are proportionally allocated 'per share' to the investor. If an investor owns 0.1% of a company, 0.1% of the company's greenhouse gas emissions are allocated to them. In cases where financial data for the investee or borrower is limited (e.g., no revenue, valuation or equity plus debt data is available), the attribution guidelines from the Global Standard are used. This provides an array of options to obtain an attribution factor based on data points available, with the aim of attributing investee or borrower emissions as accurately as possible.

Data quality

The Global Standard provides data quality scores to illustrate both the calculation approaches possible and the accuracy of the estimations given the data that is available. Score 1 represents audited emissions data from the investee and therefore a high degree of accuracy. Score 5 represents economic activity-based estimations using limited data, with a lower degree of accuracy and representing indicative results. The data available and data scores for equity investments can be seen in Figure 3. Regarding MuniFin emission calculations the average data quality scores for each asset class can be found in the respective result pages.

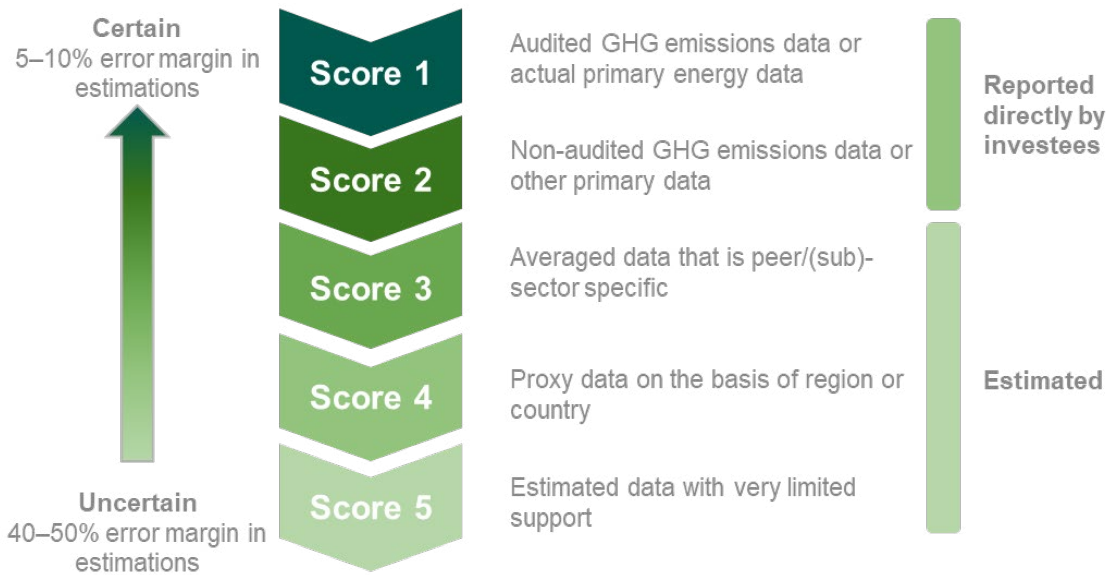

Figure 3: Data quality

Interpretation and assumptions related to financed emissions

Financed emissions are estimates whose accuracy depends on the underlying data and methodological choices one has had to make during the calculation. While the uncertainty is greater for averaged data methods this also relates to the investment-specific method where the original reporter has had to make similar decisions with the data and methodology. The uncertainty doesn't however mean that the results would be unusable.

Financed emissions calculations are not static but develop over time. As the availability and quality of the data improves, so do the calculations. Similarly methodological market practices develop as players gain experience and are able to overcome challenges they faced before. This is why the data quality score is a key aspect in PCAF methodology since it tells on average how much of the underlying data is estimated and how reliable the estimates are.

When utilizing financed emissions as a metric, it's imperative to consider a range of factors that can impact its accuracy and relevance. These factors encompass changes in financed companies' or collateral assets' real-world emissions, shifts in exposure or the value of these entities – including changes tied to attribution factors, and modifications in the data sources or methodologies used for estimation (as discussed above). When conducting a comparative analysis of financed emissions between distinct reporting periods, it's essential to bear in mind all three change-inducing factors. This is particularly crucial in sectors where a small subset of clients is responsible for a significant proportion of emissions, thereby leading to substantial fluctuations in on-balance exposure.

It's important to note that financed emissions tied to regional and consumption-based data are not directly comparable with organizational neither physical or economic activity based-emissions. The dynamics and context of regional emissions might differ significantly from those of individual organizations or sectors.

In addition, the time lag of the data must be taken into account. For example, municipalities' emissions were calculated using GDP data from 2022 because the final data for 2023 was not yet available. Time lags can also consider emissions factors which is why the latest available factors are used. We acknowledge the importance of using up-to-date data and hope to continuously restate figures with more recent data in the future to enhance the accuracy and relevance of our analysis in this regard.

Covered asset classes

Table shows the division of asset classes for MuniFin's portfolio, based on PCAF's categories and methodologies. "Derivatives contracts" and "other items" were excluded from the calculation, as there is no methodology to calculate the emissions for these asset classes yet. MuniFin's financed emissions include only on-balance sheet exposures.

Asset class	Definition
Business loans	Loans to municipal controlled entities and joint municipal authorities. These were classified as business loans instead of municipal loans since the loan is made to an entity and not the actual municipality. Moreover, in this year's assessment, wellbeing services counties, established in Finland on January 1, 2023, were also included because they now manage healthcare, social welfare, and rescue services, which were previously the responsibility of municipalities. PCAF methodology was followed. For this year's assessment the calculations were expanded to cover scope 3 emissions for Business loans.
Real estate related loans	Loans made for the specific purpose of purchasing/refinance real estate. PCAF methodology was followed. For 1,2023 onwards the portfolio was split into residential and non-residential buildings such as schools, healthcare facilities or culture service buildings.
Motor vehicle loans	Loans made to entities or consumers to finance motor vehicles. PCAF methodology was followed.
Municipal loans	Loans issued from a municipality or municipal federation to raise capital for spending needs. PCAF methodology was followed and adapted to ensure a more accurate approach.
Listed bonds	Fixed income assets issued by Financial Institutions, including Green Bonds, Sovereigns, Sovereign Agencies, and Supranationals. The PCAF methodology was used. For Green Bonds, since PCAF lacks a specific calculation method, the traditional listed bonds method was applied.
Sovereign bonds	National government-issued debt security to raise capital for spending needs. PCAF methodology was followed.

Reporting principles & PCAF requirements

For PCAF reporting, financial institutions are required to utilize either the operational control approach or the financial control approach, encompassing all financed emissions in their scope 3 category 15 reporting. PCAF has established key reporting principles, including relevance, completeness, consistency, transparency, and accuracy.

The purpose of financial institutions' reporting should align with their specific business objectives, such as identifying and managing climate-related transition risks or achieving emissions reduction targets. Reporting must occur at least annually and align with the financial accounting cycle, offering a representative view of emissions for that reporting year. Any significant changes near the reporting date should be disclosed.

In accordance with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, financial institutions must establish a baseline recalculation policy, defining when recalculation of base year financed emissions is necessary to maintain data consistency, comparability, and relevance over time. A significance threshold triggering base year emissions recalculations should be established and disclosed.

A significance threshold is a qualitative and/or quantitative criterion used to define any significant change to the data, inventory boundaries, methods, or any other relevant factors. MuniFin follows this principle, and recalculations are conducted if a change in the methodology and thus results turn out to be material especially in regards of existing emission reduction targets. MuniFin uses SBTi (Science based Target Initiative) 5% suggestion as a guiding principle. The threshold triggers the need for a separate evaluation of the recalculation need. In all cases, MuniFin will disclose any significant changes in the results or methodology as well as a plan to execute the possible recalculations if needed. If the change concerns portfolios where an emission reduction target has been set, the recalculation must be conducted for the base year.

Financial institutions should publicly disclose their financed emissions in reports such as (semi)annual reports, website articles, or other appropriate sources. Additionally, they may disclose financed emissions for multiple comparable time periods when relevant for their business goals, allowing for a historical performance evaluation.

Financed emissions 2023

Summary of the results 2023, Scope 1, 2 and 3

Summary of the results 2023, Scope 1 and 2

Asset Class	Outstanding amount (mEUR) 31.12.2023	Weight Across Portfolio (%)	Analyzed Amount (mEUR)	Coverage (%)	Share of Total Financed Emissions Across Portfolio (%)	Financed Emissions (tCO_2e / year)	Carbon Intensity (tCO_2e / mEUR Invested)	Weighted Average Data Quality Score
Customer finance portfolio								
Municipal loan[3]	9,678	28.0 %	9,678	100.0 %	76.1%	1,101,065	114	2.0
Real estate	19,841	57.5 %	19,841	100.0 %	13.4%	194,027	10	2.6
Business loans	4,938	14.3 %	4,851	98.24 %	10.4%	150,649	31	4.0
Motor vehicle loans	52	0.1 %	52	100.0 %	0.1%	907	18	4.9
Investment portfolio								
Listed bonds	3,498	95.70 %	3,498	100.0 %	86.5%	197,415	57	2.8
Sovereign bonds	156	4.30 %	156	100.0 %	13.5%	30,848	198	1.75

3 *Adapted PCAF sovereign debt method was used. Please note these are not directly comparable to entity level emissions since emissions are territorial emissions. Please see section Municipal loans for more information on page 21*

Summary of the results 2023, Scope 3

Asset Class	Outstanding amount (mEUR) 31.12.2023	Weight Across Portfolio (%)	Analyzed Amount (mEUR)	Coverage (%)	Share of Total Financed Emissions Across Portfolio (%)	Financed Emissions (tCO_2e / year)	Carbon Intensity (tCO_2e / mEUR Invested)	Weighted Average Data Quality Score
Customer finance portfolio								
Municipal loan[3]	9,678	28.0 %	9,678	100.0 %	-	-	-	-
Real estate	19,841	57.5 %	19,841	100.0 %	-	-	-	-
Business loans	4,938	14.3 %	4,851	98.24 %	100.0%	392,603	81	4.0
Motor vehicle loans	52	0.1 %	52	100.0 %	-	-	-	-
Investment portfolio								
Listed bonds	3,498	95.70 %	3,498	100.0 %	90.1%	201,935	58	2.8
Sovereign bonds	156	4.30 %	156	100.0 %	9.9%	22,295	143	2.0

3 *Adapted PCAF sovereign debt method was used. Please note these are not directly comparable to entity level emissions since emissions are territorial emissions. Please see section Municipal loans for more information on page 21*

Summary of the results 2023, Scope 1, 2 and 3

Asset Class	Outstanding amount (mEUR) 31.12.2023	Weight Across Portfolio (%)	Analyzed Amount (mEUR)	Coverage (%)	Share of Total Financed Emissions Across Portfolio (%)	Financed Emissions (tCO_2e / year)	Carbon Intensity (tCO_2e / mEUR Invested)	Weighted Average Data Quality Score
Customer finance portfolio								
Municipal loan[3]	9,678	28.0 %	9,678	100.0 %	59,9 %	1,101,065	114	2.0
Real estate	19,841	57.5 %	19,841	100.0 %	10,5 %	194,027	10	2.6
Business loans	4,938	14.3 %	4,851	98.24 %	29,5 %	543,252	112	4.0
Motor vehicle loans	52	0.1 %	52	100.0 %	0,1 %	907	18	4.9
Investment portfolio								
Listed bonds	3,498	95.70 %	3,498	100.0 %	88,2 %	399,349	114	2.8
Sovereign bonds	156	4.30 %	156	100.0 %	11,8 %	53,143	341	1.75

3 *Adapted PCAF sovereign debt method was used. Please note these are not directly comparable to entity level emissions since emissions are territorial emissions. Please see section Municipal loans for more information on page 21*

Customer finance portfolio

Real estate[4]

Scope

This asset class contains loans made for the specific purpose of constructing/ purchasing/refinancing real estate assets. MuniFin's portfolio comprises residential and municipal housing units, including but not limited to social housing, schools, hospitals, or kindergartens.

Size of the portfolio

Real estate related loans consisted of an outstanding amount of 19,841 mEUR, which represent 57.5% of the Customer Finance Portfolio. The emissions coverage for Real estate loans was 100%.

Methodology

PCAFs methodology for Mortgages was used for this asset class, which consists of the formula on the right.

$$\textit{Financed emissions} = \sum_{b} \textit{Attribution factor}_b \times \textit{Building emissions}_b$$

(with b = building)

$$\textit{Attribution factor}_b = \frac{\textit{Outstanding amount}_b}{\textit{Property value at origination}_b}$$

(with b = building)

$$\textit{Building emissions} = \textit{Estimated energy consumption from energy label} \times \textit{Floor area} \times \textit{Average emission factor}$$

When data was limited, estimations were made using Finland's average energy consumption and average property price per square metre, based on the outstanding amount.

4 *MuniFin has set its first emission reduction target for its real estate portfolio, please see here https://www.kuntarahoitus.fi/en/sustainability/sustainability-agenda*

Real estate	Description	Data source	Data quality score
Emissions	Emissions were obtained from the building's energy consumption (based on energy performance certificates) and average electricity/ heating emission factors.	Reported energy efficiency (kwh/m²): MuniFin Emission factor (tCO2e/MWh): CRREM Global Pathways (2023) obtained from the PCAF database (needs registration)	2/3
	Estimations were made using Finland's average energy consumption and average property price per square metre, based on the outstanding amount.	Energy consumption of a building per square meter of floor space (kWh/m²): CRREM Global Pathways (2023) obtained from the PCAF database (needs registration) Average property value of 1,597.01 per m² 2023 (EUR/m²): Statistics Finland Emission factor: CRREM Global Pathways (2023) retrieved from the PCAF database	4
Attribution	Outstanding amount: refers to the outstanding amount from each loan.	MuniFin	2/3/4
	Property value at origination: market value of property	MuniFin	3
	Average property value per square meter	Statistics Finland (2023)	4

Results for residential and commercial real estate

	2020	2021	2022	2023
Outstanding Amount (mEUR)	15,134	16,611	17,928	19,841
Weight Across Portfolio (%)	49.1	55.1	55.1	57.5
Analysed Amount (mEUR)	15,134	16,611	17,928	19,841
Residential real estate	12,776	13,858	14,712	15,271
Commercial real estate	2,358	2,753	3,216	4,570
Coverage (%)	100	100	100	100
Financed Emissions (tCO²e / year)	170,868	178,397	180,344	194,027
Residential real estate	94,504	96,970	97,252	91,132
Commercial real estate	76,364	81,427	83,092	102,894
Economic emission intensity (tCO2e / mEUR invested)	11.29	10.74	10.06	9.8
Residential real estate	7.40	7.00	6.61	6.0
Commercial real estate	32.39	29.58	25.84	22.5
Physical emission intensity (tCO2e / m2, weighted average)	0.022	0.021	0.020	0.02
Residential real estate	0.017	0.016	0.015	0.011
Commercial real estate	0.053	0.047	0.041	0.03
Physical emission intensity (tCO2e / m2, balance sheet method)	0.026	0.024	0.022	0.014
Residential real estate	0.018	0.017	0.016	0.015
Commercial real estate	0.052	0.046	0.040	0.035
Data Quality Score	3.93	3.87	3.81	2.57
Share of reported data: Market value of property (%)	55.50	56.23	56.33	56.3
Share of reported data: Property area (%)	53.55	56.51	59.61	59.2
Share of reported data (Energy consumption (%)	53.45	56.41	59.55	59.2

Limitations

- Some loans did not report data such as property value, area and energy consumption. Therefore, these values were estimated separately.

Assumptions and changes

- The average property value per square meter for Q1 2023 was calculated as 1,597.01 EUR/m², based on real estate prices from Statistics Finland. This value reflects a -5.3% adjustment to the Q1 2021 figure of 1,686.39 EUR/m² used in previous year calculations, in line with the change in the property price index.
- For loans where both floor size and the number of buildings are missing, it is assumed that the number of buildings is 1.
- If no property value at origination was provided, the attribution factor was capped at 1. This also applies when the outstanding amount is higher than the valuation for property value at origination. This was not the case in 2020-2022 calculations, which is why those figures were recalculated for this report.
- Compared to previous assessments, new classifications have been added to capture a more granular and accurate carbon footprint. These classifications expand beyond Residential properties to include Commercial real estate. Some loans in the Commercial category are further divided into Healthcare, Transportation and Warehousing, Leisure/Lodging, and Office. If the new classification would not have been implemented and all loans would have been assumed as residential, the total emissions

(148 130 tCO2) for real estate portfolio would have been 24 % lower for FY2023. Therefore, results for the years 2020-2022 were also recalculated accordingly as we have set a target for Residential Real Estate portfolio in 2023. Below are the PCAF definitions for the used classifications:

- Residential: total average across residential buildings.
- Commercial: total average across non-residential buildings.
- Commercial - Healthcare: properties used for primary healthcare purposes, such as hospitals, clinics, physical therapy centers, mental health centers, and rehabilitation or restorative care centers.
- Commercial - Transportation and Warehousing: heated, unenclosed industrial properties, such as large halls typically located on the outskirts, used for storing, processing, and distributing goods.
- Commercial - Leisure/Lodging: properties used for leisure and sports, such as sports clubhouses, gyms, sports stadiums, indoor sports arenas, swimming pools, theaters, and auditoria.
- Commercial - Office: office properties, including free-standing offices, office terraces, unattributed office buildings, and office parks.

The PCAF database, a reputable source known for its data quality and reliability, strengthens the rationale for its use.

- The following CRREM (2023) emission factors for carbon intensity were sourced from the PCAF database, based on 2023 data for Finland. Previously the emission factors were sourced from IEA's emission factor database.

Residential	0.1075 tCO_2e/MWh
Commercial	0.1944 tCO_2e/MWh
Commercial - Healthcare	0.1931 tCO_2e/MWh
Commercial - Transportation and Warehousing	0.2315 tCO_2e/MWh
Commercial - Leisure/Lodging	0.2291 tCO_2e/MWh
Commercial - Office	0.2039 tCO_2e/MWh

- The following CRREM (2023) emission factors, reflecting energy consumption, were sourced from the PCAF database and provide 2023 data for Finland across various property types.

Residential	169.3245 kWh/m²
Commercial	227.2000 kWh/m²
Commercial - Healthcare	287.8302 kWh/m²
Commercial - Transportation and Warehousing	72.6641 kWh/m²
Commercial - Leisure/Lodging	292.8895 kWh/m²
Commercial - Office	213.6325 kWh/m²

- As PCAF emission factors for commercial real estate are higher compared to residential factors adding classification for 2023 will have an increasing impact on the emission intensity compared to previous years.
- Due to changes and improvements in the methodology, MuniFin has recalculated Real Estate emissions for the years 2020-2022 to ensure comparability. As the data collection model has improved, the outstanding amounts may differ from the last report.
- For renovation loans, the PCAF guidelines classify these loans as optional for accounting. MuniFin has included renovation loans in the assessments.

MuniFin recognizes that focus should still be on collecting more detailed data on actual energy consumption or energy performance certificates, as this remains a key area for improvement for the legacy portfolio.

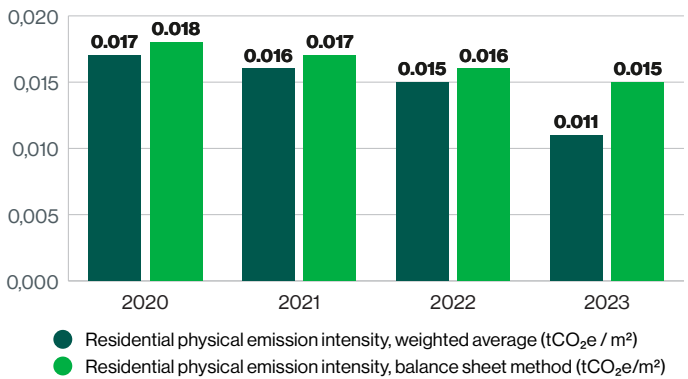

Figure 3:
Physical emission intensity (tCO_2e / m²)

5 *MuniFin´s target for physical emission intensity is 0,08 tCO_2e/m2 by 2035. Please see our Sustainability agenda. Compared to the previous report (as of 2022) MuniFin has changed the approach behind the disclosed figure from weighted portfolio average to balance sheet method as recommend by SBTi and UNEPFI. Both approaches are disclosed for the sake of transparency. Please note that in 2020-2022 figures 100 % of the portfolio was considered as residential. The figure for 2023 only covers the deals classified as residential while excluding commercial buildings.*

Municipal loans

Scope (what was included)

This asset class includes loans issued from a municipality or municipal federation to raise capital for spending needs.

Size of the portfolio

Municipal loans consisted of an outstanding amount of 9,678 mEUR, which represents 28% of the Customer Finance Portfolio. The emissions coverage for Municipal Loans was 100%.

Methodology

PCAF launched in December 2022 the 2nd version of the Global GHG Accounting and Reporting Standard for the Financial Industry. The 2nd version of the Standard included an update on measuring and reporting financed emissions, a method for sovereign debt, and guidance to account for emission removals. The new method for sovereign debt did not include sub-sovereign or municipal debt.

Municipal loans results were estimated using the territorial approach which differs significantly from organization level emissions. This approach is based on PCAF's Sovereign debt methodology, adapted to municipalities in Finnish context. The formula on the right is proposed by PCAF to estimate financed emissions for sovereign debt (adapted to municipalities). In December 2024 PCAF launched public consultation on new methodologies for the Global GHG Accounting and Reporting Standard which included a proposed method for Sub-Sovereign Debt. The suggested method heavily leverages the PCAF Sovereign debt methodology as the approach chosen by MuniFin.

$$\text{Financed emissions} = \sum_{m} \text{Attribution factor}_m \times \text{Municipality emissisions}_m$$

(with m = municipality borrower)

$$\text{Attribution factor} = \sum_{m} \frac{\text{Outstanding amount}_m}{\text{PPP-adjusted GDP}_m}$$

(with m = municipality borrower)

Methodology in practice:

Municipal-level GDP was estimated from actual province-level GDP based on the population share of each municipality. This figure was then compared to national GDP to determine the municipality's share of total national GDP generation.

The municipal-level GDP share was subsequently converted into a PPP-adjusted GDP figure by multiplying it with the national PPP-adjusted GDP. An emission factor for municipal-level emissions was then calculated by dividing municipal emissions by the PPP-adjusted GDP, representing the emissions intensity of the municipality (emissions per unit of GDP generated).

To calculate financed emissions, the total outstanding amount was multiplied by the municipality's emission intensity, attributing a share of the emissions to MuniFin. This approach is based on the rationale that lending to municipalities contributes to GDP generation and, consequently, territorial emissions within the municipality.

As the PCAF methodology does not specifically address sub-sovereign or municipal debt, this adapted approach was implemented. Feedback and suggestions for alternative methodologies for calculating sub-sovereign level financed emissions are welcomed.

Municipal loans – territorial approach	Description	Data source	Data quality score
Municipal emissions	Emissions scope: sovereign emissions include country's production emissions. Instead of using country emissions, municipalities emissions were used from Syke's database. The Finnish Environment Institute (Syke) calculates the annual GHG emissions of Finnish municipalities by using the ALas model, which is usage-based and similar to the GHG Protocol's GPC standard, which is used for cities. This model includes what corresponds to Scope 1 and 2 of a municipality, excluding industrial processes emissions.	Territorial approach: Municipality's emissions data from The Finnish Environment Institute (SYKE), using 2022 data. 2023 result were not confirmed at the time of calculation. Syke usage-based emission database Emission data: Hiilineutraali Suomi	2
Attribution	Outstanding amount: refers to the outstanding amount from each loan.	MuniFin	
	PPP-adjusted GDP: to adapt this to municipalities, the PPP-adjusted GDP from Finland was proportional to each municipality, based on each municipality's population.	Finland's GDP PPP-adjusted: World Bank (2023) Municipality's population: MuniFin (2022)	

Results and comparison with previous years, Scope 1 and 2

	2020[6]	2021[7]	2022	2023
Outstanding Amount (mEUR)	14,136	11,137	11,791	9,678
Weight Across Funds (%)	49.1	37.3	36.7	28.0
Analysed Amount (mEUR)	14,137	11,219	11,765	9,678
Coverage (%)	100	99.9	99.8	100
Financed Emissions (tCO_2e / year)	1,939,718	1,606,781	1,724,244	1,101,065
Economic emission intensity (tCO_2e / mEUR invested)	137	143	147	114
Data Quality Score	2	2	2	2

Limitations

- As aforementioned, since PCAF does not provide a specific methodology for municipal debt, the Sovereign debt methodology was used as a foundation and adapted using the "follow the money" principle.
- MuniFin provides general-purpose loans to municipalities, making it difficult to pinpoint the specific activities funded and accurately calculate the related emissions. Since municipalities have the discretion to allocate the funds and select the activities they support, MuniFin's calculation of financed emissions covers a wide range of municipal activities—though it does not directly fund all of them. MuniFin believes that the municipal customers have a significant direct or indirect impact to the territorial emissions especially through land use planning, construction and housing, waste management as well as the use of renewable energy.
- Since municipal level GDP data was unavailable, pro-rating Finland's PPP-adjusted GDP based on population may not accurately reflect municipal level GDP.

Assumptions

- Loans that were originated prior to the 2022 period and matured during the year, and loans that were originated and matured during the year (short-term loans), were not considered in this exercise based on the following statement from PCAF's Standard: "Each asset class method currently only covers financial products that are on the balance sheet of the financial institution at the fiscal year-end. This means that financed emissions from products such as revolving credit facilities, bridge loans, and letters of credit are only considered if there is outstanding finance on the financial institution's balance sheet at financial year-end. In a similar fashion, assets held for short durations and designated as held for sale are, for now, not included in the Standard."
- As Municipal level GDP data was unavailable, PPP-adjusted GDP from Finland was pro-rated to each municipality, based on each municipality's population to give an estimate of the municipal level GDP. The same methodology was applied in previous assessments.

6 *2020 emissions were recalculated using a territorial approach.*
7 *2021 emissions were recalculated using a territorial approach.*

Key takeaways

- The table shows that the outstanding amount has declined significantly, from €14,136 million in 2020 to €9,678 million in 2023, a drop of 31.6%. Financed emissions have also decreased notably, from 1,939,718 tCO_2e/year in 2020 to 1,101,065 tCO_2e/year in 2023, representing a 43% reduction. Additionally, the economic emission intensity saw a sharp decline in 2023, reflecting improved sustainability in financed activities.
- The decrease in financed emissions can be attributed to the year-over-year reduction in total municipal emissions, as reported by SYKE and this article. Additionally, part of the decrease is due to the reclassification of loans, now attributed to wellbeing service counties that were established 1.1.2023, which has reduced the outstanding amounts linked to municipalities. The share of total municipal loan emissions in 2022 for these reclassified loans, now categorized as business loans, was calculated to be 1.06% of the Municipal loans emissions in the FY2022 assessment.
- PCAF (p. 121) acknowledges that double counting occurs in two dimensions. Firstly, emissions from non-sovereign sectors, such as corporations, can be double-counted due to territorial-level accounting. While this poses a challenge for financial institutions with diverse investment portfolios, it may not be problematic if emissions from different asset classes are clearly reported separately. This comprehensive accounting ensures informed lending or investment decisions. Secondly, emissions from other sovereigns can also be double-counted when accounting for emissions beyond scope 1. It's important to note that carbon emissions associated with sovereign debt reflect the production emissions of the respective countries and are categorized under Scope 1. Consequently, there may be some overlap in emissions accounting. For example, emissions from energy production within the country contribute to production emissions. As such, the same limitations of the sovereign debt methodology apply to sub-sovereign bonds and loans. In addition, sub-sovereign emissions are initially encompassed within the sovereign emissions of the corresponding country. In cases where a portfolio comprises both sovereign and sub-sovereign assets, combining them in the same carbon footprint calculation may result in certain emissions being duplicated. Nevertheless, despite the possibility of double counting, the emission figures provide a comprehensive perspective and insight into the actual emissions associated with these loans.

Business loans

Scope

This asset class contains loans to municipal-controlled entities and joint municipal authorities (referred to as "company" in the formulas below). As part of this year's assessment, wellbeing services counties, established in Finland on January 1, 2023, were also included because they now manage healthcare, social welfare, and rescue services, which were previously the responsibility of municipalities. The calculations were also expanded to cover estimated scope 3 emissions.

Size of the portfolio

Business loans consisted of an outstanding amount of 4,938 mEUR, which represent 14.3% of the Customer Finance Portfolio. The emissions coverage for Business Loans was 98.2%.

Methodology

The PCAF methodology for Business loans and unlisted equity indicates that emissions should be estimated using the formula on the right.

$$Financed\ emissions = \sum_{c} Attribution\ factor_c \times Company\ emissions_c$$

(with c = borrower or investee company)

Reported emissions data for municipal controlled entities (or "company emissions") were not available. For some counterparties revenue data was also missing (e.g. non profit organizations which do not report revenue as such). Therefore emission factors and asset turnover ratios were used to estimate the financed emissions. The formula applied to these estimations depended on the availability of financial data, as follows:

For a data quality score of 4:

$$\frac{Outstanding\ amount_c}{Total\ equity + debt_c} \times Revenue_c \times \frac{GHG\ emissions_s}{Revenue_s}$$

(with c = borrower or investee company and s = sector)

For a data quality score of 5:

$$\sum_{c} Outstanding\ amount \times Asset\ turnover\ ratio_s \times \frac{GHG\ emissions_s}{Revenue_s}$$

(with c = borrower or investee company and s = sector)

Business loans	Description	Data source	Data quality score
Emissions	Entity emissions were estimated using sectoral emission factors provided in tCO_2e per EUR of revenue per scope.	Emission factors database stemming from OECD environmentally extended input–output dataset.	4/5
Attribution	Outstanding amount: refers to the outstanding amount from each loan.	MuniFin	4/5
	Total equity + debt. For municipal entities the value for total assets was used.	MuniFin	4
	Asset turnover ratio: financial metric to estimate the potential revenue generated with the outstanding amount. This ratio is based on sector/ industrial activity (sectoral approach).	stemming from OECD environmentally extended input–output dataset	5

Results and comparison with previous years, Scope 1 and 2

	2020	2021	2022	2023
Outstanding Amount (mEUR)	186	2,284	2,362	4,938
Weight Across Funds (%)	0.6	7.6	5.7	14.3
Analysed Amount (mEUR)	186	2,284	2,362	4,851
Coverage (%)	100	100	100	98.2
Financed Emissions (tCO_2e / year)	1,921	137,322	112,639	150,649
Economic emission intensity (tCO_2e / mEUR)	10	60	48	31
Data Quality Score	5	4	4	4

Results and comparison with previous years, Scope 3

	2020	2021	2022	2023
Outstanding Amount (mEUR)	186	2,284	2,362	4,938
Weight Across Funds (%)	0.6	7.6	5.7	14.3
Analysed Amount (mEUR)	-	-	-	4,851
Coverage (%)	-	-	-	98.2
Financed Emissions (tCO_2e / year)	-	-	-	392,603
Economic emission intensity (tCO_2e / mEUR)	-	-	-	81
Data Quality Score	-	-	-	4

Limitations

- Financed emissions were calculated using averaged data, which included data derived from the GHG footprint of companies from a similar region and sector to the investee companies of MuniFin.
- The specific end use was unknown for each loan, therefore the estimations were made based on the industries provided for each loan.

Assumptions and changes

- For the 2023 assessment the calculations were expanded to cover scope 3 emissions for Business loans category which explains the increase in 2023 emissions intensity compared to previous years.
- For the 2023 assessment, this asset class was expanded to include loans to the newly established wellbeing services counties in Finland, which began operating on January 1, 2023. These counties, responsible for healthcare, social welfare, and rescue services, were previously financed through municipal budget loans.
- For 2023 assessment some of the loans granted to municipal federations or joint municipal authorities and previously reported under municipal loans portfolio were moved to the business loans portfolio as it was concluded that these organizations operate for several municipalities and for a specific activity such as education or waste management. These loans would have represented circa 6 % of the total outstanding of the municipal loan portfolio including loans granted prior and during the reporting year.
- Calculations were based on the principles of the 'GHG Protocol', which stipulates that the emissions should only be assigned to the corresponding months in which the loan was active. Therefore, all loans that started after 12/31/2023 were not considered.

- In this year's assessment, the data quality score for business loans was mostly 4, as revenue and total asset data were provided. However, for a few specific transactions where revenue data was unavailable, asset turnover ratios were used, resulting in a data quality score of 5 for those cases
- Loans pertaining to the same counterparty (LAAKSON YHTEISSAIRAALA KOY, a real estate company) were excluded from calculations. These loans finance the construction of a hospital and are considered out-of-scope as construction loans.
- For investments with negative equity, South Pole followed PCAF's recommended approach (p.52 of the Global Standard). All emissions are attributed to debt only, while no emissions are attributed to equity investments (equity value set to 0). MuniFin provided data on debt portion only.
- The Nomenclature of Economic Activities (NACE) codes were utilized for an industry mapping exercise with the Global Industry Classification Standard (GICS). The version of GICS used for this assessment is the 2023 edition.
- Emissions for Scope 1 and scope 2 were estimated separately for reporting purposes.

Motor vehicle loans

Scope

This asset class contains loans made to entities or consumers to finance motor vehicles. The emissions estimated cover the use-phase emissions for each vehicle.

Size of the portfolio

Motor vehicle loans consisted of an outstanding amount of EUR 52 million, which represented 0.1% of the Customer Finance Portfolio. The emissions coverage for Motor vehicle loans was 100%.

Methodology

PCAF's methodology for Motor vehicle loans was used to estimate financed emissions for this asset class, which consist of the following formulas:

$$Financed\ emissions = \sum_{v} Attribution\ factor_v \times Vehicle\ emissions_v$$

(with v = vehicle or vehicle fleet)

$$Attribution\ factor = \frac{Outstanding\ amount_v}{Total\ value\ at\ origination_v}$$

(with v = vehicle or vehicle fleet)

$$Vehicle\ emissions = Distance\ traveled_v \times Efficiency_{v,f} \times Emission\ factor_f$$

(with v = vehicle or vehicle fleet, f = fuel type)

Motor vehicle loans	Description	Data source	Data quality score
Emissions	Emissions were estimated with estimated distance travelled per vehicle and an emission factor for passenger vehicles per km.	Actual distances: provided by MuniFin and based on statistical data. Emission factor: EEA vehicle emission database)	2
	Emissions were estimated with an average distance travelled per vehicle and an emission factor for passenger vehicles per km.	Average distance travelled: OECD, Indicator, Road traffic in thousand vehicle-km per road motor vehicle, 2021. Emission factor: EEA vehicle emission database.)	5
Attribution	Outstanding amount: refers to the outstanding amount from each loan.	MuniFin	2/5
	Total value at origination: value of vehicle at origination	MuniFin	2/5

Results and comparison with previous years, Scope 1 and 2

	2020	2021	2022	2023
Outstanding Amount (mEUR)	33	38	49	52
Weight Across Funds (%)	0.1	0.12	0.04	0.1
Analysed Amount (mEUR)	37.6	38	49	52
Coverage (%)	100	100	100	100
Financed Emissions (tCO_2e / year)	642	663	835	907
Economic emission intensity (tCO_2e / mEUR)	17	18	16.99	18
Data Quality Score	5	5	5	4.9

In contrast to previous assessments, the data quality score for this asset class improved from 5 to 2 for 83 of the 1,155 loans. This is because information on manufacturer and model were available for these loans, which allowed for the use of specific emission factors.

Limitations

- For the 1,072 vehicle loans with no information on vehicle type, fuel, manufacturer and model an emission factors for average gasoline-powered passenger vehicles in Finland was used: 0.143 $kgCO_2e$/km.
- When the distance traveled by vehicles was unknown, an average distance of 9,594 km, corresponding to the annual average distance traveled per road motor vehicle in Finland in 2021, was used.

Assumptions and changes

- When the manufacturer, model, or type of vehicle was not specified, an average passenger car was assumed, as confirmed by MuniFin.
- If fuel type information was unavailable, emissions were estimated using an emission factor for an average passenger car based on the national average for vehicles in Finland, consistent with the previous year's methodology.
- For rows missing data on the number of financed vehicles, it was assumed that each row represents one vehicle.
- For electric vehicles, distances of 8,901 km and 14,000 km were sourced from MuniFin's green impact reporting. Trafi.fi data was used to validate these distances, and similar values were applied to comparable vehicles and customers, assuming similar usage patterns.

Liquidity portfolio

Sovereign bonds

Scope
This asset class contains national government-issued debt security to raise capital for spending needs.

Size of the portfolio
Sovereign bonds consisted of an outstanding amount of EUR 156 million, which represent 4.3% of the liquidity Portfolio. The emissions coverage for sovereign bonds was 100%.

Methodology
PCAF's methodology for Sovereign debt was used to estimate financed emissions for this asset class. The approach considers the sovereign as a territory; emissions generated by a country's production, consumption and trade activity are attributed to the territory.

The calculation is based on the following formula:

$$Financed\ emissions = \sum_{s} Attribution\ factor_s \times Sovereign\ emissions_s$$

(with s = sovereign borrower)

Where the attribution factor is calculated as:

$$Attribution\ factor = \sum_{s} \frac{Outstanding\ amount_s}{PPP\text{-}adjusted\ GDP_s}$$

(with s = sovereign borrower)

ISIN codes were used to identify the sovereign associated with each government bond. Based on the available data, a relevant approach and underlying calculation formula based on PCAF's guidelines was selected. The formulas used in the analysis are shown below, along with the corresponding data quality score.

For a data quality score of 1:

$$Financed\ emissions = \sum_{s} \frac{Outstanding\ amount_s}{PPP\text{-}adjusted\ GDP_s} \times Verified\ emissions_s$$

(with s = sovereign borrower)

For a data quality score of 2:

$$Financed\ emissions = \sum_{s} \frac{Outstanding\ amount_s}{PPP\text{-}adjusted\ GDP_s} \times Unverified\ emissions_s$$

(with s = sovereign borrower)

Sovereign bonds	Description	Data source	Data quality score
Emissions	Emission data for verified and unverified emissions per sovereign was collected. A data quality score of 1 is assigned to data obtained from UNFCCC. Unverified data was estimated by using an economic activity-based approach and is assigned data quality score 2.	Emissions data from United Nations Framework Convention on Climate Change (UNFCCC), Organisation for Economic Co-operation and Development (OECD) and OS-Climate	1/2
Attribution	Outstanding amount: refers to the outstanding amount from each bond.	MuniFin	
	PPP - adjusted GDP	The World Bank	

Results and comparison with previous years, Scope 1 and 2

	2020[8]	2021[9]	2022	2023
Outstanding Amount (mEUR)	254	174	124	156
Weight Across Funds (%)	5.8	4.7	3.8	4.3
Analysed Amount (mEUR)	254	174	124	156
Coverage (%)	100	100	100	100
Financed Emissions (tCO_2e / year)	65,291	37,036	23,153	30,848
Economic emission intensity (tCO_2e / mEUR)	258	214	187	198
Data Quality Score	2	2	2	1.5

8 *2020 financed emissions were recalculated using a territorial approach.*
9 *2021 financed emissions were recalculated using a territorial approach.*

Results and comparison with previous years, Scope 3

	2020	2021	2022	2023
Outstanding Amount (mEUR)	254	174	124	156
Weight Across Funds (%)	5.8	4.7	3.8	4.3
Analysed Amount (mEUR)	254	174	124	156
Coverage (%)	100	100	100	100
Financed Emissions (tCO_2e / year)	-	-	-	22,295
Economic emission intensity (tCO_2e / mEUR)	-	-	-	143
Data Quality Score	-	-	-	2

Listed bonds

Scope

This asset class contains fixed income assets issued by Financial Institutions, Sovereigns, as well as Sovereign Agencies and Supranationals i.e., Corporate bonds, SSA bonds, Sovereign and Municipal bonds. Additionally, this year's assessment also includes Green Bonds, which made up 7.68% of the outstanding amount in this asset class.

Size of the portfolio

Listed bonds consisted of an outstanding amount of EUR 3,498 million, which represent 95.7% of the Investments (or Liquidity) Portfolio. The emissions coverage for listed bonds was 100%.

Methodology

For Corporate and non-sovereign bonds, including Supranational and Agency Bonds (SSA bonds), the PCAF methodology for listed equity and corporate bonds was applied to calculate financed emissions. Financed emissions for listed bonds are determined by multiplying the issuer's emissions by an attribution factor to allocate the corresponding share of emissions. Since there is no specific methodology for Green Bonds, the listed bonds methodology was utilized.

$$Financed\ emissions = \sum_{c} Attribution\ factor_c \times Company\ emissions_c$$

(with c = borrower or investee company)

If emissions are not directly reported by the issuer or data is limited, estimations are made using averaged data such as industry proxies or EEIO data, using the same approach as business loans.

For Sovereign and Municipal bonds, it was decided to use the PCAF methodology for sovereign debt, from 2022 onward. For more information regarding the methodology, please refer to the above section on Sovereign debt.[10]

10 *Please refer to Sovereign debt for details on data quality scores and data sources for emission and attribution factors.*

Listed bonds	Description	Data source	Data quality score
Emissions	Emissions reported by issuer counterparties.	Sustainability reports or CDP questionnaires	1/2
	Company emissions were estimated using sectoral emission factors provided in tCO_2e per EUR of revenue per scope.	Built emission factors database. Stemming from OECD environmentally extended input–output dataset.	4/5
Attribution	Outstanding amount: refers to the outstanding amount from each loan.	MuniFin	1/2/4/5
	EVIC: enterprise value including cash reported by the issuer.	Financial reports	1/2/4
	Asset turnover ratio: financial metric to estimate the potential revenue generated with the outstanding amount. This ratio is based on sector/ industrial activity (sectoral approach).	Built asset turnover ratio database. Stemming from OECD environmentally extended input–output dataset	5

Results and comparison with previous year, Scope 1 and 2

	2022	2023
Outstanding Amount (mEUR)	3,178	3,498
• Listed instrument excluding green bonds	3,178	3,229
• Green bonds	-	269
Weight Across Portfolio (%)	96.2	95.7
• Listed instrument excluding green bond	96.2	88.4
• Green bonds	-	7.4
Analysed Amount (mEUR)	2,982	3,498
• Listed instrument excluding green bond	2,982	3,229
• Green bonds	-	269
Coverage (%)	94	100
Financed Emissions (tCO_2e / year)	202,765	197,415
• Listed instrument excluding green bond	-	197,387
• Green bonds	-	27.60
Economic emission intensity (tCO_2e / mEUR)	68	56
• Listed instrument excluding green bond	-	61
• Green bonds	-	0.1
Data Quality Score	2.8	2.8
• Listed instrument excluding green bond	-	2.4
• Green bonds	-	3.2

Results and comparison with previous year, Scope 3

	2022	2023
Outstanding Amount (mEUR)	3,178	3,498
• Listed instrument excluding green bonds	3,178	3,229
• Green bonds	-	269
Weight Across Portfolio (%)	96.2	95.7
• Listed instrument excluding green bond	96.2	88.4
• Green bonds	-	7.4
Analysed Amount (mEUR)	2,982	3,498
• Listed instrument excluding green bond	2,982	3,229
• Green bonds	-	269
Coverage (%)	94	100
Financed Emissions (tCO_2e / year)	-	201,935
• Listed instrument excluding green bond	-	198,809
• Green bonds	-	3,125
Economic emission intensity (tCO_2e / mEUR)	-	58
• Listed instrument excluding green bond	-	62
• Green bonds	-	12
Data Quality Score	-	2.8
• Listed instrument excluding green bond	-	2.8
• Green bonds	-	2.7

Limitations

- Since some issuers did not report emissions, financed emissions for these issuers were calculated using average data which included data derived from environmentally extended input-output (EEIO) tables.

Assumptions and changes

- To classify a bond as sovereign or non-sovereign the Bloomberg database was used to match the ISIN identification with corresponding asset class. The process involved mapping the bonds' ISIN with the industry classifications from Bloomberg to determine the calculation method.
    - "Sovereign bonds" were classified as Sovereign bonds.
    - "Multi-national or Government banks" were classified as SSA bonds.
    - "Government municipal or government state" were classified as Municipal bonds.
- Financed emissions from Sovereign and Municipal bonds were calculated using the Sovereign bond methodology. Financed emissions from SSA bonds were calculated using the PCAF methodology for Listed equity and corporate bonds.
- The listed bonds associated with Korea Housing Finance Corporation have been manually classified as "Sovereign". Desk research confirms that Korea Housing Finance Corporation is a Government-Sponsored Enterprise (GSE) tasked with ensuring a long-term, stable supply of housing finance to support housing welfare and the development of the national economy.
- Starting in 2022, the Sovereign Bonds methodology from PCAF adopted a territorial approach, aligning with the latest PCAF Standard and this approach was followed as well for the FY2023 assessment.
- In 2022, the Sovereign Bonds methodology was applied to Municipal bonds, resulting in higher financed emissions due to the inclusion of broader emission factors. This approach was followed as well for the FY2023 assessment. This methodology was not applied for the years 2020-2022 which makes the year-on-year comparison irrelevant. Therefore, results only for 2022 and 2023 as disclosed. The results for 2020-2021 are disclosed in the previous report.
- For the FY2023 calculations we have added our Green Bonds. Since there is no specific methodology for Green Bonds, the listed bonds methodology was utilized.

Cash

A significant amount of MuniFin's liquidity portfolio are cash deposits. The total liquidity including cash at the end of 2023 was EUR 9,187.97 million.

During the 2020 accounting exercise, cash holdings were deemed to contribute zero emissions, primarily stemming from the assumption that these funds were not allocated towards any specific emissions-generating activities. However, in 2021 and 2022, the calculations excluded cash holdings from the emissions assessment due to the absence of a dedicated methodology to accurately measure emissions associated with cash.

Nevertheless, emerging studies have highlighted the potential relevance of factoring in cash holdings in emissions analyses, recognizing the indirect environmental impact that might arise from the allocation of these funds. Despite the methodological challenge, the consideration of cash in emissions evaluations is an evolving area of interest, acknowledging its potential influence on the overall carbon footprint.

Derivative contracts

The PCAF Standard does not offer specific instructions for calculating financed emissions for all financial products. This includes derivatives (such as futures, options, swaps) and other similar instruments. Derivatives were therefore excluded from the calculation.

Appendix I: Data Quality Score

Municipal loans

Data quality score calculation for municipal loan was based on the sovereign debt methodology, as follows:

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	Option 1: Reported emissions	1a	Verified GHG emissions of the country are available. These GHG emissions are reported by the country itself and can be extracted from UNFCCC[181]
Score 2		1b	Unverified emissions of the country are available.
Score 3	Option 2: Physical activity based emissions	2a	Reported GHG emissions of the country are not known. Emissions are calculated using primary physical activity data of the country's energy consumption (domestic generated and imported) and emission factors specific to that primary data.
Score 4	Option 3: Economic activity based emissions	3a	Reported GHG emissions of the country are not known. Emissions are calculated using sectoral revenue data of the country's production and emission factors specific to that revenue data.
Score 5		3b	Country GHG emissions are estimated by taking a proxy. GHG emissions from (a) similar (climate (zones), wealth, GDP) country are taken to estimate the country GHG emissions.

Business loans

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Reported emissions**	**1a**	Outstanding amount in the company and total company equity plus debt are known. **Verified emissions** of the company are available.
Score 2		**1b**	Outstanding amount in the company and total company equity plus debt are known. **Unverified emissions** calculated by the company are available.
	Option 2: Physical activity-based emissions	**2a**[102]	Outstanding amount in the company and total company equity plus debt are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data for the company's energy **consumption** and emission factors[103] specific to that primary data. Relevant process emissions are added.
Score 3		**2b**	Outstanding amount in the company and total company equity plus debt are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data for the company's **production** and emission factors specific to that primary data.
Score 4	**Option 3: Economic activity-based emissions**	**3a**	Outstanding amount in the company, total company equity plus debt, and the **company's revenue**[104] are known. Emission factors for the sector per unit of revenue are known (e.g., tCO_2e per euro or dollar of revenue earned in a sector).
Score 5		**3b**	Outstanding amount in the company is known. Emission factors for the sector per unit of asset (e.g., tCO_2e per euro or dollar of asset in a sector) are known.
		3c	Outstanding amount in the company is known. Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro or dollar of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

Real estate related loans

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Actual building emissions**	**1a**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **supplier-specific emission factors**[153] specific to the respective energy source.
Score 2		**1b**	Primary data on **actual building energy consumption** (i.e., metered data) is available. Emissions are calculated using actual building energy consumption and **average emission factors** specific to the respective energy source.
Score 3	**Option 2: Estimated building emissions based on floor area**	**2a**	**Estimated building energy consumption per floor area based on official building energy labels AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 4		**2b**	**Estimated building energy consumption per floor area based on building type and location-specific statistical data AND the floor area** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.
Score 5	**Option 3: Estimated building emissions based on number of buildings**	**3**	**Estimated building energy consumption per building based on building type and location-specific statistical data AND the number of buildings** are available. Emissions are calculated using estimated building energy consumption and **average emission factors** specific to the respective energy source.

Motor vehicle loans

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Actual vehicle-specific emissions**	**1a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Primary data on **actual vehicle fuel consumption** is available. Emissions are calculated using actual fuel consumption and fuel type-specific emission factors.
		1b	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model**.[166] Primary data on **actual vehicle distance** traveled is available. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 2	**Option 2: Estimated vehicle-specific emissions**	**2a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model**. **Distance traveled is estimated based on local statistical data**.[167] Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 3		**2b**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are available from **known vehicle make and model. Distance traveled is estimated based on regional statistical data**.[168] Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 4	**Option 3: Estimated vehicle-unspecific emissions**	**3a**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are estimated from **known vehicle type** (vehicle make and model are unknown).[169] **Distance traveled is estimated based on local or regional statistical data**. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.
Score 5		**3b**	Outstanding amount and total value at origination of vehicle or vehicle fleet are known. Vehicle efficiency and fuel type (fossil and/or electricity) are estimated for an **average vehicle** (vehicle make and model and vehicle type are unknown).[170] **Distance traveled is estimated based on local or regional statistical data**. Emissions are calculated using estimated fuel consumption and fuel type-specific emission factors.

Sovereign bonds

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	Option 1: Reported emissions	1a	Verified GHG emissions of the country are available. These GHG emissions are reported by the country itself and can be extracted from UNFCCC[181]
Score 2		1b	Unverified emissions of the country are available.
Score 3	Option 2: Physical activity based emissions	2a	Reported GHG emissions of the country are not known. Emissions are calculated using primary physical activity data of the country's energy consumption (domestic generated and imported) and emission factors specific to that primary data.
Score 4	Option 3: Economic activity based emissions	3a	Reported GHG emissions of the country are not known. Emissions are calculated using sectoral revenue data of the country's production and emission factors specific to that revenue data.
Score 5		3b	Country GHG emissions are estimated by taking a proxy. GHG emissions from (a) similar (climate (zones), wealth, GDP) country are taken to estimate the country GHG emissions.

Listed bonds

(score 1 = highest data quality, score 5 = lowest data quality)

Data Quality	Options to estimate the financed emissions		When to use each option
Score 1	**Option 1: Reported emissions**	**1a**	Outstanding amount in the company and EVIC are known. **Verified emissions** of the company are available.
Score 2		**1b**	Outstanding amount in the company and EVIC are known. **Unverified emissions** calculated by the company are available.
	Option 2: Physical activity-based emissions	**2a**[69]	Outstanding amount in the company and EVIC are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data of the **company's energy consumption** and emission factors[70] specific to that primary data. Relevant process emissions are added.
Score 3		**2b**	Outstanding amount in the company and EVIC are known. Reported company emissions are not known. Emissions are calculated using primary physical activity data of the **company's production** and emission factors specific to that primary data.
Score 4	**Option 3: Economic activity-based emissions**	**3a**	Outstanding amount in the company, EVIC, and the **company's revenue**[71] are known. Emission factors for the sector per unit of revenue are known (e.g., tCO_2e per euro or dollar of revenue earned in a sector).
Score 5		**3b**	Outstanding amount in the company is known. Emission factors for the sector per unit of asset (e.g., tCO_2e per euro or dollar of asset in a sector) are known.
		3c	Outstanding amount in the company is known. Emission factors for the sector per unit of revenue (e.g., tCO_2e per euro or dollar of revenue earned in a sector) and **asset turnover ratios** for the sector are known.

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