

CLIMATE-RELATED FINANCIAL
DISCLOSURES OF THE EESTI PANK
INVESTMENT PORTFOLIO

JUNE 2024

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FOREWORD



We all have a stake in reducing the impact we have on the global environment and building a sustainable and climate-resilient future. The Eesti Pank strategy has placed a particular focus on sustainability and climate change since 2021 and we are committed within the limits of our mandate as the central bank of Estonia and a member of the Eurosystem to addressing the risks that climate change and the policy efforts to mitigate its effects pose to the economy, the financial system and ultimately the balance sheet of Eesti Pank. We have set the long-term target of aligning the strategy of the bank's non-monetary policy investment portfolio with the objectives of the Paris Agreement and the EU's climate neutrality goals.

Striving to assess and reduce the exposure of our investment portfolio to climate risks, and so also to reduce its carbon footprint, means that we can better carry out our fiduciary duty of safeguarding the central bank reserves. Making the investment portfolio climate-resilient is a balancing act, because the physical effects of climate change and the transition to a low carbon economy come with a wide range of macroeconomic risks that could impact the valuation of financial assets. At the same time the shift away from a highly carbon-intensive economy can be an investment opportunity that makes it possible to take advantage of favourable new trends and innovative solutions while also facilitating the green transition to net zero.

Incorporating climate-related objectives into our overall investment strategy is complex, particularly in a world that is struggling to decarbonise at the pace required to reach net zero emissions and to deliver on the pledges of the Paris Agreement. Eesti Pank has already made progress in decarbonising some parts of our investment portfolio, but at least for the time being, it is not feasible to apply a similar approach across all asset classes. This report reflects our efforts and advances but also the challenges and constraints that we face. In this it aims to meet the growing demand from the stakeholders of the central bank for transparency about the dynamics of the carbon footprint and the climate risk exposure of the financial assets held by Eesti Pank.

Together with the European Central Bank and other central banks in the Eurosystem we will continue to publish our climate-related financial disclosures annually, and to enhance and refine transparency over time. Improved access to high-quality data and advances in climate risk assessment methodologies will allow more accurate monitoring of our progress while also helping to provide us with a better understanding of climate risks and an estimate of the impact of climate-aware investing.

*Ülo Kaasik,
Deputy Governor of Eesti Pank*

INTRODUCTION

Some of the most misunderstood risks that companies, organisations and investors all continue to face today come from climate change and the outlook for a transition over several decades to a low-carbon¹ economy. Transparency about exposure to climate-related risks is critical for well-informed decisions to be made about capital allocation, and ultimately for the transition to net zero to be made². The empirical evidence for whether climate-related risks are already being adequately priced by the financial markets is mixed. This lack of clarity will be overcome once universal methodologies for incorporating these risks into financial asset valuation have reached maturity. The key requirement for getting transparent and comprehensive information on the financial impacts of climate-related risks and opportunities is that there must be access to high-quality, timely and reliable climate data.

A single disclosure framework that companies and organisations, asset owners and asset managers can use to provide climate-related financial information has been developed by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD³). The TCFD's recommendations have become the foundation for climate-related disclosure requirements that are designed to provide a coherent framework not only for assessing and managing climate-related risks but also for identifying and capitalising on new investment opportunities. Transparency about accountability and oversight from the central bank community will enhance public confidence that central banks are adequately addressing the economic and financial consequences of climate change and the transition to a net-zero economy.

This is Eesti Pank's first stand-alone publication of climate-related financial disclosures under the framework recommended by the TCFD and its supplemental guidance for asset owners. The report covers the bank's non-monetary policy investment portfolio, while the European Central Bank is publishing a collaborative report that covers the Eurosystem's combined assets that are held for monetary policy purposes. The report is additionally aligned with the Eurosystem's common minimum climate-related disclosure framework in terms of its scope and metrics. The framework will be refined over time to add nuance by providing more meaningful information that can be useful for decision-making for investment management purposes.

The report is structured to follow the disclosure format recommended by the TCFD. The first section describes Eesti Pank's current governance set-up around reserve management in general and how considerations of climate-related risks and opportunities are integrated into the bank's investment policy; the second section outlines the strategic approach taken to reach the long-term target of a net zero emissions portfolio; the third section covers issues related to risk management, and the last section covers the most material climate metrics and target setting for them in the investment portfolio.

GOVERNANCE

Estonia's climate policy is set by its government, which has overall responsibility for the economy-wide transition to net-zero emissions by 2050⁴. Eesti Pank, within its mandate as the country's central bank and a member of the Eurosystem, has a supporting role in facilitating economic policies⁵ and the climate policies they contain as far as this does not prejudice its primary objective of maintaining price stability. The bank's main contribution lies in understanding and assessing the macroeconomic risks of climate policies while ensuring the continued stability of the financial system and reducing the carbon footprint of all of its own activities.

1 "Carbon" is often used as a synonym for all six greenhouse gas emissions covered by the Kyoto Protocol and greenhouse gases are simply referred to in this report as "emissions"

2 [United Nations Climate Action](#)

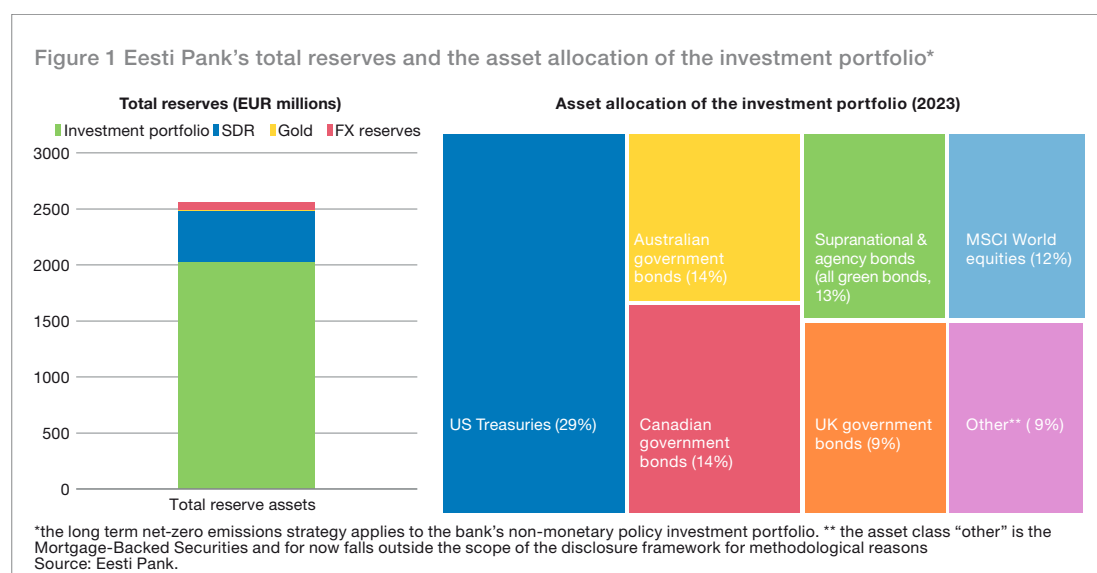
3 [Task Force on Climate Related Financial Disclosures](#)

4 [Republic of Estonia Ministry of Climate](#)

5 The Eurosystem shall support the general economic policies in the European Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union.

A special focus on the bank's own environmental impact and the need to monitor it was first introduced to the Eesti Pank strategy in 2021. This incorporated a climate-related objective for the management of the bank's non-monetary policy investment portfolio of gradually aligning its investments with the long-term objective of climate neutrality in support of the Paris Agreement. The pursuit of sustainability objectives may go beyond the goal of earning financial returns, but the underlying premise is that the investment integrity of the portfolio must be maintained and a stable investment return ensured over the medium to long term.

The reserves are all the financial assets of Eesti Pank except those that are held for monetary policy purposes. Figure 1 depicts the structure of the total reserve assets of the bank and the allocation of the investment portfolio. The marginal amount of gold the bank has, its holdings of Special Drawing Rights (SDR) and its foreign exchange reserves are not part of the investment portfolio. The Eesti Pank investment portfolio serves the purpose of earning sufficient income to cover the operational costs of the bank, increase its capital, and so preserve its financial independence. Climate-related sustainability objectives and the long-term target of net zero emissions by 2050 apply only to the investment portfolio.



Governance of reserve management refers to the institutional arrangements and processes applied for investing the bank's financial assets. At Eesti Pank it is the Executive Board⁶ that approves the reserve management policy, which includes taking decisions on investment objectives, risk tolerance, investment horizons, and strategic asset allocation. An investment committee led by a Deputy Governor reviews proposals made to the Board and monitors how the reserve management policies are implemented. This also applies for how considerations of climate-related sustainable investment are integrated with the management framework for the investment portfolio.

The front office of the bank's Financial Markets Department, which is the operational division of portfolio managers with direct responsibility for day-to-day active investment decisions, plays an integral role in setting investment policy and proposing guidelines. A separate advisory role has been created to help identify best practices and current trends in climate-related sustainable investment strategies and for engaging with financial markets and indexing experts for benchmarking.

The risk management function is the responsibility of the department's middle office, which supports portfolio management by measuring risk and return, and provides senior management with information on portfolio valuations, performance and risk on a daily basis. The middle office is also responsible for producing investment management reports and providing metrics for the annual climate-related financial disclosure report issued by the bank.

STRATEGY

It is challenging to create an investment portfolio that is well diversified and carbon neutral unless economies as a whole and the companies in them align their activities with the trajectory that must be followed to reach global net zero emissions. An orderly transition to a low-carbon world needs support from timely and effective climate policies and the large-scale deployment of technological innovation across all industries.

Eesti Pank strives to build a climate-resilient investment portfolio by carefully considering the various risks that arise from climate change and the transition to a low carbon economy, and by recognising and pursuing the investment opportunities that the green transition offers through shifts in the economy and in society as a whole.

Aligning the investment strategy with the long-term objective of climate neutrality requires a long-term mindset, while the investment horizon of the Eesti Pank investment portfolio is set at five years. The bank will set intermediate targets for portfolio decarbonisation accordingly, and where possible, in order to reflect the continuous commitment to achieving the long-term goal. At the same time, climate-related targets must be integrated into the investment management framework so that the allocation of assets remains stable and diversified with sufficiently low correlation between different asset classes.

The practical implementation of the climate-related sustainability considerations in the investment strategy is executed in steps that vary across different asset classes and may depend on the specific constraints of the portfolio. Eesti Pank will not apply climate risk criteria for sovereign debt instruments until tools emerge that can be used for making decisions in a universally coherent assessment of how sovereign bond issuers are aligned with the net zero pathway. The bank's portfolio assets are predominantly invested in the government debt securities of a select group of advanced economies, and so the sovereign bond portfolio will decarbonise as the issuers of the underlying government debt deliver on their commitments to decarbonise their economies.

Eesti Pank has mapped a decarbonisation pathway for its investment portfolio that starts with the asset class of listed equities, as the most feasible to the green transition. The bank's equity portfolio⁷ addresses both the carbon reduction and green transition dimensions, and it has the goal of building a portfolio that follows an aggregate decarbonisation trajectory without negatively impacting the risk-adjusted investment return and the potential for diversification. We consider it relevant to maintain a level of exposure to currently carbon intensive energy and utilities sectors, given their critical role in facilitating the net zero dynamic in all other sectors of the economy towards net zero. This approach is being implemented in several sequential and complementary steps that will be completed by the end of 2024.

Within the asset class of supranationals, sub-sovereigns and agencies⁸, Eesti Pank applies an impact-investing approach by participating in a green bond investment fund established by the Bank of International Settlements (BIS) for central banks and official institutions. Issuers of labelled green bonds must identify how the proceeds from them will be used before the bonds are issued, and must pledge to report on the resulting environmental outcomes. The fund invests primarily in renewable energy production, energy efficiency and other environmentally-aware projects and the underlying securities are aligned with the Green Bond Principles of the International Capital Markets Association or the Climate Bond Standard. It should be noted that projects funded by a green bond do not deliver immediate reductions of emissions, nor are the reductions directly associable with the emissions of the issuer and are therefore not reflected in the carbon metrics of the portfolio in the short term.

⁷ The geographical investment universe of the equity portfolio covers the 23 developed market countries in the MSCI World index.

⁸ This is made up of international institutions such as development banks, infrastructure developers, or export creditors that are generally mandated with taking social or economic public policy initiatives.

RISK MANAGEMENT

The reserve management policy of Eesti Pank regards climate-related risk as a factor that amplifies existing risk categories like for example, credit risk and market risk. The impact on market risk could be felt through imbalances in supply and demand, increasing market volatility and affect asset prices. In terms of credit risk, Eesti Pank relies on the credit ratings issued by major international rating agencies when assessing the creditworthiness of issuers. Although climate-related risks could become highly significant drivers of credit, a credit rating for now mainly indicates that the issuer is able to absorb climate-related shocks or take measures to mitigate them in the short run.

Climate risk is not only the various physical or material risks from the effects of climate change, but also the risks from transitioning the economy to an environmentally sustainable one. The long list of risks to be considered includes the timing risk of climate policies, the risks from technological breakthroughs, the stigmatisation of certain industries, stranded assets, changes in the business models of companies and in consumer preferences, litigation risk from collateral damage, and systemic risk from asset prices that ignore global warming.

It is yet to be agreed definitively what the best metrics for capturing climate-related risks are, but the most commonly used proxies for the transition risks that investment portfolios are exposed to, are carbon intensity metrics. The usefulness of these metrics is somewhat limited because they mainly indicate relative exposure to risks rather than quantifying the risk. Furthermore, it is not the current and historical emissions of issuers that determine their transition capacity, but rather the outlook for how they will adapt their business models and reduce their emissions in the years ahead.

The next step for Eesti Pank will be to introduce both forward-looking climate metrics and metrics based on scenario analysis into its asset allocation and the overall risk management framework. Scenario analysis would allow the bank to quantify the impacts of climate risks on its investment portfolios across a range of plausible transition and physical risk scenarios. Eesti Pank will apply a set of reference scenarios developed by the Network for Greening the Financial System⁹ (NGFS), which have been brought up to date with the latest economic and climate data and reflect the country-level commitments to reaching net zero emissions.

METRICS AND TARGETS

METRICS

Carbon metrics are used to apportion the emissions of the companies invested in within an investment portfolio so that the emissions financed by the portfolio can then be quantified. The calculation of metrics in this report follows the latest recommendations of the Partnership for Carbon Accounting Financials (PCAF)¹⁰, a global financial industry-led initiative to standardise how the emissions financed by investors are measured. The metrics in this report are based on the Eurosystem's common primary data set¹¹ and a harmonised approach to disclosure in order to ensure the comparability of climate-related analysis among the national central banks.

The reference years for portfolio holdings, emissions and financial data do not match for the most recent reporting periods because of the natural delay with which the latest emissions data become available. Metrics will be adjusted retrospectively in the disclosures of future years as the underlying data are updated or due to any methodological changes or enhancements. Eesti Pank has set the year 2021 as

⁹ [NGFS](#) is a network of central banks and supervisors committed to sharing best practices, contributing to developing climate and environment-related risk management in the financial sector, and mobilising mainstream finance to support the transition toward a sustainable economy.

¹⁰ [Partnership for Carbon Accounting Financials](#).

¹¹ The independent climate data providers Institutional Shareholder Services (ISS) and Carbon4Finance were selected under the Eurosystem's common procurement process led by the Bundesbank in 2022

the baseline or starting point for setting decarbonisation targets where applicable, and it is aligning portfolios where possible with the trajectory that must be followed to achieve net zero by 2050. Meaningful trends in the dynamics of the portfolio's carbon emissions and intensities become evident only once the timeline has built sufficiently. The latest underlying emissions data available for the current report are from 2022 for the corporate issuers in the portfolio and from 2021 for the sovereign issuers.

The key metrics are calculated separately for sovereign issuers and corporate issuers because they have overlapping scopes and different methods of attributing underlying emissions. Sovereign metrics are calculated for both, emissions from production and consumption and are additionally split between emissions that include and exclude Land Use, Land-Use-Change and Forestry (LULUCF)¹².

The starting point for the process of carbon analysis is the calculation of the **total financed emissions** metric, which measures the absolute emissions in tonnes of CO₂e attributed to the investment portfolio. Emissions are apportioned by taking the share in the portfolio's financing of either the enterprise value of a corporate issuer or the PPP-adjusted GDP¹³ of a sovereign issuer. As an absolute measure it scales with portfolio size and responds to changes in emissions as well as to changes in the underlying financials. In calculating the metrics for corporate issuers, Eesti Pank has chosen a holistic approach that takes into account emissions across the entire value chains of the companies invested in, including their scope 3 emissions. It should be acknowledged that data gaps make these emissions difficult to measure for now, but they are essentially key to understanding and accounting for the full magnitude of the exposure of a portfolio to climate risks.

BOX: The Greenhouse Gas Protocol divides emissions into three main categories:

- Scope 1: Direct emissions from owned and controlled assets, such as company facilities and vehicles, and fugitive emissions
- Scope 2: Indirect emissions from electricity, steam, heat or cooling purchased
- Scope 3: Indirect emissions from the rest of a company's value chain, occurring either upstream, before its activities, or downstream, after them. The Greenhouse Gas Protocol separates those emissions into 15 separate sub-categories.

While Scope 3 emissions are more challenging to reduce because of their diverse and dispersed nature, these emissions include activities that are often material to companies' business models and thereby to the transition risks they face.

The **carbon footprint** of the investment portfolio normalises the total emissions financed by the value of the portfolio and so reflects the emissions per million euros invested. This metric allows comparability across portfolios of different sizes and enables assessment of the contribution of individual issuers so that relatively large contributors to the overall emissions of the portfolio can be identified.

The **weighted average carbon intensity** (WACI) metric is arrived at by calculating the carbon intensity of each issuer in the portfolio and then computing the weighted average from portfolio weights. It is a measure of emissions normalised by revenues for corporate issuers and PPP-adjusted GDP for sovereign issuers. The WACI indicates a portfolio's exposure to carbon intensive issuers, and thereby the exposure to climate-related transition risks. However, normalisation using revenues can make the metric sensitive to short-term fluctuations in product prices and sensitive to outliers, as extreme values with large portfolio weights can skew the resulting indicator.

¹² [LULUCF](#)

¹³ GDP based on purchasing power parity is considered the best available proxy for the value of sovereign issuers.

The key carbon metrics for the Eesti Pank investment portfolio for 2023 are illustrated in Table 1. The complete set of metrics for 2021-2023 can be found in Annex 1, while Annex 2 sets out how each metric is calculated.

Table 1. Climate-related metrics for the Eesti Pank investment portfolio in 2023

	Sovereign			Non-Sovereign			
	Sovereign bonds			Total	Supranational & Agency bonds	Equities	Other*
	Production based emissions		Consumption based emissions				
	exc LULUCF	incl LULUCF					
Portfolio size (eur mln)	1 348			682	268	237	177
WACI (t CO₂e)**	269	245	18	scope 1&2	35	6	55
				scope 1+2+3	945	999	907
Total carbon emissions (t CO₂e)	351 583	320 787	361 424	scope 1&2	6 632	312	6 320
				scope 1+2+3	93 927	7 651	86 276
Carbon footprint (t CO₂e per € mln invested)	269	245	276	scope 1&2	16	2	27
				scope 1+2+3	233	46	366

Data source: ISS, C4F, World Bank

Portfolio size is the value on the bank's balance sheet as at 31.12.2023

Underlying emissions data for sovereigns are from 2021 and for corporates from 2022; macro data for sovereigns and financial data for corporates are from 2022

* The asset class "other" is for Mortgage-Backed Securities and for now falls outside the scope of the disclosure framework for methodological reasons

** The WACI for sovereign production based emissions is expressed per million euros of PPP-adjusted GDP; for consumption based emissions it is expressed in tonnes of CO₂e per capita; for corporate issuers the WACI is expressed in tonnes of CO₂e per million euros of revenue

The main limitation of these metrics stems from their backward-looking nature and their consequent inability to determine the outlook for the decarbonisation targets of corporate and sovereign issuers and so for the whole portfolio. Adding complementary forward-looking and scenario-analysis-based climate metrics might make the climate risk assessment exercise for the portfolio more useful for decision-making, but those metrics have their own drawbacks. Scenario-analysis metrics are sensitive to the various underlying scenario assumptions and do not typically provide an indication of the probability of the proposed scenarios unfolding.

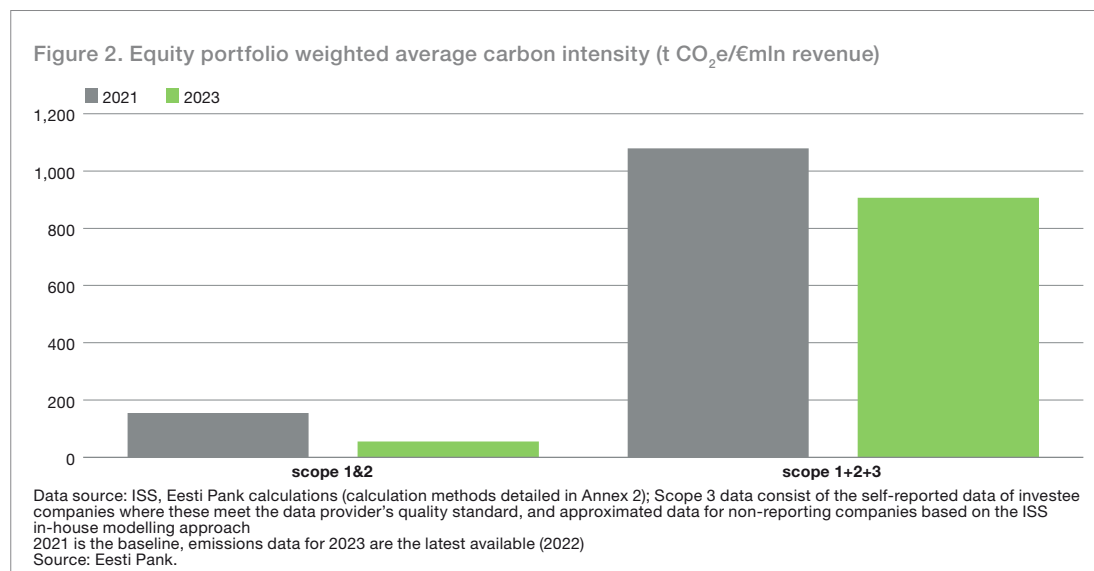
TARGETS

Net zero is a target that is still decades away and since neither climate change nor the global response to it is linear, the decarbonisation pathway of the bank's diversified investment portfolio cannot be a straight line either. Pursuing a linear decarbonisation rate for the portfolio would primarily imply reallocating capital to sectors that are already lower in carbon intensity, but this would have a limited impact on the decarbonisation of the real economy. The best opportunities for finding long-term value as the world transitions towards net zero may be offered by currently high-emitting companies following credible reduction trajectories. Furthermore, the potential for setting intermediate quantitative targets for reducing emissions funded by the bank's investment portfolio varies, depending on the asset class, the investment style and the expectation that the underlying issuers will follow through on their climate pledges.

The sovereign bonds in the Eesti Pank portfolio are issued by the governments of a select group of advanced economies whose net zero emissions targets are aligned with a global 1.5°C scenario. However, it is difficult to determine the actual decarbonisation pathways followed by those countries in comparison to the trajectory required for achieving net zero while there is no uniform framework for making climate-related assessments of sovereign debt issuers. Eesti Pank is refraining from setting decarbonisation targets for this asset class until there is a broadly accepted framework for determining the emission pathways of countries that issue sovereign debt and the effectiveness of their climate policy actions.

As at the end of 2023, 70% of the value of Eesti Pank's portfolio of listed equities, meaning the underlying issuers, is committed to aligning with international climate goals. Since commitments are not a guarantee, it is crucial that there be transparency in how the actual decarbonisation progress is gauged. Given that the climate strategy of the portfolio addresses both the carbon reduction and the funding of the green transition, the carbon footprint trajectories may rise temporarily in the short term. The carbon footprint may also increase as data availability improves over time on the companies in the existing portfolio, as it recently has in the bank's supranational and agency bond portfolio. This means that the intermediate climate-related targets of the investment portfolio must be set dynamically, and so Eesti Pank reviews those targets periodically.

Figure 2 shows the reduction in the weighted average carbon intensity of the bank's equity portfolio since the base year 2021 until 2023, which is a year after climate-related targets were introduced to the investment strategy. The WACI indicates the level of carbon emissions that the portfolio generates for each unit of revenue from the underlying companies, thereby offering a metric of carbon efficiency in terms of output. The initial decrease in the metric has been achieved via reducing the portfolio weight of companies assessed as high carbon emitters while maintaining a level of exposure to sectors with a high impact on climate change, *i.e.* those sectors that are key to the low carbon transition. Notably, the revenue effect of the utilities sector has been the largest driver of the reduction in the WACI metric since 2021.



The figure illustrates the fact that scope 3 emissions generated outside the portfolio's investee companies' own operations, but within their value chains, make up the majority of portfolio emissions. Therefore they are a critical area of focus for total emissions reduction. Given that measuring and reporting these emissions is challenging due to their sources lying beyond investee companies' operational reach, scope 3 emissions are more challenging to reduce.

Further progress is needed in improving the quality of climate-related data and the transparency of verification mechanisms, and in the universal applicability of metrics across all asset classes. Enhancing the reliability and consistency of the metrics will permit better informed pricing of climate risks, more efficient capital allocation, and better judgement about the broader impact of investments beyond the financial returns generated.

ANNEX 1

Climate-related metrics of the Eesti Pank investment portfolio 2021-2023

	Sovereign				Non-Sovereign			
	Sovereign bonds				Total	Supranational & Agency bonds	Equities	Other*
	Production based emissions		Consumption based emissions					
exc LULUCF	incl LULUCF							
Portfolio size (eur mln)								
2023		1 348			682	268	237	177
2022		1 137			454	170	179	105
2021		1 066			445	171	172	102
WACI (t CO₂)**								
2023	269	245	18	scope 1&2	35	6	55	
				scope 1+2+3	945	999	907	
data coverage	100%	100%	100%		81%	60%	99%	
2022	265	243	17	scope 1&2	41	4	66	
				scope 1+2+3	1 033	1 143	960	
data coverage	100%	100%	100%		82%	60%	100%	
2021	327	299	17	scope 1&2	79	4	154	
				scope 1+2+3	707	333	1 080	
data coverage	100%	100%	100%		100%	100%	100%	
Total carbon emissions (t CO₂e)								
2023	351 583	320 787	361 424	scope 1&2	6 632	312	6 320	
				scope 1+2+3	93 927	7 651	86 276	
data coverage	100%	100%	100%		81%	60%	99%	
2022	322 110	294 304	333 019	scope 1&2	5 299	120	5 179	
				scope 1+2+3	68 963	5 487	63 476	
data coverage	100%	100%	100%		82%	60%	100%	
2021	337 186	309 188	348 227	scope 1&2	13 171	16	13 155	
				scope 1+2+3	100 901	1 731	99 170	
data coverage	100%	100%	100%		100%	100%	100%	
Carbon footprint (t CO₂e per € mln invested)								
2023	269	245	276	scope 1&2	16	2	27	
				scope 1+2+3	233	46	366	
data coverage	100%	100%	100%		81%	60%	99%	
2022	265	243	274	scope 1&2	18	1	29	
				scope 1+2+3	234	46	360	
data coverage	100%	100%	100%		82%	60%	99%	
2021	327	299	337	scope 1&2	39	<1	77	
				scope 1+2+3	297	10	583	
data coverage	100%	100%	100%		100%	100%	100%	

Data sources: ISS, C4F, World Bank, Eesti Pank calculations

All underlying GHG emissions data for sovereigns are from 2021; the latest emissions data for corporates are from 2022; the latest underlying macro data for sovereign and financial data for corporates are from 2022. The percentages below each metric indicate data coverage or availability, calculated as the percentage of the market value of the investments for which all the required underlying primary data are available. Portfolio size is the value on the bank's balance sheet as at each year end and may deviate from the portfolio values of the reported asset classes because of methodological considerations or the availability of methodologies.

* The asset class "other" is for Mortgage-Backed Securities and for now falls outside the scope of the disclosure framework for methodological reasons. ** The WACI for sovereign production based emissions is expressed per million euros of PPP-adjusted GDP; for consumption based emissions it is expressed in tonnes of CO₂e per capita; for corporate issuers the WACI is expressed in tonnes of CO₂e per million euros of revenue.

ANNEX 2

Apportioning methods, normalisation and attribution factors for the carbon emissions in the portfolio

SOVEREIGN ISSUERS

Total carbon emissions of the portfolio:

$$\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{GDP by PPP}_i} \times \text{GHG emissions of (sub-)sovereign}_i \right)$$

Carbon footprint of the portfolio:

$$\frac{\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{GDP by PPP}_i} \times \text{GHG emissions of (sub-)sovereign}_i \right)}{\text{Portfolio value}}$$

Weighted average carbon intensity (WACI) of the portfolio:

$$\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{Portfolio value}} \times \frac{\text{GHG emissions of (sub-)sovereign}_i}{\text{GDP by PPP}_i} \right)$$

where GDP at PPP is the purchasing power parity adjusted GDP (the sum of the gross value added by all resident producers plus any product taxes and minus any subsidies not included in the value of the products). The purchasing power parity conversion factor is a spatial price deflator and currency converter that eliminates the effects of differences between the price levels of countries.

GHG emissions: either the **production emissions** produced domestically within a country's physical borders, including domestic consumption and exports. This definition follows the territorial emissions approach used by the United Nations Framework Convention on Climate Change (UNFCCC) for annual national inventories; or the **consumption emissions** related to domestic demand, accounting for trade effects. This metric provides a broader view of a sovereign's emissions and tackles the issue of carbon leakage that arises from productions shifts from countries where goods are consumed later.

CORPORATE ISSUERS

Total carbon emissions of the portfolio:

$$\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{EVIC of corporation}_i} \times \text{GHG emissions of corporation}_i \right)$$

Carbon footprint of the portfolio:

$$\frac{\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{EVIC of corporation}_i} \times \text{GHG emissions of corporation}_i \right)}{\text{Portfolio value}}$$

Weighted average carbon intensity (WACI) of the portfolio:

$$\sum_n^i \left(\frac{\text{Value of investment}_i}{\text{Portfolio value}} \times \frac{\text{GHG emissions of corporation}_i}{\text{Revenue of corporation}_i} \right)$$

where a corporation's EVIC is the sum of the market capitalisation of ordinary shares at the fiscal year-end, the market capitalisation of preferred shares at the fiscal year-end, and the book values of total debt and minority interests; and a corporation's revenue is the total amount of income generated by the sales of goods and services related to the primary operations of the business.