Sustainable Finance in Luxembourg

A quantitative and qualitative overview

LSFI
Luxembourg
Sustainable Finance
Initiative

pwc

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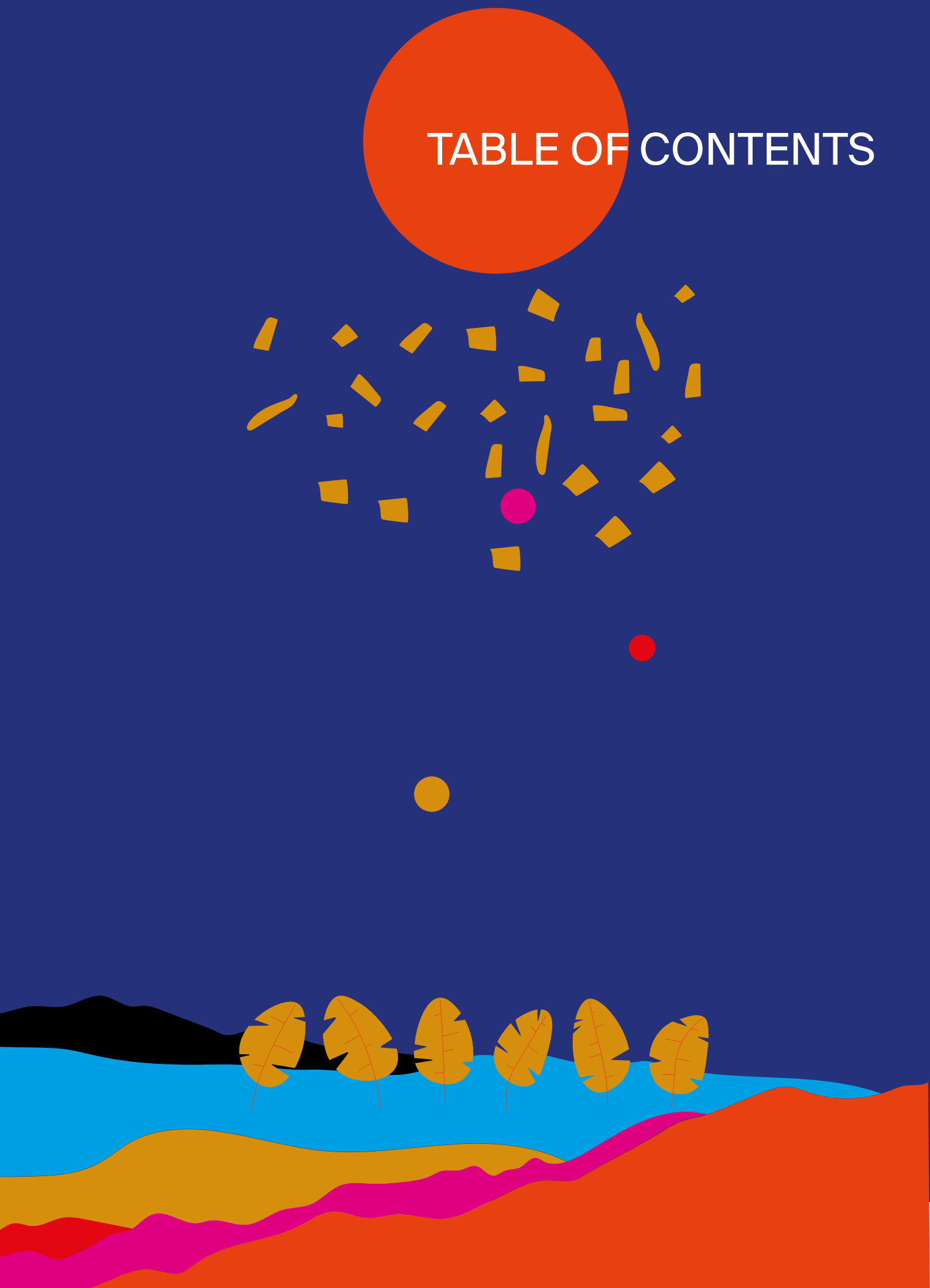

FOREWORD

Sustainable Finance is coming to the fore on the agendas of financial institutions, governments, decision-making bodies and corporates, among others. What started as a niche field with origins in the microfinance industry has ramped up over the last years, with the regulatory agenda, increased investor demand and the apparent effects of climate change being some of the triggers for this strong push. The development of Sustainable Finance indeed suggests that a paradigm shift is taking place within the financial industry, demonstrated by the changes in the priorities or guidelines that long governed financial systems and investment decisions. Financial risk considerations now need to be complemented with those of ESG risks, and ESG criteria now stands at the forefront of financial players' investment decisions across the industry.

As Sustainable Finance increasingly becomes accepted as the key to confronting the sustainable challenges we currently face, this rapid development can only be expected to become stronger and for Sustainable Finance to become the norm. The Paris Agreement of 2015 also emphasises this, clearly stating that the redirection of financial flows is an absolute requirement to achieve the current environmental objectives, as well as resolve the associated social challenges. However, the rapid development of Sustainable Finance over the last few years has not been exempt from challenges, difficulties, and questions. Financial institutions' need to transition requires them to acquire a new set of skills, adapt to a very fast-evolving regulatory landscape, and also navigate the complex data challenge. In this context, accompanying the financial institutions in this process and helping them find the correct solutions becomes key to ensuring an effective and efficient transition.

Luxembourg has long been a pioneer in the Sustainable Finance landscape — being home to leading and innovative solutions in this space. In 2020, the country launched the Luxembourg Sustainable Finance Initiative (LSFI) in order to have a coordinating entity in the field of Sustainable Finance, to find synergies among the different players, and raise awareness on this very relevant matter with the ultimate goal of advancing the sector's transition. With this mission at the core of its activities, the LSFI structures its actions around three pillars: raising awareness, unlocking potential and measuring progress. These overarching and closely interconnected pillars, in fact, constitute the very challenging tasks that Sustainable Finance has ahead of its mission:

- Raising awareness among the financial institutions and the general public, this being the ground to any further development in the field.
- Unlocking the potential of the sector in order to provide its players with the necessary tools to transition.
- Measuring progress to understand where the sector stands, being able to analyse and report its progress and finding appropriate solutions to the identified gaps.

Being in a transition period and considering the rapid development of Sustainable Finance, the ability to measure the progress made is of utmost importance. It provides a way to effectively understand the effects of the changes made, the level of advancement, the impacts on the real economy, and the assessment of which new actions might be needed for further improvement.

This is why the LSFI, following its mission, embarked on this undertaking to analyse the status of Sustainable Finance in Luxembourg. We wanted to complement the extensive and hard work of financial players over the last years in the area of Sustainable Finance and further deep dive into it by having a closer look at the extent to which Sustainable Finance is applied as well as how it is applied. Thus, with this study, we aim to provide a baseline for the financial industry, bring transparency and clarity, and identify strengths and gaps in order to help identify improvement actions and appropriate solutions for the advancement of Sustainable Finance.

I would like to thank all those involved in the development of this study and encourage the Luxembourg financial sector to continue working and embarking on the transition towards sustainability. I hope that this study will also inspire additional research in the space for the further advancement of Sustainable Finance. This is necessary as it is only through a joint effort that we will overcome the challenges that we currently face to achieve a more sustainable future.

Nicoletta Centofanti
LSFI Interim General Manager

ACKNOWLEDGEMENTS

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- **Laetitia Hamon** (Head of Sustainable Finance at the Luxembourg Stock Exchange): *The Luxembourg Green Exchange: The Rapid Growth of Green, Social, Sustainable and Sustainability-Linked Bonds.*
- **Lennart Duschinger** (Adviser for Sustainable Finance at the Luxembourg Ministry of Finance), **Kaspar Wansleben** (Managing Director of Luxembourg Microfinance and Development Fund (LMDF) & **Stephan Peters** (Managing Director at the International Climate Finance Accelerator (ICFA): *Blended Finance Is Mobilising Capital Towards Sustainable Development: The Case of Luxembourg.*
- **Ioana Popescu** (PhD Student in Sustainable Finance at the Luxembourg Institute of Science and Technology): *REFUND — Assessing the Environmental Impact of Investment Funds.*
- **Sophia Sunderji** (Associate Director, Research at the Global Impact Investing Network) & **Lissa Glasgo** (Director, IRIS+ and Impact Measurement & Management at the Global Impact Investing Network): *IRIS+ System - Standardisation Within the Impact Investing Landscape.*
- **Lucy Auden** (Senior Programme Manager of CISL's Investment Leaders Group (ILG)) & **Colette Bassford** (Senior Project Manager of the Investment Leaders Group): *Sustainable Investment Framework - An Overview of Investment's Impact.*
- **Victor Van Hoorn** (Former Managing Directing at Eurosif), **Prof. Timo Busch**, **Matthais Stapelfeldt** & **Eric Pruessner** (University of Hamburg): White paper on the Classification Scheme for Sustainable Investments described in *Impact Assessment - A New Classification Scheme for Investments Focused on Impact.*

1. See *Contacts/LSFI Advisory Committee.*

KEY FINDINGS & CONCLUSIONS

This study aims to present an analysis of the current status of the Sustainable Finance universe within the Luxembourg financial industry and endeavours to go a step further to analyse not only the extent to which it is applied, but also how it is applied - assessing less traditional dimensions. Moreover, this study tries to answer the question of how the impact of Sustainable Finance investments can be assessed and provides an overview of its developments within the industry. In this context, the statements below outline the key observations and findings obtained from our qualitative and quantitative analysis of the Luxembourg Sustainable Finance landscape:

- Attempts to analyse the ESG landscape within Luxembourg's overall financial services industry are significantly constrained by the lack of publicly available data on the banking and insurance sectors, as well as on the alternative investment sectors (Private Equity, Venture Capital, Real Estate and Infrastructure). At the moment, the investment funds industry remains the only assessable sector within the financial industry. This is because it is currently the only sector with consistent and public ESG data (both historical and current), positioning it as the most common predicate for existing studies on ESG (including the study). The lack of publicly available data can be observed not just in Luxembourg but globally.
- Even though the investment fund sector stands as the only sector for which (paid) data is available, the ESG dimensions and data that are assessed in various studies (including the study) are heavily reliant on the data provider, who typically has sole oversight on how their ESG data is collected and classified.
- Despite the economic uncertainty and market turmoil observed during the first half of 2022, Luxembourg-domiciled ESG funds registered EUR 2.2tn in total assets at the end of June 2022[2]. This ESG fund AuM represents approximately 54.6% of the country's overall UCITS fund assets, which surpassed EUR 4.0tn by the same period. In terms of number of funds, ESG funds correspond to 4,022 out of the 9,656 funds in our sample[3], highlighting the far-reaching extent of sustainability integration within the Luxembourg fund investment framework.
- While our analysis showed that some ESG involvement funds apply more than one sub-strategy[4 5] at a time, 89% of them follow only one sub-strategy. Best-in-class and Thematic[6] strategies were the most popular in the ESG Involvement cluster, accounting for 54.9% and 26.9% respectively of ESG Involvement funds.
- Nearly half of the ESG funds in our sample (2,005 funds) apply ESG Exclusions[7] strategy, accounting for 54.8% of the ESG UCITS assets. Out of these funds, 27% apply up to 2 exclusions while 21% apply up to 3 exclusions — mainly from the weapons, tobacco and fossil energy sectors. The largescale use of this strategy is linked to the exclusion of companies in controversial sectors from their portfolios being the preliminary step for asset managers who are beginning to take a stand towards sustainability.
- ESG Involvement[8] was the least applied strategy, accounting for only 18% of funds in our sample and 14% of ESG fund assets. Some of these funds in this cluster were also found to implement ESG exclusion, with 66.6% of them excluding at least one sector from their universe of investable assets, and 11% excluding up to 5 sectors.
- Equity accounted for 47% of total ESG asset allocation in Luxembourg as of end-Q2 2022, making it the most preferred asset class for ESG fund investments in Luxembourg. This preference is catalysed by a growing interest by institutional investors to expand their ESG asset base, the strong draw of retail investors towards the asset type, as well as structural overlaps between the active approach that is generally applied in both equity and ESG fund management. Bonds are the second most predominant asset class for ESG fund allocation, constituting 31% of total Luxembourg-domiciled assets by the end of June 2022.
- Luxembourg's ESG investment diversification approach focuses on a plethora of sectors, led by the Software & Services sector holding 9.8% of ESG funds' AuM. This, in addition to Pharmaceuticals (9.1%) and Capital Goods (8.4%) saw the greatest ESG fund asset allocations by June 2022.

2. A 14.2% drop in AuM from the end of 2021
3. 41.7% of the analysed funds
4. See *Overview of ESG Involvement Sub-Strategies in Section 4.1.*
5. Our analysis does not assess or verify the strategy itself; it provides an overview on collected datasets based on Refinitiv Lipper dataset.
6. See *Description of Fund ESG Characteristics* in Section 2.3.
7. See *Description of Fund ESG Characteristics* in Section 2.3.
8. See *Description of Fund ESG Characteristics* in Section 2.3.

- 55.4% of Luxembourg-domiciled ESG assets are placed in global-focused funds, which allows fund managers to meet clients' diversification and risk mitigation objectives while providing them with a wide asset coverage. Europe and US represent the next most common regions when it comes to the geographical focus of ESG funds in Luxembourg.
- French fund managers have the highest number of ESG funds domiciled in Luxembourg -738 out of the total 4,022. In terms of AuM, however, they are outpaced by US fund managers, who boast more than one-fifth (23%) of Luxembourg's EUR 2.2tn ESG funds' AuM.
- 93% of ESG funds' AuM in Luxembourg is actively managed, hinged on the notion that intentional and proactive ESG integration is preferably executed actively. Nevertheless, despite the lack of industry-accepted ESG indices for passive investments, we are seeing a growing attraction towards passive ESG investments by investors who are drawn in by its low costs, reduced risks and diversification benefits. In addition to this, the expanded adoption of the EU Climate Transition benchmarks and EU Paris-aligned benchmark[9] could see a rise in ESG passive investments.
- Over 53% of UCITS AuM in Luxembourg is invested in funds adhering to either Article 8 or Article 9 disclosure requirements in compliance with the Sustainable Finance Disclosure Regulation (SFDR). The less stringent nature of Article 8 requirements makes it the predominant category, with 47% of UCITS assets under this classification, while Article 9 constitutes 6%.
- The lack of generally accepted, standardised and widely utilised impact measures suggests that it is currently not possible to assess the effective positive impacts of Sustainable Finance investments on the real economy. It also remains to be clarified how the theoretical changes underpinned by Sustainable Finance investments can be best assessed, monitored and verified.
- To complete the analysis of the applied strategies and have a greater understanding of overall investment ESG approach and investments' impact, an additional look at the underlying companies and their ESG dimensions – collected in the desired standardised and comparable way mentioned above – should be further explored. In line with this, additional clear and harmonised KPIs on environmental dimensions, social and human rights considerations and governance aspects are much needed to measure and track progress.
- The transition towards Sustainable Finance investments is still ongoing. Bolstered by a heightened regulatory push, ESG funds find themselves on a consistent growth trajectory. While ESG Exclusion remains the most common first step in the majority of funds managers' Sustainable Finance journey, there is a case for this to extend towards impact investing[10], which ensures that investments actively and intentionally seek to have a positive impact on the environment and society.
- Further, there is currently no availability of structured and comparable data on the application of ESG funds' engagement strategies – a fundamental aspect of which is generally known as active ownership[11]. Engagement is a fundamental leverage that can possibly be applied by financial players to push the transition of the invested companies. This underscores the need for further research/studies as well as significant data collection on ESG funds' engagement strategies and the applied approaches.
- In developing countries, sustainable growth is still hampered by the perception and presence of numerous risks. In such cases, blended finance can be a useful tool to raise additional funds - specifically private capital, providing financial returns to investors while reducing some of these risks.

9. https://finance.ec.europa.eu/regulation-and-supervision/implementing-and-delegated-acts/eu-climate-transition-benchmarks-regulation_en. There is currently insufficient data for these benchmarks to enable us to assess their rate of adoption by funds at this stage.
10. See *Glossary.*
11. See *Glossary.*

1.

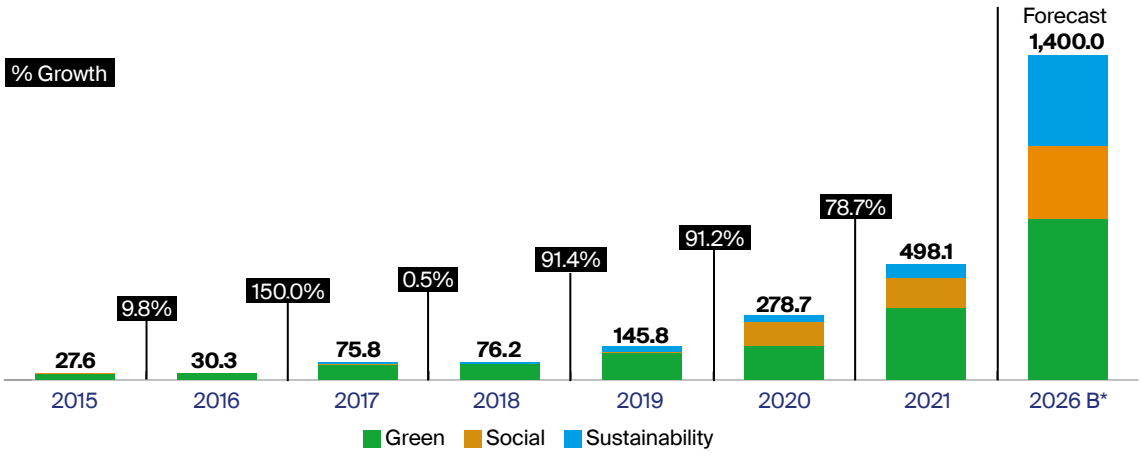
INTRODUCTION

1.1. BACKGROUND AND OBJECTIVE OF THE STUDY

The shift towards Sustainable Finance has taken an upward turn in recent times across all sectors of the global financial industry, namely banking, asset management and insurance. Increasingly, we are seeing what began as a relatively shallow penetration of ESG considerations within traditional financial markets evolving to become a core and crucial tenet of the global financial industry – beginning from the fund industry and now impacting all financial service sectors. Bloomberg and the Global Sustainable Investment Alliance (GSIA) estimate that the total ESG market is worth approximately USD 40tn – adding that it could reach USD 50tn by 2025[12]. In the insurance sector, for instance, a recent PwC survey[13] indicated that 80% of global insurers have already taken action or are planning to take action in order to align with the UN Principles for Responsible Investment (PRI), while 72% have already aligned or will align soon with the Sustainable Development Goals (SDGs). On the banking side, ESG integration is also picking up pace, with 27% of global banks being a signatory of at least one ESG initiative[14]. Within the asset management sector, the rapidly growing interest in ESG investment is evidenced by the fact that nearly 8 out of 10 institutional investors, according to a PwC survey[15], plan to increase their allocations to ESG products over the next two years.

The European financial services industry has been at the forefront of this global sustainability development. According to a PwC analysis, European issuance of sustainable bonds (green, social, sustainability) has grown remarkably in the past years and is expected to further accelerate up till 2026[16]. Specifically, GSS bond issuance stood at nearly EUR 500bn as of end 2021 but is expected to skyrocket to EUR 1.4tn by 2026 (Exhibit 1). Meanwhile, assets in Europe-domiciled ESG funds (UCITS)[17] have also noted significant growth since 2015, jumping from a mere EUR 912bn to nearly EUR 4.9tn in 2021. With the observed shift of institutional investors towards sustainable investments, assets in Europe-domiciled ESG UCITS are expected to reach EUR 7.7tn by 2026 in a base case scenario. Similarly, strong investor demand has seen European ESG Private markets AuM at EUR 281bn as of end 2021, with expectations of a four-fold growth to EUR 873bn by 2026[18](Exhibit 2). Given that the available data for this analysis does not include bank loans and insurance products, we can expect the true magnitude of ESG adoption within the European financial services industry to be far greater.

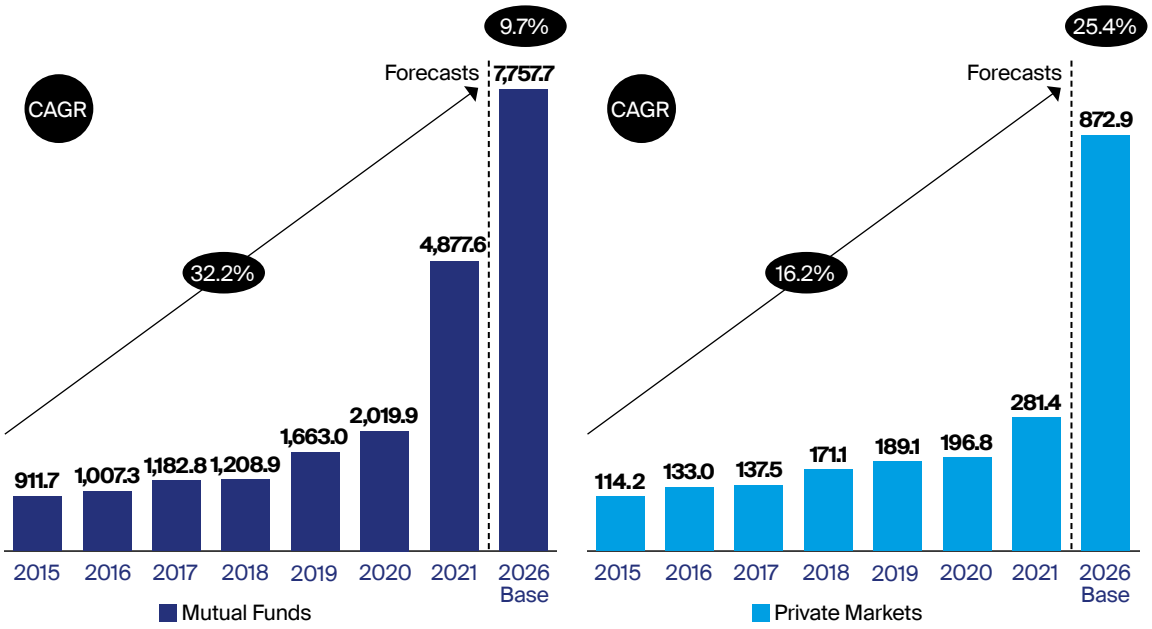
Exhibit 1: European Sustainable Bonds New Issuance Volume (in EUR bn)



Sources: PwC Global AWM and ESG Research Centre

12. ESG 2021 Midyear Outlook report, Bloomberg Intelligence (https://www.bloomberg.com/company/press/esg-may-surpass-41-trillion-assets-in-2022-but-not-without-challenges-finds-bloomberg-intelligence/)
13. Next in Insurance: Top Insurance Industry Issues- ESG: A Growing Sense of Urgency, PwC (https://www.pwc.com/us/en/industries/financial-services/library/next-in-insurance-top-issues/esg-insurance-industry.html)
14. Benchmarking ESG in Banking and Finance, LFF, (https://www.luxembourgforfinance.com/wp-content/uploads/2021/10/2021.10-Benchmarking-ESG-in-banking-and-finance-New-Financial.pdf)
15. Exponential Expectations for ESG, PwC, (https://www.pwc.com/gx/en/financial-services/assets/pdf/pwc-awm-revolution-2022.pdf)
16. The ESG Transformation of the Fixed Income Market, PwC (https://www.pwc.lu/en/sustainable-finance/docs/esg-transformation-fixed-income-market.pdf)
17. UCITS make up 95% of the Q2 2022 AuM domiciled in Luxembourg, but the term is interchangeably used to cover all open-ended investment funds (liquid mutual funds & ETFs) domiciled in the EU.
18. Exponential Expectations for ESG, PwC, (https://www.pwc.com/gx/en/financial-services/assets/pdf/pwc-awm-revolution-2022.pdf)

Exhibit 2: European UCITS AuM/European ESG Private Market funds AuM (in EUR bn)



Sources: PwC Global AWM and ESG Research Centre

When it comes to Luxembourg, PwC estimates the AuM of ESG UCITS domiciled in the country to grow at a Compound Annual Growth Rate (CAGR) of 9.8% from Q2 2022 to 2026 (Exhibit 3), surpassing EUR 3.3tn in a base case scenario. This change represents a 52.3% increase (in absolute terms) compared to Q2 2022 levels, further indicating the importance of sustainability in the Luxembourg-domiciled UCITS landscape.

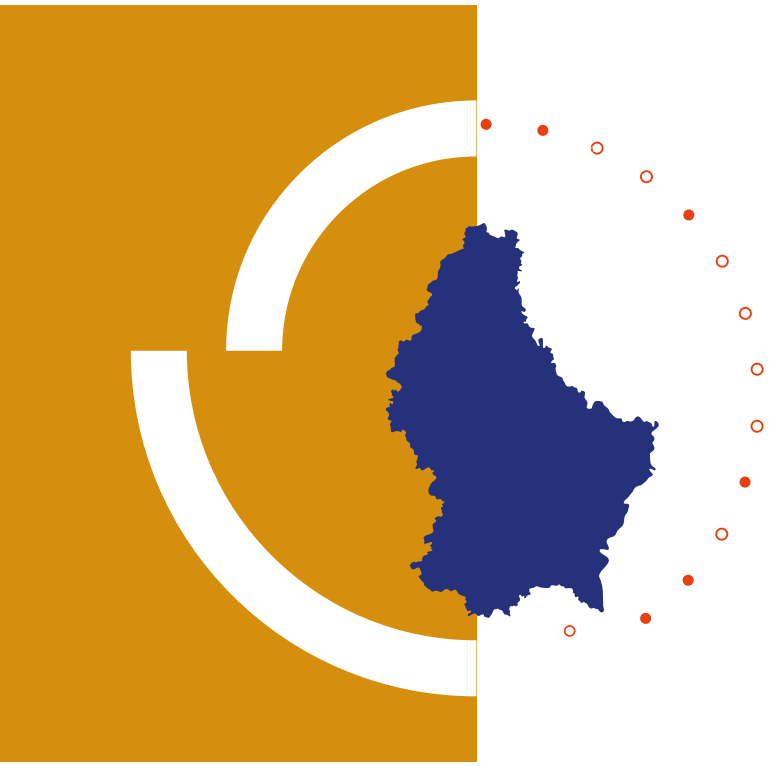
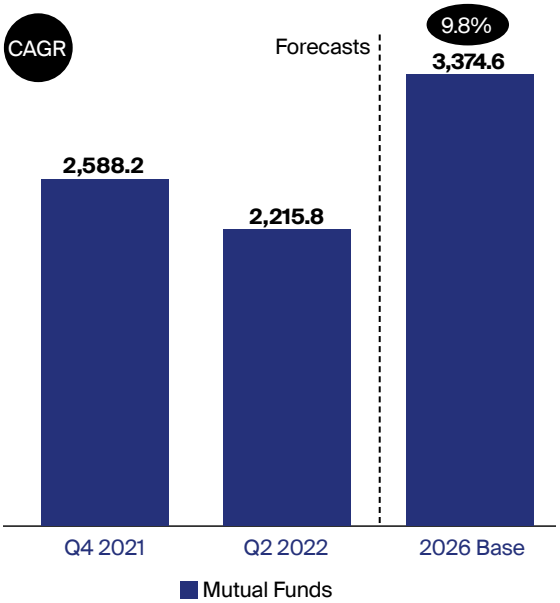


Exhibit 3: Luxembourg ESG UCITS AuM (Forecasts)



Sources: PwC Global AWM and ESG Research Centre

This marked drive towards global sustainability transition has undoubtedly been underpinned by several global initiatives such as the UN 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change as they have drawn attention to the need for countries to rethink their socio-economic and financial models. The Paris Agreement has also pointed to the role of the global financial industry in addressing climate change by directing financial flows towards lowering greenhouse gas emissions[19]. In response, we have seen an unprecedented push towards Sustainable Finance that is strongest within the EU. In fact, since the EU's ratification and adoption of the Paris Agreement in 2016[20], the region has seen a slew of regulatory initiatives aimed at advancing the sustainability agenda - with the financial industry serving as a catalyst. In this context, the EU Action Plan on Sustainable Finance was introduced in 2018 to integrate ESG considerations within financial policy and support the sustainable growth of the region[21]. This resulted in the emergence of new regulations like the Taxonomy regulation and the SFDR (Exhibit 4), as well as amendments to existing directives such as MiFID II, IDD, UCITS Directive, AIFMD, CRR II, or CRD and Solvency 2[22]. The Taxonomy regulation, for instance, has established an EU-wide classification scheme to provide investors and market participants with a list of economic activities that are considered to be environmentally sustainable. The SFDR also enforces sustainable disclosure obligations for manufacturers of financial products and financial advisors to end-investors regarding their sustainability-related information. Collectively, these regulatory additions apply broadly to various participants and sectors of the financial industry and impact every aspect of their chosen strategy, risk management framework and product/service offerings.

In fact, as part of such ongoing regulatory efforts, we have recently seen the publication of guidelines in the form of Questions and Answers(Q&As)[23] by the European Supervisory Authorities (ESAs), aimed at continuously updating and enhancing asset managers' understanding of what should constitute a sustainable investment and how firms should categorise their ESG products.

Exhibit 4: EU Regulatory Timeline

Sources: PwC Global AWM and ESG Research Centre

19. Adoption of the Paris Agreement, United Nations (https://unfccc.int/sites/default/files/english_paris_agreement.pdf)
20. Climate change — Paris Agreement, ratified by EU (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:20110301_2)
21. Sustainable Finance, European Commission (https://finance.ec.europa.eu/sustainable-finance_en)
22. See *Glossary.*
23. Questions and answers (Q&A) on the SFDR Delegated Regulation (Commission Delegated Regulation (EU) 2022/1288) (https://www.esma.europa.eu/sites/default/files/library/jc_2022_62_jc_sfdr_qas.pdf)

But regulation has not been the only driver of the region's progress in this respect. Other factors such as investors' changing preferences and policymakers' increasing focus on the growing threat of climate change have inevitably driven Europe to the forefront of the Sustainable Finance transition of the global financial services industry – ahead of its peers in the USA and APAC regions. That being said, these regions are catching up fast, with emerging regulatory requirements and a renewed commitment by industry stakeholders during the COP 26 in November 2021 set to ignite heightened efforts to achieve total sustainability transformation across all regions[24].

Within the EU, the Luxembourg financial centre has also been instrumental in the expansive adoption of Sustainable Finance. Boasting a history of active engagement in microfinance and financial inclusion since the 1990s and landmark feats like the listing of the first Climate Awareness Bond in 2007 on the Luxembourg Stock Exchange; the country has firmly established itself as a leading international platform for Sustainable Finance – with a plethora of regulatory initiatives and structures to support related activities such as responsible investments funds, blended finance, green bond listings, and ESG fund labelling[25]. The Luxembourg Green Exchange (LGX), the first platform dedicated to the display of sustainable securities, for instance, hosts almost half of the world's listed green bonds[26] within the Luxembourg Stock Exchange, while the Luxembourg Sustainable Finance Roadmap[27], published in 2018, seeks to set a vision and lay the groundwork for establishing a comprehensive and far-reaching Sustainable Finance strategy. This is necessary to drive the realisation of the 2030 Agenda for Sustainable Development as well as the country's recommendations for reaching the 2015 Paris Agreement objectives.

Following the first two Roadmap recommendations, the Luxembourg Sustainable Finance Initiative (LSFI)[28] has been set up as a coordinating entity for Luxembourg's Sustainable Finance actors and has been appointed with the mandate to implement the Luxembourg Sustainable Finance Strategy's Action Plan[29], launched in February 2021. In particular, one of the Strategy Pillars and key actions foresees the LSFI to measure the progress of the financial sector within the context of its efforts towards Sustainable Finance. With this objective, the LSFI decided to assess the Sustainable Finance segment in Luxembourg in order to understand where the sector stands, what the key trends are and what strategies towards sustainability are used. It also sought to identify gaps in the existing framework so as to determine actions for improvement. As a starting point for the study, the LSFI set out to ascertain the possibility of measuring and tracking the impact of Sustainable Finance on the ESG dimensions of invested and financed assets. It also sought to determine if the capital flow towards Sustainable Finance investments was effectively impacting the shift needed in the real economy.

24. https://ukcop26.org/the-conference/cop26-outcomes/
25. Sustainable Finance, LSFI (https://lsfi.lu/what-is-sustainable-finance/#sfluxembourg/)
26. Luxembourg Green Exchange, Luxembourg Stock Exchange (https://www.bourse.lu/documents/brochure-LGX-EN.pdf)
27. Luxembourg Sustainable Finance Roadmap, Government of Luxembourg (https://gouvernement.lu/dam-assets/documents/actualites/2018/10-octobre/04-sustainable-finance/Luxembourg-Sustainable-Finance-Roadmap-WEB.pdf/)
28. Luxembourg Sustainable Finance Initiative (LSFI), https://lsfi.lu/what-we-do/
29. Luxembourg Sustainable Finance Strategy (https://lsfi.lu/what-we-do/#strategy)

1.2. SCOPE AND TARGET AUDIENCE

The study is aimed at providing a fact-based, neutral and informative overview of the Sustainable Finance segment within the context of the overall financial industry in Luxembourg. It is also meant to complement existing studies and is not intended to be promotional or activist in nature. As an objective and independent assessment, the LSFI's Sustainable Finance in Luxembourg study becomes all the more significant by leveraging the latest available data to identify existing strengths and gaps, outline future expectations and determine future improvements necessary for tracking progress and furthering the sustainability transition of the country.

That being said, it is important to mention that the study presents only a partial assessment of the financial services sector: the study focuses solely on the Sustainable Finance segment in Luxembourg and does not include any national or regional comparisons or benchmarks. Also, despite the efforts to assess the whole of Luxembourg's financial industry in this first edition, the study's quantitative section covers the investment fund industry and makes use of the latest obtainable data on Luxembourg-domiciled investment funds only. The fact is that the status and progress of other sectors within the financial industry cannot currently be assessed in terms of Sustainable Finance. On one hand, this is due to the relative maturity of the investment funds sector in terms of this segment. Another constraint is the lack of comprehensive, consistent, and publicly available historical and current data on other financial sectors like banking and insurance, making it extremely challenging to objectively assess them at this stage. While these constraints are, of course, not solely specific to Luxembourg, it is important to note that for the same aforementioned reasons, the study's quantitative analysis focuses only on Luxembourg-domiciled Undertakings for Collective Investments in Tradable Securities (UCITS Funds) and excludes Alternative Investment Funds (AIFs) and other types of investment fund vehicles. Given the size of Luxembourg's fund industry (EUR 4.1tn at the end of Q2 2022)[30] and especially its share of cross border funds that are marketed throughout the European Union (57%)[31], the results also give a relatively good picture of the overall state of play of the European investment fund sector.

The study is targeted at professionals within the financial services sector in Luxembourg and other European financial services players who may be interested in the Luxembourg Sustainable Finance segment. The study also tries to monitor new dimensions such as applied sustainable strategies, invested sectors and geographies. This was done to complement existing studies and metrics, attempt to cover a more sustainable angle, and possibly identify meaningful trends, new insights, and areas of improvement. Given its extensive use of investment funds data, we believe that the study would also be useful specifically to asset managers and institutional investors.

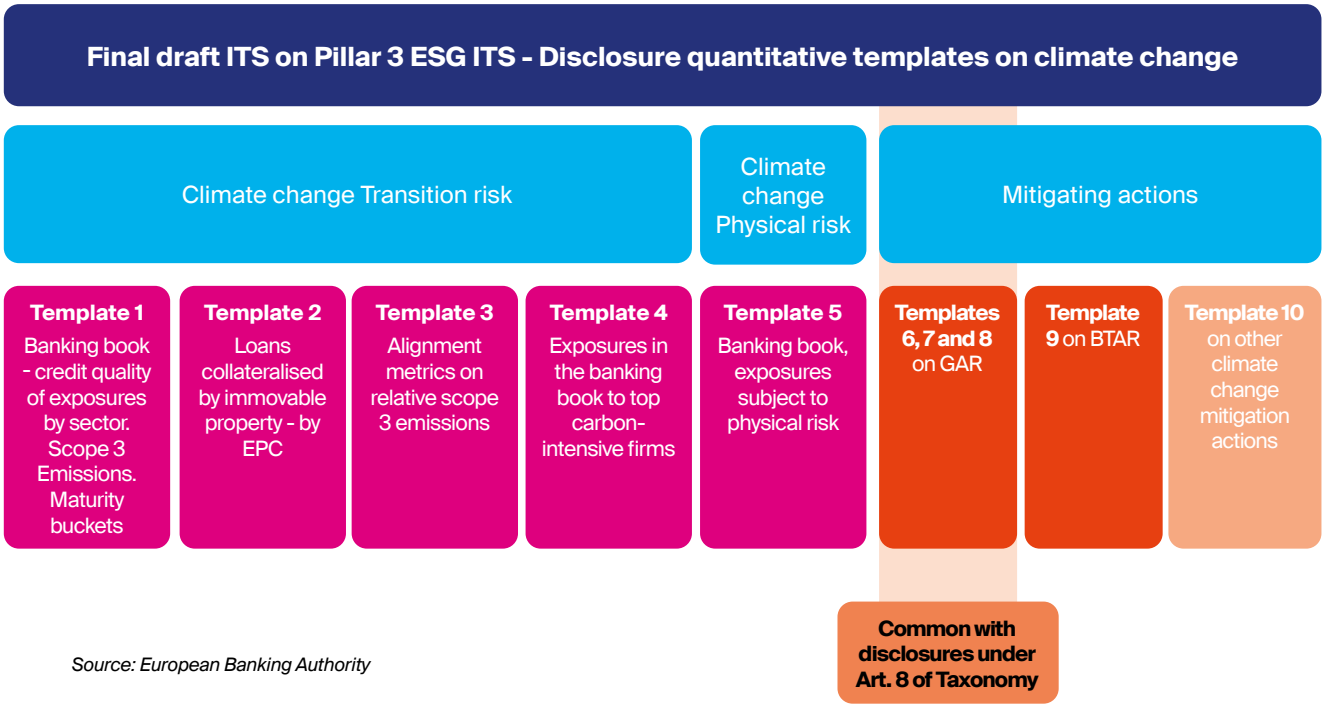
30. See *Section 3.1.*
31. PwC Global Fund Distribution Poster (https://www.pwc.lu/en/fund-distribution/docs/pwc-publ-gfd-march-2022.pdf)

1.3. BANKING AND INSURANCE SECTORS OVERVIEW

Despite the lack of publicly available data, we attempted to provide an overview of regulatory initiatives in the banking and insurance sectors that could likely lead to increased data availability in the near future. The materialisation of this could facilitate the measurement of progress in these financial sectors within the context of their efforts toward Sustainable Finance.

In the banking sector, the European Banking Authority (EBA) has published standards on Pillar 3 disclosures on ESG risks, calling on European Banks to begin disclosing not only more information on their climate risk exposures but also actions being taken to mitigate these risks (e.g., financing activities that reduce carbon emissions)[32] (Exhibit 5). Also, as part of the phased implementation of the Taxonomy regulation, banks will be required to publish a Green Asset Ratio as from 2024, which is a metric showing banks' EU Taxonomy-compliant assets as a proportion of their loan portfolios. They would also be expected to report more broadly on the taxonomy compliance of their overall balance sheet using the Banking Book Taxonomy Alignment ratio. This requires banks to request and report additional taxonomy-relevant information as part of their customer origination processes, and also devise strategies to apply the EU Taxonomy to core banking products together with other related industry bodies[33]. While data availability issues are yet to be resolved, it is expected that these disclosures will most likely generate more sustainability data for the banking sector in the future.

Exhibit 5: EBA Proposed Quantitative Disclosures[34]

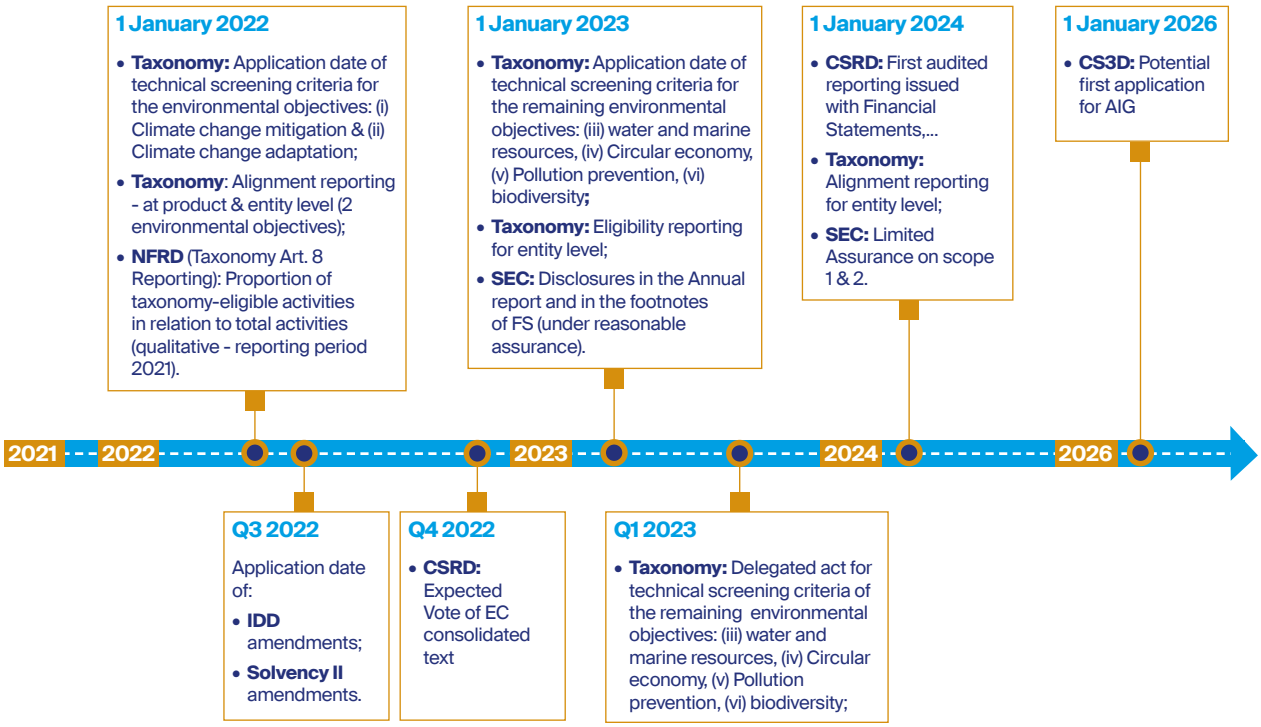


Source: European Banking Authority

32. European Banking Authority, Environmental Social and Governance Pillar 3 disclosures (https://www.eba.europa.eu/sites/default/documents/files/document_library/News%20and%20Press/Communication%20materials/Factsheets/1026177/EBA%202021.5984%20ESG%20Factsheet%20update2.pdf)
33. PwC, How to apply the EU Taxonomy in Practice https://blog.pwc.lu/how-to-apply-the-eu-taxonomy-system-in-practice/
34. European Banking Authority, Final draft implementing technical standards on prudential disclosures on ESG in accordance with Article 449a CRR (https://www.eba.europa.eu/eba-publishes-binding-standards-pillar-3-disclosures-esg-risks)

When it comes to the insurance sector, we also noted required compliance with the Sustainable Finance Disclosure Regulation (SFDR) and the Non-Financial Reporting Directive (NFRD) under the EU Taxonomy, which subjects insurance companies to product and corporate reporting requirements respectively. Moreover, in August 2022[35], amendments to the Insurance Distribution Directive (IDD) saw the inclusion of sustainability factors and preferences within the product oversight and governance requirements for insurance undertakings and insurance distributors[36]. Similar amendments to the Solvency II directive[37] also now mandate reporting on sustainability risks by insurance companies. Upcoming applicable regulations for this sector include the Corporate Sustainability Reporting Directive (CSRD), which is a revision of the NFRD and expands the scope and sustainability reporting requirements of the NFRD for large public companies, including insurance companies. This is due to take effect from January 2024, with the first report from companies that are already subject to the NFRD due in 2025[38]. The European Commission has also proposed the introduction of the Corporate Sustainability Due Diligence Directive (CSDDD)[39], aimed at setting out obligations for companies regarding actual and potential adverse impacts on human rights and the environment – with respect to their own operations and operations across their value chain. This regulation is due for adoption within the EU in 2024 and will be applicable to the first group of companies (Companies with more than 500 employees and a net turnover of over EUR 150mn) as from 2026[40]. As was the case with banking, this additional reporting stands to provide regulators and the general public with more sustainability-related information and data (such as KPIs) on insurance companies.

Exhibit 6: EU Upcoming Regulatory Timeline

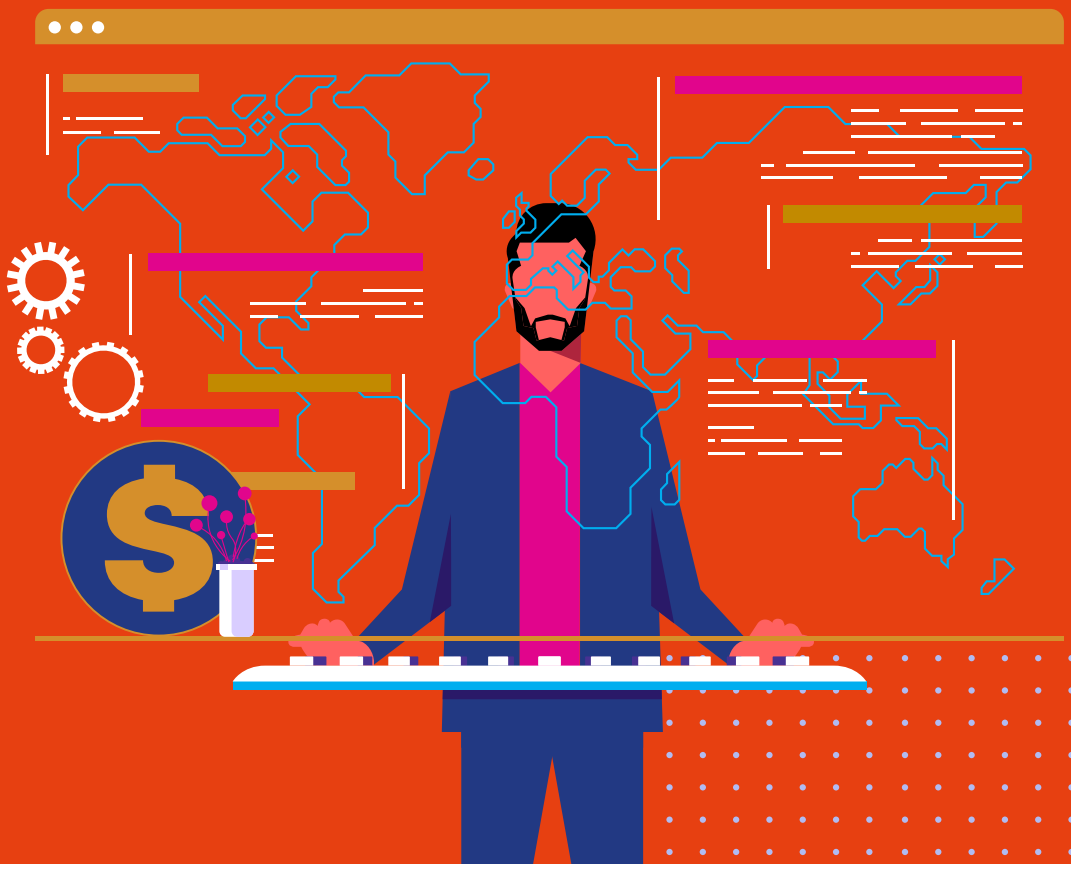


Sources: PwC Global AWM and ESG Research Centre

35. Arendt, ESG in the insurance sector – Integrating sustainability into the Solvency II and IDD frameworks (https://www.arendt.com/jcms/p_99092/en/esg-in-the-insurance-sector-integrating-sustainability-into-the-solvency-ii-and-idd-frameworks#:~:text=The%20IDD%20framework%20has%20been,governance%20processes%20and%20suitability%20assessments)
36. EIOPA, Guidance on the integration of sustainability preferences in the suitability assessment under the IDD (https://www.eiopa.europa.eu/sites/default/files/publications/reports/guidance_on_integration_of_customers_sustainability_preferences_under_idd.pdf)
37. EIOPA, Proposal for amendments to the Solvency II Technical Standards on Reporting and Disclosure (https://www.eiopa.europa.eu/sites/default/files/publications/eiopa_guidelines/eiopa-22-160-feedback-statement-its-reporting-disclosure.pdf)
38. EU Council, New rules on corporate sustainability reporting: provisional political agreement between the Council and the European Parliament (https://www.consilium.europa.eu/en/press/press-releases/2022/06/21/new-rules-on-sustainability-disclosure-provisional-agreement-between-council-and-european-parliament/)
39. European Commission, Directive on Corporate Sustainability Due Diligence (https://ec.europa.eu/info/sites/default/files/1_2_183888_annex_dir_susta_en.pdf)
40. PwC, Corporate Sustainable Due Diligence Directive - A focus on your entire value chain(https://www.pwc.lu/en/sustainable-finance/a-year-of-esg/corporate-sustainable-due-diligence-directive.html)

2.

STRUCTURE AND METHODOLOGY



2.1. INITIAL PREPARATORY WORK

In order to define the scope and structure of the study, the LSFI commenced with preparatory work to determine the best way to assess the industry, the most viable options for doing so, as well as data availability for the different sectors. To this end, in December 2021, the LSFI began engagement with relevant industry participants. These included industry associations and major players, data providers, national and international researchers from Luxembourg and abroad, and consulting firms. The LSFI decided to appoint a consulting firm to help with the elaboration of this study based on the aforementioned discussions and key findings. In the selection of a consulting firm to partner with, the LSFI looked out for the ability to support on financial sector data analysis, drafting of the study by developing the stipulated structure and key data points and provision of additional research, guidance and key contacts. PwC Luxembourg was selected for this collaboration. To provide an additional layer of procedural rigour, the LSFI also appointed an Advisory Committee[41] comprising researchers and industry practitioners with related experiences to intermittently review the study (mid-term and final reviews) and ensure supervisory oversight, providing constructive feedback as and when needed over the course of the study.

2.2. STRUCTURE OF THE STUDY

The study begins with a quantitative analysis of overall Luxembourg-domiciled UCITS[42] with a particular focus on ESG funds in Luxembourg, analysing key fund metrics such as AuM, net flows, investments by asset class, asset class performance, distribution by investor type, SFDR classification, management type, as well as new dimensions such as applied sustainable strategies, geographical focus and sector allocation. It then continues with a qualitative analysis in which it describes additional Sustainable Finance investment practices in Luxembourg and presents a description of major impact methodologies identified in the financial market as a way to assess the impact of investments on the real economy. This section also includes a pilot assessment of a methodology currently under development to assess the impact of funds. Finally, the study includes the proposal of a new classification scheme for investments that are focused on impact.

2.3. METHODOLOGY FOR THE QUANTITATIVE ANALYSIS

PwC has utilised data from Refinitiv Lipper for the quantitative analysis of this study, which is due to the latter being among the most credible, comprehensive and widely accepted data providers within the fund management sector.

41. See *Contacts/LSFI Advisory Committee.*
42. UCITS funds make up 95% of the Q2 2022 AuM domiciled in Luxembourg, but the term is interchangeably used to cover all open-ended investment funds (liquid mutual funds & ETFs) domiciled in the EU.

• DESCRIPTION OF FUND ESG CHARACTERISTICS[43]

The following definitions have been adapted by PwC for the quantitative analysis of the study:

ESG

This attribute identifies funds that include material[44] Environmental and/or Social and/or Governance factors into their overall screening process.

Negative Screening

This category identifies funds that include Negative Screening criteria in their overall selection process. In other words, these funds exclude one or more of the following controversial sectors from its investments: Weapons, Tobacco, Adult Entertainment, Nuclear, Alcohol or Drugs, GMO, Fossil Energy, and Other (i.e., sectors other than those mentioned that fit the criteria).

Best-In-Class

Funds in this category choose leading sustainable companies in a certain peer group which is not necessarily noted as 'sustainable', e.g., the least polluting oil company.

Positive Tilt

Funds in this segment place more weight on leading companies (in terms of sustainability) compared to the benchmark.

Thematic

Funds which invest in sustainable themes such as clean water, climate change etc.

Microfinance

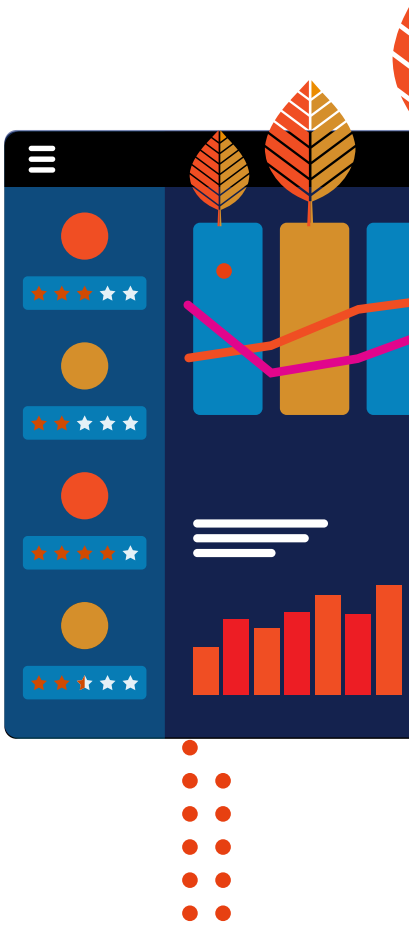
Funds that invest exclusively in microfinance projects.

Sustainable Development Goals

Funds that invest in companies that strive to have a positive contribution to the achievement of the UN sustainable development goals as part of the agenda 2030.

Sustainable Bonds

Funds that invest exclusively in so-called green bonds, social bonds, sustainable bonds, blue bonds, impact bonds, transition bonds or other type of similar fixed income securities.



For the classifications above, official documents such as fund prospectuses, KIIDs, and ESG strategy documents (that include specific references to the fund examined) were used to ensure maximum transparency.

43. All definitions are quoted from Lipper "Responsible Investing Attributes-Definitions", *March 2022*.
44. "Material" is an important keyword here: it means 'material to the financial balance sheets of the sectors that the fund invests in'.

• DESCRIPTION OF DATA GROUPING METHODOLOGY

To simplify our analysis and ease the reading of the report, we decided to aggregate the data by re-organising the aforementioned attributes into the clusters or categories below. All the funds included in this categorisation are labelled as ESG funds in our source database, meaning that all of them apply ESG Screening in varying degrees. These clusters are:

ESG Screening

This cluster contains all the funds which only apply ESG factors into their overall screening process and cannot be explicitly included in either of the two following categories.

ESG Exclusion

In this cluster, we include funds that are labelled as ESG funds and also apply one or more exclusion criteria.

ESG Involvement

This cluster includes funds that apply one or more of the following sub-strategies: Best-In-Class, Positive Tilt, Thematic, Microfinance, Sustainable Development Goals, Sustainable Bonds. These funds could also apply exclusion criteria as well[45].

• DATA REVIEW PERIOD

The starting point of our data analysis is Q4 2021. This is due to the fact that a significant number of funds that had no ESG characteristics in previous years have now reshaped their investment strategies to consider responsible investments or ESG factors within their screening process. In practice, this means that a fund which was not labelled as ESG three years ago may currently be labelled as ESG. Given that a large number of funds underwent reclassification following the effective implementation of the SFDR in March 2021, using historical ESG fund data could result in data dilution and inflation as majority of funds were reclassified as ESG only recently.

• LIMITATIONS OF THE QUANTITATIVE ANALYSIS

Given the fast-paced changes in the ESG funds environment[46], it is necessary to state that the methodology used in this report does not present an exhaustive and absolute analysis of the Luxembourg ESG fund industry. Indeed, we acknowledge the existence of other methodologies which could be complementary to ours. We have defined this methodology because it specifically allows us to perform a more granular analysis of applied ESG strategies. However, for this study, the identified ESG strategies applied by each fund were not assessed or verified, and no analysis of the underlying constituent companies of the funds was performed.

45. 66.6% of ESG Involvement Funds in the study apply at least one exclusion criteria.
46. For example, ongoing fund reclassifications, refinement of asset managers' methodologies for integrating ESG within their portfolios, adaptations in the ESG evaluation methodologies by ESG data and service providers, as well as regulatory change.

3.

QUANTITATIVE ANALYSIS OF LUXEMBOURG ESG FUNDS

This section provides a quantitative analysis of the current Sustainable Finance landscape in Luxembourg, with a particular focus on trends within the ESG funds realm for which data is accessible and available. Our analysis covers a top-down assessment of the sustainable investment attributes of each fund and begins with the funds that apply ESG Screening (ESG Screening), followed by a focus on funds that apply one or more exclusionary criteria (ESG Exclusions), and then by a section covering those that apply a dedicated ESG strategy (e.g., Best-In-Class, Positive Tilt, Thematic, Microfinance, Sustainable Bonds, and SDGs)[47] (ESG Involvement).

3.1. OVERALL LANDSCAPE OF LUXEMBOURG UCITS

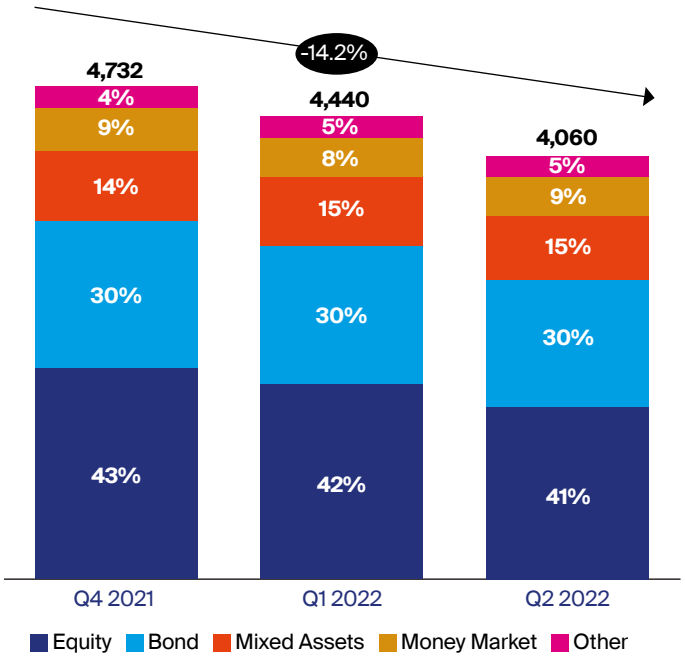
In order to develop a well-rounded assessment and analysis of trends within the Luxembourg Sustainable Finance realm, it was important for us to first understand the context of overall funds domiciled in Luxembourg.

• ASSET CLASS BREAKDOWN

Equity funds capture the lion's share of AuM in Luxembourg's UCITS segment

Our results showed Luxembourg AuM in UCITS to surpass EUR 4.7tn as of end-2021 (Exhibit 7). As of the end of Q2 2022 however, total fund assets stood at EUR 4.1tn, representing a year-to-date (YTD) slump in assets of 14.2%. This observed slump in fund assets is in line with the overall market decline due to the rise of inflation, the war in Ukraine and soaring energy prices. Further, EUR 2tn of these assets – approximately 43% – were seen to be held in equity funds as of end-2021, followed by bonds and mixed assets. Compared to five years ago, asset allocation has displayed a shift from fixed income to equities. The strong overall performance of equity markets between 2017 and the end of 2021, as well as the shift to responsible investments and index investing led to more allocations in equity funds.

Exhibit 7: UCITS AuM in Luxembourg (by Quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

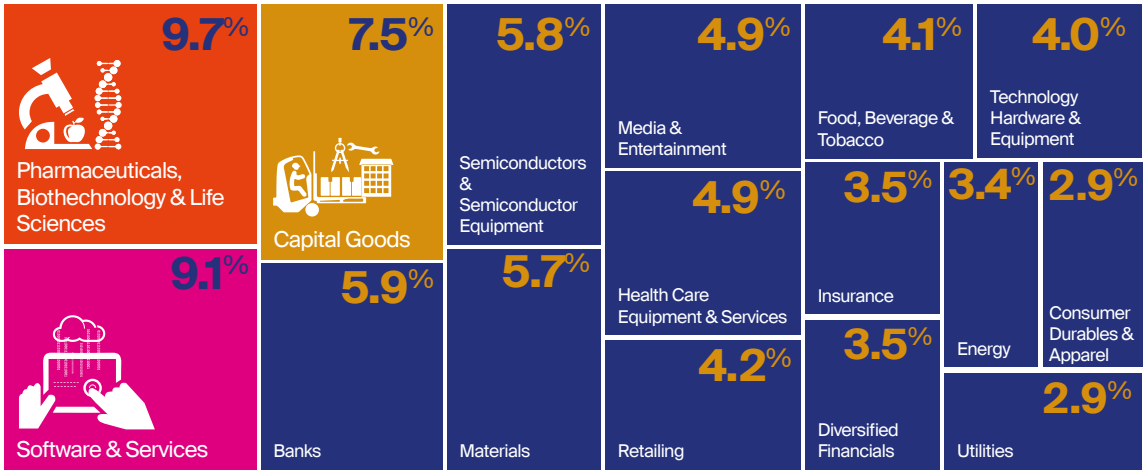
47. See *Description of Fund ESG Characteristics* in Section 2.3.

• SECTORAL ANALYSIS

Pharmaceuticals, Biotechnology & Life Sciences industry top the fund allocation list

Our analysis showed the Luxembourg investment environment to be highly diversified, with investable assets across a broad range of economic sectors (Exhibit 8). Of these, the Pharmaceuticals sector was seen to hold the highest asset allocation of 9.7%, likely due to the COVID-19 pandemic. Software and Services followed with 9.1% of total Luxembourg UCITS AuM, while Capital Goods represented the segment with the third highest asset allocations in terms of sector[48]. To put this into perspective, the top sector in terms of AuM allocation five years ago was Banks (9.0%), while the Pharmaceuticals sector ranked third (8.0%).

Exhibit 8: AuM Percentage allocation to top sectors (as of June 2022)[49]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

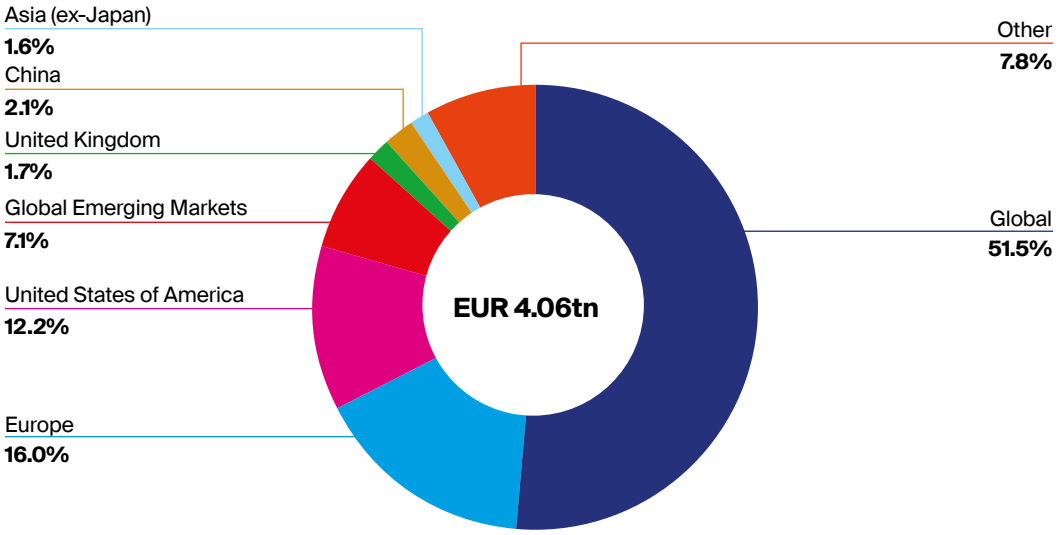
48. See *Appendix B.*
49. The total AuM of funds for which sector data was available is EUR 1.11tn or 27.3% of the EUR 4.06tn displayed previously. The remaining sectors account for 17.9% of the allocation.

• GEOGRAPHICAL FOCUS

Luxembourg-domiciled funds with a global focus hold more than 50% of UCITS AuM

Luxembourg's broad asset focus is also underscored by the fact that 51.5% of its funds landscape is dominated by funds with a global focus, followed by Europe[50] (16%) and US- (12.2%) focused funds (Exhibit 9). Collectively, these three fund categories represent nearly 80% of the country's total UCITS AuM as of end-June 2022.

Exhibit 9: Top geographies by AuM % (as of June 2022)



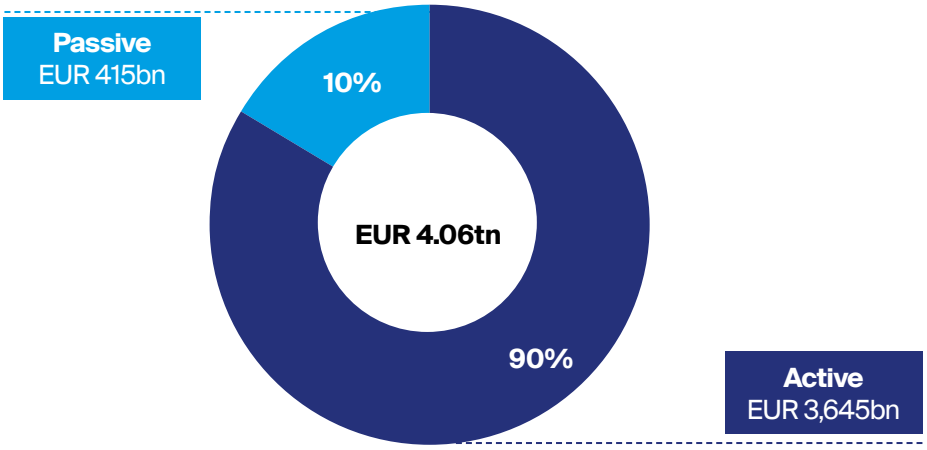
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• MANAGEMENT STRATEGY SPLIT

90% of Luxembourg-domiciled UCITS assets are under active management

Our study showed 8,904 out of the 9,656 funds in the Grand Duchy to be actively managed, proving active management to be the predominant strategy of 92% of Luxembourg's UCITS segment. Active management also accounted for EUR 3.6tn out of the country's EUR 4.1tn fund assets (Exhibit 10), bringing the share of overall UCITS AuM that apply this strategy to 90%.

Exhibit 10: Active vs Passive Management (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

50. The countries that constitute the Europe segment vary according to the fund manager.

• MANAGER HEADQUARTER SPLIT

US-based managers are highly concentrated within Luxembourg's UCITS domiciliation frame

With its favourable regulatory framework, Luxembourg has managed to attract a large number of UCITS (Part I) into the country, becoming the largest mutual fund domicile in Europe. Given its position as the largest fund domiciliation centre in Europe and second largest in the world, it is only to be expected that the country hosts several asset managers from other countries – despite the fact that the actual portfolio management functions take place in funds managers' headquarters. To estimate a proxy for the manager headquarters, our analysis looked at all the asset managers/promoters with funds domiciled in Luxembourg (approximately 1,200 names), after which we obtained information on their countries of origin and headquarters from their websites. This data was added to our main dataset and an analysis of AuM and the number of funds per country of manager headquarters was performed[51]. This analysis showed that, of the asset managers that prefer to domicile their funds in Luxembourg, those headquartered in the USA rank first in terms of AuM – boasting EUR 1.2tn of US-originated but Luxembourg-domiciled fund assets. UK and France headquartered managers come in next (Exhibit 11). When it comes to the number of funds, however, Swiss asset managers are ahead of the pack, with more than 1,500 funds domiciled in the country, followed by the US and France.

Exhibit 11: Manager HQ Split by AuM and Number of Funds *(as of June 2022)*

	Manager HQ	AuM Q2 2022 (EUR bn)	# of funds
1	USA	1,245.3	1,440
2	UK	533.2	952
3	FR	530.4	1,361
4	CH	513.5	1,525
5	DE	354.7	959
6	IT	230.6	711
7	BE	148.0	338
8	LU	118.7	966
9	DK	117.9	193
	Other	267.7	1,211
	TOTAL	**4,059.9**	**9,656**

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

51. Even though this approach does not accurately depict where the actual portfolio management is taking place, it is the closest proxy that can be provided based on the available data.

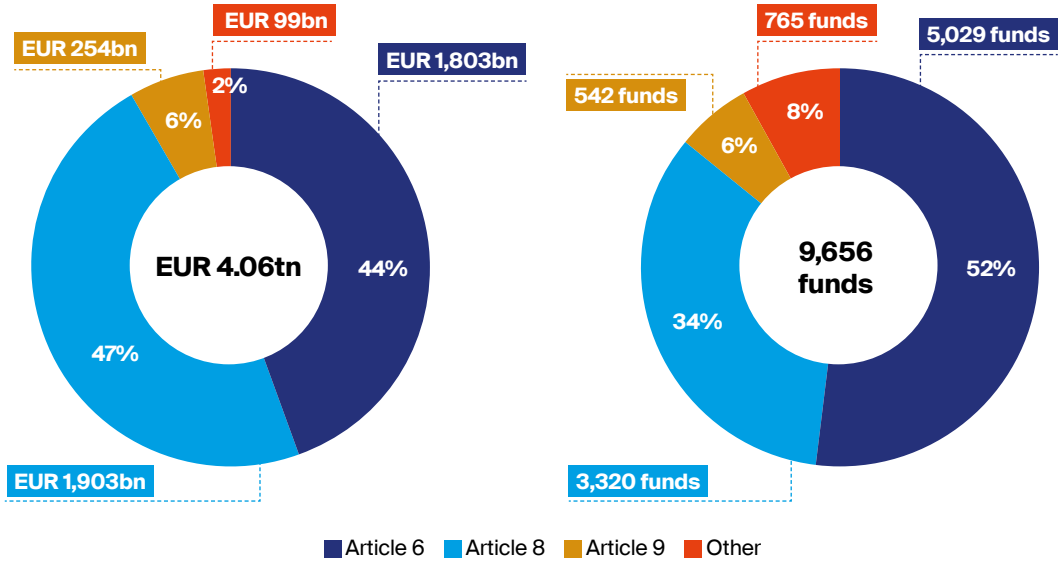
• SFDR SPLIT OF LUXEMBOURG UCITS

Over 53% of overall Luxembourg UCITS assets are held in Article 8 and 9 funds

The introduction of SFDR saw a large number of asset managers racing to include Article 8 and Article 9 funds in their offerings, either by launching new funds or by reclassifying legacy products into one of these categories. This transition was noted within the ESG realm all across Europe and Luxembourg was no exception, given its role as the foremost fund domiciliation centre in Europe. The result is that, in a little over one year following the introduction and implementation of the SFDR, the combined value of Article 8 and 9 Luxembourg-domiciled funds exceeds EUR 2.0tn, or 53% of total UCITS AuM for the country.

Within this SFDR-disclosure fund split, Article 8 funds were seen to dominate the landscape in terms of fund assets, accounting for 47% of Luxembourg UCITS AuM while Article 6 funds constitute 44%. Article 9 funds represent 6% and the remaining funds, designated as "Other[52]" make up 2% (Exhibit 12). A similar distribution is observed when considering the number of funds. Here, Article 6 funds take the lead, representing 52% of all funds domiciled in Luxembourg. Article 8 and Article 9 funds constitutes 34% and 6% respectively, while funds designated as "Other" make up 8%[53]. The observed popularity of Article 8 compliance by funds is likely due to the less stringent nature of this segment's disclosure requirements, which has served as the starting point for several managers who are developing sustainable fund offerings.

Exhibit 12: SFDR Split by AuM and Number of Funds *(as of June 2022)*



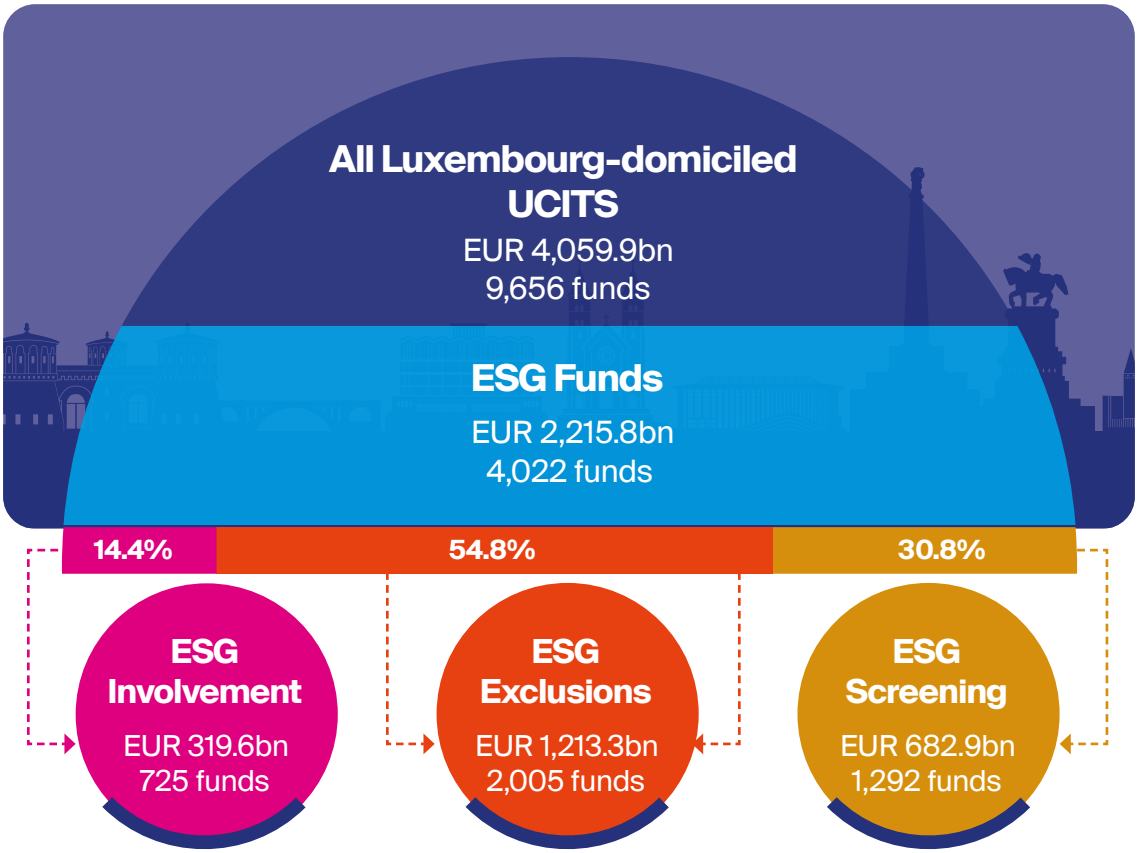
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

52. Other includes funds that have not reported their SFDR status and funds for which no public data is available.
53. Other includes funds that have not reported their SFDR status and funds for which no public data is available.

3.2. THE LUXEMBOURG ESG FUNDS LANDSCAPE

To add more granularity to our analysis of the Luxembourg ESG funds landscape, our study categorises the various dimensions of ESG funds in our sample based on the ESG strategy employed. In this context, as previously mentioned[54], we have placed ESG fund strategies into three main clusters namely: ESG Screening, ESG Exclusions and ESG Involvement (Exhibit 13).

Exhibit 13: Our approach to ESG funds (Q2 data, percentages and bar sizes in terms of AuM)[55]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

A closer look at these strategies showed ESG Exclusion to be the primary ESG strategy within the Luxembourg ESG fund universe, accounting for 55% and 50% of overall ESG fund value and number of funds respectively. ESG Screening was the second most applied strategy, with 31% of fund assets and 32% of funds. This relatively significant proportion of funds under ESG Screening could be attributed to the fact that it is not easy to assess as many funds prefer to have a more "flexible" ESG policy or may apply different strategies which somehow do not fall under these classifications. This attests to the need for further delineation of definitions and the resolution of other limitations within the SFDR. ESG Involvement was seen to constitute the least applied ESG strategy, with only 18% of funds and 14% of fund assets applying this strategy. These disparities are likely a result of the relative complexity of these strategies as well as the level of maturity and precision required for their implementation. However, before we proceed to review each of these clusters in detail, we would like to analyse a few major trends in the overall ESG domain.

54. See *Description of Fund ESG Characteristics* in Section 2.3.

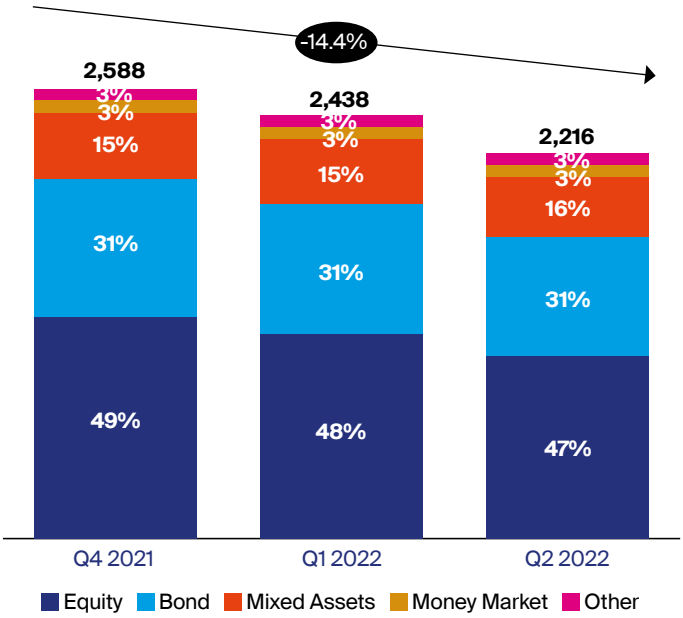
55. In order to calculate the number of funds, we started with a sample of more than 70,000 ISIN codes representing different share classes for all Luxembourg-domiciled UCITS. We then re-organised the data so as to have one share class/ISIN for each fund, resulting in a total of 9,656 funds indicated in this exhibit.

• ASSET CLASS BREAKDOWN

More than half of Luxembourg's UCITS universe AuM is ESG, and is driven by equities and bonds

Luxembourg-domiciled ESG fund assets stood at EUR 2.2tn as of end-Q2 2022 (Exhibit 14), representing 54.6% of all Luxembourg-domiciled UCITS AuM. Further, even though the end of Q2 2022 saw ESG assets falling by 14.4% in line with overall market decline, the share of assets in this cluster as a percentage of total market assets still stood at 55% - yet another indication of the increasing level of Luxembourg's ESG funds' adoption.

Exhibit 14: ESG UCITS AuM in Luxembourg (by Quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

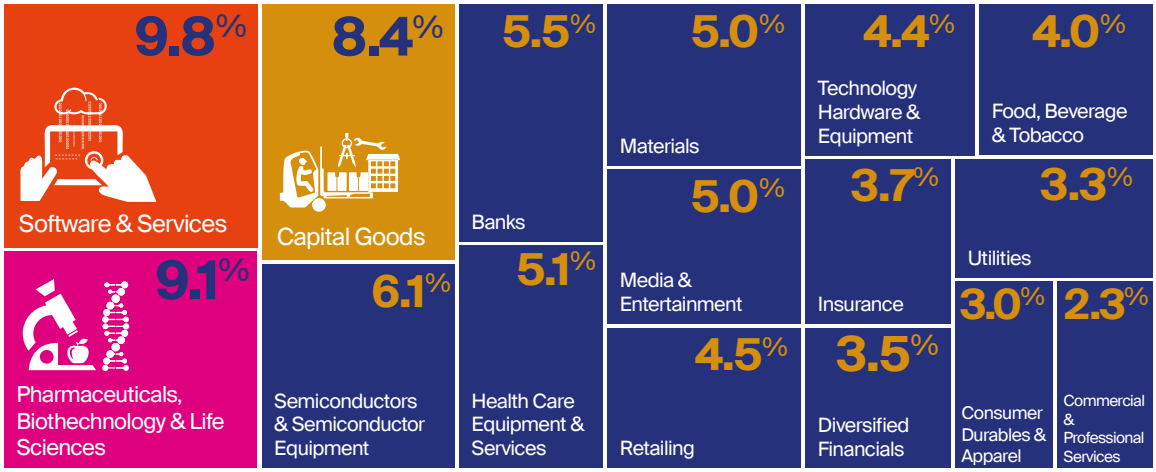
Equity was also seen to be the most dominant asset class for funds allocation in this segment, with the share of equity ESG assets as a percentage of total ESG assets standing at 49% and 47% as of end-2021 and end-Q2 2022 respectively. Not only that, but ESG equity assets constituted nearly a third of total equity fund assets in Luxembourg within the same period. This preference for ESG equities is largely attributable to the strong structural overlap between the active management style that is typically employed in managing both ESG and equity funds, institutional investors' growing interest in boosting ESG assets within their portfolios, as well as the strong draw of ESG to retail investors – who represent 61% of investors in Luxembourg's ESG funds. Bonds follow as the second most preferred asset class for ESG funds asset allocation, making up 31% of total ESG funds and 56% of total bond AuM in Luxembourg as of end-Q2 2022.

• SECTORAL ANALYSIS

Software & Services see highest indicative allocation of ESG fund assets

Our sector analysis of Luxembourg-domiciled ESG funds indicated allocation in several sectors. That being said, the Software & Services[56] sector stands out as holding the largest weight among our sector allocation for ESG funds, capturing nearly 10% of AuM (Exhibit 15). This was followed by the Pharmaceuticals, Biotechnology & Life Sciences sector with 9.1%, while the Capital Goods sector completes the top three sectors. This contrasts slightly with the overall market where Pharmaceuticals rank first, followed by Software and services[57].

Exhibit 15: Indicative AuM percentage allocation to top sectors (as of June 2022)[58]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

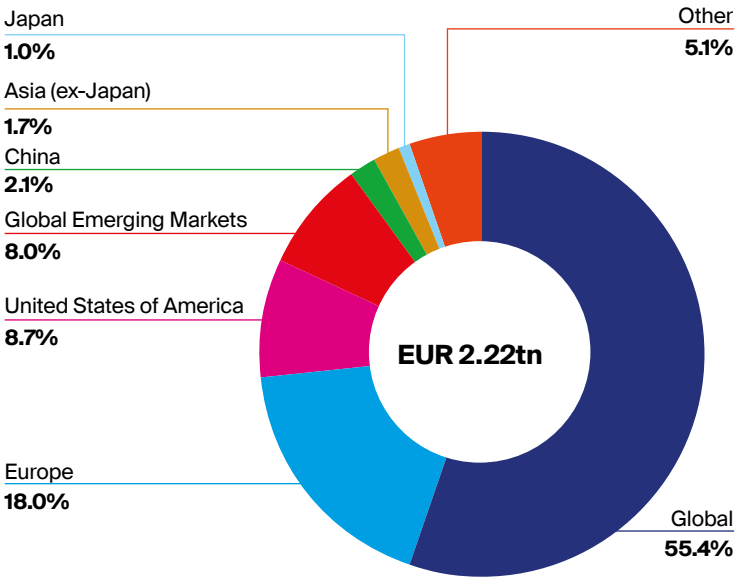
56. See *Appendix B.*
57. Refer to *Sectoral Analysis* in Section 3.1.
58. The total AuM of funds for which sector data was available is EUR 671bn or 30.3% of the EUR 2.2tn in this fund cluster. The remaining sectors account for 17.5% of the allocation.

• GEOGRAPHICAL FOCUS

55% of Luxembourg-domiciled ESG assets are allocated to funds with a global focus

The majority of ESG funds domiciled in Luxembourg have a global geographical focus and represent 55.4% of the ESG fund AuM (Exhibit 16). This is followed by Europe-focused funds[59] (18%) and US-focused funds (8.7%), while 8% of the AuM is held in funds investing in Emerging markets globally.

Exhibit 16: Top geographies by AuM % (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

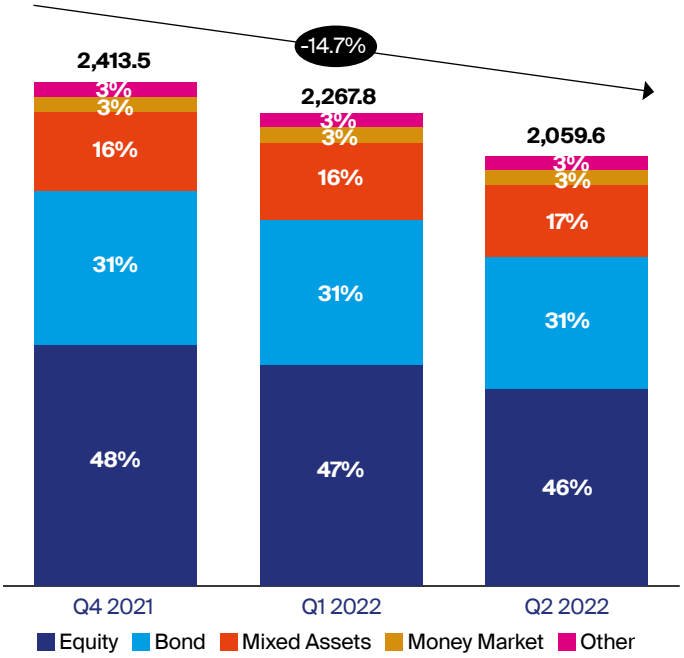
• MANAGEMENT STRATEGY SPLIT

Active management accounts for 93% of Luxembourg-domiciled ESG fund AuM

The discussion surrounding active and passive management extends to the Sustainable Finance realm. The widely held view is that the intentional and proactive integration of ESG within portfolios can only be executed through active strategies, with proponents pointing to the convergence between ESG exclusionary strategies and active management. For most, this argument is further supported by the lack of industry-accepted ESG indices to foster increased ESG passive investments, although there has been some progress in this respect with the development of the EU Climate Transition benchmarks and EU Paris-aligned benchmarks[60]. Within Luxembourg, the predominance of active management as the most utilised management style is supported by the fact that 93% of ESG funds' AuM is actively managed. At the end of June 2022, our study showed total active ESG fund AuM to be EUR 2.06tn, representing a 14.7% dip from the EUR 2.41tn it hit at the end of Q4 2021 and mirroring the overall market trend (Exhibit 17). In both periods – and throughout the review period – more than 45% of active assets were held in equity funds, further underscoring the position of equities as the leading asset class within the ESG fund universe. Bond and mixed assets follow as the second and third most dominant asset classes for active ESG assets, making up 31% and 17% of total active fund AuM as of end-Q2 2022.

59. The countries that constitute the Europe segment vary according to the fund manager.
60. https://finance.ec.europa.eu/regulation-and-supervision/implementing-and-delegated-acts/eu-climate-transition-benchmarks-regulation_en. There is currently insufficient data for these benchmarks to enable us to assess their rate of adoption by funds at this stage.

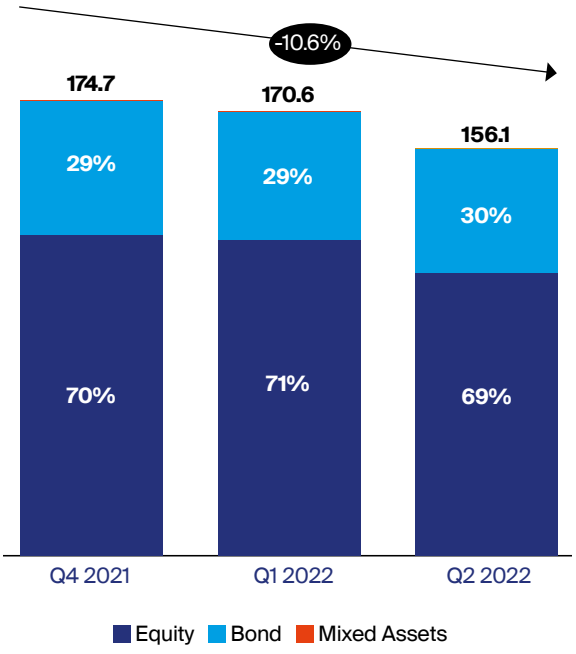
Exhibit 17: Active ESG UCITS AuM in Luxembourg (by quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

While overall assets in passive ESG funds are significantly lower in value than those in active funds, we observed a shifting focus by investors towards this cluster – a reflection of the wider market's attraction to the lower costs associated with passive investments. This culminated in the segment experiencing significant growth in 2021, and a less severe downturn during the first two quarters of 2022 compared to their active counterparts. Asset exposure within the passive segment was (almost) exclusively limited to equity and bonds, with these accounting for 69% and 30% of total passive ESG fund AuM as of end-Q2 2022 (Exhibit 18). Exposure to money market and other assets was either very marginal or non-existent. This, and the overall limited exposure of ESG assets to passive funds, can be attributed partially to the limited availability of passive ESG indices on the market – a trend that is likely to be reversed should the increased adoption of EU level benchmarks see more ESG passive products on the market.

Exhibit 18: Passive ESG UCITS AuM in Luxembourg (by quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• MANAGER HEADQUARTER SPLIT

French managers are leading the promotion of ESG investment funds in Luxembourg

When it comes to ESG fund managers' headquarters, US managers claim the lead in terms of fund AuM domiciled in Luxembourg. With EUR 508.6bn held in 670 funds, they rank first within the Luxembourg ESG sphere (Exhibit 19). Nevertheless, French asset managers rank first in terms of number of ESG funds in Luxembourg, having domiciled 738 funds promoting ESG investments.

Exhibit 19: Manager HQ split by AuM and number of funds (as of June 2022)

	Manager HQ	AuM Q2 2022 (EUR bn)	# of funds
1	USA	508.6	670
2	FR	357.8	738
3	CH	345.5	657
4	UK	276.1	395
5	DE	187.4	346
6	BE	120.0	158
7	IT	102.6	203
8	NL	96.5	203
9	DK	89.2	141
	Other	132.1	511
	TOTAL	**2,215.8**	**4,022**

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

In the subsequent section, we take a deeper dive into the three aforementioned ESG strategies, analysing the extent to which they permeate the Luxembourg Sustainable Finance realm.

3.3. OVERVIEW OF ESG SCREENING FUNDS

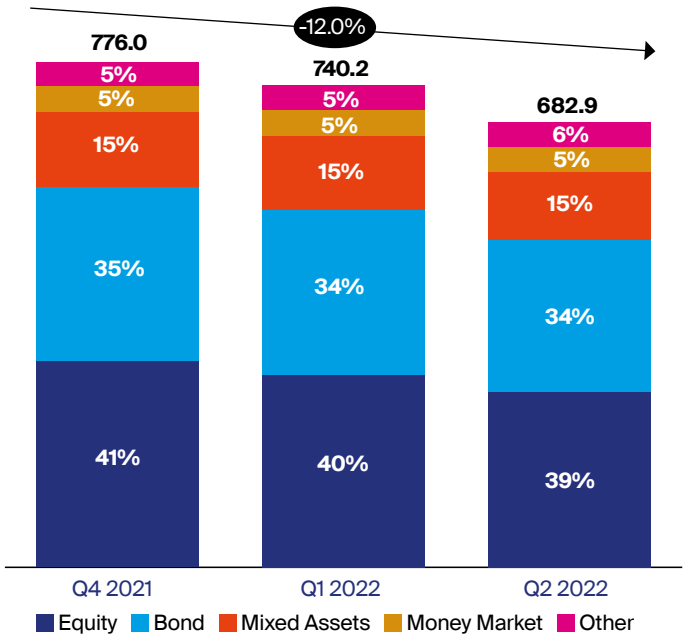
As mentioned in the methodology, our process of outlining funds' ESG characteristics identified a group of funds that were labelled as ESG due to the inclusion of ESG factors in their fund investment screening process. Given that these ESG funds followed a strategy that could not be classified as either ESG Exclusion or ESG Involvement (to be further explored in the subsequent chapters), we grouped them into a third segment called ESG Screening[61] funds for the purpose of our study. Accordingly, we identified the strategy as the second most applied strategy by 1,292 – or 32% – of funds within the Luxembourg ESG fund universe.

• ASSET CLASS BREAKDOWN

Equity and bonds show equitable distribution within ESG Screening Funds

Total assets of funds that applied ESG Screening stood at EUR 682.9bn at the end of the first two quarters of 2022 (Exhibit 20). This represented a 12% decrease since the beginning of the year in line with overall market volatility. Equity and bond funds were seen to hold the highest weighting in terms of asset class – 39% and 34% respectively – while Mixed assets followed with a 15% asset allocation. Notably, this was the only ESG strategy in our study that had a fairly equitable distribution of assets between equities and bonds, compared to all other categories.

Exhibit 20: ESG Screening Funds AuM in Luxembourg (by quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

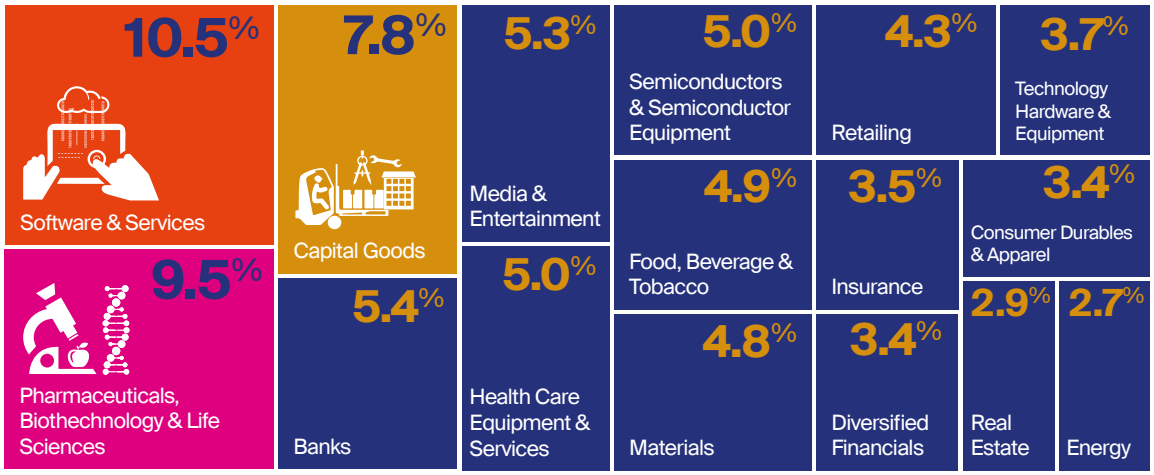
61. See *Description of Fund ESG Characteristics* in Section 2.3.

• SECTORAL ANALYSIS

Software & Services sees the highest allocation for ESG Screening Funds

In terms of sectoral allocation, Software & Services was seen to hold the highest allocation for ESG Screening Funds with 10.5% of fund AuM in this cluster. Pharmaceuticals and Capital Goods followed to complete the top three most dominant sectors in terms of allocation[62], respectively holding 9.5% and 7.8% of ESG Screening fund assets (Exhibit 21).

Exhibit 21: Indicative AuM percentage allocation to top sectors (as of June 2022)[63]



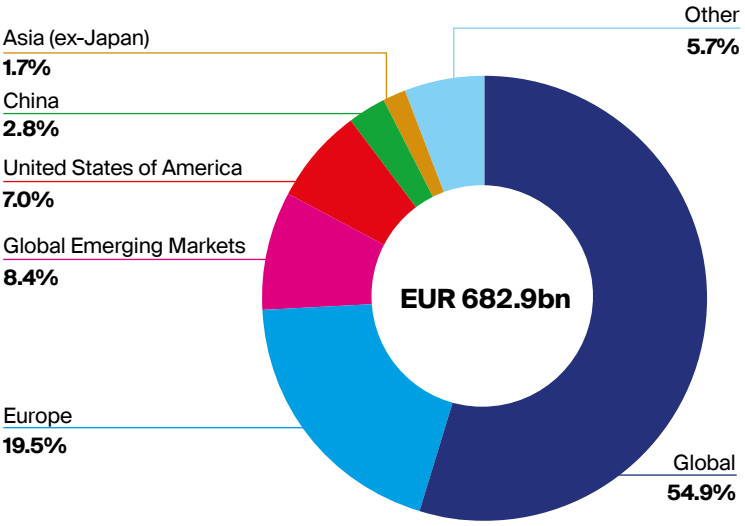
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• GEOGRAPHICAL FOCUS

Nearly 55% of ESG Screening AuM is placed in globally-focused funds

According to our analysis, close to 55% of our analysed ESG Screening funds' AuM are allocated to funds with a global focus. Europe-focused funds followed, holding 19.5% of ESG Screening assets, while 8.4% of assets in this cluster are invested in Global Emerging market funds (Exhibit 22).

Exhibit 22: Top Geographies by AuM Percentage (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

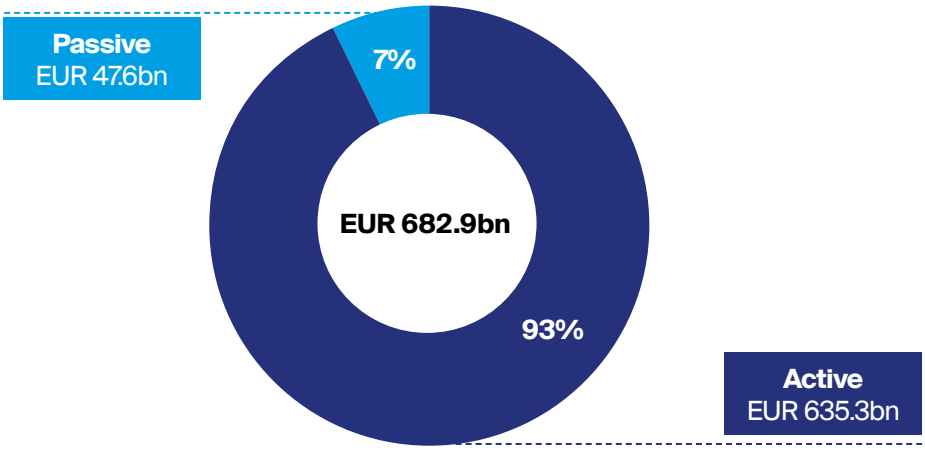
62. See *Appendix B.*
63. The total AuM of funds for which sector data was available is EUR 164bn or 24.0% of the EUR 682.9bn in this fund cluster. The remaining sectors account for 17.8% of the allocation.

• MANAGEMENT STRATEGY SPLIT

93% of ESG Screening Funds are aligned with active management

Active management was demonstrated to be the most dominant management strategy in this segment, accounting for 93% of the ESG Screening funds analysed in the study, while passive management constituted the remaining 7% of funds. That being said, these actively managed ESG Screening funds recorded higher net YTD outflows of EUR 7.7bn as of end-June 2022. On the other hand, their passive counterparts ended the same period with slightly positive net flows of EUR 0.3bn (Exhibit 23).

Exhibit 23: Active vs passive management (as of June 2022)



Management	Net Flows (YTD)	Number of Funds
Active	-7.7	1,223
Passive	0.3	69
TOTAL	-7.3	1,292

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• MANAGER HEADQUARTER SPLIT

Swiss managers boast the largest number of ESG Screening funds

A look at manager headquarters showed that US managers, with EUR 152bn, are leading in terms of total assets in Luxembourg-domiciled ESG Screening funds. This is followed by Switzerland and France, with EUR 125.7bn and EUR 107.6bn respectively. Collectively, these three countries account for 56.4% of Luxembourg-domiciled ESG Screening AuM. In terms of number of funds, however, asset managers based in Switzerland have more ESG Screening funds domiciled in the country than their US counterparts, with the top three in terms of number of funds being completed by France (Exhibit 24).

Exhibit 24: Manager HQ split by AuM and number of funds (as of June 2022)

	Manager HQ	AuM Q2 2022 (EUR bn)	# of funds
1	USA	152.0	203
2	CH	125.7	254
3	FR	107.6	237
4	DE	87.6	131
5	UK	53.9	117
6	BE	47.8	48
7	LU	26.5	93
8	DK	25.6	28
9	SG	17.1	35
10	IT	10.8	46
	Other	28.3	14
	TOTAL	**682.9**	**1,292**

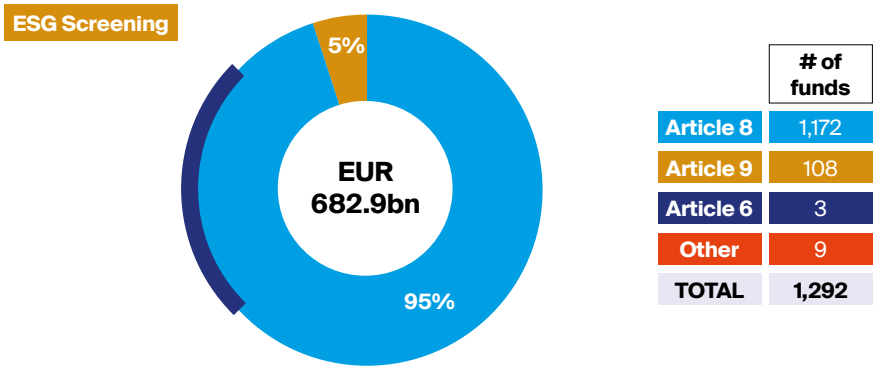
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• SFDR SPLIT

More than 90% of ESG Screening funds disclose compliance with Article 8 of the SFDR

As is consistent with the majority of Luxembourg-domiciled ESG funds in our study, 91% of ESG Screening funds were found to adhere to Article 8 disclosure requirements under the SFDR, as was 95% of ESG Screening AuM (Exhibit 25). This relatively significant proportion of Article 8 funds under ESG Screening can largely be attributed to the fact that many funds prefer to have a more "flexible" approach to integrating sustainability objectives within their portfolios, and attests to the need for further delineation of definitions and possibly stricter disclosure requirements within the SFDR.

Exhibit 25: SFDR Split by AuM and Number of Funds

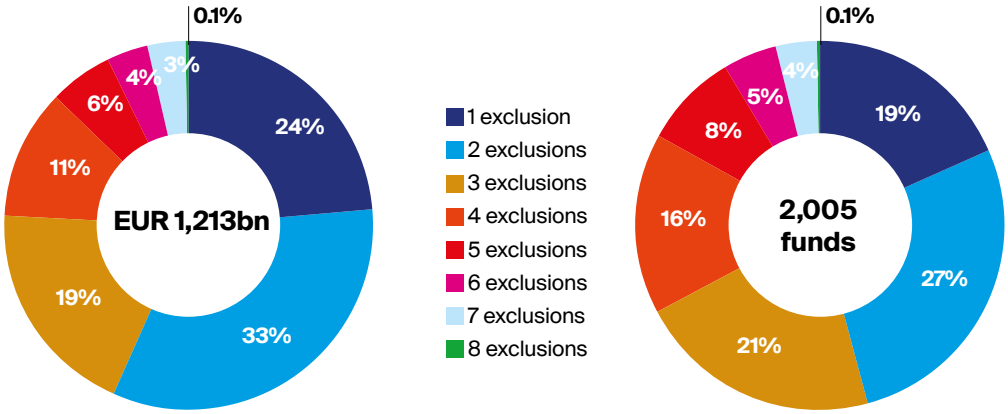


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

3.4. OVERVIEW OF ESG EXCLUSION FUNDS

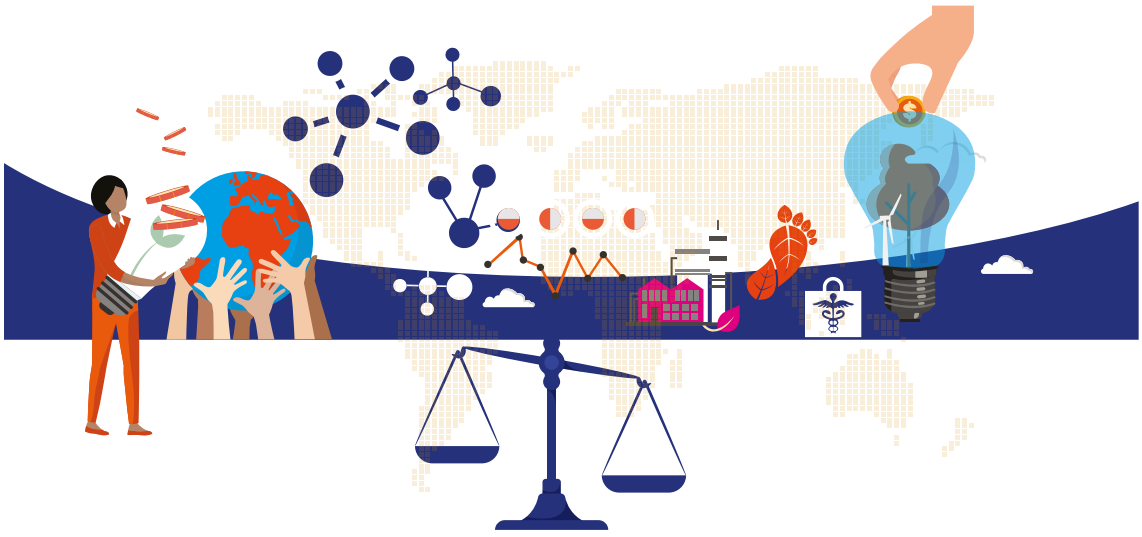
Funds in the ESG Exclusion cluster exclude companies operating in one or more controversial sectors (weapons, tobacco, fossil energy, adult entertainment, nuclear, alcohol and drugs, GMO and others)[64] from their investable universe. These funds constitute 50% of the total number of funds within the Luxembourg-domiciled ESG UCITS realm – of which 27% apply up to 2 exclusions and 21% apply up to 3 (Exhibit 26). The significant number of funds applying exclusion criteria can be attributed largely to the fact that the exclusion of companies that operate within controversial sectors from the investable universe of a fund is typically the preliminary step for asset managers who are trying to shift towards a "sustainability" profile.

Exhibit 26: Number of exclusions for ESG Exclusion funds (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

That being said, this strategy has come under some scrutiny by market participants for two key reasons. The first is the fact that merely excluding a company from a portfolio does not necessarily push the company towards its sustainability transition – especially in the absence of key fund managers to enforce "active ownership" either through voting or company engagement. The second reason is the widescale perception of this strategy as a fast-track solution to mangers' efforts to classify funds as ESG.



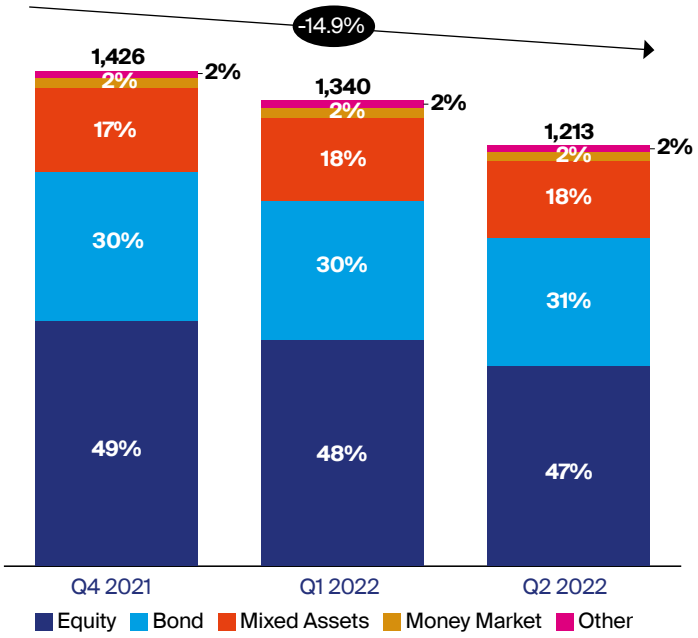
64. See *Description of Fund ESG Characteristics* in Section 2.3.

• ASSET CLASS BREAKDOWN

Equity and bond funds dominate in terms of fund AuM, but mixed assets also hold a sizeable share

AuM of funds held in this cluster reached EUR 1.2tn as of end-June 2022 (Exhibit 27). Equity and bonds, being the main constituents, make up 47% and 31% of total assets respectively. That being said, since this ESG Exclusion strategy allows for a certain level of flexibility and is relatively easier to implement across all asset classes, mixed assets also hold a respectable portion of 18% total assets within the segment – the highest share of mixed assets per ESG strategy in our study.

Exhibit 27: ESG Exclusions Funds AuM in Luxembourg (by quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

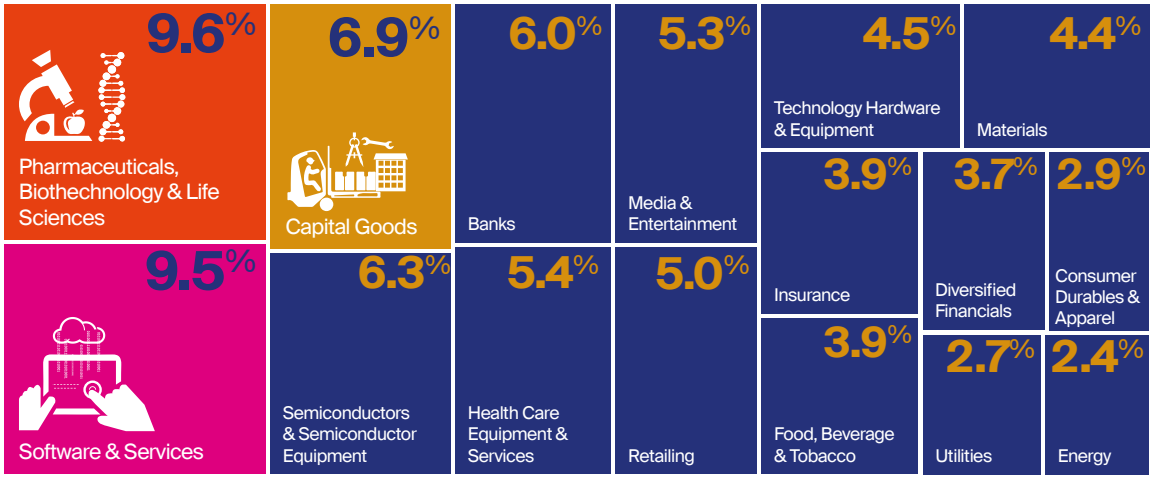
As a subset of the overall Luxembourg funds universe, ESG Exclusion funds were not exempt from the impact of the market turmoil and economic downturn observed during the first half of the year, reflected by a 14.9% dip in assets.

• SECTORAL ANALYSIS

Pharmaceuticals, Biotechnology & Life Sciences industry tops sectoral allocation rankings

When looking at the sectoral allocation of ESG Exclusion fund AuM, Pharmaceuticals, Biotechnology, and Life sciences[65] are seen to collectively hold the highest asset allocation of 9.6%. Software and Services followed closely with a 9.5% allocation, while Capital Goods accounted for 6.9% of assets managed under this ESG criteria (Exhibit 28). This sectoral allocation distribution is very similar to the overall market in Luxembourg - a convergence that is possibly explained by the fact that the ESG Exclusion fund cluster alone accounts for approximately 30% of all Luxembourg-domiciled UCITS AuM. Moreover, even with the implementation of the ESG Exclusion criteria, most funds maintain their overall portfolio diversification, allowing them to have a similar allocation distribution as some non-ESG funds.

Exhibit 28: Indicative AuM percentage allocation to top sectors (as of June 2022)[66]



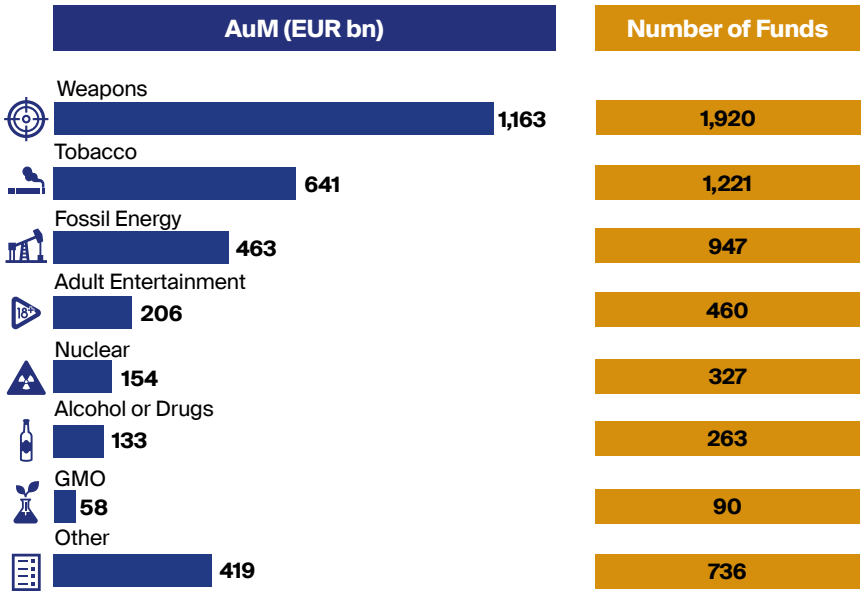
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Weapons, tobacco and fossil energy are the most frequently excluded sectors by ESG funds

Our sectoral analysis also looked at the implementation of this ESG strategy in terms of excluding specific sectors. Here, our results showed weapons as the most excluded sector, with 96% of all ESG Exclusion funds ruling out investments in this sector from their portfolios (Exhibit 29). Tobacco represents the second most excluded sector, with 1,221 funds eliminating companies that operate in this business area from their investable universe. Following the aforementioned sectors is fossil fuels, which completes the top three sectors in terms of exclusions. As heightened efforts towards decarbonisation, net zero commitments and sustainable development calls for a complete abolishment of this sector, 947 funds representing more than EUR 460bn of AuM are excluding this sector as of June 2022.

65. See *Appendix B.*
66. The total AuM of funds for which sector data was available is EUR 420bn or 34.6% of the EUR 1.21tn in this fund cluster. The remaining sectors account for 17.6% of the allocation.

Exhibit 29: AuM and number of ESG funds excluding each sector (as of June 2022)[67]



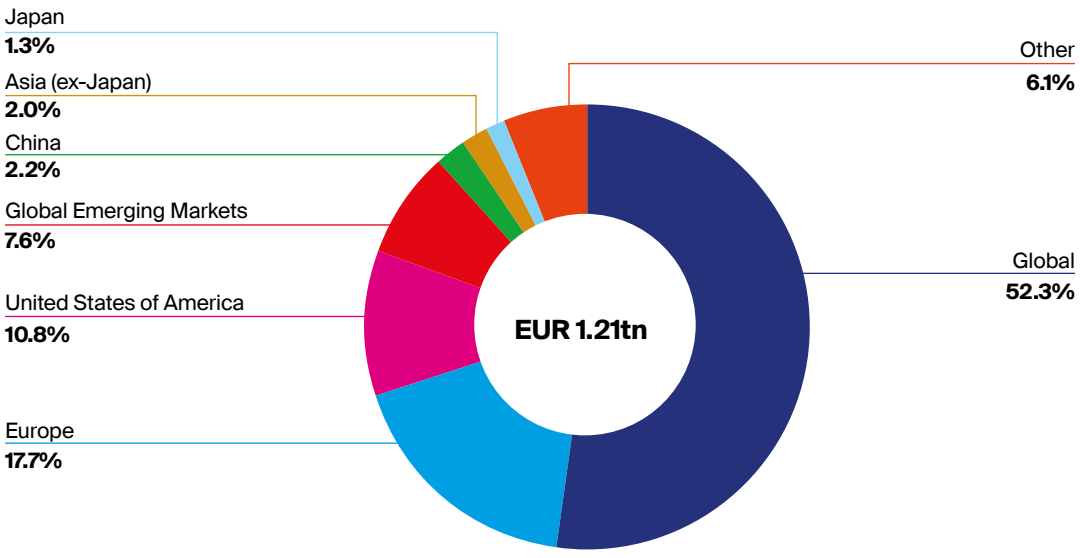
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• GEOGRAPHICAL FOCUS

Over 50% of ESG Exclusion AuM are held in globally-focused funds

ESG Exclusion funds do not only mirror the overall fund industry when it comes to sectoral allocation, but also in terms of assets' geographical focus. The results of our analysis showed that the majority (52.3%) of assets held in ESG Exclusion funds have a global focus, followed by Europe[68] (17.7%) and the US (10.8%) (Exhibit 30). This allows investment managers to provide clients with a significant degree of global coverage and diversification without deviating from maintaining their portfolio's focus on exclusion.

Exhibit 30: Top Geographies by AuM Percentage (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

67. Funds within this cluster can apply exclusion of more than one sector. As a result, the AuM shown sum up to more than the total for this fund cluster.

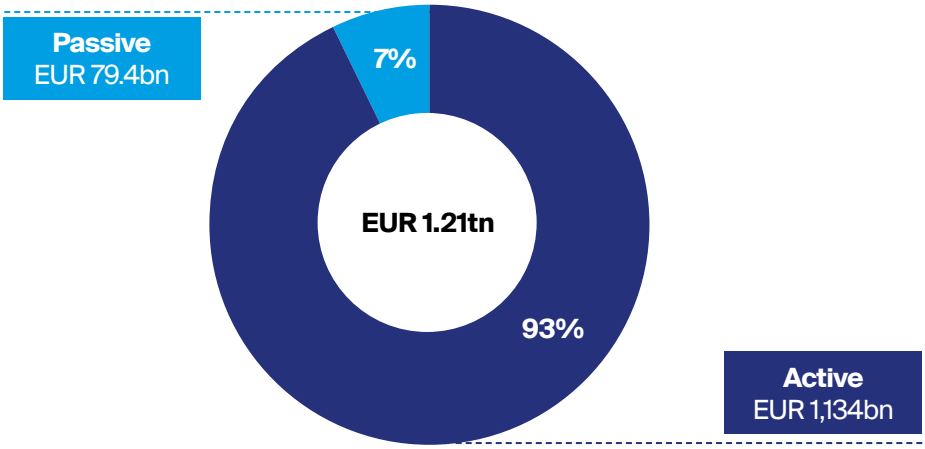
68. The countries that constitute the Europe segment vary according to the fund manager.

• MANAGEMENT STRATEGY SPLIT

Active management is the most adopted management approach, but passives record more inflows

In terms of management strategies, our analysis showed active funds to account for 93% of AuM in this fund cluster. Nevertheless, these funds recorded net YTD outflows of EUR 28.2bn between January and June 2022, while their passive counterparts have recorded positive net sales during the same period (Exhibit 31). While this result may appear counter-intuitive in light of current market sentiments, it is not unusual. Fund managers' attempts to comply with pension and insurance fund mandates to invest new inflows in lower-cost and diversification-aligned ETFs is giving rise to a surge in passive investments.

Exhibit 31: Active vs passive management (as of June 2022)



Management	Net Flows (YTD)	Number of Funds
Active	-28.2	1,877
Passive	2.2	128
TOTAL	-26.0	2,005

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• MANAGER HEADQUARTER SPLIT

USA-headquartered asset managers rank first both in terms of AuM and number of ESG Exclusion funds

When analysing the headquarters of asset managers domiciling their ESG Exclusion funds in Luxembourg, the study further showed that US, followed by UK and French asset managers, are leading in terms of Luxembourg-domiciled AuM. Collectively, these three countries boast a combined AuM of EUR 677bn (or 54% of the AuM within this fund cluster). Nevertheless, when it comes to the number of funds, French and Swiss managers follow the US as having the second and third largest number of ESG Exclusion funds domiciled in Luxembourg (Exhibit 32).

Exhibit 32: Manager HQ split by AuM and number of funds (as of June 2022)

	Manager HQ	AuM Q2 2022 (EUR bn)	# of funds
1	USA	314.5	369
2	UK	192.8	229
3	FR	170.0	322
4	CH	149.6	299
5	NL	83.6	135
6	DE	82.0	143
7	IT	62.0	125
8	BE	59.2	71
9	DK	47.6	103
10	LU	25.1	110
	Other	26.8	99
	TOTAL	**1,250.9**	**2,005**

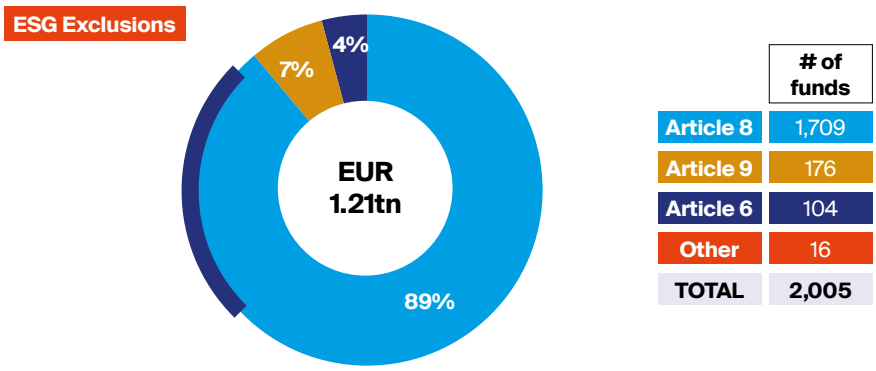
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• SFDR SPLIT

Article 8 funds dominate in the ESG Exclusion fund cluster

The majority of funds within the ESG Exclusion cluster follows Article 8 disclosure requirements under the SFDR – 85% to be precise – while Article 9 funds represent 9% of the total number of funds (Exhibit 33). In terms of fund assets, Article 8 and 9 exclusion funds hold 89% and 7% respectively of total fund AuM within the cluster. This predilection for Article 8 compliance can be attributed to the compatibility of the less stringent disclosure requirements with the implementation of an ESG exclusion strategy.

Exhibit 33: SFDR Split by AuM and Number of funds

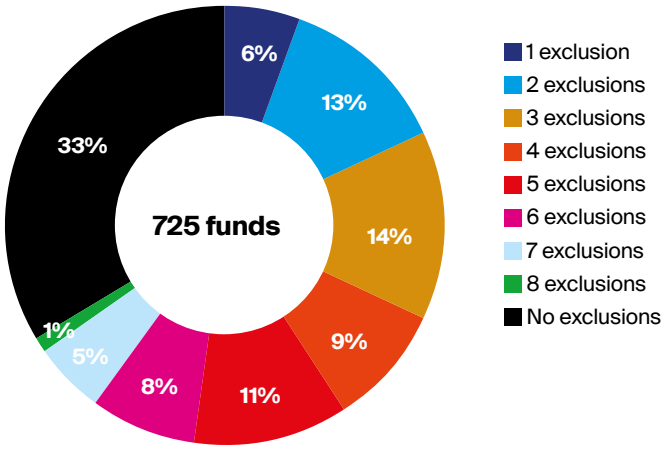


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

3.5. OVERVIEW OF ESG INVOLVEMENT FUNDS

Our study also identified 725 ESG Involvement funds that constitute 18% of all Luxembourg-domiciled ESG funds. These are funds that pursue a more focused ESG strategy; namely Best in class, Positive Tilt, Thematic, Microfinance, Sustainable Development Goals, and Sustainable Bonds[69], by considering companies that actively employ best ESG practices or companies within a sector that have a high level of ESG integration within their governance and operations. This criterion also applies to and includes funds that are working towards the achievement of Sustainable Development Goals (SDGs) or a specific ESG theme (such as Thematic or Microfinance), as well as funds specialised in a specific type of sustainability-related instruments (such as sustainable bonds). This section looks at overall funds within this segment and continues to fully explore the sub-strategies in a subsequent section. It is worth noting that in addition to the ESG Involvement strategy, some of the funds in this cluster also apply exclusion criteria, with 66.6% of the 725 funds in this cluster applying at least one exclusion criteria while 11% exclude up to 5 controversial sectors[70] from their investable universe (Exhibit 34).

Exhibit 34: Number of exclusions applied by ESG Involvement funds (as of June 2022)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

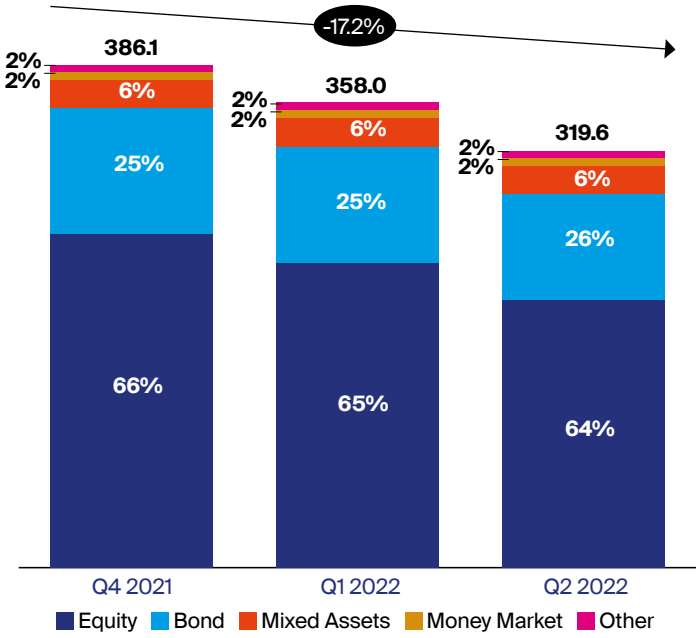
• ASSET CLASS BREAKDOWN

ESG Involvement funds recorded a significant increase in assets, followed by a sharp decline in 2022

Our analysis showed total AuM of ESG Involvement funds to reach EUR 320bn at the end of Q2 2022, representing a significant drop of more than 17% from nearly EUR 390bn at the end of 2021 (Exhibit 35). This was seen to be the highest rate of decline in assets noted among all three categories. Assets in equity funds constituted 64% of this figure while bond assets made up 26%. Given that the investable universe for funds in this cluster is more limited than funds in other categories, they are more prone to the spillover impacts of a downturn in one or more companies within the universe.

69. See *Description of Fund ESG Characteristics* in Section 2.3.
70. See *Description of Fund ESG Characteristics* in Section 2.3.

Exhibit 35: ESG Involvement Funds AuM in Luxembourg (by quarter, EUR bn)



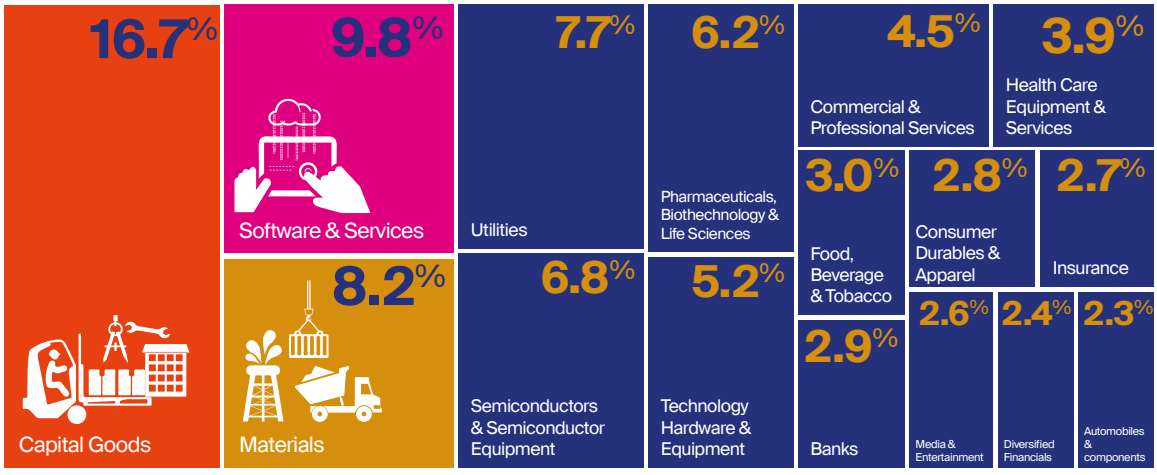
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• SECTORAL ANALYSIS

Capital Goods industry is among the most preferred sectors for funds in this cluster

Capital Goods was seen to be the most preferred sector for ESG Involvement funds, constituting 16.7% of fund allocation by sector[71]. This was followed by Software & Services and Materials, respectively holding 9.8% and 8.2% of fund assets (Exhibit 36). Interestingly, the Pharmaceuticals sector was seen to have a relatively smaller allocation within this segment (6.2%), as compared to ESG Exclusion (9.6%) and ESG Screening (9.1%).

Exhibit 36: Indicative AuM percentage allocation to top sectors (as of June 2022)[72]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

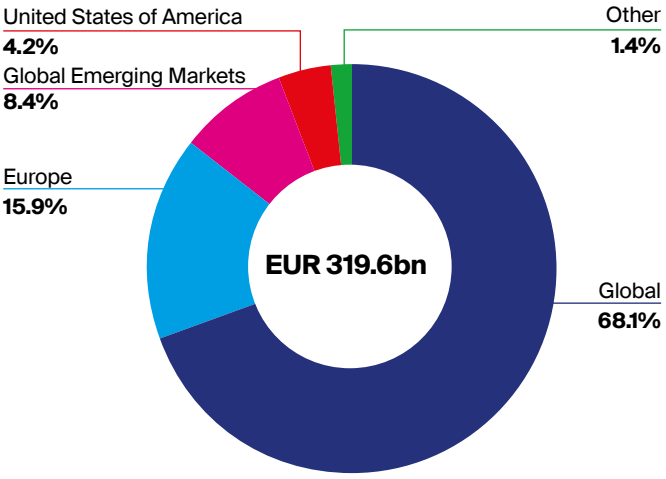
71. See *Appendix B.*
72. The total AuM of funds for which sector data was available is EUR 86.7bn or 27.1% of the EUR 319.6bn in this fund cluster. The remaining sectors account for 12.3% of the allocation.

• GEOGRAPHICAL FOCUS

Global-focused funds hold over 65% of ESG Involvement Funds

In addition to this sectoral distribution, our study also found 68.1% of ESG Involvement assets to be held in global-focused funds while 15.9% were in Europe-focused funds[73] – opening up a variety of options for managers when it comes to investments (Exhibit 37). Surprisingly, a respectable 8.4% of fund AuM was seen to be dedicated to Emerging markets, indicating a burgeoning focus by this cluster on geographical areas where there still remains plenty room for further ESG integration.

Exhibit 37: Top Geographies by AuM Percentage (as of June 2022)



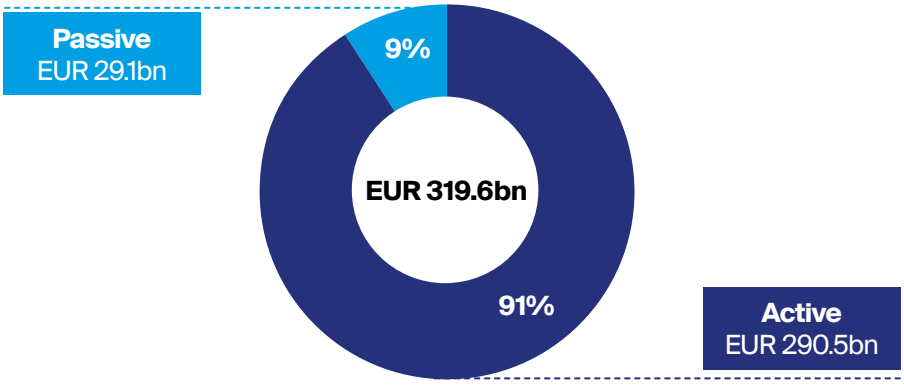
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

• MANAGEMENT STRATEGY SPLIT

More than 90% of ESG Involvement AuM is highly compatible with active management

As was seen in other clusters, active management is the go-to management strategy for ESG involved funds, constituting 91% of fund AuM in this segment while the remaining 9% is passively managed (Exhibit 38). YTD net flow data further reflects this distribution of active and passive fund assets, with the former being the sole contributor to outflows within the segment. This is likely due to the fact that managers in this category are more active and deliberate in ensuring that funds included in their ESG involved portfolios meet specific sustainability objectives and do not merely exclude unfavourable sectors.

Exhibit 38: Active vs Passive management (as of June 2022)



Management	Net Flows (YTD)	Number of Funds
Active	-6.9	648
Passive	3.3	77
TOTAL	-3.6	725

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

73. The countries that constitute the Europe segment vary according to the fund manager.

• MANAGER HEADQUARTER SPLIT

French asset managers demonstrate high inclination towards ESG Involvement

In addition to this analysis of funds' geographical distribution, we also observed that the ESG Involvement fund cluster is dominated both in terms of fund AuM and number of funds offered by French asset managers (Exhibit 39). This is likely the result of surging demand by retail investors, translating into increased offerings by managers of products that correspond to investors' sustainability needs. Swiss managers come second in our ranking, followed by US-headquartered managers in third place.

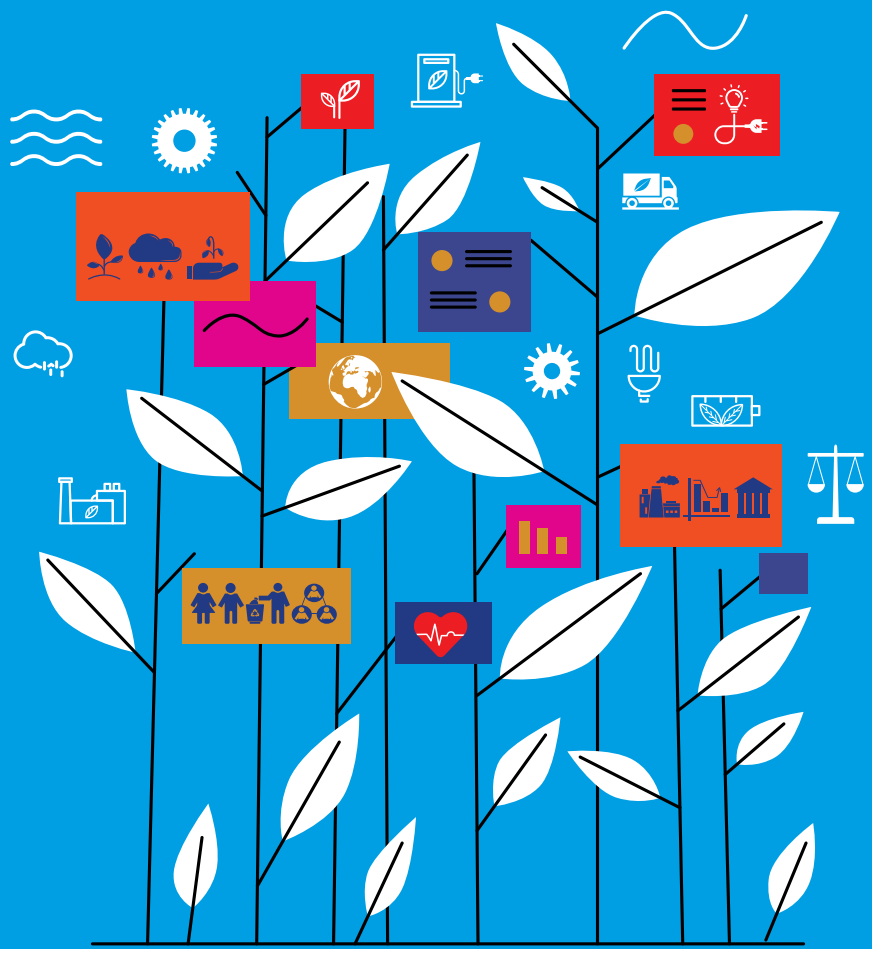
Exhibit 39: Manager HQ split by AuM and number of funds (as of June 2022)

	Manager HQ	AuM Q2 2022 (EUR bn)	# of funds
1	FR	80.2	179
2	CH	70.2	104
3	USA	42.1	98
4	UK	29.4	49
5	NL	27.5	54
6	DE	17.9	72
7	DK	15.9	10
8	BE	13.0	39
9	LU	9.4	58
10	IT	8.2	22
	Other	5.9	40
	TOTAL	**359.2**	**725**

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

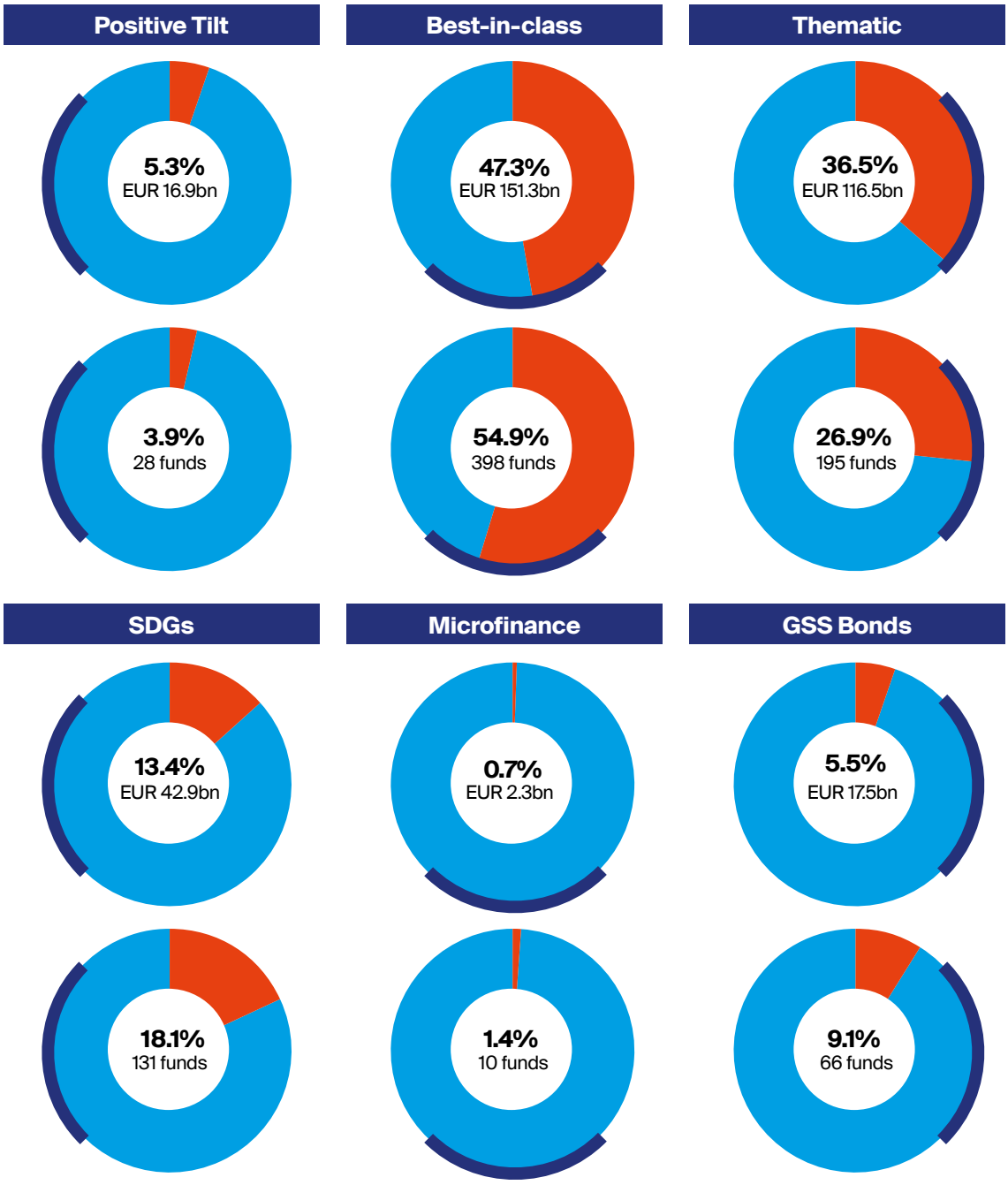
4.

QUANTITATIVE ANALYSIS: SUB-STRATEGIES UNDER ESG INVOLVEMENT



In anticipation of a more stringent regulatory environment to drive the further integration of sustainability objectives within the Luxembourg fund investment universe, investment managers would have to decide the most viable approach to adopt in efforts to ensure compliance to mandates of their increasingly ESG-demanding client base. While our analysis showed that some funds follow more than one sub-strategy[74], the majority of funds – 89% represented by 645 out of 725 funds in the ESG Involvement cluster – follow only one of the following strategies (Exhibit 40).

Exhibit 40: AuM and Number of funds for each ESG Involvement strategy (as of June 2022)[75*]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

74. Our analysis does not assess or verify the strategy itself; it provides an overview on collected datasets.
75. *Funds within this cluster can apply more than one of the ESG Involvement strategies. As a result, the percentages shown sum up to more than 100%.

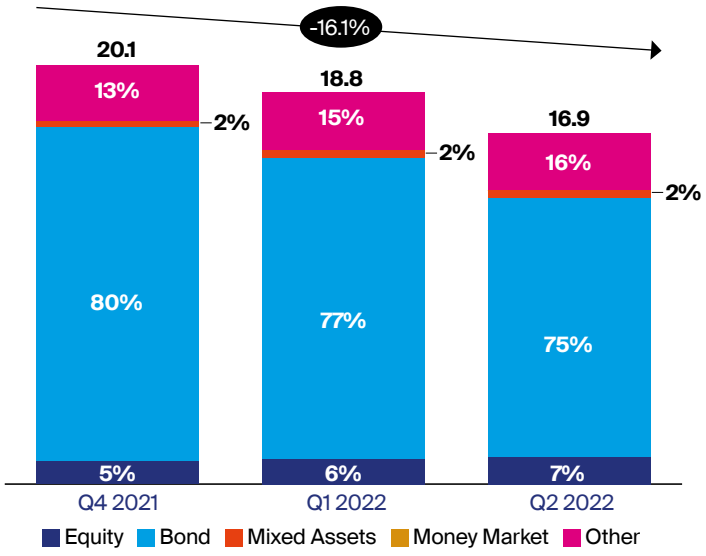
4.1. OVERVIEW OF ESG INVOLVEMENT SUB-STRATEGIES

This section of the report provides a more granular exploration of the sub-strategies within the ESG Involvement cluster, namely Positive Tilt, Best-In-Class, Thematic, SDGs, Microfinance and GSS (Green, Social, Sustainability) bonds[76,77].

• POSITIVE TILT

Funds that employ the positive tilt strategy typically attach greater weight to leading companies in terms of ESG engagement compared to the weight attached to the benchmark of the fund. As such, the financial performance of funds in this segment is driven – to a large extent – by the performance of companies with higher ESG ratings and less by ESG laggards. Our analysis indicated that, within the ESG Involvement sphere, only 28 funds representing EUR 16.9bn of AuM are following this investment strategy as of the end of Q2 2022 – from EUR 20.1bn at the end of Q4 2021 (Exhibit 41). A possible reason for the low popularity of this strategy could be the gradual development of ESG benchmarks that are aligned with either the EU Climate Transition benchmarks or the EU Paris-Aligned Benchmarks Agreement[78]. That would also explain the large dominance of bond investments in this space. In fact, bonds constitute the majority of this fund strategy segment, accounting for EUR 12.6bn or approximately 75% of the assets in this cluster.

Exhibit 41: AuM of funds applying the positive tilt strategy (by quarter, EUR bn)

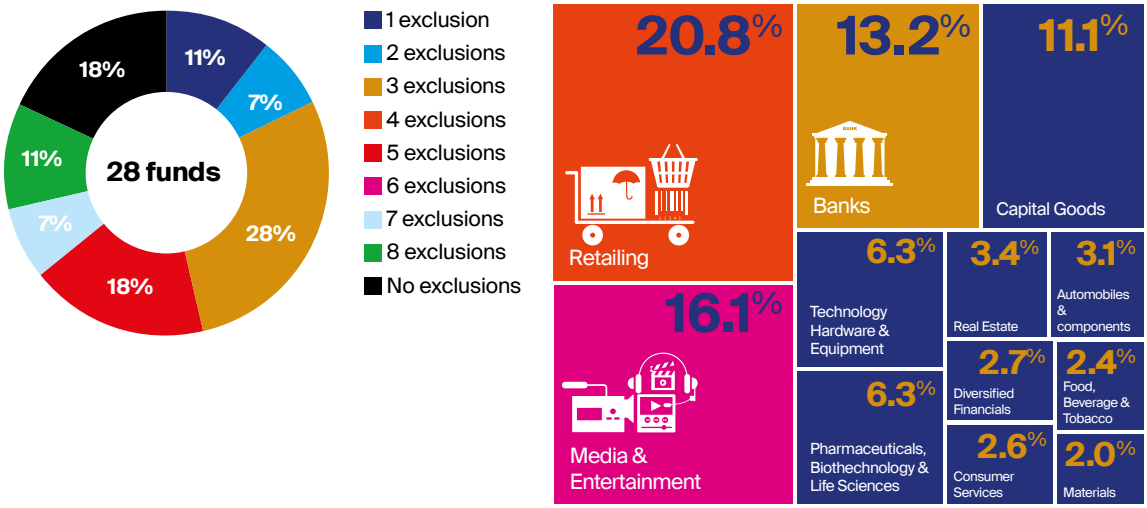


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

76. See *Description of Fund ESG Characteristics* in Section 2.3.
77. Our analysis does not assess or verify the strategy itself; it provides an overview on collected datasets based on Refinitiv Lipper dataset.
78. https://finance.ec.europa.eu/regulation-and-supervision/implementing-and-delegated-acts/eu-climate-transition-benchmarks-regulation_en. There is currently insufficient data for these benchmarks to enable us to assess their rate of adoption by funds at this stage.

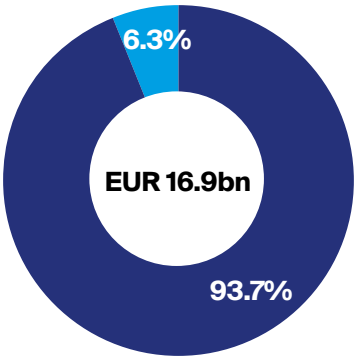
In terms of exclusions, 82% of the funds following the positive tilt strategy also exclude at least one sector. Further, our indicative sample suggests that the Retail sector[79] attracted the largest percentage of asset allocation (20.8%), followed by Media & Entertainment (16.1%) and Banks (13.2%) (Exhibit 42). In terms of management, nearly 94% of AuM within this sub-strategy is held in actively managed funds (Exhibit 43).

Exhibit 42: Number of exclusions applied (number of funds) and Indicative AuM percentage allocation to top sectors (as of June 2022)[80]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Exhibit 43: Active vs Passive Management (as of June 2022)



	# of funds
Active	25
Passive	3
TOTAL	28

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

79. See *Appendix B.*
80. The total AuM of funds for which sector data was available is EUR 0.8bn or 4.6% of the EUR 16.8bn in this fund cluster. The remaining sectors account for 10.1% of the allocation.

• BEST-IN-CLASS

The Best-In-Class strategy typically involves the portfolio manager of a fund selecting the best companies in terms of ESG engagement within a sector. By itself, the approach does not directly exclude any sectors from the potential investment universe. In fact, the asset manager could choose companies from less "green" sectors, as long as they have sound ESG policies in place. An example of this would be selecting an oil company with the lowest emission levels or an oil company with clear plans towards decarbonisation.

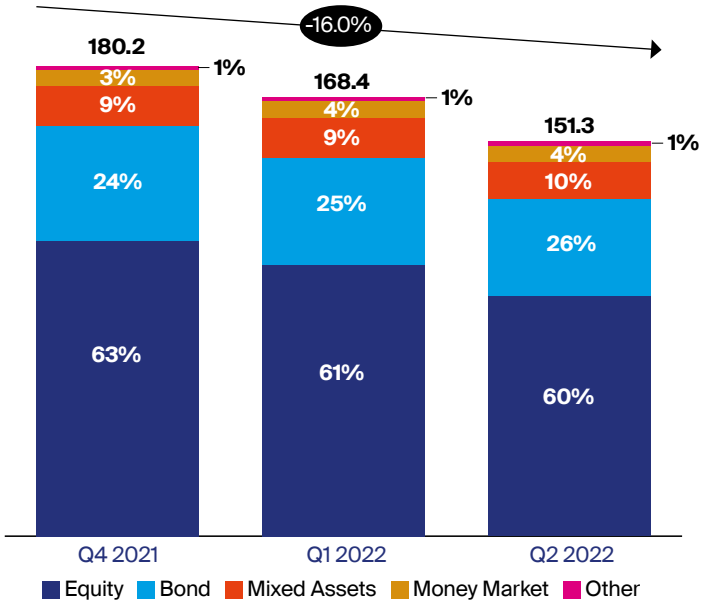
Among the sub-strategies examined in our study, this strategy proved to be the most popular, with 398 – or 54.9% - of the 725 ESG Involvement funds employing best-in-class screenings in their investment selection process, while Best-In-Class fund assets made up 47.3% of the total fund AuM in the ESG Involvement cluster. The increased preference for this strategy can possibly be attributed to two reasons:

a. Portfolio managers of a fund can keep a high degree of diversification in their portfolio on the condition that no sectors should be excluded.

b. This strategy rewards companies that successfully transitioned from being low-ESG to being high-ESG (compared to their peers).

Assets in this cluster reached EUR 151.3bn as of June 2022, after experiencing a 16% drop since the beginning of the year on the back of the wider market selloff (Exhibit 44). Equity and bond funds account for 59.8% and 25.6% of total fund assets respectively, with equity consistently taking up a significant proportion of assets allocation throughout the review period.

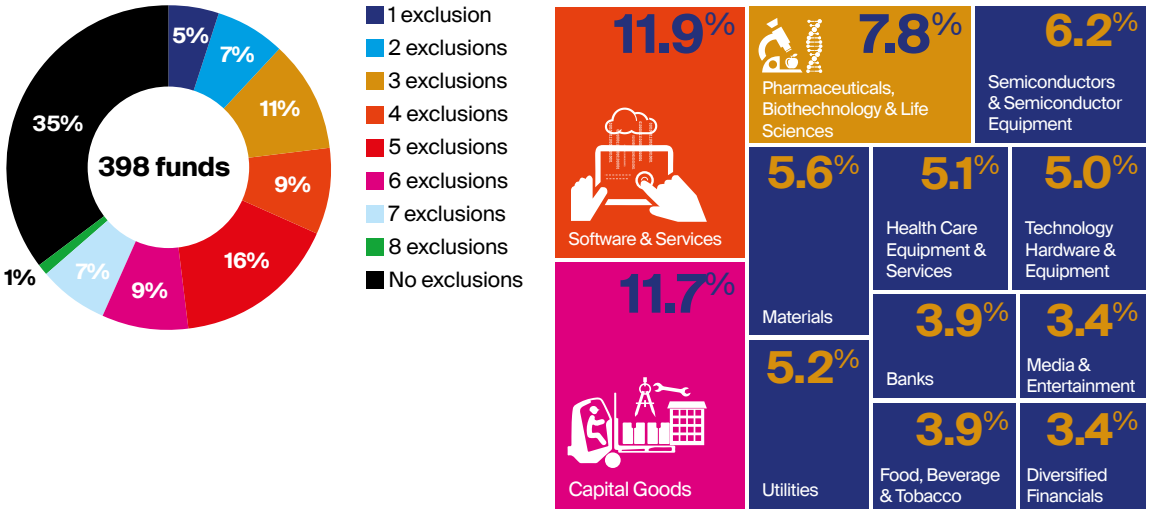
Exhibit 44: AuM of funds applying the Best-in-Class strategy (by quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

65% of the funds in this cluster were found to apply the exclusion of at least one sector from their investment selection process, and 53% exclude three or more sectors. A look at sectoral weightings in this cluster saw Software & Services[81] boasting the highest percentage of allocated capital. Capital Goods boasts the second largest allocation, while the top three is completed by the Pharmaceutical, Biotechnology & Life Sciences industry with 7.8% of Best-In-Class AuM (Exhibit 45).

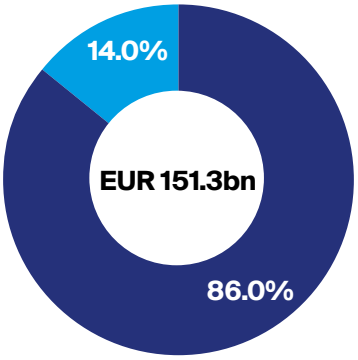
Exhibit 45: Number of exclusions applied (number of funds) and Indicative AuM percentage allocation to top sectors (as of June 2022)[82]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

In addition, we observed a relatively high share of passive investments for funds in this cluster compared to other sub-strategies, with 14% of the AuM held in passively managed funds (Exhibit 46). The flexibility offered by this sub-strategy to invest in several sectors makes it easier to track large indices in the market and underscores its compatibility with passive fund investments.

Exhibit 46: Active vs Passive Management (as of June 2022)



	# of funds
Active	351
Passive	47
TOTAL	398

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

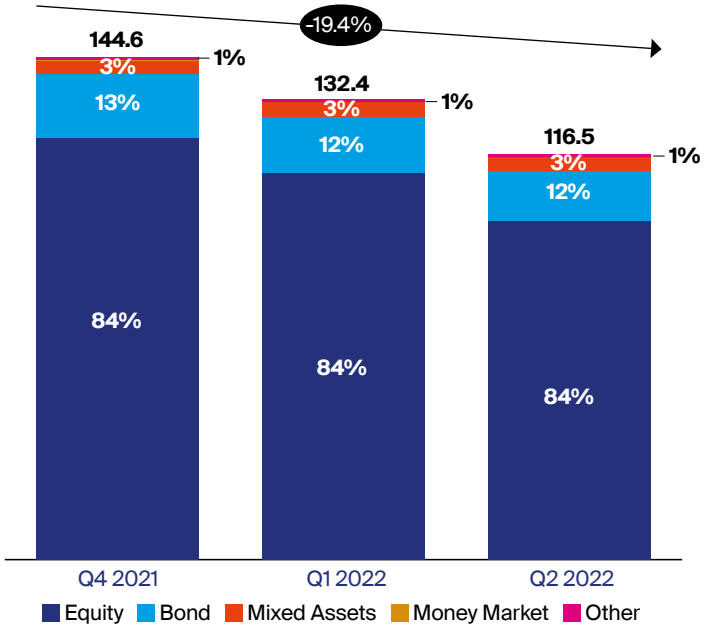
81. See *Appendix B*.
82. The total AuM of funds for which sector data was available is EUR 47.3bn or 31.3% of the EUR 151.3bn in this fund cluster. The remaining sectors account for 26.9% of the allocation.

THEMATIC

Thematic investing funds are also quite common among asset managers, as they represent one of the sustainable investment strategies used by numerous funds globally. A fund identified as thematic suggests that it primarily focuses on thematic areas pursuing sustainability objectives, including, for example, clean water, low carbon, low pollution, climate change, and energy efficiency, among others. Consequently, this investment strategy is ideal for investors who are interested in targeting a specific element of the ESG universe – for example decarbonisation – instead of selecting a fund with a more "generic" ESG investment mandate.

The thematic sub-strategy is the second largest within the ESG Involvement domain in terms of fund AuM and number of funds. As of Q2 2022, assets within this cluster totalled EUR 116.5bn, held in 195 funds (Exhibit 47). Despite that, thematic strategy funds domiciled in Luxembourg took a strong hit as a result of the market turmoil during the first half of the year, losing nearly 20% of their assets in the process. This drop is interconnected with the fall in equity markets globally, given that the majority of these funds – representing around 84% of AuM – are equity funds.

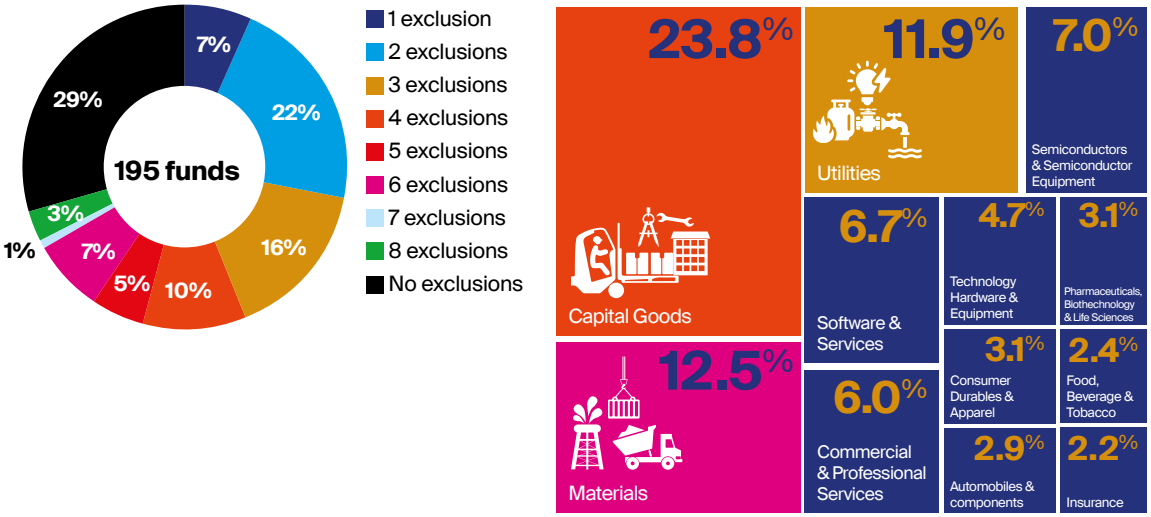
Exhibit 47: AuM of funds applying the Thematic strategy (by Quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Our study showed that approximately 71% of the funds in this cluster apply one or more exclusion criteria, and about 43% exclude three or more sectors. When it comes to the allocation of thematic funds, Capital Goods represent the most indicative sector[83], with approximately 24% of fund AuM allocated in companies operating in this industry. The top three is completed by the Materials (12.5%) and Utilities (11.9%) sectors (Exhibit 48). With technological progress playing a key role in the transition to a cleaner, carbon-free economy, thematic strategy funds' investment in engineering firms, construction companies and machinery manufacturers who could research and deploy state-of-the-art methods to mitigate climate impact stands to gain more interest over time - despite the related challenges of reduced portfolio diversification.

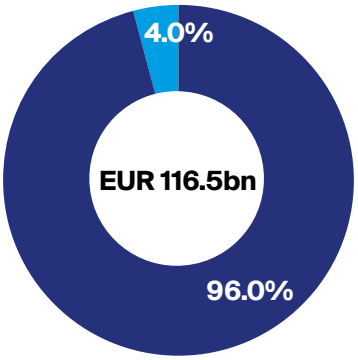
Exhibit 48: Number of exclusions applied (number of funds) and Indicative AuM percentage allocation to top sectors (as of June 2022)[84]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Further, 96% of thematic strategy fund assets are actively managed, pointing to the primacy of this management style within the cluster (Exhibit 49).

Exhibit 49: Active vs Passive Management (as of June 2022)



	# of funds
Active	174
Passive	21
TOTAL	195

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

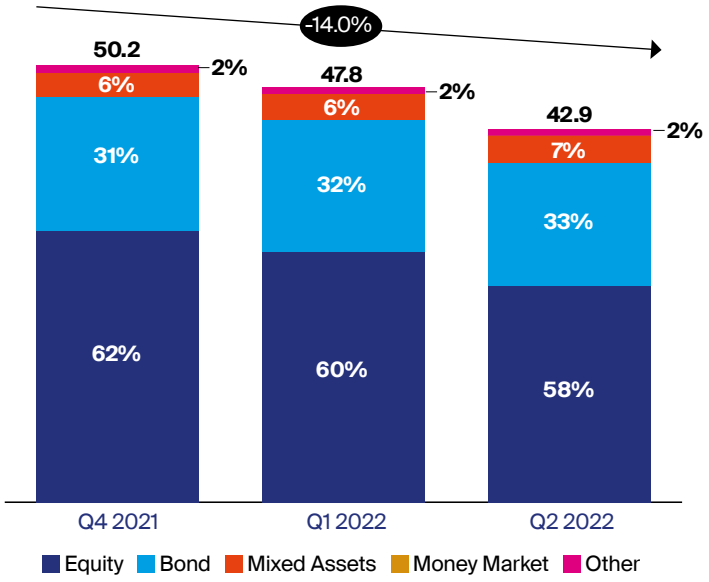
83. See *Appendix B.*
84. The total AuM of funds for which sector data was available is EUR 33.7bn or 29.0% of the EUR 116.5bn in this fund cluster. The remaining sectors account for 13.8% of the allocation.

• SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Despite being considered by some industry players to be inadequate or very generic to assess, integrate and measure, the UN Sustainable Development Goals (SDGs) represent a solid pillar for structuring a global path towards sustainability, and are officially recognised to be a key element for future economic development – for which UN states have to provide required reporting. As an ESG involvement sub-strategy, funds in this cluster are focused on investing in companies that positively contribute to the realisation of the UN SDGs.

According to our study, the 131 Luxembourg-domiciled funds that disclose this strategy in their investment mandate posted EUR 42.9bn of AuM at the end of Q2 2022, representing 13.4% of total ESG Involvement assets (Exhibit 50). This fund asset value also marks a 14% decline since the beginning of the year, when total SDG strategy assets stood at EUR 50.2bn. In terms of asset allocation, 58% of SDG strategy fund AuM is held in equity funds, 33% in bond funds, and the remaining amount in balanced funds.

Exhibit 50: AuM of funds applying the SDG strategy (by Quarter, EUR bn)



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

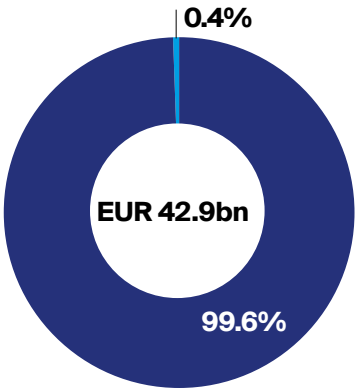
Regarding sector allocation[85], our analysis once more pointed to Capital Goods as holding the greatest asset weighting of 20.5% within the SDG sub-strategy, with reasons for this being similar to those mentioned for thematic funds. Semiconductors & Semiconductor Equipment come in second, while Pharmaceuticals and Life Sciences industry follows. These last two sectors particularly have the potential to align their activities with SDGs as they promote good health, well-being, and innovation. Moreover, the majority of funds (66.4%) applying this strategy also exclude certain sectors from their investable universe (Exhibit 51).

Exhibit 51: Number of exclusions applied (number of funds) and Indicative AuM percentage allocation to top sectors (as of June 2022)[86]

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Similar to most sub-strategies, active management accounts for nearly all funds and fund assets within the SDG cluster, with only 3 funds in the segment being passively managed (Exhibit 52).

Exhibit 52: Active vs Passive Management (as of June 2022)



	# of funds
Active	128
Passive	3
TOTAL	131

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

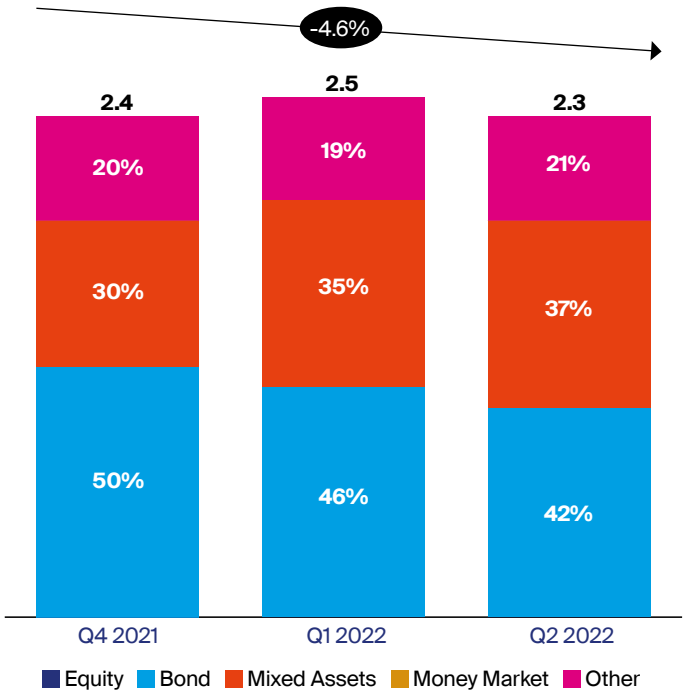
85. See *Appendix B.*
86. The total AuM of funds for which sector data was available is EUR 10.0bn or 23.3% of the EUR 42.9bn in this fund cluster. The remaining sectors account for 10.4% of the allocation.

• MICROFINANCE

This cluster includes funds that invest in microfinance projects. By definition, microfinance is the provision of financial services to low-income individuals and households that are not served or do not have access to the global financial system[87]. As a result, some overlap between funds in this cluster and the SDG cluster described above is not unusual, given the fact that poverty eradication stands as one of the leading sustainable investment goals.

Given the niche nature of this investment strategy, our study showed the EUR 2.3bn fund assets in this cluster accounting for 0.7% of the total assets within the ESG Involvement cluster – making it the sub-strategy with the lowest share of assets among all sub-strategies analysed (Exhibit 53). This is possibly as a result of the tailored and localised approach that this investment strategy requires, and the fact that it typically only impacts small and medium enterprises as well as individuals and households mostly in developing countries. Moreover, due to the nature of their investments, these strategies are difficult to scale up given the usually small size of microfinance projects. Despite that, the 10 funds included in this cluster were seen to be more resilient compared to the other ESG sub strategies, recording only a 4.6% decline in assets since the beginning of the year.

Exhibit 53: AuM of funds applying the Microfinance strategy (by Quarter, EUR bn)

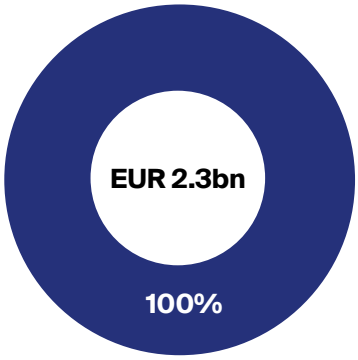


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

87. https://www.infine.lu/faq/

Our data also confirms that all funds in this cluster are actively managed (Exhibit 54). This makes microfinance the only ESG sub strategy with active management as the sole approach to portfolio management, which is not surprising given the nature of the strategy's implementation. Finally, 7 out of the 10 funds in this cluster apply exclusion criteria in addition to their Microfinance-focused strategy (Exhibit 55).

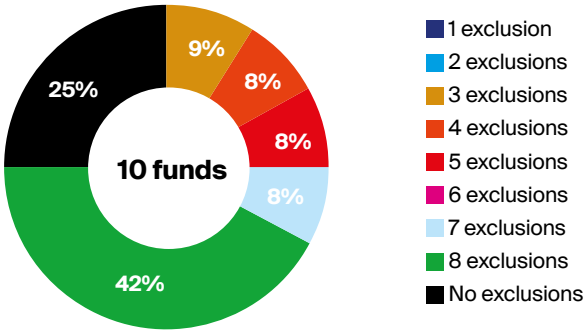
Exhibit 54: Active vs Passive Management (as of June 2022)



	# of funds
Active	10
Passive	0
TOTAL	10

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Exhibit 55: Number of exclusions applied (number of funds as of June 2022)



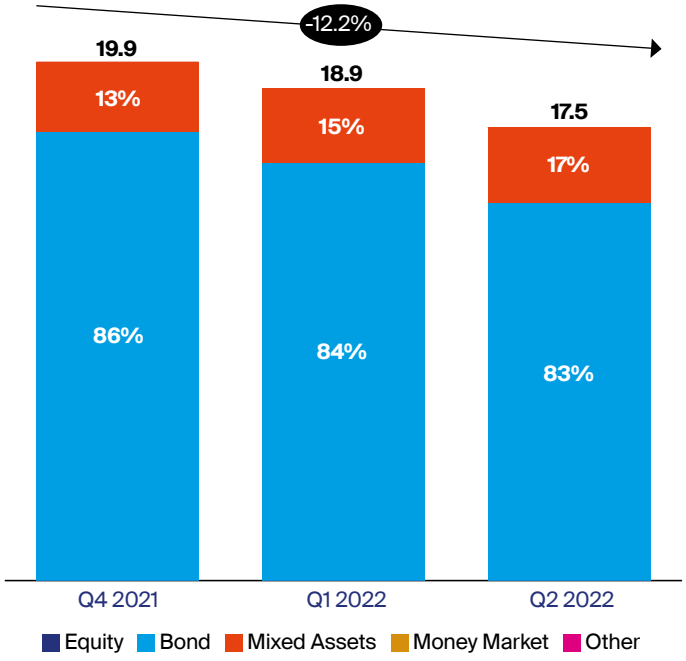
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

SUSTAINABLE BONDS

Sustainable bonds have undergone rapid growth in recent years as Sustainable Finance becomes more and more embedded within the fixed income market. According to PwC's report "Transformation of the Fixed Income market"[88], the anticipated acceleration of this growth could very well see sustainable bond issuance representing as much as 50% of total new bond issuance in Europe by 2026. Within this strategy, funds are focused on investments in GSS bonds[89] (Green, Social, Sustainability) or other similar bond categories such as blue bonds, impact bonds and transition bonds[90].

Total fund assets in this cluster hit EUR 17.5bn as of Q2 2022 (Exhibit 56), with 83% of assets held in bond funds and the remaining assets (17%) held in balanced funds. While net flows since the beginning of the year were very close to zero, this was not enough to sustain 2021 fund AuM levels. As a result, assets recorded a 12.2% decline during the same period.

Exhibit 56: AuM of funds applying the Sustainable Bonds strategy (by Quarter, EUR bn)

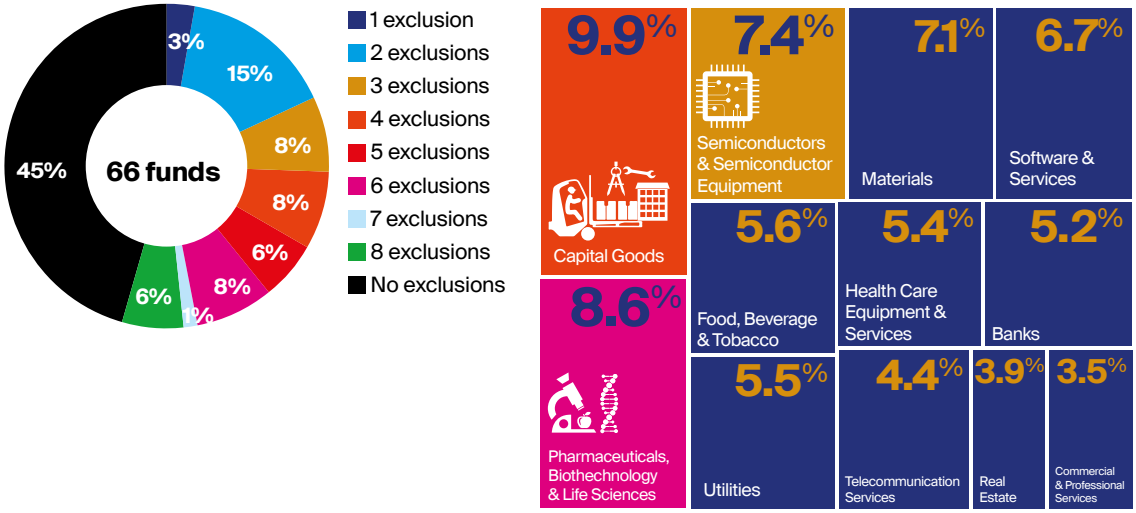


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

88. The ESG Transformation of the Fixed Income Market, PwC (https://www.pwc.lu/en/sustainable-finance/docs/esg-transformation-fixed-income-market.pdf)
89. See *Glossary* and refer to *Section 5.2* for more information.
90. See *Glossary.*

Funds in this cluster seem to follow a very diversified allocation ranging from the Semiconductor industry to Banks, Utilities, Telecommunications, and Commercial/Professional services[91]- underscoring the potential of investments in this asset type to contribute to the sustainability transition of our economies. The Capital Goods sector takes the lead with 9.9% of the indicative allocation, followed by the Pharmaceutical industry (8.6%) and the Semiconductor industry (7.4%). In terms of exclusions, 45% of the funds do not exclude any sector from their investable universe (Exhibit 57). The targeted nature of sustainable bonds could make these investments a direct tool to support the transition of a company without having to apply exclusion.

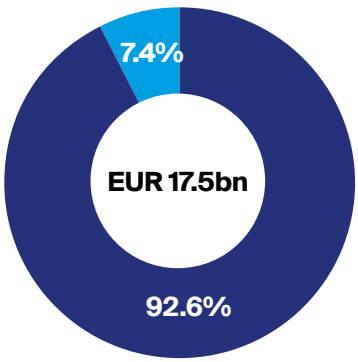
Exhibit 57: Number of exclusions applied (number of funds) and Indicative AuM percentage allocation to top sectors (as of June 2022)[92]



Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

As fund managers have to make a careful selection of instruments and issuers to include in their ESG - aligned portfolios, active management becomes key to the implementation of the sustainable bonds' strategy too. Our sample aptly confirms this, with 59 out of the 66 funds – 93% of total assets – in this sub-category being actively managed (Exhibit 58).

Exhibit 58: Active vs Passive Management (as of June 2022)



	# of funds
Active	59
Passive	7
TOTAL	66

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

91. See *Appendix B.*
92. The total AuM of funds for which sector data was available is EUR 0.6bn or 3.6% of the EUR 17.5bn in this fund cluster. The remaining sectors account for 26.3% of the allocation.

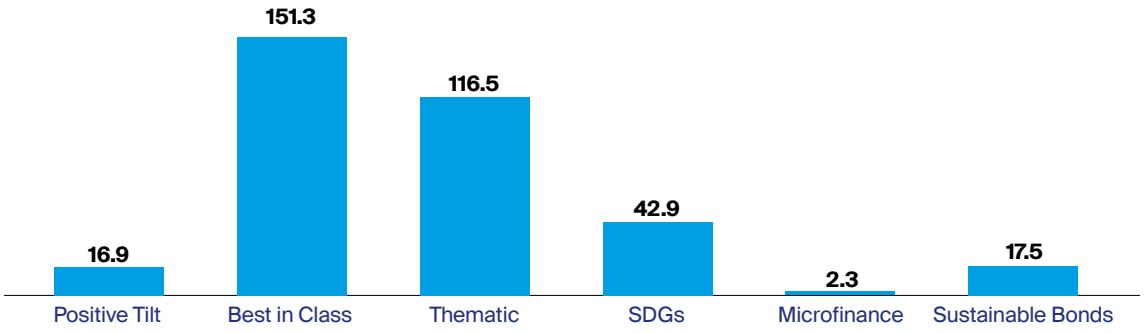
4.2. COMPARISON BETWEEN SUB-STRATEGIES

This section of the report compares the aforementioned ESG Involvement sub-strategies using metrics such as fund AuM and asset class performance.

Best-in-class and Thematic dominate the ESG Involvement landscape in terms of AuM

Our analysis indicated Best-in-class and Thematic as the leading sub-strategies when it comes to managers expanding their sustainability-aligned portfolios through ESG involvement (Exhibit 59), these sub-strategies constituted 47.3% and 36.5% of Luxembourg's total ESG Involvement fund AuM. The seeming preference for these strategies is not without reason. The likely current ease of access to a broad spectrum of different ESG ratings from data providers within the former, and the direct targeting of sustainable sectors within the latter, make both strategies highly attractive to managers looking to enhance their sustainable investment footprints and accounts for their popularity. Meanwhile, microfinance, with only EUR 2.3bn was seen as the lowest ranking strategy, an observation that can be explained by the niche nature of this segment and its limited accessibility in the global financial market.

Exhibit 59: Comparison by AuM (EUR bn, as of June 2022)

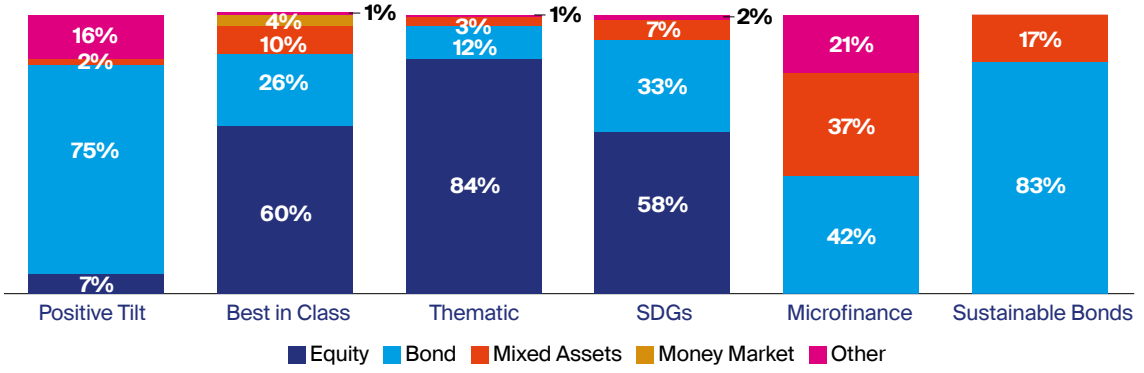


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Equity and bond funds dominate within most sub-strategies

In terms of asset class, equity and bonds were seen to be the most dominant within most sub-strategies (Exhibit 60). Equity, for instance, constitutes 84%, 60%, and 58% of Thematic, Best-In-Class, and SDG strategy funds – a result likely explained by the high level of interconnectivity between these strategies and the possibility to apply them with the support of ESG ratings and ESG data providers. Sustainable bond and positive tilt strategy funds, on the other hand, have increasingly integrated bonds as their main constituent, with the asset class holding 83% and 75% of total assets for these sub-strategies respectively.

Exhibit 60: Comparison by asset class (EUR bn, as of June 2022)



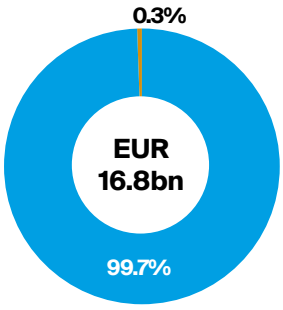
Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

Sub-strategy funds lean strongly towards either SFDR Article 8 or Article 9

Depending on their objectives and the extent to which ESG is expected to be embedded within their implementation, each of the sub-strategies demonstrated a heavy inclination to either SFDR Article 8 or 9 disclosure requirements (Exhibit 61). In this context, our analysis showed nearly 100% of positive tilt strategy fund assets to follow SFDR Article 8 requirements. Best-In-Class and Microfinance strategy funds followed, with 71% and 65% respectively of assets in each cluster deemed to be Article 8-compliant. This is not surprising given that these sub-strategies largely adopt a more flexible approach to ESG involvement. Conversely, facing what may be considered to be more "rigid" ESG requirements, most thematic, sustainable bonds, and SDG strategy funds were found to apply Article 9 to a more significant degree than their peers – with 68% of thematic strategy fund assets, 64% of Sustainable bond and 54% of SDG strategy fund assets aligned with Article 9 criteria.

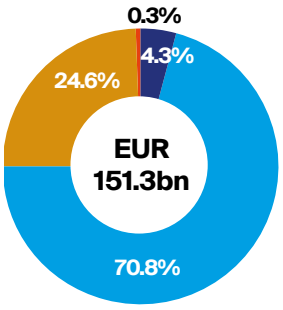
Exhibit 61: AuM and Number of funds for each ESG Involvement strategy (as of June 2022)

Positive Tilt



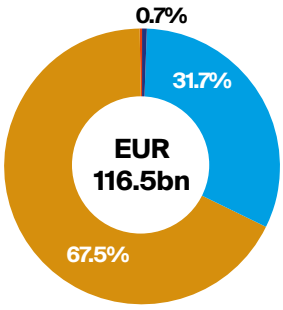
	# of funds
Article 8	25
Article 9	3
Article 6	-
Other	-
TOTAL	28

Best-in-class



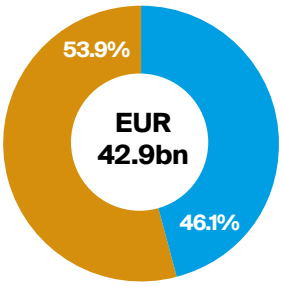
	# of funds
Article 8	303
Article 9	70
Article 6	21
Other	4
TOTAL	398

Thematic



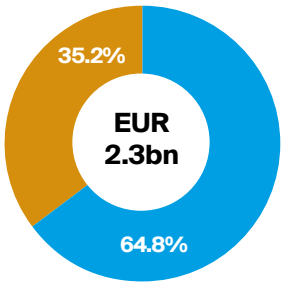
	# of funds
Article 8	79
Article 9	113
Article 6	1
Other	2
TOTAL	195

SDGs



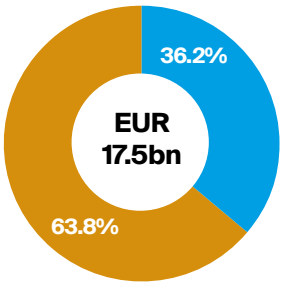
	# of funds
Article 8	50
Article 9	79
Article 6	-
Other	2
TOTAL	131

Microfinance



	# of funds
Article 8	5
Article 9	5
Article 6	-
Other	-
TOTAL	10

GSS Bonds



	# of funds
Article 8	25
Article 9	41
Article 6	-
Other	-
TOTAL	66

Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

5.

QUALITATIVE ANALYSIS: LEADING SUSTAINABLE FINANCE INVESTMENT PRACTICES IN LUXEMBOURG

In addition to the quantitative analysis performed, our study also includes two qualitative sections: **Leading Sustainable Finance Investment Practices in Luxembourg** (Section 5) and **Towards Impact** (Section 6). The first of these two sections, **Leading Sustainable Finance Investment Practices in Luxembourg**, aims to shine the light on pioneering Sustainable Finance (best) practices within Luxembourg, specifically on blended finance and the work of the Luxembourg Green Exchange (LGX) in further driving the green transition of the financial services industry. In particular, it seeks to describe and showcase key achievements under these segments and also provide important notions to enhance their understanding and uptake in the near future.

5.1. BLENDED FINANCE IS MOBILISING CAPITAL TOWARDS SUSTAINABLE DEVELOPMENT: THE CASE OF LUXEMBOURG[93]

Even with the considerable increase in sustainability-core financial instruments in recent years, there does not appear to be a comparable uptick in the rate of access to and adoption of these instruments by all participants of the funds sector. Attempts to shift capital towards certain geographies and sectors are still being rendered cumbersome by heightened uncertainty and the persistence of other risks. In this context, blended finance represents a formidable means to address this challenge.

Blended finance describes the strategic leveraging of development finance to raise additional funds – specifically private capital – with the aim of improving sustainable growth in developing countries. It seeks to bridge the perceived disconnect between sustainable investments and investors' income objectives by attracting capital toward projects that contribute to sustainable development goals while providing financial returns to investors.

Within Luxembourg, the national framework for enhancing co-operation incudes a drive to expand blended finance instruments as one of its key action points. This has seen the country launching or taking part in several initiatives within this field in recent years, such as the Luxembourg-EIB Climate Finance Platform (LCFP), the Forestry and Climate Change Fund (FCCF), and the International Climate Finance Accelerator (ICFA). In this section, we outline these blended finance vehicles in Luxembourg, taking a detailed look at how they are currently structured and their investment scope.

93. Contributing Authors: Lennart Duschinger, Kaspar Wansleben & Stephan Peters (see *Acknowledgements*)

• LUXEMBOURG-EIB CLIMATE FINANCE PLATFORM (LCFP)

Aimed at addressing the challenges with sourcing funding for climate change action projects, the Luxembourg - EIB Climate Finance Platform (LCFP) was launched in 2017 by the Luxembourg Government in collaboration with the European Investment Bank (EIB). The platform enables investors to hold equity investments in junior tranches of layered funds, limiting private capital owners' exposure to senior tranche-related risks. These funds then invest in Emerging Market companies that are focused on climate change mitigation and/or adaptation projects. The LCFP currently has investments and capital commitments in the following funds:

Emerging Market Climate Action Fund (EMCAF)

This is a new, innovative fund-of-funds with an investment focus on climate mitigation and climate adaptation. It also considers environmental sustainability projects in developing countries.

Target fund size - EUR 500mn

LCFP investment - EUR 15mn in the junior tranche

EIB investment - EUR 50mn in the senior tranche

Green for Growth Fund

This is an impact investment fund aimed at mitigating climate change and promoting sustainable economic growth. It primarily invests in measures to reduce energy consumption, resource use, and CO2 emissions.

Target fund size - EUR 787.8mn

LCFP investment – EUR 5mn

EIB investment – EUR 100mn

Urban Resilience Fund (TURF) B

This is a layered fund that focuses on equity and quasi-equity investments to support sustainable and resilient greenfield infrastructure projects across African municipalities.

Target fund size - EUR 350mn

LCFP investment – EUR 5mn

EIB investment – up to EUR 50mn

Land Degradation Neutrality Fund

This fund supports private sector-led projects that promote sustainable land management and use, as well as the restoration of degraded land - mainly through sustainable agriculture and forestry.

Target fund size - EUR 174.6mn

LCFP investment – EUR 5mn

EIB investment – EUR 39mn

Access to Clean Power Fund

This fund supports small companies that provide renewable energy solutions ranging from off-grid to captive generation (collective distributed generation).

Target fund size - EUR 130.7mn

LCFP investment – EUR 5mn

EIB investment – EUR 27mn

Climate Resilience Solutions Fund

This is the first investment fund to focus on climate adaptation. It is also the first commercial investment vehicle to focus on small companies involved in climate intelligence and solutions for developing countries.

Target fund size - EUR 218.9mn

LCFP investment – EUR 5mn

EIB investment – EUR 24.3mn

• FORESTRY AND CLIMATE CHANGE FUND (FCCF)

The Forestry and Climate Change Fund (FCCF) is a blended finance vehicle that counts the Luxembourg State as an investor in Class I shares (first loss tranche). With this provision, the fund provides a layer of capital protection designed to attract a broader range of institutional and eligible individual investors. The fund allows participating investors to support innovative projects focused on restoring secondary and degraded forests while enjoying a degree of risk mitigation. This has attracted a range of institutional and private investors from Luxembourg with varying risk appetites and diverse priorities who can come together to scale the fund's work.

• SDG500 PLATFORM

The SDG500 is an investment platform developed to finance the UN Sustainable Development Goals with USD 500mn raised through six sub-investment funds. Three of these sub-funds have registered blended finance investments from the Luxembourg Ministry of Finance:

The ABC Fund

This is an impact investment vehicle that targets smallholder farmers and small and medium agribusinesses in developing countries.

*Target fund size - **EUR 200mn***

The BUILD Fund

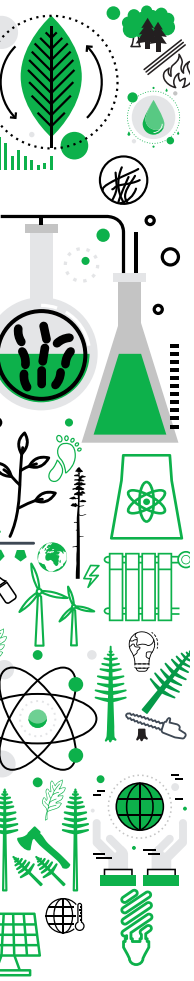
This is a fixed income fund aimed at early-stage enterprises in the Least Developed Countries.

*Target fund size - **USD 250mn***

The BLOC SmartAfrica and BLOC Latin America Venture Capital Funds

These funds target technology enterprises in Africa, Latin America and the Caribbean respectively (BLOC Smart Africa).

*Target fund size - **EUR 100mn***



• INTERNATIONAL CLIMATE FINANCE ACCELERATOR (ICFA)[94]

In addition to the previously mentioned initiatives, Luxembourg created the **International Climate Finance Accelerator (ICFA)** in 2018. The ICFA is a unique fund manager support programme endorsed by the Luxembourg Ministry of Finance, the Luxembourg Ministry of Environment, Climate and Sustainable Development, and 12 private partners active in the Luxembourg financial services sector with experience in impact finance. Specifically, the initiative supports managers embarking on their first or second climate change action projects. The ICFA has, so far, onboarded 28 fund managers with a projected fund AUM of USD 2.4bn and helped to launch four funds with a total AuM value of USD 293mn as of December 2022 – of which three are blended finance vehicles outlined below:

Spark+ Africa Fund by Enabling Qapital and Stichting Modern Cooking

This is a fund that invests in clean cooking solutions for deployment across Africa. The solutions provided by Spark+ not only keep families safe and healthy, they save them time and money but also have a range of societal benefits including greater gender equality, reduced GHG emissions and deforestation, and industrial and economic development.

Climate Resilience Solutions Fund (CRAFT) by The Lightsmith Group

This fund is the first dedicated private sector investment strategy focused on climate adaptation and resilience solutions. It targets private companies providing to enhance adaptation and resilience to climate change, particularly for the benefit of developing countries and their vulnerable populations and livelihoods.

Empower Impact Investing Platform by Empower New Energy

This fund invests in renewable energy projects traditionally too small for international finance. Through their innovative business model, they make the market for commercial and industrial projects in Africa accessible to impact investors and climate financiers.

Apart from these confirmed successes, the programme foresees other ICFA-supported fund managers to secure commitments for their funds of up to USD 30mn by the end of 2022.

94. https://www.icfa.lu/

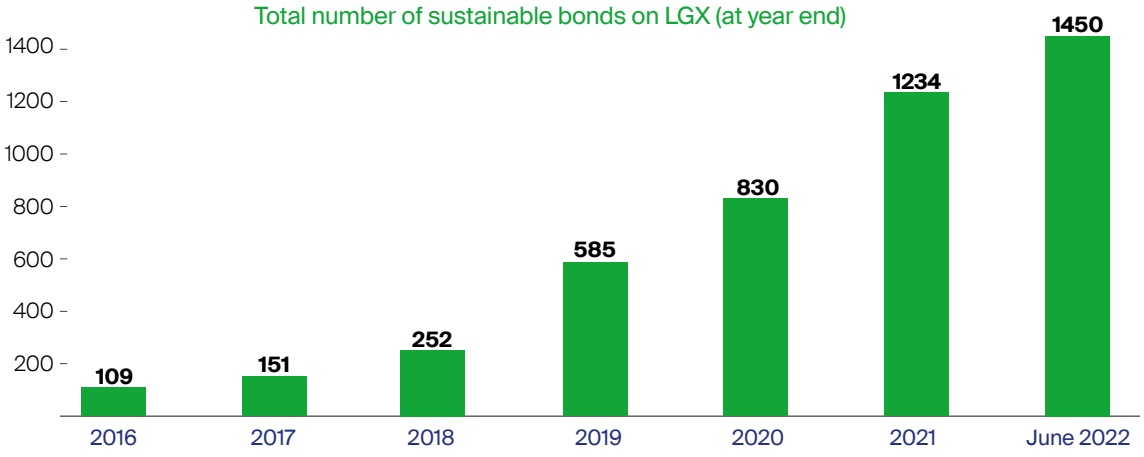
5.2. THE LUXEMBOURG GREEN EXCHANGE: THE RAPID GROWTH OF GREEN, SOCIAL, SUSTAINABILITY AND SUSTAINABILITY-LINKED BONDS[95]

The Luxembourg Green Exchange (LGX) was established in 2016 by the Luxembourg Stock Exchange (LuxSE) to contribute to the realisation of the Paris Climate Agreement and the United Nations Sustainable Development Goals. Today, LGX serves as a securities platform entirely dedicated to sustainable, financial assets and is the leading platform for the world's listed green, social, sustainability and sustainability-linked (GSSS) bonds. In addition, all issuers on LGX commit to applying ongoing reporting practices, which allows investors to verify the allocation and use of funds raised and also concretely assess the green or social impacts of projects financed.

• GSSS BONDS ARE ON THE RISE, WITH SUSTAINABILITY-LINKED BONDS GROWING THE FASTEST

Since the inception of the Luxembourg Green Exchange, the GSSS bond segment has experienced considerable development. As of June 2022, LGX displayed 1,450 GSSS bonds – up from 109 in 2016 – and accounted for a total of EUR 757bn in capital raised to support sustainable development projects across the world (Exhibit 62). This steep rise in the number of issued GSSS bonds has also been coupled with high investor demand for sustainable products. This is reflected on LGX, which has seen exponential growth in scope and reach over the past six years. Within the bonds displayed on LGX, the most frequent types are green and sustainability bonds. However, other categories are also experiencing remarkable growth - particularly sustainability-linked bonds (SLBs). In 2021, SLBs gained strong traction, with global estimated issuances worth EUR 91bn - a tenfold increase from 2020. Issuance data for the first half of 2022 suggests that SLBs stand to be the fastest-growing GSSS bond category in 2022 as the issuer pool for this segment continues to diversify in line with the rising popularity of transition financing. In terms of the amount raised, the SLBs listed on LuxSE and displayed on LGX in the first half of 2022 doubled compared to the same period last year. Unlike other bonds in this segment (green, social and sustainability bonds), sustainability-linked bonds do not raise financing for specific green or social projects. Instead, SLBs act as general-purpose bonds that require issuers to commit to achieving specific sustainability objectives by a set deadline.

Exhibit 62: GSSS bonds – yearly evolution on LGX



Sustainable bonds include green, social, sustainability and sustainability-linked bonds.

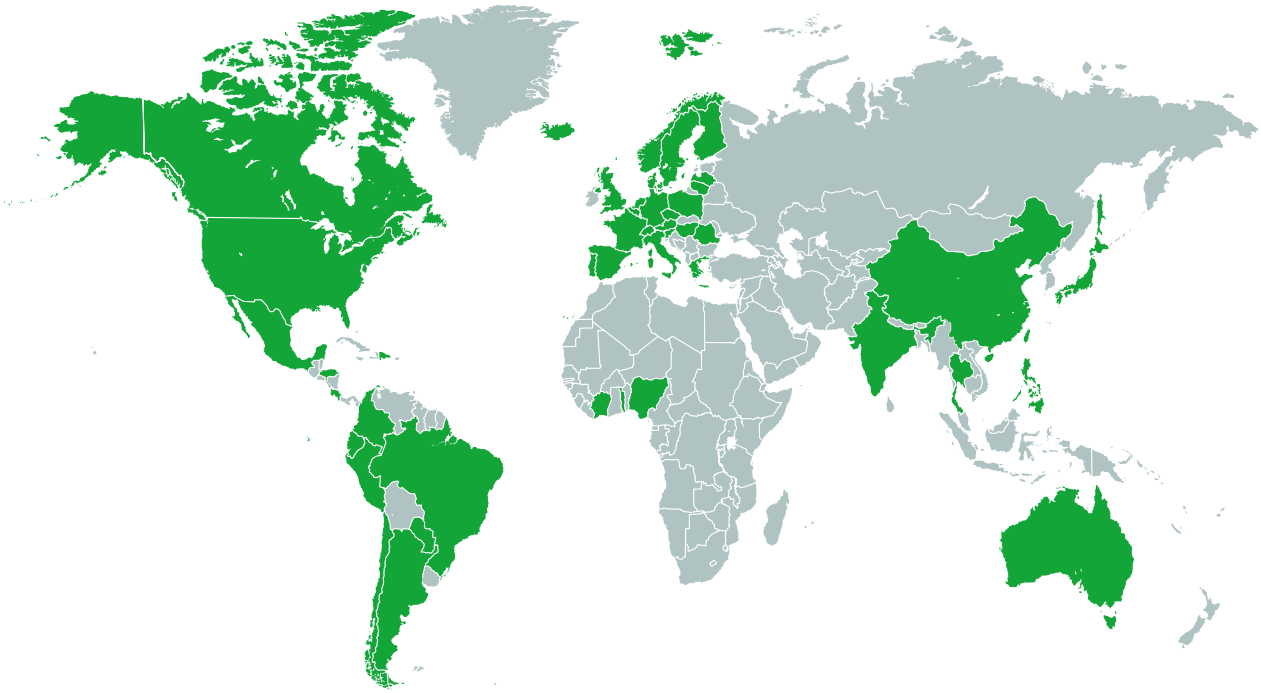
Source: Luxembourg Stock Exchange

95. Contributing Author: Laetitia Hamon (see *Acknowledgements*)

• GSSS BOND ISSUERS AT A GLANCE

In September 2020, the Grand Duchy of Luxembourg issued Europe's first sovereign sustainability bond – a historical EUR 1.5bn bond that is listed on LuxSE and displayed on LGX. Through this bond issuance, Luxembourg has raised financing for social and environmental projects such as the electric public transportation service Luxtram and affordable housing projects, among other projects. 2021 also saw LuxSE welcoming the largest green bond issued to date – a EUR 12bn green bond issued by the European Commission under the NextGenerationEU recovery programme. Current issuers on LGX represent several countries spanning Europe, the Americas, West Africa, Asia and Oceania (Exhibit 63).

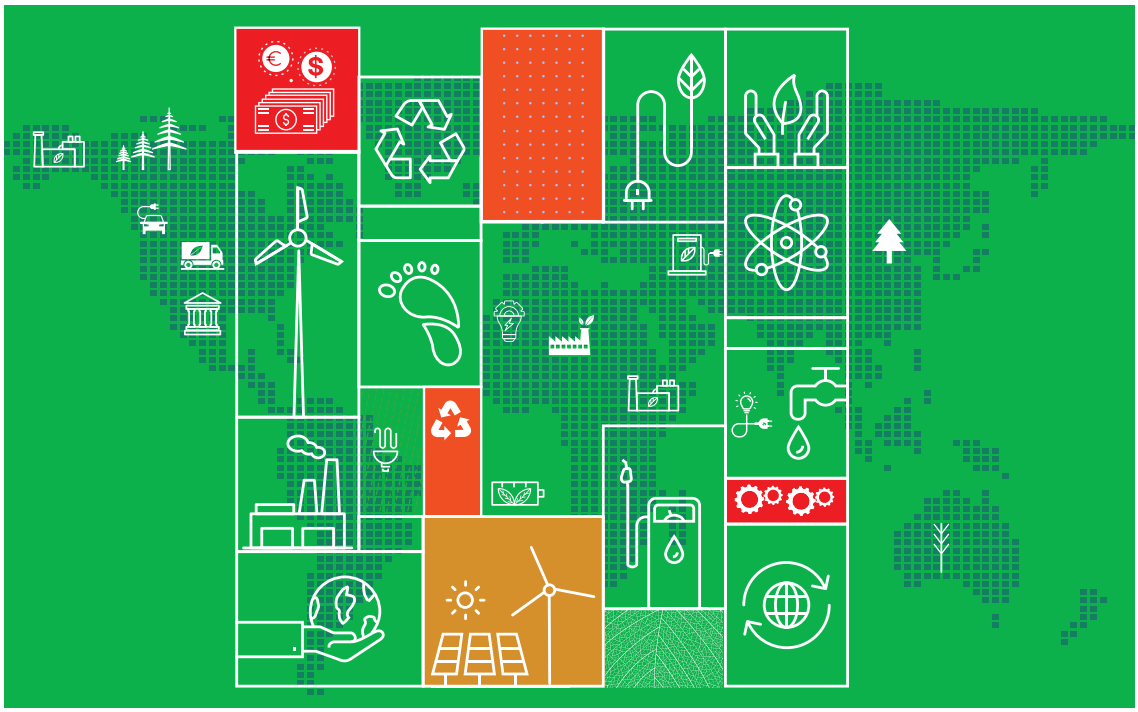
Exhibit 63: Geographical overview of issuers on LGX



Source: Luxembourg Stock Exchange

• DISPLAYING SUSTAINABLE BONDS ON LGX

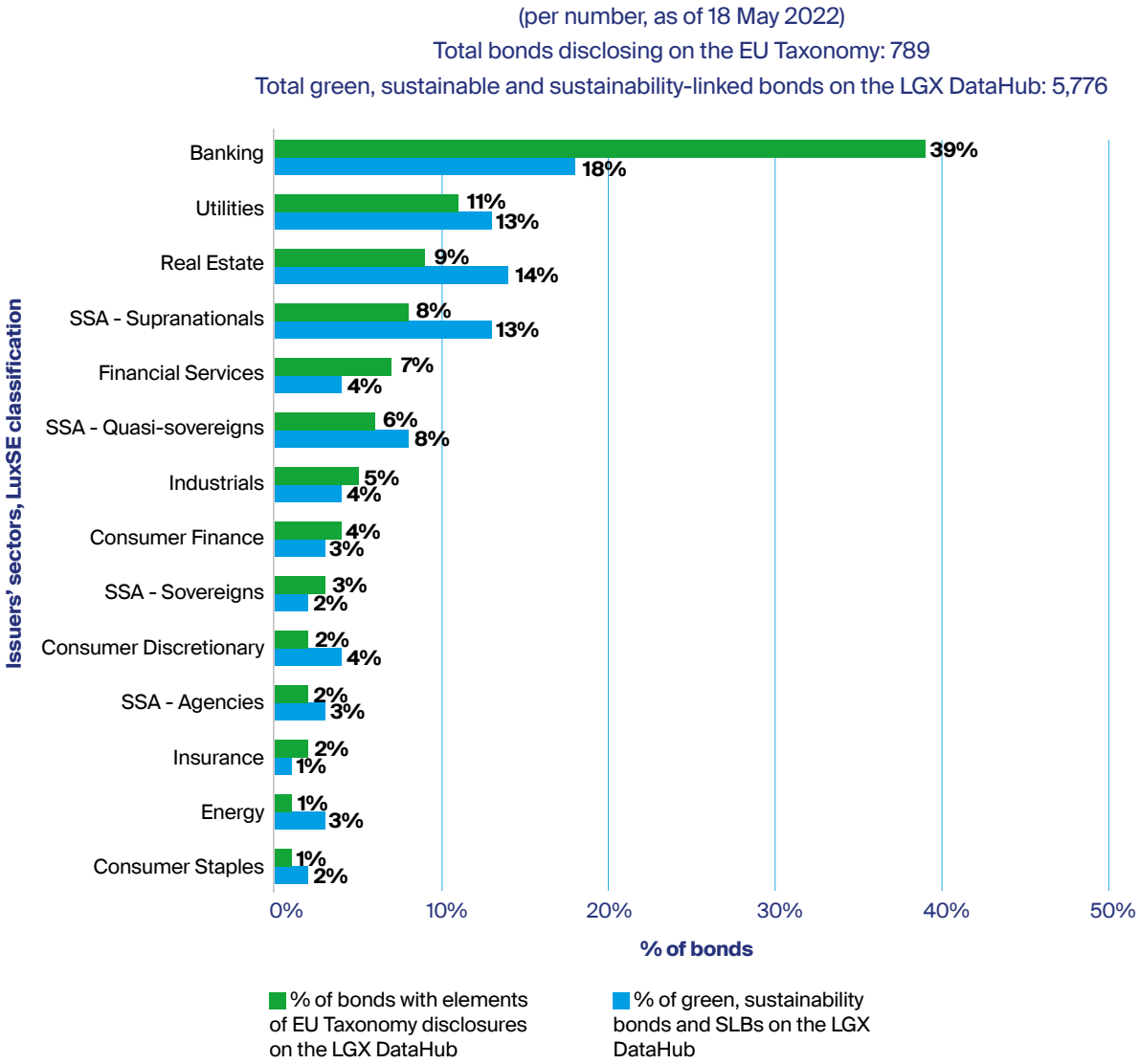
For a GSSS bond to be included on LGX, it must first be listed on LuxSE, and the issuer must follow internationally recognised standards for GSSS bond issuance. The process begins with the submission of listing documentation by the prospective issuer. Once this has been received, LGX officials verify that the stated use of proceeds, the bond framework, and the external review all meet the eligibility criteria. Once all documentation has been made available and confirmed as complete, it is then followed by the onboarding process – a stringent 3-level validation process to ensure that the bond complies with all criteria for LGX display.



• PREPARING FOR EU TAXONOMY DISCLOSURES

To understand how issuers are preparing for EU Taxonomy disclosures, LGX conducted a preliminary assessment of bond issuers and their bond-level disclosures on elements of the EU Taxonomy in May 2022. This assessment – based on data from the LGX DataHub – involved the analysis of 5,450 sustainable bonds issued worldwide. The study identified 789 bonds from 262 different issuers which currently include elements of the EU taxonomy in their bond-related disclosures. The banking sector accounts for the highest percentage of bonds disclosing elements of the EU taxonomy, followed by the utilities sector and real estate (Exhibit 64).

Exhibit 64: LuxSE Classification of Issuers' sectors



Source: LGX DataHub as of 18 May 2022

6.

QUALITATIVE ANALYSIS: TOWARDS IMPACT – ASSESSING CURRENT IMPACT METHODOLOGIES

The section "Toward Impact" aims to demonstrate the existing efforts to advance measurements to regularly assess the impact of Sustainable Finance investments on the real economy. Not only is this a fundamental step to foster a comprehensive understanding within the financial sector of its role in the sustainable transition of the real economy, but it is also an effort to push Sustainable Finance toward becoming mainstream. This section begins with a pilot analysis using the REFUND impact assessment tool currently under development by the Luxembourg Institute of Science and Technology (LIST), which assesses the impact of funds. It also includes a description of major impact methodologies developed to assess the impact of an investment on the real economy. In particular, it presents the impact methodologies employed by the Cambridge Institute for Sustainability (CILS) Impact framework and the Global Impact Investing Network (GIIN) IRIS+. Finally, this section also presents an overview of the newly proposed classification scheme developed by EUROSIF and the University of Hamburg for investments falling in the segment of Sustainable Finance.

6.1. REFUND – ASSESSING THE ENVIRONMENTAL IMPACT OF INVESTMENT FUNDS[96]

Starting 2020, the Luxembourg Institute of Science and Technology (LIST) has been working on developing the REFUND tool for the estimation of life cycle sustainability of investment funds. In this section, a case study for the same sample of funds (and same ESG strategy and SFDR classification) used in the previous sections of the report and based on the latest pilot version of the REFUND model[97] is presented. Currently, the tool can be applied only to equities. The tool is still in a testing phase and should only be used to conduct initial screening for fund-level impact, as carbon footprint of fund holdings is estimated based on the country-industry allocation of a company and company-level differences within industries are not considered within the model.

The REFUND model can be used to estimate different environmental and social impacts, such as emissions, air pollution, water stress or vulnerable employment. For this study on Luxembourg UCITS, only the carbon footprint was estimated - using the indicator greenhouse gas (GHG) emissions - as it is a widely used indicator in Sustainable Finance. Examples of the estimation of "***Eutrophication***" and "***Particulate Matter Formation***" impacts for the same sample of funds are presented in the Appendix.

• REFUND METHODOLOGY

The REFUND tool uses life cycle environmental impact factors adapted from the environmentally extended multi-regional input-output (EEMRIO) database EXIOBASE, as well as detailed country and industry holding-level revenue information sourced from proprietary financial database FactSet, to build company-level life cycle estimates of environmental indicators. Afterwards, fund-level holding information is used to compute fund-level life cycle estimations of environmental indicators. The tool is limited to the estimation of scope 1 (direct impacts), scope 2 (impacts from purchased electricity for own operations) and scope 3 upstream (indirect impact from complete supply chain).

EEMRIO databases are built using national and international company-level transaction data reported to national statistical offices. IO tables thus contain, in a matrix format, the "production recipes" for all country-industry combinations (direct requirement matrix) – for example, all the inputs needed to produce one million EUR output of Chemicals in Luxembourg. These are expressed in monetary units. Environmental extensions give the total environmental impacts per country-industry combination. Using the Leontief inverse, one obtains the indirect

96. Contributing Author: Ioana Popescu (see *Acknowledgements*)
97. Described in detail in the working paper: Popescu, I., Gibon, T., Hitaj, C., Rubin, M. and Benetto, E. (2022) *Are SRI Funds Financing Carbon Emissions? An Input-Output Life Cycle Assessment of Investment Funds.* (http://dx.doi.org/10.2139/ssrn.4047292)

requirement matrix, which, multiplied with the direct environmental impact factors vector, gives the indirect environmental impact factors vectors, i.e., the environmental requirements induced over the life cycle (cradle-to-gate) by the main country-industry activity studied. The specificities of the EXIOBASE database are detailed in the literature[98, 99]. In the REFUND model, this data is then linked to company-level revenue information.

To estimate impact at fund-level the metric Relative Carbon Footprint (RCF) is used, defined as the GHG emissions attributed to a USD 1.0mn investment in a fund, by allocating absolute company-level impact, on a share basis, expressed in tons CO2 equivalents (tCO2-eq) per million US dollars invested in the fund.

• FUND SAMPLE USED FOR THIS ANALYSIS

For this pilot analysis, the same ESG classification of funds has been used. The final dataset of funds contains 2,650 funds. The initial sample was reduced by only keeping one entry for funds with different share classes/ ISINs but same portfolio allocation[100] and removing funds that invested in companies without sufficient revenue-level data or fixed income funds. The analysis has been performed for year 2021 for fund-level holding information, and year 2019 for holding-level revenue information, so that the results would not be affected by the COVID-19 pandemic. Collectively, the fund sample pool invests in 13,076 different publicly listed companies. The sampling process is detailed in the Appendix[101].

• ANALYSIS OF THE SELECTED FUND SAMPLE

Exhibit 65 presents the main results of the study – average RCF by type of fund. The significant contribution of scope 3 GHG emissions to total emissions is clearly evident, representing more than 50% of total impact – which underscores the importance of including them in carbon footprint measurements. Article 9 funds tend to perform better than Article 6 and 8 funds. For year 2021[102], Article 9 funds recorded on average, 208 tCO2-eq life cycle emissions/million USD invested, compared to an average of 315 for Article 8 funds and 508 for Article 6 funds.

Industry allocation was also noted to be one of the – if not the most significant – drivers of the GHG emission profile of a fund. For instance, Article 8 funds investing in Finance, Tech or Real Estate were seen to be the leading sectors when it comes to achieving a low carbon footprint. That being said, Article 9 funds also indicated a lower carbon footprint on average, with none of the top 50 funds with the highest life cycle intensity including Article 9 funds. In addition, ESG Involvement strategies were seen to show a lower carbon footprint across all Article 6, 8 and 9 funds.

98. Miller, R. and P.R. Blair (2009) *Input–Output Analysis: Foundations and Extensions*. 2nd ed. Cambridge, Cambridge University Press

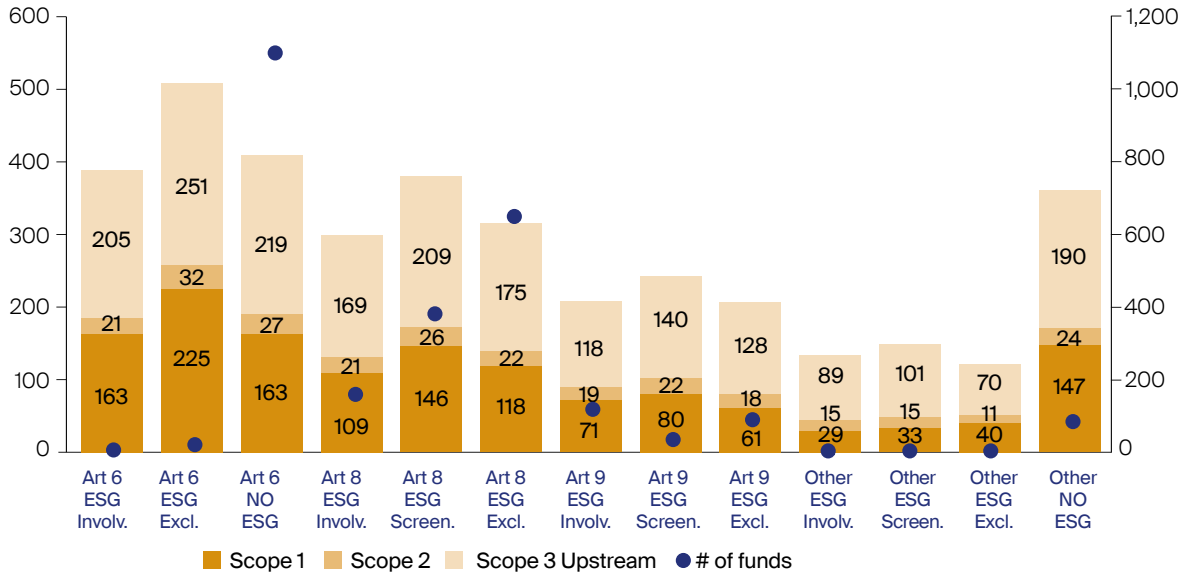
99. Stadler, K., Wood, R., Bulavskaya, T., et al., 2018. EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables. J. Ind. Ecol. 22, 502–515. (https://doi.org/10.1111/jiec.12715)

100. Funds with different share classes which have the same portfolio would result in the same estimate of carbon footprint per unit of investment, resulting in duplicate values in the analysis.

101. See *Appendix C.*

102. For this example, only funds applying an exclusionary strategy have been considered.

Exhibit 65: Relative Carbon Footprint for the funds sample, in tCO2-eq/mUSD invested (GWP100) (averages by fund category)



Source: Luxembourg Institute of Science and Technology (LIST)

• CONCLUDING REMARKS

Through the REFUND analysis, the estimated carbon footprint of SFDR Article 6, 8, and 9 were compared. Article 9 funds have the lowest RCF among the three, followed by Article 8 and Article 6 funds. ESG Involvement funds appear to be the best performing funds from all strategies, with Article 6 Exclusion funds having the highest footprint from all studied funds.

The REFUND methodology analysis estimated that indirect (scope 3 upstream) impacts represent more than 50% of the total carbon footprint attributable to an investment fund. Moreover, funds investing in industries that are by default low emitters, such as Technology or Finance, appear to do better from a climate change perspective, while at the same time they do not make a significant contribution to the transition to a low-carbon economy. An option would be that carbon footprint measurements are complemented by forward-looking metrics, when evaluating the sustainability of investment funds. Finally, in terms of holdings' distribution for the funds analysed, only less than 2% of the Article 9 funds' holdings are not also invested in Article 8 or Article 6 funds. According to the analysis, investing in an Article 9 fund ensures less exposure to companies not aligned with the climate transition, but its holdings do not deviate significantly from holdings that could be invested in by other Article 8 or 6 portfolios. The further development of the model could propel Luxembourg's role in driving the low carbon transition through all the funds domiciled in its territory.

6.2. IRIS+ SYSTEM - STANDARDISATION WITHIN THE IMPACT INVESTING LANDSCAPE[103]

While impact investors recognise and acknowledge the importance of impact measurement and management (IMM), a study by the Global Impact Investing Network (GIIN)[104] shows that many of them face significant challenges such as the lack of transparency on impact performance (89%), inability to compare results with market performance (84%), and difficulties in aggregating, analysing, or interpreting data (74%). To address these challenges, the GIIN developed and manages the IRIS+ System, which provides a standardised approach for investors to measure, manage, and optimise their impact.

Specifically, the IRIS+ System[105] is a website-based resource that allows impact investors to identify and select appropriate and evidence-backed metrics. It also offers guidance on the standardisation of data collection and reporting to facilitate data comparability. The System is publicly available and has 30,000 users globally from over 15,000 organisations as of September 2022.

• HOW THE IRIS+ SYSTEM WORKS

Within the platform, users can select relevant impact themes or SDGs, identify the impact strategic goal(s) relevant to their approach, and acquire the Core Metrics Sets[106] to measure and manage their impacts. The IRIS+ System helps users to better understand how to set objectives, recognise impact, assess performance, and communicate impact results with other stakeholders in the impact investing industry. Ultimately, the system enables impact investors to analyse and extract impact information for investment decision-making and also facilitates impact comparison to drive results. In terms of its usability, IRIS+ metrics can be used and analysed in combination with the Five Dimensions of Impact and industry-validated factors to contextualise outcomes[107].

• DEVELOPMENT OF THE IRIS+ SYSTEM

In order to be consistent with industry demands, the IRIS+ System has evolved over time to become an interactive database. In 2021, the GIIN also launched the COMPASS methodology to help standardise how the impact results of impact investments are compared[108]. COMPASS leverages the standardised metrics of the IRIS+ System and provides an analytical methodology to guide users and service providers, such as rating agencies and benchmark developers, as to how to perform comparative analysis using standardised impact and contextual data. This methodology – which is publicly available – provides guidance on how to normalise impact performance data so that investors can both assess how they measure up against their peers, and understand the impacts required to achieve specific SDGs or science-based targets.

In addition, the GIIN piloted the industry's first impact performance benchmark – the IRIS+ Financial Services Impact Performance Benchmark – in 2022. This is an analytics tool that aggregates sector-specific impact results, allowing investors to analyse impact performance and compare the impacts of their investments to those of peer groups and global development goals[109]. Ultimately, it is expected that the introduction and implementation of these benchmarks will help investors incorporate standardised and comparable impact metrics within their portfolio construction, due diligence, target-setting, investment management, and reporting.

103. Contributing Authors: Sophia Sunderji, Lissa Glasgo (see *Acknowledgements*)
104. Bass et al, "The State of Impact Measurement and Management Practice, Second Edition," The Global Impact Investing Network, January 21, 2020, https://thegiin.org/research/publication/imm-survey-second-edition.
105. Visit the IRIS+ System here: https://iris.thegiin.org/
106. IRIS+ Core Metrics Sets are short lists of key impact performance indicators—built on standard IRIS metrics and backed by evidence and best practice—that impact investors can use to assess the effects of their investments.
107. The Global Impact Investing Network "IRIS+ and the Five Dimensions of Impact," https://iris.thegiin.org/document/iris-and-the-five-dimensions/
108. The Global Impact Investing Network, "COMPASS: The Methodology for Comparing and Assessing Impact," May 19, 2021, https://thegiin.org/research/publication/compass-the-methodology-for-comparing-and-assessing-impact
109. The Global Impact Investing Network, "Impact Performance Benchmarks | IRIS+ System," IRIS+ System, accessed July 8, 2022, https://iris.thegiin.org/performance-analytics/

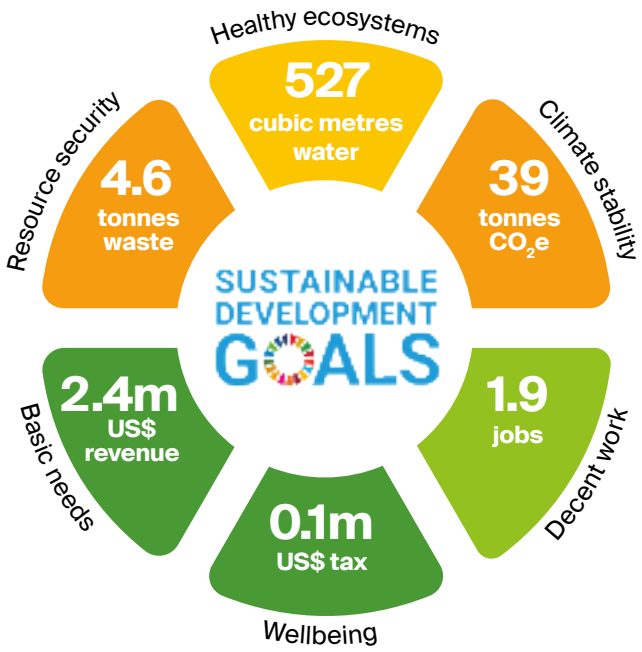
6.3. SUSTAINABLE INVESTMENT FRAMEWORK - AN OVERVIEW OF INVESTMENT'S IMPACT[110]

Regardless of the stated fund objective or differentiation strategy (such as thematic ESG or Impact funds), all investments have an impact on the world. To demonstrate these impacts, the Investment Leaders Group (ILG)[111] convened by the University of Cambridge Institute for Sustainability Leadership (CISL) developed the Sustainable Investment Framework. This framework aims to provide a clear readout to users of their investment holdings' impact on the planet and society, so as to ensure that investors make informed investment decisions that align with their values.

• DEVELOPMENT OF THE SUSTAINABLE INVESTMENT FRAMEWORK

The initial proposal for the Sustainable Investment Framework was published in a 2016 study by the Cambridge Institute for Sustainability Leadership (CISL)[112]. Based on this, the Investment Leaders Group (ILG) formulated a set of six open-source metrics to be used by investors as proxies for measuring their progress toward the United Nations Sustainable Development Goals (SDGs). They are listed as follows: Basic needs, Well-being, Decent Work, Resource Security, Healthy Ecosystems, and Climate stability (Exhibit 66). These metrics were developed to make the SDGs adaptable to the framework and draw heavily from first principles and robust scientific ideas. Further, these metrics do not measure intent or process within the asset base. Instead, they focus on the actual performance outcomes of assets on social and environmental segments that are relevant to sustainable development.

Exhibit 66: The Sustainable Investment Framework



Impact per US$ 1m invested

Source: Cambridge Institute for Sustainability Leadership

110. Contributing Author: Lucy Auden & Colette Bassford (see *Acknowledgements*)
111. This group is a global network composed of 9 members including pension funds, insurers, and asset managers, with over £14 trillion under management and advice.
112. The Framework was initially proposed in the report "In Search of Impact: Measuring the full value of capital (2016).

• THE ROLE OF THE FRAMEWORK

The framework describes the ideal ways in which impact should be measured and explores how far those measures can be applied to investment funds using currently available data. It provides formulas and analysis that facilitate the measurement of a fund's performance against the aforementioned six metrics. The framework also comes with a set of principles listed below:

- Focus on social and environmental impact, not financial materiality.
- Examination of sustainable development outcomes across value chains.
- Measurement of the impact of companies and hence application across listed equity and corporate credit portfolios, and different investment styles.
- Inclusion of formulas for calculating developed base metrics as well as proposed ideal metrics for the six impact themes.
- Presentation of fund performance compared to a benchmark (MSCI Europe is used in the report) using two statistical methods: Quintile analysis of performance against 20% blocks of the benchmark fund, and Difference analysis, which calculates percentage differences in performance between funds and benchmark averages.

• THE FRAMEWORK IN PRACTICE

Following the development of the framework, the ILG analysed and tested funds against the base metrics, using formulas to calculate the performance of their funds. The results were expressed in terms of total impact per USD 1mn invested – a normalised figure that indicates the impact attributable to the amount invested by a particular client. For users of the framework, a user-friendly graph is generated to present the data from the fund analysis. These graphs utilise a five-colour key to illustrate performance for each metric – dark green (best performing) through orange and yellow to dark red (worst performing).

• NEXT STEPS

While there has been an improvement in the availability of data that investors need to understand fund impacts, in many cases, low coverage of the right type of proxy data continues to inhibit investors from measuring impact in an ideal way. In this regard, the metrics outlined in In Search Of Impact: Measuring The Full Value Of Capital act as a roadmap for the areas in which impact data needs to improve. Going forward, the CISL is working with the ILG to research the requirements for enhancing disclosure and fulfilling the most ideal impact metrics. In 2021, the search for a simple, transparent metric for investors to communicate portfolio emissions led to a proposal to express these emissions in terms of degrees Celsius, in order to make it easy for non-experts to understand their investment's impacts on climate stability. The group is now focused on determining how to measure portfolio impact on quality jobs (decent work). It also intends to continue research on each of the six themes to improve how investors can measure their environmental and social impact holistically, alongside financial performance.

6.4. IMPACT ASSESSMENT - A NEW CLASSIFICATION SCHEME FOR INVESTMENTS FOCUSED ON IMPACT[113]

Latest reports have shown a tremendous increase in investments within the context of ESG and sustainability over the last decade – especially in Europe. However, statistics usually do not differentiate investments based on their ambition to actively support the transition towards a more just and sustainable economy. The current methodology for calculating the extent of sustainable investment as well as ongoing regulatory efforts highlight the need for a new, more nuanced classification scheme for sustainable investments – ideally with the notion of

113. Contributing Authors: Prof. Timo Busch, Victor Van Hoorn (see *Acknowledgements*)

transition at its core. As such, a new scheme is needed to illustrate the potential of different investment products and their investment approaches to create direct and indirect positive impacts and contribute to a sustainable transition. In this context, EUROSIF and academics from the University of Hamburg have developed a white paper that aims to propose such a transition-focused classification for investments[114].

• TRANSITION-FOCUSED CLASSIFICATION FOR INVESTMENTS

In the development of these classifications, the authors of the white paper consider existing sustainable investment strategies such as exclusions or engagement as defining criteria and combine them with additional dimensions from the classification proposed by the impact task force established by the G7[115]. In this respect, the white paper proposes a new classification scheme that is based on five distinctive categories:

1 Exclusions-focused investments

Exclusion-focused investments aim to align the portfolio with specific personal values or norms.

2 Basic ESG investments

The main objective of Basic ESG investments is to mitigate ESG risks, providing an important category for the traditional focus of investors on long-term risk-adjusted returns.

3 Advanced ESG investments

Advanced ESG investments aim to mitigate ESG risks and opportunities by focusing on financially material ESG issues.

4 Impact-aligned investments

The objective of impact-aligned investments is to address environmental and social challenges and to align with internationally accepted goals such as the SDGs.

5 Impact-generating investments

Impact-generating investments actively contribute to solutions for social and/or environmental real-world challenges.

To clearly define each category, criteria on general characteristics, pre-investment strategies, performance measurement and documentation are identified. Regulatory approaches like the Principal Adverse Impacts and the EU Taxonomy alignment can also be smoothly integrated into the newly proposed classification.

• NEXT STEPS

It is important to note that this classification aims to illustrate how investments accelerate the just and sustainable transition of the real economy and are not to be used as a tool for implementing regulatory requirements. As such, it captures the transition contribution of different investment approaches based on the notion of investor impact. Further, it goes beyond the current ability of concepts used in the SFDR, the EU Taxonomy and MiFID II - which focus predominantly on identifying companies that are already sustainable, aligned, or have a positive company impact.

Nevertheless, the information disclosed due to the EU Taxonomy, SFDR and MiFID II still provide important building blocks that can be used to apply the newly proposed classification. Indeed, the classification system briefly summarised above could be complimentary to the SFDR, particularly if EU policymakers decide to introduce a product labelling regime for sustainable investment products. Another important next step would be to develop a more detailed assessment system for evaluating which investments qualify for each of the classification's categories.

114. Classification Scheme for Sustainable Investments (https://www.eurosif.org/wp-content/uploads/2022/07/FINAL-White-Paper-Eurosif-Classification.pdf) (see *Acknowledgements*)

115. Financing a better world requires impact transparency, integrity and harmonization; based on Busch et al 2021; https://link.springer.com/article/10.1007/s43546-020-00033-6

7.

STUDY CONCLUSION

The Sustainable Finance transition is set to pick up pace in the coming years as global concerns about climate change, as well as environmental and social challenges heighten like never before. In this respect, our study aptly demonstrates the key role of the funds' industry in promoting the further uptake of ESG strategies. But more so, our study highlights that the current assessment of ESG investment impacts is severely limited and inexhaustive - which is to be expected as the topic is still relatively new, the complete regulatory framework is still under development, and the majority of existing impact methodologies and impact measurement methods are yet to become mainstream and reach a harmonised and comparable approach. This is why the LSFI aims to continue conducting this study on an ongoing basis, providing updates on methodologies and new observations within the Sustainable Finance investments universe, possibly expanding its coverage to include more exhaustive invested sectors and asset classes.

Already noting the limited scope of this edition, based on data availability and consistency, the LSFI intends to continue working with all experts and stakeholders to enlarge the scope of the study to include a comprehensive overview of financial sectors and assets. In the meantime, based on the study's key findings, the LSFI plans to leverage its coordination role to engage in discussions with key stakeholders aimed at identifying areas for improvements and follow-up actions.

Within the broader context of the financial services industry, the LSFI hopes to continue raising awareness both for the financial sector and the general public. This would be useful in advancing a greater understanding of Sustainable Finance, help in the sector's sustainability transition, and push Sustainable Finance towards becoming mainstream. It also plans to continue providing information and toolkits, as well as sharing best practices among industry participants so as to further strengthen its role as the central point of information when it comes to Sustainable Finance in Luxembourg.

Ultimately, the study serves as an initial step in the LSFI's efforts to continue developing and implementing its activities to fulfil its mission and objectives - raising awareness, promoting and helping to develop Sustainable Finance in Luxembourg.

REFERENCES

- ALFI, *Hitting the road to a greener future — Sustainable funds: from niche to mainstream* (https://www.alfi.lu/getattachment/d590f0cc-8141-402e-9df2-bff575382dbe/european-sustainable-investment-funds-study-2022.pdf)
- Arendt, *ESG in the insurance sector — Integrating sustainability into the Solvency II and IDD frameworks* (https://www.arendt.com/jcms/p_99092/en/esg-in-the-insurance-sector-integrating-sustainability-into-the-solvency-ii-and-idd-frameworks.)
- Bass et al. (2020), *The State of Impact Measurement and Management Practice, Second Edition*, The Global Impact Investing Network (https://thegiin.org/research/publication/imm-survey-second-edition)
- Bloomberg Intelligence, *ESG 2021 Midyear Outlook report'* (https://www.bloomberg.com/company/press/esg-may-surpass-41-trillion-assets-in-2022-but-not-without-challenges-finds-bloomberg-intelligence/)
- Busch T., Johnson M., Pioch T. (2020), *Corporate carbon performance data: Quo vadis?*, Journal of Industrial Ecology, 1–14. (https://doi.org/10.1111/jiec.13008)
- Busch et al. (2021), *Impact investments: a call for (re)orientation* (https://link.springer.com/article/10.1007/s43546-020-00033-6)
- Busch et al. (2022), *Classification Scheme for Sustainable Investments* (https://www.eurosif.org/wp-content/uploads/2022/07/FINAL-White-Paper-Eurosif-Classification.pdf)
- *COP26 Outcomes* (https://ukcop26.org/the-conference/cop26-outcomes/)
- *Climate change — Paris Agreement* (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:20110301_2)
- EIOPA, *Guidance on the integration of sustainability preferences in the suitability assessment under the IDD* (https://www.eiopa.europa.eu/sites/default/files/publications/reports/guidance_on_integration_of_customers_sustainability_preferences_under_idd.pdf)
- EIOPA, *Proposal for amendments to the Solvency II Technical Standards on Reporting and Disclosure* (https://www.eiopa.europa.eu/sites/default/files/publications/eiopa_guidelines/eiopa-22-160-feedback-statement-its-reporting-disclosure.pdf)
- European Banking Authority, *Environmental Social and Governance Pillar 3 disclosures* (https://www.eba.europa.eu/sites/default/documents/files/document_library/News%20and%20Press/Communication%20materials/Factsheets/1026177/EBA%202021.5984%20ESG%20Factsheet%20update2.pdf)
- European Commission, *Directorate-General for Environment (2021), Recommendation on the use of Environmental Footprint methods*, Annex 1 to 2 and 3 to 4 (https://environment.ec.europa.eu/publications/recommendation-use-environmental-footprint-methods_en)
- European Commission, *Directive on Corporate Sustainability Due Diligence* (https://ec.europa.eu/info/sites/default/files/1_2_183888_annex_dir_susta_en.pdf)
- European Commission, *EU Climate Transition Benchmarks Regulation - Implementing and delegated acts* (https://finance.ec.europa.eu/regulation-and-supervision/implementing-and-delegated-acts/eu-climate-transition-benchmarks-regulation_en)
- European Commission, *Sustainable Finance* (https://finance.ec.europa.eu/sustainable-finance_en)
- EU Council, *New rules on corporate sustainability reporting: provisional political agreement between the Council and the European Parliament* (https://www.consilium.europa.eu/en/press/press-releases/2022/06/21/new-rules-on-sustainability-disclosure-provisional-agreement-between-council-and-european-parliament/)
- Global Impact Investing Network, *Core Characteristics of Impact Investing* (https://thegiin.org/assets/Core%20Characteristics_webfile.pdf)

- Government of Luxembourg, *Luxembourg Sustainable Finance Roadmap* (https://gouvernement.lu/dam-assets/documents/actualites/2018/10-octobre/04-sustainable-finance/Luxembourg-Sustainable-Finance-Roadmap-WEB.pdf/)
- Inclusive Finance Network (https://www.infine.lu/faq/)
- LFF, *Benchmarking ESG in Banking and Finance* (https://www.luxembourgforfinance.com/wp-content/uploads/2021/10/2021.10-Benchmarking-ESG-in-banking-and-finance-New-Financial.pdf)
- LSFI, *Luxembourg Sustainable Finance Strategy* (https://lsfi.lu/what-we-do/#strategy)
- Luxembourg Sustainable Finance Initiative (LSFI) (https://lsfi.lu/what-we-do/)
- Luxembourg Stock Exchange, *Luxembourg Green Exchange* (https://www.bourse.lu/documents/brochure-LGX-EN.pdf)
- *Paris Agreement* (https://unfccc.int/sites/default/files/english_paris_agreement.pdf)
- Popescu et al. (2022), *Are SRI funds financing carbon emissions? An Input-Output Life Cycle Assessment of investment funds*, SSRN Electronic Journal (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4047292)
- PwC, *ESG: A Growing Sense of Urgency, Next in Insurance: Top Insurance Industry Issues* (https://www.pwc.com/us/en/industries/financial-services/library/next-in-insurance-top-issues/esg-insurance-industry.html)
- PwC, *Asset and Wealth Management Revolution 2022: Exponential Expectations for ESG* (https://www.pwc.com/gx/en/financial-services/assets/pdf/pwc-awm-revolution-2022.pdf)
- PwC, *Corporate Sustainable Due Diligence Directive - A focus on your entire value chain* (https://www.pwc.lu/en/sustainable-finance/a-year-of-esg/corporate-sustainable-due-diligence-directive.html)
- PwC, *How to apply the EU Taxonomy in Practice* (https://blog.pwc.lu/how-to-apply-the-eu-taxonomy-system-in-practice/)
- PwC, *Key Challenges for the Financial Industry in dealing with ESG risks* (https://www.pwc.lu/en/sustainable-finance/a-year-of-esg/key-challenges-for-the-financial-industry.html)
- PwC, *The ESG Transformation of the Fixed Income Market* (https://www.pwc.lu/en/sustainable-finance/docs/esg-transformation-fixed-income-market.pdf)
- The Global Impact Investing Network (2021), *COMPASS: The Methodology for Comparing and Assessing Impact* (https://thegiin.org/research/publication/compass-the-methodology-for-comparing-and-assessing-impact)
- The Global Impact Investing Network, *Impact Performance Benchmarks*, IRIS+ System (https://iris.thegiin.org/performance-analytics/)
- The Global Impact Investing Network, *IRIS+ and the Five Dimensions of Impact* (https://iris.thegiin.org/document/iris-and-the-five-dimensions/)
- University of Cambridge (2016), *In Search of Impact: Measuring the full value of capital* (https://www.cisl.cam.ac.uk/system/files/documents/impact-report.pdf)

GLOSSARY

BONDS[116]

- **Green Bonds**

A green bond is a debt security that is issued to enable capital-raising and investment for new and existing projects with environmental benefits.

- **Impact Bonds**

Impact Bonds are a category of debt securities where the proceeds raised during funding are used to create a positive impact. These instruments are outcome-based contracts and use the capital received by investors to cover upfront capital requirements for the set up and delivery of a service. Often also called social impact bonds, governments could use such instruments to cover and address social issues.

- **Social Bonds**

A social bond is a use of proceeds bond that raises funds for new and existing projects with positive social outcomes (such as tackling poverty, unemployment, education, healthcare etc.).

- **Sustainability Bonds**

A sustainability bond is a bond where the proceeds will be exclusively applied to finance or re-finance a combination of both Green and Social projects.

- **Sustainability-Linked Bond (SLB)**

A Sustainability-linked Bond (SLB) is any type of bond for which the issuer commits to achieve predefined sustainability objectives, and in which the financial and/or the structural characteristics can vary depending on whether or not the issuer achieves these predefined sustainability objectives. SLBs contribute to financing the issuer's strategy towards achieving predefined sustainability objectives within a set timeline.

- **Transition Bonds**

Transition Bonds are debt securities issued by high greenhouse gas (GHG) emission entities with the aim of ultimately transitioning into a more environmentally friendly entity[117].

REGULATIONS & DIRECTIVES

- **AIFMD**

The Alternative Investment Fund Managers Directive is designed to protect investors and regulate private equity, real estate, hedge funds and other Alternative Investment Fund Managers (AIFMs).

- **CRR II**

The Capital Requirements Regulation sets out general prudential requirements in relation to risk, large exposures, liquidity, reporting and public disclosure for institutions, financial holding companies and mixed financial holding companies.

- **CSRD**

The Corporate Sustainability Reporting Directive is a new EU regulation that requires companies to report regularly on their environmental and social impact activities. Its purpose is to amend and strengthen the current requirements of the NFRD.

- **CSDDD**

The Corporate Sustainability Due Diligence Directive is targeting companies operating in the EU and encourages the adoption of sustainable and responsible practices within corporations. Moreover, it aims to establish a strong link between the governance/operational side of the company and the consideration of human rights and environmental issues.

- **IDD**

The Insurance Distribution Directive aims at regulating how insurance products are a) designed and b) distributed in the EU. It also aims at harmonising and standardising insurance market regulations across the EU countries.

116. Definitions have been adapted from the LGX website (https://lgxhub.bourse.lu/academy/glossary/bonds).

117. This definition reflects the current understanding in the market. Stakeholders are still working on a final definition (https://lgxhub.bourse.lu/academy/glossary/bonds).

- **MiFID II**

MiFID is the Markets in Financial Instruments Directive. This regulation aims at increasing transparency across the EU financial markets and provides a standardised framework for regulatory disclosures required by any firm operating in Europe.

- **NFRD**

The Non-Financial Reporting Directive is designed to provide investors and company stakeholders with information regarding environmental and social matters. Examples include environmental impact, human rights issues, anticorruption, bribery and diversity levels in the management of the company.

- **SFDR**

The Sustainable Finance Disclosure Regulation (SFDR) is a European regulation introduced in 2019 and effective from March 2021. The key targets of the regulation are to a) increase transparency in the sustainable investment products market, b) reduce greenwashing and c) increase transparency around the sustainability claims made by financial market participants.

- **Solvency II**

This EU directive aims to harmonise the EU Insurance regulation, with a key focus on the minimum capital that EU Insurance companies are required to hold in order to reduce the risk of insolvency.

- **UCITS**

The Undertaking for Collective Investments in Transferable Securities directive is targeted towards facilitating the cross-border distribution of UCITS funds within the EU.

MISCELLANEOUS

- **Active Ownership**

Active Ownership of a company is when its shareholders are actively engaging with the company, influencing the strategy and future planning. The term is mostly used in the context of Sustainable Finance investments, given that shareholders might push for meeting ESG goals and/or including more sustainability considerations.

- **ESG Exclusion**

In this cluster, we include funds that are classified as ESG funds and also apply one or more exclusion criteria.

- **ESG Involvement**

This cluster includes funds that apply Best-In-Class, Positive Tilt, Thematic, Microfinance, Sustainable Development Goals, Sustainable Bonds. These funds could also apply exclusion criteria as well.

- **ESG Screening**

This cluster contains all the funds which only apply ESG factors into their overall screening process and cannot be explicitly included in either of the two following categories: ESG Exclusion and ESG Involvement.

- **Impact Investments**[118]

Impact investments are investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return. Impact investments can be made in both emerging and developed markets and target a range of returns from below market to market rate, depending on investors' strategic goals.

- **Mixed**

Funds which invest in a mixture of securities (bonds, equities etc.) or other funds.

- **Other**

Open-ended funds with investments that cannot be classified in the conventional categories (bond, equity, mixed, money market). These usually include real estate, commodities, and absolute return strategies.

118. Global Impact Investing Network, Core Characteristics of Impact Investing (https://thegiin.org/assets/Core%20Characteristics_webfile.pdf)

APPENDIX

A.COMPARISON WITH MORNINGSTAR METHODOLOGY

In conducting our study, we acknowledge that the classification of investment funds as ESG and the subsequent measurement of their impacts is not a straightforward task. Concerns surrounding the availability and sufficiency of credible and consistent ESG data, the lack of homogenous standards and definitions, and differences in the criteria used by various data providers in evaluating the ESG characteristics of funds are some of the challenges faced in such studies - with impacts on research methodologies and outcomes. Thus, for the purpose of our study, we deem it expedient to outline the differences between our methodology and the approach employed in the European Sustainable Investment Funds study commissioned by the Association of the Luxembourg Fund Industry (ALFI), hereafter referred to as "the Study", which has already attracted significant attention from players in Luxembourg.

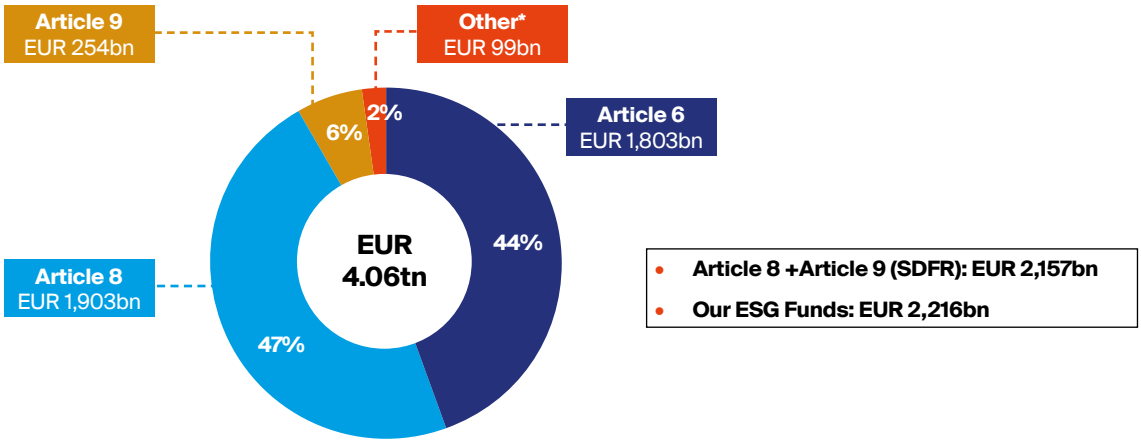
As highlighted in our objective, our goal is to provide an objective snapshot of the ESG fund universe in Luxembourg, complement existing studies, and contribute to the expanding body of knowledge on the subject of ESG investments. Our methodology refrains from performing any fund assessments or valuations to determine if a fund is ESG or not – compared to the approach used in the aforementioned Study. Instead, it takes a more granular approach to assess how ESG strategies are applied within the Luxembourg fund universe and uses that as the basis for fund classification.

In this context, a key difference between the methodologies used by us and the Study is that the database that is sourced by the latter employs proprietary methodology developed by its in-house analysts to determine whether a fund is sustainable or not. Using a combination of fund names, prospectuses, regulatory documents, and an in-depth analysis of each fund, they distinguish funds that are deemed to be considered as sustainable investments from those that are not[119]. The outcome of this process is a more strictly filtered universe of funds that are labelled as "sustainable" in their database, resulting in a lower figure for total sustainable fund AuM for the Study compared to our figures. In contrast, the source database for our study relies on public information and documents (such as fund prospectuses) to classify funds as either ESG or conventional. Our ESG classification also includes all negative screening funds – which are part of the SFDR requirements but which the ALFI Study methodology does not consider as sustainable if they do not also integrate sustainability as a central and binding feature of the investment strategy.

The result is that our process yields overall fund AuM figures that are more closely aligned to the SFDR totals for Article 8 and Article 9 funds (Exhibit 67), which was essential for the objectives of this study especially since the methodology used is not an industry-wide standard. In fact, the ALFI Study duly notes the possibility of an overall underestimation of sustainable funds, given that a significant number of possible ESG funds are excluded from their sustainable universe. Since there is currently no consensus on a standardised and industry-accepted methodology, we decided to keep as close as possible to the SFDR figures. This ensured that we maintained a broader and more transparent approach to then deep dive into our very granular analysis.

119. See pages 10, 13 and 14 of the of European Sustainable Investment Funds Study ***here***.

Exhibit 67: Comparison of total AuM with SFDR[120]

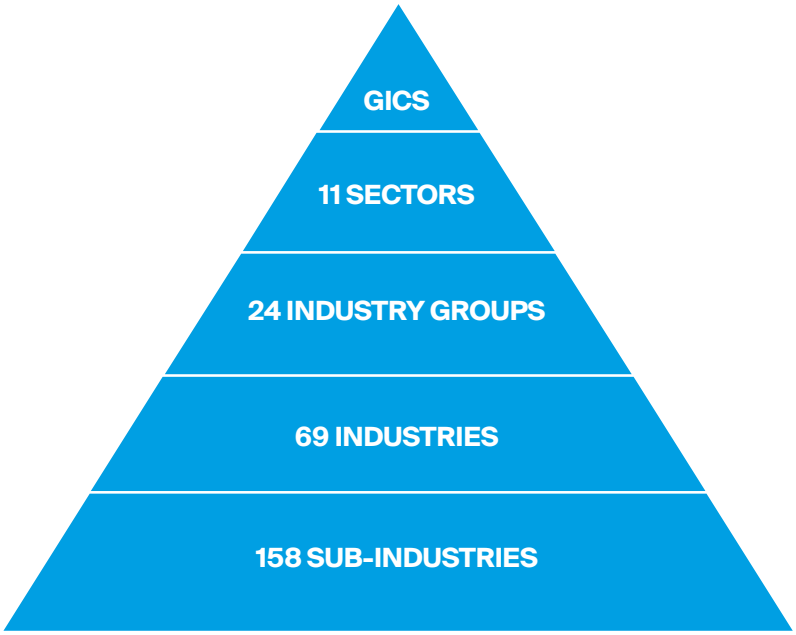


Sources: PwC Global AWM and ESG Research Centre analysis based on Refinitv Lipper

B. SECTOR DEFINITIONS[121]

In our analysis we use the MSCI Global Industry Classification Standard (GICS®), a classification of industry sectors developed by MSCI in order to provide a more granular view of the economic activities and facilitate investment decisions.

Exhibit 68: The GICS® classification structure



Source: MSCI

120. Other includes funds that have not reported their SFDR status or for which not data is available.
121. All Information for this segment obtained from the MSCI GICS® website: https://www.msci.com/our-solutions/indexes/gics

We decided to use the second pillar of GICS (i.e. the 24 Industry Groups) for our analysis, as we believe that this level provides enough granularity without unnecessary details. The 24 industry groups are the following:

Table 1: The 24 GICS® industry groups

Automobiles & Components	Food & Staples Retailing	Real Estate
Banks	Food, Beverage & Tobacco	Retailing
Capital Goods	Health Care Equipment & Services	Semiconductors & Semiconductor Equipment
Commercial & Professional Services	Household & Personal Products	Software & Services
Consumer Durables & Apparel	Insurance	Technology Hardware & Equipment
Consumer Services	Materials	Telecommunication Services
Diversified Financials	Media & Entertainment	Transportation
Energy	Pharmaceuticals, Biotechnology & Life Sciences	Utilities

Source: MSCI

For the sake of clarity, and given the fact that an overall definition for the industry groups is not provided by MSCI, the following tables contains the aforementioned industry groups sub-divided in the following 69 industries:

Table 2: The GICS® industry groups and their underlying industries

Industry Group	**Industry**
Automobiles & Components	Auto Components
Automobiles & Components	Automobiles
Banks	Banks
Banks	Thrifts & Mortgage Finance
Capital Goods	Aerospace & Defense
Capital Goods	Building Products
Capital Goods	Construction & Engineering
Capital Goods	Electrical Equipment
Capital Goods	Industrial Conglomerates
Capital Goods	Machinery
Capital Goods	Trading Companies & Distributors
Commercial & Professional Services	Commercial Services & Supplies
Commercial & Professional Services	Professional Services
Consumer Durables & Apparel	Household Durables
Consumer Durables & Apparel	Leisure Products
Consumer Durables & Apparel	Textiles, Apparel & Luxury Goods
Consumer Services	Hotels, Restaurants & Leisure
Consumer Services	Diversified Consumer Services
Diversified Financials	Diversified Financial Services
Diversified Financials	Consumer Finance
Diversified Financials	Capital Markets
Diversified Financials	Mortgage Real Estate Investment Trusts (REITs)
Energy	Energy Equipment & Services
Energy	Oil, Gas & Consumable Fuels

Industry Group	Industry
Food & Staples Retailing	Food & Staples Retailing
Food, Beverage & Tobacco	Beverages
Food, Beverage & Tobacco	Food Products
Food, Beverage & Tobacco	Tobacco
Health Care Equipment & Services	Health Care Equipment & Supplies
Health Care Equipment & Services	Health Care Providers & Services
Health Care Equipment & Services	Health Care Technology
Household & Personal Products	Household Products
Household & Personal Products	Personal Products
Insurance	Insurance
Materials	Chemicals
Materials	Construction Materials
Materials	Containers & Packaging
Materials	Metals & Mining
Materials	Paper & Forest Products
Media & Entertainment	Media
Media & Entertainment	Entertainment
Media & Entertainment	Interactive Media & Services
Pharmaceuticals, Biotechnology & Life Sciences	Biotechnology
Pharmaceuticals, Biotechnology & Life Sciences	Pharmaceuticals
Pharmaceuticals, Biotechnology & Life Sciences	Life Sciences Tools & Services
Real Estate	Equity Real Estate Investment Trusts (REITs)
Real Estate	Real Estate Management & Development
Retailing	Distributors
Retailing	Internet & Direct Marketing Retail
Retailing	Multiline Retail
Retailing	Specialty Retail
Semiconductors & Semiconductor Equipment	Semiconductors & Semiconductor Equipment
Software & Services	IT Services
Software & Services	Software
Technology Hardware & Equipment	Communications Equipment
Technology Hardware & Equipment	Technology Hardware, Storage & Peripherals
Technology Hardware & Equipment	Electronic Equipment, Instruments & Components
Telecommunication Services	Diversified Telecommunication Services
Telecommunication Services	Wireless Telecommunication Services
Transportation	Air Freight & Logistics
Transportation	Airlines
Transportation	Marine
Transportation	Road & Rail
Transportation	Transportation Infrastructure
Utilities	Electric Utilities
Utilities	Gas Utilities
Utilities	Multi-Utilities
Utilities	Water Utilities
Utilities	Independent Power and Renewable Electricity Producers

Source: MSCI

For more information, please refer to the MSCI GICS® website[122] or the GICS® detailed methodology[123]. Detailed definitions are provided only for the 11 sectors and the 158 sub-industries.

122. MSCI GICS® website: https://www.msci.com/our-solutions/indexes/gics

123. GICS® Methodology: https://www.msci.com/documents/1296102/11185224/GICS+Methodology+2022.pdf/f9910041-6127-17d2-1246-4052926adaf7?t=1645738126436

C. ABOUT REFUND

REFUND is a tool that estimates the holding-level impact of investment funds based on regionalised industry-level environmental impact indicators that are sourced and adapted from multi-regional environmentally extended input-output (EEMRIO) databases. The tool, developed by the LIST, is still in a testing phase and should only be used to conduct initial screening for fund-level impact, as company-level specifications are not considered in the model. The indicator measured is greenhouse gas (GHG) emissions, and model uses the following metrics to measure GHG emissions at fund level:

Relative Carbon Footprint (RCF)

The RCF represents the GHG emissions that can be attributed to a USD 1.0mn investment in a fund by allocating absolute company-level impact, on a share basis, expressed in tons CO2 equivalents (tCO2-eq) per million US dollars invested in the fund.

Weighted Average Carbon Intensity (WACI)

The WACI looks at the company-level intensity for the specific indicator, GHG emissions. It is not weighted based on market value; hence it shows the exposure to companies but does not account for the amount owned (measured in tCO2-eq per MEUR of company revenue).

Owned Impact (OI)

Unlike the first two relative metrics, the OI is an absolute metric that shows the total owned environmental impact at fund level.

• FUND SAMPLE USED FOR THIS ANALYSIS

Starting from the initial database of approximately 29,000 share classes (ISINs) of Luxembourg-domiciled funds used in this report, a unique list of 3,388 funds was defined[124]. Then, for the 2,650 of these funds that were eligible for the environmental assessment exercise[125], fund information and portfolio composition were retrieved for 2021 – as it was the year with the highest coverage. Further, holding-level revenue information – needed for the estimation of impact – was retrieved for 2019 due to higher coverage and also to remove any bias caused by the impact of COVID-19 on revenues.

• REFUND METHODOLOGY

To estimate the carbon footprint of an investment fund, one would require the greenhouse gas (GHG) emissions measurements for all underlying holdings. However, the lack of reliable self-reported data has led to the rise of different estimation methods trying to fill this data gap[126].

The REFUND tool, developed in a project co-funded by the Luxembourg National Research Fund (FNR)[127] (grant number REFUND O19/13947579), uses environmentally extended multi-regional input-output (EEMRIO) analysis and detailed company-level revenue breakdown to estimate life cycle environmental impacts (such as GHG emissions) of listed companies[128]. The company-level impacts are then aggregated at a fund level.

124. Removing funds' ISINs representing different share classes, but with the same investment portfolio.
125. Non-equity funds, funds with no reporting information, and funds with less than 5 holdings or less than 90% of the holdings covered by holding-level information have been removed for this purpose.
126. Busch, T., Johnson, M., Pioch, T., 2020. Corporate carbon performance data: Quo vadis? J. Ind. Ecol. 1–14. https://doi.org/10.1111/jiec.13008
127. Popescu, I.S., Gibon, T., Hitaj, C., Rubin, M., Benetto, E., 2022. Are SRI funds financing carbon emissions? An Input-Output Life Cycle Assessment of investment funds [WWW Document]. SSRN Electron. J. (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4047292 (accessed 3.3.22).
128. It covers scope 1, scope 2 and scope 3 upstream emissions.

For example, to estimate the scope 1, scope 2 and scope 3 upstream GHG emissions of a company active in the Beverages and Textile Manufacturing sector in over 50 countries in the world, the revenue percentages by country-industry will be linked to the impact factors of all 50 countries - Beverages production sectors and all 50 countries - Textile Manufacturing sector, separately, and then aggregated at company level, to estimate the company-level life cycle GHG emissions (or, on short, Carbon Footprint).

The advantage of the REFUND tool is that it uses a detailed set of regionalised industry emission factors and a thorough breakdown of a company's economic activities. In addition, it estimates impacts homogenously across the over 10,000 company-sample, while self-reported data is rather heterogeneous in terms of methodology. Moreover, since both direct and indirect impacts are estimated, it allows investors to understand the total impact "generated" by their investments.

• FUND SAMPLE USED FOR THIS ANALYSIS

The sampling process is summarised in the table below (Table 3):

Table 3 : Summary sample curation

SFDR article	Fund ISINs	Fund ISINs covered	Unique fund entities	Funds analysed
6	10,191	8,864	1,553	1,129
8	14,235	12,242	1,378	1,186
9	3,646	2,655	288	246
Other	933	678	169	89
Total	**29,005**	**24,439**	**3,388**	**2,650**

Source: Luxembourg Institute of Science and Technology (LIST)

Based on the above table, most of the analysed funds in the sample fall under Article 8. In Table 4, the distribution of the sample of analysed funds is shown, in number of funds by SFDR Article type and ESG strategy (Table 4).

Table 4: Funds by SFDR split and ESG Strategy

SFDR article	6			8			9			Other			
ESG cluster	ESG Involvement	ESG Exclusion	NO ESG	ESG Involvement	ESG Screening	ESG Exclusion	ESG Involvement	ESG Screening	ESG Exclusion	ESG Involvement	ESG Screening	ESG Exclusion	NO ESG
# funds	8	25	1,096	158	383	645	119	34	93	1	1	1	86

Source: Luxembourg Institute of Science and Technology (LIST)

• ANALYSIS OF THE SELECTED FUND SAMPLE

Relative Carbon Footprint

Table 5 shows the results in numbers, which are exposed in graphical format in Exhibit 65 of the main report. In 2021[129], Article 9 funds recorded on average, 208 tCO2-eq life cycle emissions/million USD invested, compared to an average of 315 for Article 8 funds and 508 for Article 6 funds. Industry allocation was also noted to be one of the – if not the most significant – drivers of the sustainability profile of a fund. For instance, Article 8 funds investing in Finance, Tech or Real Estate were seen to be the leading sectors when it comes to achieving a low carbon footprint. That being said, Article 9 funds also indicated a lower carbon footprint on average, with none of the top 50 funds with the highest life cycle intensity including Article 9 funds. In addition, ESG Involvement strategies were seen to show a lower carbon footprint across all Article 6, 8 and 9 funds.

Table 5: Relative Carbon Footprint funds sample in tCO2-eq/million USD invested in a fund (Values are displayed as average per fund category)

Fund type	# funds	Scope 1	Scope 2	Scope 3 Upstream	Life cycle
Art 6 ESG Involvement	8	163	21	205	388
Art 6 ESG Exclusion	25	225	32	251	508
Art 6 NO ESG	1,096	163	27	219	410
Art 8 ESG Involvement	158	109	21	169	299
Art 8 ESG Screening	383	146	26	209	381
Art 8 ESG Exclusion	645	118	22	175	315
Art 9 ESG Involvement	119	71	19	118	208
Art 9 ESG Screening	34	80	22	140	242
Art 9 ESG Exclusion	93	61	18	128	208
Other ESG Involvement	1	29	15	89	133
Other ESG Screening	1	33	15	101	149
Other ESG Exclusion	1	40	11	70	122
Other NO ESG	86	147	24	190	362

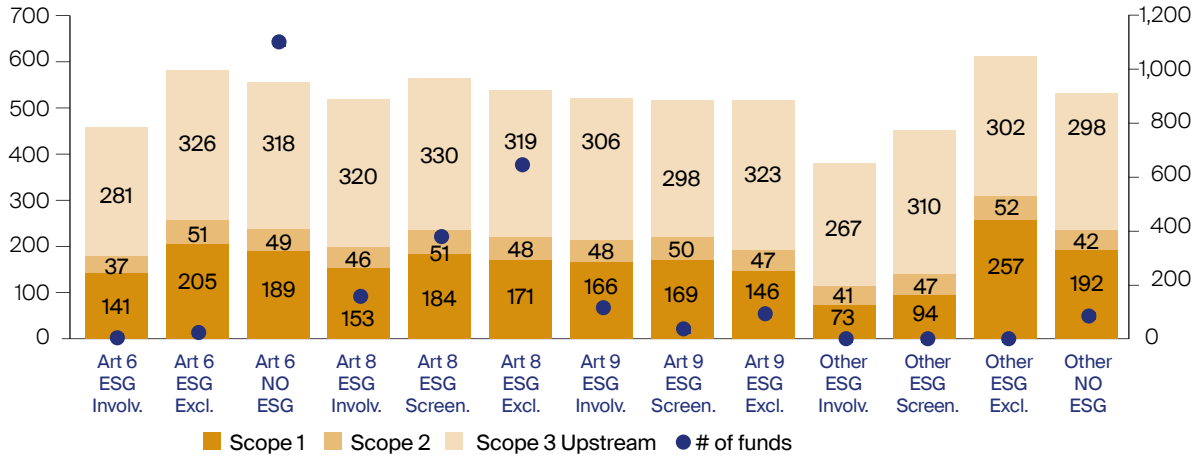
Source: Luxembourg Institute of Science and Technology (LIST)

Weighted Average Carbon Intensity (WACI)

For the Weighted Average Carbon Intensity (WACI), the average Article 9 fund is similar to the average Articles 6 or 8 fund (Exhibit 69). This implies that Article 9 funds while reducing their exposures to carbon-intensive companies, could still maintain some shares in these companies. In fact, the assessment of differences in holdings for Article 9 and 8 funds showed a 93% overlap in the pool of companies owned by both fund categories. Accordingly, the REFUND model showed a link between differences in sustainability performance and underinvestment by Article 9 funds in more carbon-intensive companies compared to Article 8 funds.

129. For this example, only funds applying an exclusionary strategy have been considered.

Exhibit 69: Weighted Average Carbon Intensity for the funds sample, in tCO2-eq/mEUR of company revenue (averages by fund category)



Source: Luxembourg Institute of Science and Technology (LIST)

Owned Emissions

In terms of owned emissions, the analysis showed direct emissions[130] of the 2,650 funds in the sample to amount to 254.2 million tCO2-eq (Table 6).

Table 6: Owned GHG emissions by self-labelled article 6, 8 and article 9 funds in Luxembourg*

Fund type	# funds	AuM (million USD)	Scope 1	Scope 2	Scope 3 Upstream	Life cycle	Mean life cycle owned per fund
	1	2	3	4	5	6	7
Art 6 ESG Involvement	8	4,127	232	91	586	909	114
Art 6 ESG Exclusion	25	14,649	1,947	331	2,520	4,797	192
Art 6 NO ESG	1,096	687,863	82,719	14,747	112,037	209,503	191
Art 8 ESG Involvement	158	125,509	9,966	2,066	17,146	29,178	185
Art 8 ESG Screening	383	298,067	36,127	6,186	46,987	89,301	233
Art 8 ESG Exclusion	645	640,156	58,307	10,862	81,898	151,067	234
Art 9 ESG Involvement	119	139,485	15,729	2,819	14,898	33,446	281
Art 9 ESG Screening	34	21,006	1,776	434	3,149	5,358	158
Art 9 ESG Exclusion	93	79,666	4,025	1,299	8,233	13,556	146
Other, All ESG Strategies	89	20,061	4,113	500	3,960	8,573	96
TOTAL	**2650**	**2,030,589**	**214,941**	**39,333**	**291,414**	**545,688**	**206**

* Note: *Data is for the reporting year 2021. Column 2 sums up the total Assets under Management (AuM) for all funds. Columns 3 to 6 show results in ktCO2-eq, and column 7 shows results in tCO2-eq per million USD invested in the pool of funds.*

130. Direct emissions refer to scopes 1 and 2.

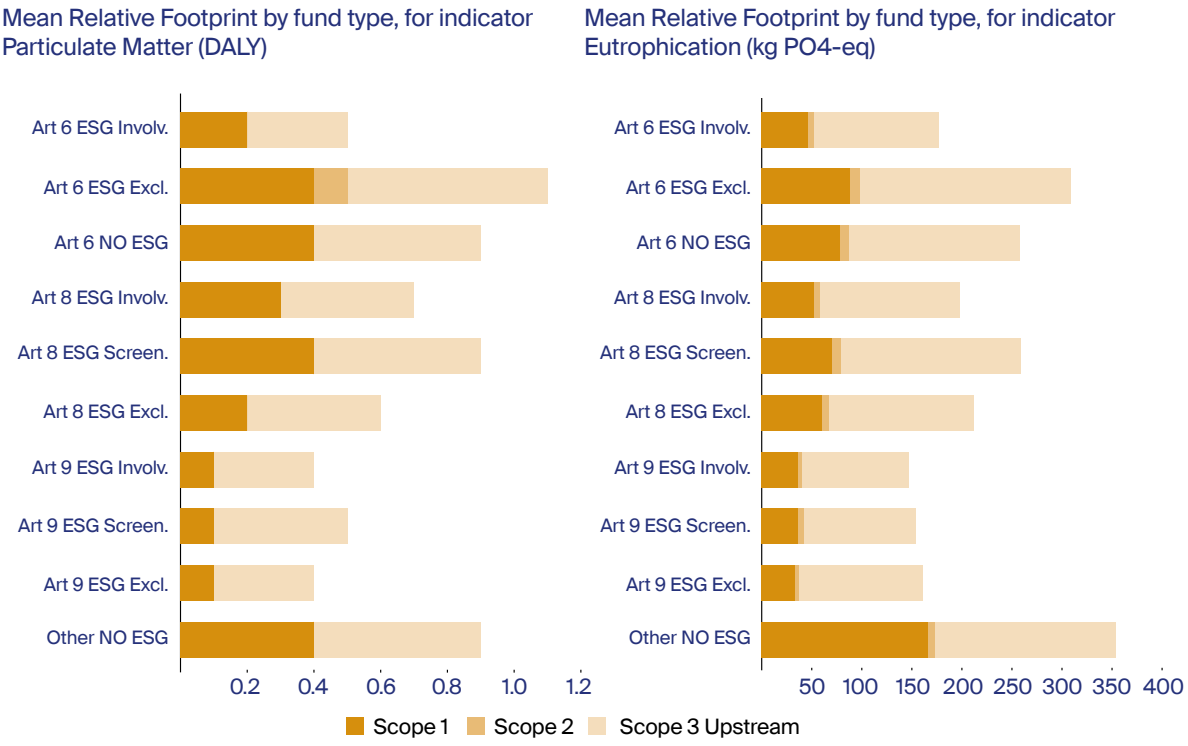
• ADDITIONAL ENVIRONMENTAL INDICATORS

Other environmental indicators can be analysed using EEMRIO databases. These can be used to quantify other toxic emissions or impacts on specific environments such as water or soil. However, the use of these results requires a high level of caution as the related uncertainty is much higher for impact categories besides GHG emissions. For this analysis, indicators were selected to match the proposed indicators under the European Product Environmental Footprint[131].

In addition to the existing ones, two more indicators — Eutrophication and Particulate Matter Formation — were chosen as control indicators. Eutrophication is measured in kgPO4-eq and measures emissions of ammonia and nitrogen compounds (NH3, NOx), while Particulate Matter measures emissions of air pollutants, like PM2.5, SOx, CO in disability-adjusted life years (DALY). This latter metric represents the loss of the equivalent of one year of full health. DALYs are the sum of the years of life lost to due to premature mortality (YLLs) and the years lived with a disability (YLDs) over the EU population. Together, these two indicators serve as proxies for the following Taxonomy-related indicators: "The protection and restoration of biodiversity and ecosystems" and "Pollution prevention and control".

The indicators are closely correlated with the results from GHG emissions at fund level, showing Article 9 to perform best on average. For Particulate Matter, a loss of between 0.2 and 1 DALY was noted due to pollution caused by a USD 1.0mn investment in a self-classified fund under the SFDR. For the Eutrophication indicator, a similar investment in the sampled funds resulted in between 150 and 350 kgPO4-eq of emissions (Exhibit 70). However, as with all other indicators, funds should be considered on an individual basis, as funds with different industry focus could produce different results.

Exhibit 70: Mean relative footprint in terms of "Particulate Matter" and "Eutrophication", averages by fund type, in impact unit per million USD invested a fund.



Source: Luxembourg Institute of Science and Technology (LIST)

131. PEF, 2021. European Commission - Directorate-General for Environment - Recommendation on the use of Environmental Footprint methods Annex 1 to 2 and 3 to 4 [WWW Document]. https://environment.ec.europa.eu/publications/recommendation-use-environmental-footprint-methods_en

To comprehensively assess the full environmental impact of a fund, it is important to also consider other indicators apart from climate change impact. This is particularly essential in line with regulators' gradually increasing shift towards a multi-criteria impact assessment, such as the six environmental objectives under the EU Taxonomy. While it can be argued that other indicators present higher levels of uncertainty in terms of data, they could still serve to provide a first-level understanding of what impacts could be detrimental to a fund and the companies it invests in.

• LIMITATIONS AND FURTHER RESEARCH NEEDS

It is important to reiterate that the REFUND tool is still in a testing phase and is marked by a high level of uncertainty in terms of regionalised industry-level environmental indicators, making it impossible to consider results as fully accurate. In terms of limitations, the tool does not take into account the differences in company-level practices, treating companies with the same sub-industry and sub-country breakdown as equal. This is likely due to the fact that current data from company reports is incomplete and does not follow the same methodology for assessment. In order to understand the complete sustainability profile of a fund, one should also account for forward-looking indicators at company level[132] as well as funds' engagement policies. These will indicate the degree of commitment to reducing the environmental impact of investments.

132. Indicators such as verified Science-Based targets, the role a company plays in decarbonising the economy or R&D for new green technologies).

ABOUT THE SPONSORING COMPANIES

• ABOUT THE LUXEMBOURG SUSTAINABLE FINANCE INITIATIVE (LSFI)

The Luxembourg Sustainable Finance Initiative (LSFI) is a not-for-profit association and a public-private partnership, founded in 2020 by the Ministry of Finance, the Ministry of the Environment, Climate and Sustainable Development, Luxembourg for Finance (the agency for the development of the financial centre) and the High Council for Sustainable Development (Conseil Supérieur du Développement Durable),which is an independent and representative advisory body to the Luxembourg Government about sustainable development matters. The LSFI serves as a coordinating entity with a mission to:

- Become the central point of information for all Sustainable Finance actors in Luxembourg.
- Raise awareness on Sustainable Finance.
- Help the financial sector further transition towards sustainability.
- Design and implement the Luxembourg Sustainable Finance Strategy for the Luxembourg financial centre.

Through its past and current projects, the LSFI aims to achieve its objective of helping the financial sector transition towards sustainability, raising awareness of Sustainable Finance, and fostering collaboration and regular dialogue among all the stakeholders within the Luxembourg Sustainable Finance landscape (financial institutions, public bodies, civil society, research and education, and corporates, among others). It acts as a central source of information for all Sustainable Finance actors in Luxembourg by regularly collating news, events, regulatory updates, publications, and tools. The LSFI also fosters dialogue and coordination, facilitating regular exchanges on Sustainable Finance topics, challenges, and needs, in a bid to advance Sustainable Finance at the country level.

In addition, the LSFI has the mandate from the Luxembourg Government to design and implement the Luxembourg Sustainable Finance Strategy for the Luxembourg financial centre. In particular, under the Luxembourg Sustainable Finance Strategy Pillar 3, “Measuring Progress”, the LSFI seeks to help the industry understand where it stands and the progress made in terms of Sustainable Finance, which are fundamental to identifying areas for improvement. The materialisation of this involves analysing and reporting on progress in Sustainable Finance and also conducting regular studies on Sustainable Finance in Luxembourg, which are adapted based on data availability, the regulatory landscape, and other identified needs. As the first in the series, this study is meant to be objective and provide a baseline for the country to understand its strengths and challenges - with an emphasis on expanding the scope in subsequent editions to include all actors and financial vehicles/products.

The LSFI is not a regulatory, public affairs or advisory entity. Thus, it does not provide commentary on regulation. However, following its mission to raise awareness, the LSFI regularly follows and relays the latest regulatory update to industry participants in a neutral way. Find out more by visiting **www.lsfi.lu.**

ABOUT PWC

PwC Luxembourg (**www.pwc.lu**) is the largest professional services firm in Luxembourg with over 3,100 people employed from 85 different countries. PwC Luxembourg provides audit, tax and advisory services including management consulting, transaction, financing and regulatory advice. The firm provides advice to a wide variety of clients from local and middle market entrepreneurs to large multinational companies operating from Luxembourg and the Greater Region. The firm helps its clients create the value they are looking for by contributing to the smooth operation of the capital markets and providing advice through an industry-focused approach.

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 152 countries with over 328,000 people who are committed to delivering quality in assurance, advisory and tax services. Find out more and tell us what matters to you by visiting us at www.pwc.com and www.pwc.lu.

STUDY ADVISORY COMMITTEE

As previously mentioned, to provide an additional layer of procedural rigour, the LSFI appointed an Advisory Committee comprising researchers and industry practitioners with relevant experience on the topic of our study. The Advisory Committee intermittently reviewed the study (mid-term and final reviews) and ensured supervisory oversight, particularly of the quantitative analysis. It was not within the remit of the Advisory Committee to decide on the scope and design of the sections of the study but to provide constructive feedback as and when needed over the course of the study.

Jane Wilkinson, Independent Director, Ripple Effect

Jane is an experienced independent director sitting on the Boards of UCITS and alternative investment funds. She teaches Sustainable Finance at the University of Luxembourg within the Executive Certification Programme and the MSc Specialised Sustainable Finance track. Prior to going independent, Jane was a KPMG partner responsible for the Sustainability Services team and served as the Private Equity sector leader. She was also the only Luxembourg-appointed member of the European Commission's Technical Expert Group on Sustainable Finance between 2018 and 2019.

Michael Halling, Chair and Coordinator of the research program in Sustainable Finance, University of Luxembourg

Michael joined the University of Luxembourg in January 2021, as Full Professor within the Department of Finance, and moved into his current role as the Chair and coordinator of the research program in Sustainable Finance in November 2021. He holds a Ph.D. in Computer Science from the Vienna University of Technology and a PhD in Finance from the University of Vienna. Michael's research ranges from empirical asset pricing, asset management and business-cycle dynamics of firms' capital structures, to Sustainable Finance.

Enrico Benetto, Researcher and Head of Environmental Sustainability Assessment And Circularity Unit, Luxembourg Institute of Science and Technology (LIST)

Enrico's core research interest is in developing science-based methods and indicators to orient sustainable decarbonisation pathways toward climate targets. He leverages a 25-year leadership experience in RDI institutions in the field of environmental life cycle sustainability and risk assessment of products, technologies, and policies and a broad range of experiences in decision-making to aid the development of industry and public policy.

On the academic side, he has contributed to scientific literature, co-authoring 120+ peer-reviewed scientific papers, 150+ scientific conference proceedings, 18 chapters in volumes with ISBN, and editing one open-access book which has been accessed 1M+ times.

On the impact side, he has contributed to generate and disseminate new knowledge in 30+ European research projects and 25+ collaborative research partnerships with SMEs, policymakers, and large industries.

Enrico is keen to contribute broadly to enhance the consideration of sustainability in society. He has developed research and strategic partnerships with national Ministries and international institutions (e.g. World Alliance for Efficient Solutions of Bertrand Piccard). He has served as an advisor for the TEG on Sustainable Finance of the EU Commission and is currently serving as an advisor on different Boards (e.g. Spuerkees, IRT M2P).

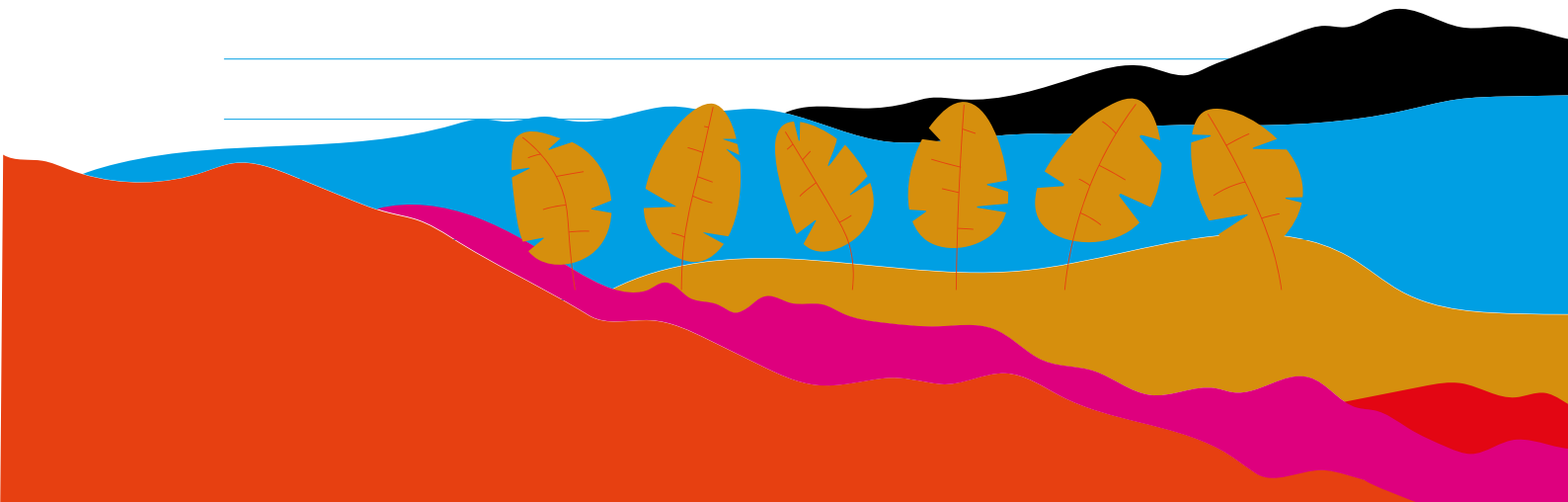
Laetitia Hamon, Head of Sustainable Finance, Luxembourg Stock Exchange (LuxSE)

Laetitia Hamon has been Head of Sustainable Finance at the Luxembourg Stock Exchange (LuxSE) since July 2020. She is responsible for the exchange's Sustainable Finance strategy and related projects and leads the expert team at LuxSE's UN-awarded platform for Sustainable Finance, the Luxembourg Green Exchange (LGX). Laetitia was appointed to the European Commission's prestigious High-Level Expert Group on scaling up Sustainable Finance in low- and middle-income countries in 2022.

As a pioneer in Sustainable Finance, Laetitia started her career as an ESG analyst for an extra-financial rating agency in 2008. Passionate about the topic, Laetitia decided to dedicate her career to Sustainable Finance. After gaining experience from the investment fund industry through different positions at Thomson Reuters and ALFI – the Association of the Luxembourg Fund Industry, she spent 8 years managing and then leading the Sustainable Finance audit and advisory practice at KPMG in Luxembourg.

Laetitia has a Master's degree in International Management from the Institut Supérieur Européen de Gestion (ISEG) and a Master's degree in Corporate Social Responsibility from Ecole Supérieure des Affaires, Paris XII.

NOTES



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