UNSW Law & Justice Research Series

Datafication of Sustainable Finance

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[2024] *UNSWLRS* 19

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DATAFICATION OF SUSTAINABLE FINANCE

DIRK A. ZETZSCHE[*], MARIAN UNTERSTELL[**], ROSS P. BUCKLEY[***] & DOUGLAS W. ARNER[****]

ABSTRACT:

In the wake of the Paris Agreement of 2016, the EU Sustainable Finance Action Plan of 2018 and the EU Green Deal of 2019, the ongoing implementation of the EU's Sustainable Finance Strategy has led to a significant development of EU law with a view to financing and facilitating the transition of the real economy towards sustainability. We argue first that this strategy, at its core, is a data strategy, requiring the datafication of the entire European financial, production and services sector. By taking into account sustainability data, the ongoing process of datafication prompted by digitalization of finance will extend to data concerning externalities previously not incorporated into quantitative financial models and analysis. Second, we look at other datafication processes in finance to identify regulatory lessons for the EU's sustainable finance framework. On that basis we present policy recommendations with a view to furthering datafication of sustainable finance by way of financial regulation. In particular, we recommend the implementation of digital reporting standards developed in tandem by industry and regulators, the utilization of Green RegTech and SupTech, centralized and enabled via digital reporting infrastructure, and the facilitation of the use of official estimates to ensure proportionality.

Keywords: Sustainable Finance, Datafication, Financial Regulation, Taxonomy, CSRD, SFDR, Sustainability, ESG, FinTech, RegTech, SupTech, Digitalization.

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The authors gratefully acknowledge the financial support of the Luxembourg National Research Fund (FNR), grant reference NCER22/IS/16570468/NCER-FT, the Hong Kong Research Grants Council Senior Research Fellowship program and the Australian Research Council Laureate Fellowship (FL200100007). The views herein are solely the authors and not necessarily the views of these funding bodies.

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I. Introduction

This paper discusses two central themes of finance and financial regulation today: sustainable finance and datafication of finance. We consider in particular the linkages between sustainable finance, datafication and financial regulation, arguing in favour of synergistic strategic approaches, using financial regulation to drive datafication which in turn supports financing of sustainable development. We focus on the case of the EU, as the EU has emerged as the leader in the use of regulation to drive sustainable finance as well as in the use of law and regulation to drive digitalization of finance.[1]

The backbone of the EU Sustainable Finance Framework is the EU Commission's Sustainable Finance Action Plan adopted in 2018,[2] as amended by the Renewed Strategy for Financing the Transition to a Sustainable Economy in 2021.[3] Not less than ten legislative Acts[4] have been developed to date from these strategic commitments, including the Taxonomy Regulation,[5] the Sustainable Finance Disclosure Regulation (SFDR)[6] and the Corporate Sustainability Reporting Directive (CSRD).[7] While the Taxonomy Regulation introduced a standardized definition of "environmental sustainability", the SFDR and CSRD stipulate in conjunction with the Taxonomy Regulation a comprehensive reporting regime for financial and larger non-financial entities based on the principle

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[1] For the role of regulation in driving digitalization of finance in the EU, see D. Zetzsche, D. Arner, R. Buckley & R. Weber, "The Evolution and Future of Data-drive Finance in the EU", 57 Common Market Law Review 331, 331-360 (2020)..

[2] See EUROPEAN COMMISSION, ACTION PLAN: FINANCING SUSTAINABLE GROWTH (3 Mar. 2018), COM/2018/097 final.

[3] See Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Strategy for Financing the Transition to a Sustainable Economy, COM/2021/390 final, 6 July 2021 ('Revised Strategy').

[4] For an overview, see Dirk A. Zetzsche and Linn Anker-Sørensen, 'Regulating Sustainable Finance in the Dark', EBOR 2022, p. 47-85.

[5] Regulation (EU) 2020/852 of the European Parliament and of the Council of June 18, 2020, on establishing a framework to facilitate sustainable investments and amending Regulation (EU) 2019/2088, OJ L 198, 22.6.2020, p. 13–43.

[6] Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector ("SFDR*"),* OJ L 317, 9.12.2019, p. 1–16*, p.* 1.

[7] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting, OJ L 322, 16.12.2022, p. 15–80.

of "double materiality":[8] reporting entities must report, on the one hand, on sustainability risks impacting on the reporting entity, and, on the other hand, on how the reporting entity impacts on sustainability factors.[9] The revision of the Benchmark Regulation[10] and the Green Bond Regulation[11] form the third building block of the Sustainable Finance Strategy, providing a governance framework for issuers of green bonds, and for administrators of sustainability indices and ratings.

We argue in this paper that the generation, aggregation, processing and disclosure of sustainability data is central to each of these legislative acts and at the heart of the EU Sustainable Finance Framework. In addition to the "natural" demand of data from investors, the EU's legal framework on sustainable finance has propelled sustainability data generation forward,[12] with various disclosure, investment and risk management requirements across the entire value chain necessitating the aggregation and disclosure of sustainability-related data (hereafter referred to as 'sustainability data'). As a result, the value of global sustainability data reached 1.3 billion USD in 2022 after five years of an average growth of 28%, with European institutions alone representing 60% of the market for sustainability data in 2020.[13]

We thus frame the direct interrelation between sustainable finance regulation and datafication, stressing that sustainable finance regulation would be impossible in the absence of digitalization, as it is preconditioned on data standardization, automation of processes and integration of data analytics dimensions into financial services and regulatory and supervisory

[8] Dirk A. Zetzsche and Pedro Vilanculo, 'Blended Finance' (22 March 2024) p. 29, available at SSRN: <papers.ssrn.com/sol3/papers.cfm?abstract_id=4443483>.

[9] Cf. Art. 19a (1) and Art. 29a (1) Accounting Directive, as amended by CSRD (disclosure aims at furthering the understanding of "the undertaking's impacts on sustainability matters", and/or are "how sustainability matters affect the undertaking's development, performance and position".

[10] Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014, ("BMR"), OJ L 171, 29.6.2016, p. 1–65, as amended.

[11] Regulation (EU) 2023/2631 of the European Parliament and of the Council of 22 November 2023 on European Green Bonds and optional disclosures for bonds marketed as environmentally sustainable and for sustainability-linked bonds, PE/27/2023/REV/1, OJ L 2023/2631, 30.11.2023.

[12] See Recital (11) CSRD: "There has been a very significant increase in demand for corporate sustainability information in recent years, especially on the part of the investment community. […] Part of that increase is the logical consequence of previously adopted Union legislation, notably Regulations (EU) 2019/2088 and (EU) 2020/852."

[13] Anne-Laure Foubert, 'ESG Data is Now Worth It', available at: https://www.opimas.com/research/742/detail/.

processes ("RegTech" and "SupTech"). We therefore argue that the EU Sustainable Finance Framework is a data strategy, relying on the information processing systems and powers of finance and financial markets.[14] This datafication perspective is significant for financial institutions, issuers, regulators, policymakers and the full range of stakeholders alike as it shifts the focus from an (negative or often exaggerated positive) impact on sustainability factors to what truly matters for financial markets, that is: information, costs and benefits, particularly transaction costs.[15] To balance the costs and benefits of the EU Sustainable Finance Framework, policymakers and regulators must seek to enable digital data transmission, digital data validation and analytics, including through new forms of data infrastructure such as the European Single Access Point ('ESAP')[16], expected to be operational in 2027. We analyse, from that perspective, the steps taken by EU regulators so far, and identify building blocks that are missing in the EU Sustainable Finance Framework for an efficiently integrated data-driven, yet more effective financial system.

Part II of this Article shows that the EU Sustainable Finance Framework rests on information collection, transmission and analysis across the financial services value chain. Part III, starting with the insight that sustainable finance is at its core a datafication project, identifies as three core elements of a data-driven finance strategy the need for quantification, standardization and data validation. Against this background, we present in Part IV policy considerations as to which elements could further the implementation of the EU Sustainable Finance Framework as a datafication project, with implications for the future global evolution of datafication of sustainable finance.

II. Towards a Sustainability Data Ecosystem

This section argues that the EU Sustainable Finance Strategy is at its core a data strategy and shows how each of the major legal acts under the Sustainable Finance Strategy necessitates the collection, aggregation and disclosure of sustainability data.

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[14] Goldstein, Itay, Information in Financial Markets and Its Real Effects (August 3, 2022). Available at SSRN: https://ssrn.com/abstract=4180871.

[15] Ferrarini, Guido and Saguato, Paolo, Regulating Financial Market Infrastructures (June 1, 2014). Forthcoming draft chapter, The Oxford Handbook on Financial Regulation, edited by Eilís Ferran, Niamh Moloney, and Jennifer Payne, (Oxford University Press)., European Corporate Governance Institute (ECGI) - Law Working Paper No. 259/2014, Available at SSRN: https://ssrn.com/abstract=2450095.

[16] Carriages preview | Legislative Train Schedule (europa.eu)

1. Utilizing the Invisible Hand of Capital Markets

The EU estimates that investments of €1.5tn *per annum* are needed between 2031 and 2050 to reach the net zero goal.[17] As the financial needs for transition to a sustainable economy exceeds what can be financed with public funds, the EU's Sustainable Finance Framework is intended to encourage private investments for that purpose.[18]

To further a sustainable economy, EU law developed in the context of the EU Sustainable Finance Framework mandates transparency on sustainability matters through reporting. Comprehensive information is intended to enable investors and financial market participants to assess sustainability risks, impacts and opportunities when making investment and lending decisions, as well as to enable better analysis by other stakeholders including regulators and policymakers.[19] Policymakers expect more sustainable financial products in turn, and, relying on the invisible hand of capital markets, an indirect pressure on the real economy to change in order to meet the financiers' search for profit, risk management and sustainability. In response to this market demand more sustainable products and services are expected to be developed and demanded.

At the heart of this strategy financiers (regardless of whether they invest in equity, debt or otherwise) need the capacity to distinguish between sustainable and unsustainable use of the funds, and to allocate their funds according to their sustainability and return preferences. This requires that (1) there is some consensus as to which data are relevant for understanding sustainability, (2) the relevant data are generated or at least collected by the target (real economy) firm, (3) these data are disseminated to, and analysed and put to use by, various financial intermediaries (which themselves rely on data aggregators) acting as information intermediaries, until (4) they reach, in pure, but more often intermediated form the investors at the end of the financial value chain which can express their preferences by steering investments towards their particular desired combination of sustainability and return.

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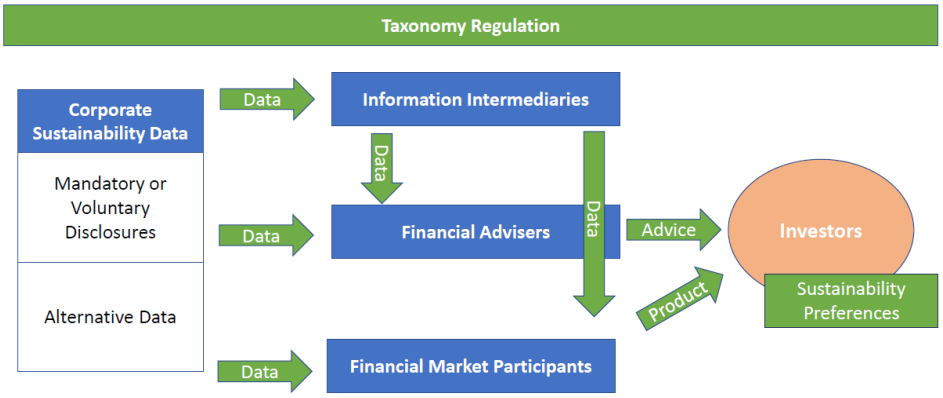
[17] Financial Times, "EU must invest about €1.5tn a year to meet net zero targets, says Brussels", available at: https://www.ft.com/content/abababab4c-7d81-4e63-b48c-0c59b687b5f2.

[18] Cf. European Commission, Revised Strategy, supra note 2, at p. 1; Recital (6) SFDR.

[19] "A lack of clarity among investors regarding what constitutes a sustainable investment is a contributing factor behind this investment gap", Action Plan 2018 p. 2; "4. Fostering transparency and long-termism", Action Plan 2018, p. 9 et seq.

Figure 1: Data flows from Real Economy Firms to Financiers



Source: European Commission, modified by the authors.

The raw data on a firm's performance either comes directly from the company via mandatory or voluntary disclosures, or via other channels as alternative data, which can be manifold like social media commentaries, satellite imagery and so on. These corporate data are the underlying of the reporting requirements for financial market participants (FMP), and benchmark administrators (BMA), who offer the shares of the respective company as part of their financial product offerings. Finally, these products along with the disclosed data will be offered by financial advisers (FA) to the end-investors. Therefore, until sustainability data reaches end-investors, the data-stream *flows-through* a long way, being used, created and packaged into different products, indices and market segment by various intermediaries.

We will demonstrate in turn that the EU Sustainable Finance Framework foresees tools for each of these four steps, together resulting in the development of a "Sustainability Data Ecosystem",[20] comprising the definition of sustainability, disclosure requirements and data generation, information gathering, assessment and processing, and dissemination, to financiers and potentially to other stakeholders including regulators and policymakers and the public, eventually through data infrastructures such as the ESAP.

[20] European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union, Study on sustainability-related ratings, data and research, Publications Office of the European Union, 2021, available at: https://data.europa.eu/doi/10.2874/14850.

2. Defining Sustainability

The definition of which data are relevant is set by the Taxonomy Regulation ('TR'), which is directly applicable in all EU Member States and defines which economic activities are to be regarded as sustainable and non-sustainable. The objective of the Taxonomy Regulation is to provide clarity and legal certainty to the market about what activities are sustainable, while addressing issues of greenwashing, i.e. false claims as to being sustainable.[21]

Accordingly, an economic activity is regarded as environmentally sustainable under Article 3 TR if it fulfills a three factor test: the activity must: (1) contribute substantially to at least one of six environmental objectives defined in the Taxonomy Regulation,[22] (2) not significantly harm any of the remaining five objectives (Do-no-significant-harm: 'DNSH'), and (3) comply with minimum social safeguards including the OECD Guidelines for Multinational Enterprises ('MNEs') or the EU Charter of Fundamental Rights ('CFREU').

Yet, the world is diverse and the three-factor-test is only clear in principle. Its difficulty lies in its details. For that purpose, the Taxonomy Regulation foresees to stipulate details by way of so-called Technical Screening Criteria defined by the EU Commission.[23] Being a crucial prerequisite for channeling investments into sustainable activities, setting these details for each and every sector of the economy that is potentially of relevance has turned out to be an enormous task. The Taxonomy Regulation foresees, for instance, how much CO2 a house may emit, with how much water its toilet may flush, and what type of fuel a lorry may use to be qualified as sustainable. Together with a set of implementing and delegated powers granted to the EU Commission, the Taxonomy Regulation's detailed set of criteria for every material sector of the US$ 20 trillion EU economy in total exceeds 1,000 pages for environmental sustainability measures alone.[24] The

[21] Recital (6) and (1) TR.

[22] See Art. 9 TR et seq.: 1. climate change mitigation, 2. climate change adaptation, 3. the sustainable use and protection of water and marine resources, 4. the transition to a circular economy, 5. pollution prevention and control, 6. the protection and restoration of biodiversity and ecosystems.

[23] See as an overview: European Commission, implementing and Delegated Acts on Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, available at: https://finance.ec.europa.eu/regulation-and-supervision/financial-services-legislation/implementing-and-delegated-acts/taxonomy-regulation_en.

[24] See among them Taxonomy Regulation, Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing

EU Commission is currently working on similar standards for social sustainability.[25]

3. Disclosure Requirements and Data Generation: Sustainability Risks and Impacts

As a second element, the EU Sustainable Finance Framework mandates the disclosure of sustainability risks and sustainability impacts on the basis of the definitions provided by the Taxonomy Regulation.

a) CSRD reporting

As a general principle under EU law, the costs of data generation and reporting must be commensurate to any positive impact potentially associated with it, hence the EU Sustainable Finance Framework focuses on larger firms that have potentially a larger impact on sustainability factors.

Under the EU accounting rules from 2014, as implemented by the Non-Financial Reporting Directive ('NFRD'), approximately 11,000 firms were subjected to disclosure obligations on non-financial information,[26] given the rules applied, in principle, to firms with more than 500 employees. Note that the objective of these disclosures was to ensure that material

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substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives, C/2021/2800OJ L 442, 9.12.2021, p. 1–349 ('Climate Delegated Act'), Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to the sustainable use and protection of water and marine resources, to the transition to a circular economy, to pollution prevention and control, or to the protection and restoration of biodiversity and ecosystems and for determining whether that economic activity causes no significant harm to any of the other environmental objectives and amending Commission Delegated Regulation (EU) 2021/2178 as regards specific public disclosures for those economic activities, C/2023/3851OJ L, 2023/2486, 21.11.2023 ('Environmental Delegated Act'); Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU concerning environmentally sustainable economic activities, and specifying the methodology to comply with that disclosure obligation, C/2021/4987, OJ L 443, 10.12.2021, p. 9–67.

[25] See Platform on Sustainable Finance, Final Report on Social Taxonomy, 28.02.2022; See also Dirk A. Zetzsche, Marco Bodellini and Roberta Consiglio, 'Towards a European Social Taxonomy: A Scorecard Approach' (September 14, 2022), available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4218874.

[26] European Commission, Press Release: Sustainable Finance and EU Taxonomy, 21.04.2021.

sustainability risks are identified and investor and consumer trust is enhanced.[27] Yet, the data disclosed under the 2014 rules lacked quality and comparability:[28] the scope of the rules was limited,[29] compliance was in parts subject to comply-or-explain requirements,[30] and mandatory reporting standards[31] as well as verification by auditors[32] were lacking.[33]

The Corporate Sustainability Reporting Directive (CSRD)[34] adopted under the EU Sustainable Finance Framework in 2022 now mandates all listed companies (except microenterprises)[35] and all public-interest companies (ie. the main regulated financial institutions)[36] to disclose, as part of the annual accounts, a sustainability report drawing on double materiality.[37] Further, the CSRD applies to large undertakings defined as firms that exceed two of three factors: a balance sheet of 25 million EUR, a net

[27] Cf. Art. 19a, 29a of the Accounting Directive as amended by Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups, OJ L 330, 15.11.2014, p. 1–9. The 2014 Directive disclosures on the "undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters".

[28] COMMISSION STAFF WORKING DOCUMENT Fitness Check on the EU framework for public reporting by companies Accompanying the document Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the review clauses in Directives 2013/34/EU, 2014/95/EU, and 2013/50/EU, SWD/2021/81 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021SC0081.

[29] Only approximately 11.000 companies are required to report, see Questions and Answers: Corporate Sustainability Reporting Directive proposal, Brussels, 21 April 2021, available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_1806.

[30] Art. 19a (1) and 29a (1) Accounting Directive as amended by the NFRD required an explanation where the undertaking or group did not pursue policies in a sustainability matter.

[31] Recital (9) SFDR.

[32] Art. 19a (5) and 29a (5) Accounting Directive as amended by the NFRD.

[33] Recital (9) SFDR.

[34] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting, 16.12.2022, OJ L 322/15.

[35] Cf. Art. 19a and 29a Accounting Directive as amended by the CSRD.

[36] Public-interest entities (PIEs) include all entities listed at an EU regulated market, all credit institutions, all insurance undertakings, entities designated as PIE by a Member State; cf. Art. 2 (1) Accounting Directive as amended by the CSRD.

[37] Cf. Art. 19a and 29a Accounting Directive as amended by the CSRD.

turnover of 50 million EUR, and an average of at least 250 employees during the financial year.[38]

To introduce and harmonize double materiality reporting,[39] the CSRD comes with the duty to report according to tailor-made mandatory reporting standards (the European Sustainability Reporting Standards – ESRS,[40] developed by the expert European Financial Reporting Advisory Group [EFRAG])[41], as well as mandatory assurance of sustainability data disclosed.[42] Approximately 49,000 EU firms inside and outside of the EU are now in the CSRD's scope.

The CSRD should result in an increased availability and comparability of data, as well as lower data costs for anyone relying on these disclosures.[43] To further comparability by technical means, all CSRD disclosures must be digitally tagged,[44] ie. search software may easily identify which disclosures provide information on which sustainability risk or sustainability impact.

b) Taxonomy Data Disclosures

In addition to the CSRD reporting requirements, companies are obliged to include in the non-financial statements "information on how and to what extent the undertaking's activities are associated with economic activities that qualify as environmentally sustainable" [45] as defined by the TR.

[38] Cf. Art. 3 (4) Accounting Directive as amended by the CSRD.

[39] Art. 19a (1) and 29a (1) Accounting Directive, as amended (stating that "undertaking's impacts on sustainability matters, and information necessary to understand how sustainability matters affect the undertaking's development, performance and position.").

[40] Commission Delegated Regulation (EU) 2023/2772 of 31 July 2023 supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards, C/2023/5303, OJ L 2023/2772, 22.12.2023.

[41] Commission Delegated Regulation (EU) 2023/2772 of 31 July 2023 supplementing Directive 2013/34/EU of the European Parliament and of the Council as regards sustainability reporting standards, C/2023/5303, OJ L 2023/2772, 22.12.2023.

[42] Cf. Art. 34 (1) sub. 2 (aa), 34 (2) Accounting Directive as amended by the CSRD.

[43] Recital (13), (15), and (16) CSRD.

[44] Art. 29d Accounting Directive, as amended by CSRD.

[45] Cf. Article 8 TR in conjunction with Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU concerning environmentally sustainable economic activities, and specifying the methodology to comply with that disclosure obligation, C/2021/4987, OJ L 443, 10.12.2021, p. 9–67.

This disclosure requirement follows a phased-in implementation approach, which began in 2022.[46] Once fully implemented by 2026 all large (financial[47] and non-financial) entities[48] will be required to disclose i) the proportion of economic activities that can be environmentally sustainable ("TR eligible") and ii) the proportion of economic activities that meet the TR's definition of environmental sustainability ("TR aligned"), by specifying the respective Capital Expenditures, Operating Expenditures and turnover relating to these activities.

Accordingly, companies must in a first step break down their business model into economic activities as separated by the NACE coding system[49], then review all their economic activities, whether the respective activity is listed in the Disclosure Delegated Act[50] to ascertain their "TR-eligibility". In a second step, these entities must assess whether the identified activities meet TR prerequisites to ascertain their "TR alignment". In turn, (e.g.) an aluminium producing company investing in a new plant must separate its revenue and capital expenditures in relation to this plant in its annual report.

By requiring disclosure of the firm's current income (revenues), operational expenses (OpEx) as well as the firm's investments into future business (as measured by CapEx) relating to TR-eligible or TR-aligned activities the Taxonomy Regulation seeks to provide information to market participants as to the potential, and real, compliance with the TR's sustainability definition.[51] Assuming that the TR's definition is accurate the market should be informed about the share of sustainable activities a firm pursues.[52]

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[46] Art. 10 Disclosure Delegated Act.

[47] Art. 1 (8) Disclosures Delegated Act: 'financial undertaking' means an undertaking that is subject to the disclosure obligations laid down in Articles 19a and 29a of Directive 2013/34/EU and is an asset manager, a credit institution as defined in Article 4(1), point (1), of Regulation (EU) No 575/2013 of the European Parliament and of the Council (6), an investment firm as defined in Article 4(1), point (2), of Regulation (EU) No 575/2013, an insurance undertaking as defined in Article 13, point (1), of Directive 2009/138/EC of the European Parliament and of the Council (7), or a reinsurance undertaking as defined in Article 13, point (4) of Directive 2009/138/EC.

[48] Art. 1 (9) Disclosures Delegated Act: "'non-financial undertaking' means an undertaking that is subject to the disclosure obligations laid down in Articles 19a and 29a of Directive 2013/34/EU and is not a financial undertaking as defined in point (8).

[49] Statistical Classification of Economic Activities in the European Community, commonly referred to as **NACE** („***n****omenclature statistique des* ***a****ctivités économiques dans la* ***C****ommunauté* ***e****uropéenne"*).

[50] See for an overview: https://finance.ec.europa.eu/regulation-and-supervision/financial-services-legislation/implementing-and-delegated-acts/taxonomy-regulation_en.

[51] Recital (22) TR.

[52] EU Technical Expert Group, Financing Sustainable European Economy, June 2019, p. 76, https://finance.ec.europa.eu/system/files/2019-06/190618-sustainable-finance-teg-report-taxonomy_en.pdf.

c) Voluntary Adoption of Green Bond Standards

Beyond the CSRD and TR, real economy or financial issuers may decide to opt into the standards of the EU Green Bond Regulation (GBR).[53] The GBR complements the EU Sustainable Finance Framework and allows the voluntary use of the designation *European Green Bond* or *EuGB* (which is understood as gold standard in the field of sustainable financial products) if the bond meets the GBR requirements: reporting must rest on the sustainability criteria as defined in the Taxonomy Regulation[54]; disclosure of relevant revenue/OpEx/CapEx figures is mandatory.[55]

The issuer must allocate the proceeds to sustainable projects (as defined by the Taxonomy Regulation) before issuing an EuGB factsheet.[56] Further, it must report annually, until all proceeds are allocated, on how the proceeds were used in an allocation report.[57] In addition, the issuer must disclose the positive and adverse environmental impacts of the financed projects in bespoke impact reports after the full allocation and at least once during the lifetime of the bond.[58] The EuGB factsheet and the allocation report must be reviewed by external reviewers,[59] while external review is voluntary for the impact report.[60]

d) Data Generation and the Use of Estimates

By mandating reporting, the EU Sustainable Finance Framework mandates generation of data across a range of sustainability risks and sustainability factors. While sustainability risks is what any sound risk management perspective should take into account in any event, at least where predictions are somewhat accurate or likely, companies are forced to collect and verify completely new data on their impacts on sustainability factors; issuers and financial institutions subject to Article 8 TR reporting were to disclose the

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[53] Regulation (EU) 2023/2631 of the European Parliament and of the Council of 22 November 2023 on European Green Bonds and optional disclosures for bonds marketed as environmentally sustainable and for sustainability-linked bonds, PE/27/2023/REV/1, OJ L 2023/2631, 30.11.2023.

[54] Cf. Art. 4 (1) and (2), Art. 5 GBR.

[55] Cf. Art. 10 (1) (a) GBR, Annex I Point 3; Art. 11 (1) GBR, Annex II Point 3; Art. 12 (1) GBR, Annex III Point 3.

[56] Art. 10 and Annex I GBR.

[57] Art. 11 and Annex II GBR.

[58] Art. 12 and Annex III GBR.

[59] Arts. 10 (3) and 11 (8) GBR.

[60] Art. 12 (3) GBR.

relevant data starting in 2022 for the financial year 2021, and similar requirements apply since under the SFDR and now the CSRD.

Target (real economy) firms must either generate the data required by the Taxonomy Regulation themselves – for instance by implementing measuring tools in their production processes for CO2 emissions, biodiversity impacts, or use of water – or hire experts for impact measurement including monitoring particularities like the development of local insect populations. It is self-evident that firms will have capacity and focus only for some, but rarely all, sustainability measures defined as relevant by the Taxonomy Regulation. We will turn to this issue below in Part III.

Financial markets function best when provided with information. Naturally the data generated by corporate sustainability reporting is significant in a system relying on the invisible hands of the capital markets, and essential to produce the data needed by financial market participants, benchmark providers and financial advisers. Yet, data availability may not always be given, either because the data is not measurable due to its nature or due to limitations of the reporting company preventing comprehensive data generation.

This raises the question to what extent estimates can be used to fill these data gaps. Regarding CSRD reporting, the applicable ESRS firstly recognize that the required disclosures on the value will not always be possible as the companies cannot measure the data themselves, but instead must rely on the measurements of the suppliers, among them potentially small and medium enterprises (SMEs) and third country firms outside of the coverage of EU law. These entities will often lack expertise and resources to undertake extensive and precise data collection. The ESRS approach the problem by allowing estimates based on sector-average data and proxies after the company made reasonable efforts to obtain the required data.[61]

Second, estimates are explicitly allowed for a few sustainability matters that by their nature require to be based on estimates, typically explanations about possible future events that have uncertain outcomes.[62]

Third, for all other sustainability matters, most disclosures must in principle be made once the matter is considered material. [63] Whether estimates can also be used in this case is not fully clear from the wording of the ESRS. These state in a general manner that the use of reasonable assumptions and estimates "does not undermine the usefulness of [quantitative] information,

[61] ESRS 1, No. 69 and 92.

[62] ESRS 1, No. 91.

[63], ESRS 1, No. 2 and 30.

provided that the assumptions and estimates are accurately described and explained".[64] Subsequently however, the ESRS only lists the already discussed first two cases where estimates are allowed, suggesting that the previous rather general statement should be limited to these two cases. Given there is only an explicit stipulation for these two cases, it is arguable that the use of estimates is not permitted in other cases.

Regarding the Taxonomy data disclosures under Article 8 TR, financial entities are only allowed to use estimates when assessing the TR-alignment of their exposures in third-country investee companies. This follows the reasoning of allowing estimates under the ESRS for the value chain disclosure; as the data gathering is beyond the scope of financial entities and solely in the hands of the investee companies.[65]

This use of estimates based on sector-average data and proxies as allowed for the disclosure on the value chain seems to be a reasonable approach we will explore and develop further in Part IV, Section 3.

4. Information Quality and Assurance: Information Gathering, Validation and Processing

The main beneficiaries of the sustainability reporting include investors, stakeholders[66] and entities along the sustainable value chain that function either as a) information intermediaries (such as rating or benchmark providers, or auditors), or b) financial intermediaries that rely on the data for their investments and risk management, as well as their own reporting. Both information and financial intermediaries rely on the third user group, the third-party data providers.[67]

A number of legislative acts require the intermediaries' proper gathering, validation and processing of the relevant information. This explains why the CSRD aims at an alignment with the applicable reporting rules under other relevant EU regulation, including the SFDR and Benchmark Regulation, among others.[68]

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[64] ESRS, No. 89.

[65] Art. 7 (7) Disclosure Delegated Act; ESMA, 'Concept of estimates across the EU Sustainable Finance framework', 22.11.2023, ESMA30-1668416927-2548.

[66] Recital (9) CSRD.

[67] Recital (10) CSRD.

[68] Recital (41) CSRD.

a) Information Intermediaries: Benchmark Administrators, Rating Providers etc

With the growth of sustainable finance in the EU the demand for Sustainability Information Intermediaries is steadily increasing. EU law does not prescribe the use of information intermediaries; however the use of third parties as data providers enables economic advantages due to specialization and scaling.[69] In turn, market forces strongly support the role of Sustainability Information Intermediaries that gather data, fulfil a translative function, convert the enormous amount of data generated[70] into a simple standardized value or score that can be processed by the markets and end investors in their automatized investment and risk management systems. Through this mechanic, a complex set of sustainability data becomes a simple "investment limit" or "sustainability score" which can then be used by any financial institution.

Sustainability Information Intermediaries can be divided into ESG Rating Providers and ESG Benchmark Providers. As a result of reports of high discrepancies between the ratings of different providers, and thus a lack of quality and comparability, the EU is about the adopt the ESG Rating Regulation (ERR) in 2024.[71] In the area of ESG benchmarks, the EU widened existing rules on providers of financial benchmarks, which were amended by the Climate Benchmark Regulation[72] and supplemented by three delegated acts[73] to provide more specific rules on ESG scores and indices. Both legislative projects aim at convergence, resulting in a fundamentally comparable framework for both ESG Rating and Benchmark Providers. That framework relies on ensuring the quality of the rating or benchmark disclosed, through organizational requirements, due diligence processes as well as disclosure of methodologies and supervision.

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[69] Gargantini, Matteo and Siri, Michele, Information Intermediaries and Sustainability (November 4, 2022), available at SSRN: https://ssrn.com/abstract=4316820.

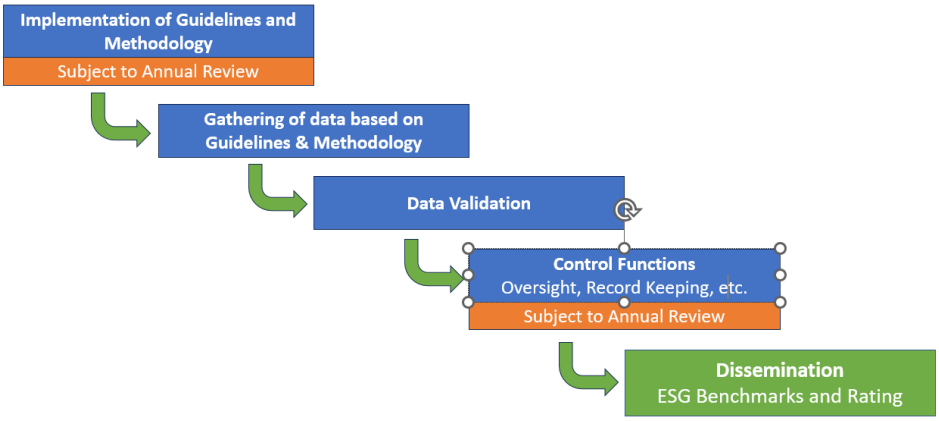
[70] See Section II.3.

[71] Council of the Europen Union, Proposal for a Regulation of the European Regulation and the Council on the transparency and integrity of Environmental, Social and Governance (ESG) rating activities, and amending Regulation (EU) 2019/2088 - Confirmation of the final compromise text with a view to agreement, 2023/0177 (COD).

[72] Regulation (EU) 2019/2089 of the European Parliament and of the Council of 27 November 2019 amending Regulation (EU) 2016/1011 as regards EU Climate Transition Benchmarks, EU Paris-aligned Benchmarks and sustainability-related disclosures for benchmarks, PE/90/2019/REV/1, OJ L 317, 9.12.2019, p. 17–27.

[73] For an overview see: https://finance.ec.europa.eu/regulation-and-supervision/financial-services-legislation/implementing-and-delegated-acts/eu-climate-transition-benchmarks-regulation_en.

Figure 2: Data flows from Information Intermediaries



b) Financial Intermediaries: Investment Funds etc

Besides the reliance on third-party information intermediaries, financial intermediaries can gather, validate and process the relevant sustainability data in preparation for the dissemination (See 5.) themselves.

The so-called April 2021 package[74] builds the foundation for this process by introducing sustainability risks into the fiduciary duties and governance structures of asset managers, and insurance, reinsurance and investment firms by amending the UCITSD, [75] AIFMR, [76] MiFID II[77] and IDD[78].

[74] European Commission, EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal, COM/2021/188 final (21 April 2021).

[75] Commission Delegated Directive (EU) 2021/1270 of 21 April 2021 amending Directive 2010/43/EU as regards the sustainability risks and sustainability factors to be taken into account for Undertakings for Collective Investment in Transferable Securities (UCITS), C/2021/2617, OJ L 277, 2.8.2021, p. 141–144.

[76] Commission Delegated Regulation (EU) 2021/1255 Commission Delegated Regulation (EU) 2021/1255 of 21 April 2021 amending Delegated Regulation (EU) No 231/2013 as regards the sustainability risks and sustainability factors to be taken into account by Alternative Investment Fund Managers, C/2021/2615, OJ L 277, 2.8.2021, p. 11–13.

[77] Commission Delegated Regulation (EU) 2021/1253 of 21 April 2021 amending Delegated Regulation (EU) 2017/565 as regards the integration of sustainability factors, risks and preferences into certain organisational requirements and operating conditions for investment firms, C/2021/2616, OJ L 277, 2.8.2021, p. 1–5.

[78] Commission Delegated Regulation (EU) 2021/1257 of 21 April 2021 amending Delegated Regulations (EU) 2017/2358 and (EU) 2017/2359 as regards the integration of sustainability factors, risks and preferences into the product oversight and governance requirements for insurance undertakings and insurance distributors and into the rules on conduct of business and investment advice for insurance-based investment products, C/2021/2614, OJ L 277, 2.8.2021, p. 18–24.

Investment fund management companies must integrate sustainability risks into their risk management,[79] due diligence,[80] conflict of interest assessment[81] and organizational structures,[82] and ensure effective resources and expertise for the integration of sustainability risks[83]. This full integration of sustainability risks into the processes of investment funds requires comprehensive data collection, validation and documentation to ensure compliance. For example, risk management must be based on "sound and reliable data",[84] necessitating the validation of the data gathered.[85] In addition, these duties must be fulfilled as a prerequisite of the reporting obligations under the SFDR, as will be discussed further in the next Section (Section 5).

Similarly, investment firms under MiFID II must integrate sustainability risks into their organizational structures,[86] risk management policies,[87] and their conflict of interest policies and assessments.[88] Additionally, data gathering and validation will be necessary to be able to comply with the suitability assessment. (See below Section 5).

5. Data Dissemination

The dissemination of data constitutes the final step in the flow of sustainability data before reaching financiers and other users, providing them with the information necessary for sustainable investment decisions.

At the centre of data dissemination processes are 'Financial Market Participants' (FMPs) and 'Financial Advisors' (FAs). Under the SFDR they

[79] Art. 38 (1) UCITSD, Art. 40 (2) AIFMR.

[80] Art. 23 (5) UCITSD, Art. 18 (5) AIFMR; Where PAIs are considered they shall be taken into account, Art. 23 (6) UCITSD, Art. 18 (6) AIFMR.

[81] Art. 17 (3) UCITSD, Art. 30 (2) AIFMR.

[82] Art. 4 (1) UCITSD, Art. 57 (1) subpara. 2 AIFMR.

[83] Art. 5 (5) UCITSD, Art. 22 (3) AIFMR.

[84] Art. 40 (2) (a) UCITSD, Art. 43 (1) (a) AIFMR.

[85] See also: Dirk A. Zetzsche and Linn Anker-Sørensen, 'Regulating Sustainable Finance in the Dark', EBOR 2022, p. 61 et seq.; Dirk A. Zetzsche and Marco Bodellini, 'A Sustainability Crisis Makes Bad Law! - Towards Sandbox Thinking in EU Sustainable Finance Law and Regulation' (July 4, 2022), available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4147295.

[86] Art. 21 (1) subpara. 2 Commission Delegated Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive (Text with EEA relevance.), C/2016/2398, OJ L 87, 31.3.2017, p. 1–83.

[87] Art. 23 (1) (a) Commission Delegated Regulation (EU) 2017/565.

[88] Art. 33 Commission Delegated Regulation (EU) 2017/565.

are required to disclose sustainable information about themselves (entity-level)[89] and their products (product-level),[90] via pre-contractual documents, websites or periodic reports. Beginning from 2027, both financial and sustainability disclosures – in digital form – will take place via ESAP, providing an eventual single point of digital reporting and data access infrastructure to form the heart of the sustainable finance data ecosystem for all stakeholders.

a) Entity-level disclosure

Based on the principle of double materiality FMPs and FAs are required to publish *on their websites* how at the entity-level they consider sustainability risks (internalities)[91] and following a comply or explain system as to how they consider adverse impacts on sustainability factors (externalities).[92] Further, Article 5 SFDR requires FMPs and FAs to disclose information on how the remuneration policy is consistent with the integration of sustainability risks.

Significant new data collection will be required for the new materiality dimension on externalities through the PAI statement in Article 4 SFDR to be disclosed by FMPs on their website.[93] Detailed mandatory disclosures[94] are to be made by using different adverse sustainability indicators, including eg., GHG emissions, carbon footprint, all to be measured quantitatively using defined metrics. Furthermore, additional indicators are provided which shall be used if the entity assesses the indicator to have an adverse impact.

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[89] Arts. 3-5 SFDR.

[90] Arts. 6-11 SFDR.

[91] Art. 3 and 6 SFDR.

[92] Pursuant to Art. 4 (1) (b) SFDR, FMPs and FAs are required to provide a clear explanation where they do not comply with the disclosure requirement i.e., they do not provide a statement on how they consider adverse impacts. The comply or explain system does not apply to FMPs with an average of more than 500 employees during a financial year, see Art 4 (3) SFDR.

[93] Mandatory for FMPs that exceed an average of 500 employees (Art. 4 (3) SFDR); FAs are subject to a comply-or-explain mechanism, requiring an explanation if they do not take into account PAIs (Art. 4 (5b) SFDR).

[94] Cf. Commission Delegated Regulation (EU) 2022/1288 of 6 April 2022 supplementing Regulation (EU) 2019/2088 of the European Parliament and of the Council with regard to regulatory technical standards specifying the details of the content and presentation of the information in relation to the principle of 'do no significant harm', specifying the content, methodologies and presentation of information in relation to sustainability indicators and adverse sustainability impacts, and the content and presentation of the information in relation to the promotion of environmental or social characteristics and sustainable investment objectives in pre-contractual documents, on websites and in periodic reports, C/2022/1931OJ L 196, 25.7.2022, p. 1–72.

b) Product-level disclosure

At the product-level, three reporting requirements are stipulated with differing requirements in relation to the sustainable ambition of the product. In practice the products are categorized as Article 6, Article 8 (light green) and Article 9 (dark green) products. Article 6 SFDR functions as a minimum standard for products that do not have a sustainable scope, requiring only to report how sustainability risks (internalities) are integrated into the investment decisions. For Article 8 SFDR, products that promote environmental or social characteristics while following good governance practices must disclose the necessary information on how these characteristics are met. Similarly, an Article 9 product must demonstrate how it has *sustainable investment as its objective*, characterizing it as a subgroup of Article 8 products.[95] Accordingly, these products must contribute to an environmental or social objective, (ii) do not significantly harm on any other objective and (iii) follow certain good governance practices. The concept of sustainable investment within the meaning of Article 9 of the SFDR is therefore similar to the concept of environmentally sustainable investment under Article 3 TR, with the main difference that the SFDR introduces social objectives rather than focusing solely on environmental objectives.[96]

Furthermore, the disclosure requirements for Article 8 and Article 9 products are linked to the TR. For Article 8 products an additional statement (Article 6 TR) is required, while more importantly Article 9 funds must contribute to an environmental objective pursuant to Article 2 (17) and disclose (i) additional information on the environmental objective and (ii) how and to what extent the underlying investments are in economic activities that qualify as environmentally sustainable under Article 3 TR.

c) Linking Disclosures to Investor Preferences

Investment firms under MiFID II[97] that provide investment advice on, or portfolio management of, products are required to undertake a suitability

[95] Dirk A. Zetzsche, Marco Bodellini and Roberta Consiglio, 'Towards a European Social Taxonomy: A Scorecard Approach' (September 14, 2022), p. 7, available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4218874.

[96] The definition of "sustainable investment" in Art. 2 (17) SFDR comprises three aspects: (i.) the investment must contribute to an environmental or social objective, (ii.) do not significantly harm on any other objective and (iii.) follow certain good governance practices.

[97] Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU (recast) Text with EEA relevance, OJ L 173, 12.6.2014, p. 349–496.

assessment.[98] The assessment promotes investor protection and should ensure that firms act in the best interest of their clients and are provided a product that is suitable for them and matches their functions as a bridge between investors and a financial product.

To provide suitable advice, firms must firstly understand their customers, and gather and analyze their data.[99] Secondly, they need to fully understand the products on offer in order to bring product and investors together,[100] and then record all this in a report[101].

These three steps should ensure the advice provided meets the investment objectives of the client, and their sustainability preferences, which refers to the client's choice to use financial instruments that are either (1) environmentally sustainable under the TR, (2) sustainable investments under the SFDR or at the least (3) consider adverse impacts on sustainability factors.[102] This gives investment firms a further decisive translative function, as they have to analyse whether the clients' information corresponds to one of the three predefined categories and consequently link these preferences to the suitable investment product.

III. Lessons learned

While the objective to finance the transition of the economy towards sustainability has long been on the EU policy agenda, the first regulatory measures adopted for this goal only date back to 2018, and many announced regulatory measures remain outstanding.[103] The ambition, scope, detail and pace of the EU Sustainable Finance Framework has never before been seen in European financial law (or probably anywhere), making it all the more important to identify the lessons learned so far; thereby laying the groundwork for continuous improvement as well as for other efforts across the world.

[98] Art. 25 (2) MiFID, Art. 54 Commission Delegated Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive ('MiFID L2'), C/2016/2398, OJ, L 87, 31.3.2017, p. 1–83.

[99] Art. 54 (2) MiFID L2.

[100] Art. 54 (9) MiFID L2.

[101] Art. 25 (6) MiFID and Art. 54 (12) MiFID L2.

[102] Art. 2 (7) MiFID L2.

[103] CSDDD, ESG Rating Regulation, Revision of the SFDR, Social Taxonomy.

1. Sustainable Finance: A Massive Datafication Project

The first lesson is that the EU Sustainable Finance Framework is at its core a datafication project. Datafication can be understood as the application of analytics tools to digital data.[104] We identify the application of analytical tools such as algorithms and data-driven applications such as machine learning in the context of the Sustainable Finance Regulation.

First and foremost, the extensive reporting requirements described above in Section II require the disclosure, and as a prerequisite the collection and creation, of unprecedented volumes of sustainability-oriented data of extraordinary granularity. In particular, the introduction of impact materiality requires entities to not only disclose the financial risks posed by sustainability matters (financial materiality), but also the impacts the entity has on these matters, which results in a considerable expansion of data to be gathered, potentially created, and disclosed. The mandatory digitization of the data leads to the capture of sustainability risks and impacts into standardized data sets that can be automatically analyzed via various forms of analytics. To achieve the required reporting and compliance, companies and financial market participants must revise their internal data gathering and reporting structures utilizing datafied solutions. The need for compliance requires the implementation of data storage capacities and data collection tools, data processing and analysis tools, and data verification resulting in the datafication of sustainability reporting, risk management and oversight.

Second, datafication results not from the regulation per se, but from the need to meet regulatory requirements in an efficient manner and the necessity of the use of technology in this process. The reporting obligations lead to increased need for human and other forms of capital and thus to higher costs, for both labour and technology. Companies that succeed better in the transition to an automatic and digitized data gathering and disclosure will benefit from a competitive advantage. Sustainability gains and market opportunities will be able to be be seized speedily and more cost-effectively with datafied analysis. For instance, digitalized disclosure systems enable the cost-efficient launch of sustainability-oriented products that come with new types of investment limits and sustainability risk and impact management, with green bonds or investment funds under Articles 8 or 9 SFDR as eminent examples.

Third, datafication is essential for establishing a fundamental link between finance and the sustainability dimension. The EU's strategy to reallocate resources towards sustainable projects requires an understanding by the financial sector of what sustainable impacts, risks and opportunities may

[104] Ross P. Buckley, Douglas W. Arner and Dirk A. Zetzsche, 'FinTech – Finance, Technology and Regulation', Cambridge University Press (2023), p. 1.

be, and how the emergence of these is linked to financial flows. From a regulatory perspective, many fundamental questions remain unanswered, which require a more in-depth analysis of the data generated in the future. For example, the actual impact of sustainable investments in the real economy and the willingness of investors to pay a premium for sustainable products lacks scientific analysis.[105] In the logic of the capital markets, investors will need to be able to determine whether financial product A or B best delivers on their particular combination of sustainability, risk and financial objectives, to underpin a functioning sustainable finance regime. However, this in turn requires a translative mechanism that promotes understanding of the complex science around sustainability, in a form which can be used effectively by the financial sector in undertaking various forms of analysis. Datafication by use of reporting requirements may provide such a mechanism, as the use of metrics and models based on up-to-date scientific practices and the translation of findings from various disciplines such as climate and environmental sciences, can be datafied. As digitized, standardized, and quantified data can more easily be analysed and compared by the financial sector this could, in the end, indicate for example how significant the impact of a company or a portfolio is on biodiversity or any other factor of significance to investors, policymakers and/or other stakeholders.

2. Searching for Quantitative Data

The second lesson is that there is great demand for further quantitative data allowing for comparability and the application of automated processes and tools.[106] At the same time, gathering quantitative data is challenging as metrics, models and sustainability targets for externalities must be developed, tested, and adjusted over time. For that reason, Article 13 Commission Delegated Regulation (EU) 2020/1818 acknowledges the paucity of data by allowing the use of estimates if the reporting entity delivers additional reporting on the methodology and the approach used for the estimates.

Yet EU regulators want to change this and move from qualitative to quantitative data, as exemplified by the revision of the NFRD by the CSRD. As the NFRD does not stipulate any reporting standards to be applied and the KPIs provided by non-binding guidelines impose no obligation, companies under the NFRD are free to report quantitatively or qualitatively. Thus, the EU was forced to recognize in an impact report that "few

[105] For an overview, see Dirk A. Zetzsche and Linn Anker-Sørensen, 'Regulating Sustainable Finance in the Dark', EBOR 2022, pp. 66-et seq.

[106] EBA analysis of RegTech in the EU financial sector, EBA/REP/2021/17, June 2021 p. 58.

numerical indicators and targets are disclosed, and those that are disclosed are often not directly comparable between companies".[107] Now, with the introduction of the CSRD, EU legislators seem to have learned to some extent from their mistakes and introduced the mandatory ESRS, consisting of over 1,000 data points. However, EFRAG states that only 30% of these data points are of a numerical nature, ie. can be determined quantitatively. In addition, 12% are semi-narrative data points, which contain at least comparable values.[108]

Compared to the complete lack of standards under the NFRD, this is a significant leap forward. However, qualitative items still represent over half (58%) of the reporting subject matter; and data to be disclosed is prepared by people primarily trained in finance, with many companies unable to employ climate, environmental, and multi-disciplinary researchers for reporting purposes. For sustainability reporting to achieve its objective of becoming a second means of directing financial flows, in addition to financial reporting, quantitative data based on precise metrics is needed that can be compared and processed automatically. After all, the language of the financial markets is quantitative data; quantitative data are at the heart of financial modelling and underpin investment and risk management. Market-wide financing decisions across all sectors, such as by institutional investors, require granular and accurate quantitative data since comparing large amounts of qualitative data is expensive and of little use, as discretionary terms (like adequate, reasonable, proportionate, fair) are determined from the perspective of one party rather than the market as a whole. Even where automatic processes (including AI and automated language processing) screen and compare qualitative texts, the outcome will not be particularly useful.

3. The Necessity of Standardization

Closely connected to the need for quantitative data is the need for standardization. Sustainability standards provide the metrics, models and methodologies required for consistent and comparable data disclosure. Such standards are a prerequisite for much use of fintech (see Part IV),

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[107] COMMISSION STAFF WORKING DOCUMENT, Fitness Check on the EU framework for public reporting by companies Accompanying the document Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the review clauses in Directives 2013/34/EU, 2014/95/EU, and 2013/50/EU, Brussels, 21.4.2021, SWD(2021) 81 final, 7.1.2.2, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52021SC0081.

[108] EFRAG SRB, Meeting 15 November 2023 Paper 06-02, available at: https://www.efrag.org/Assets/Download?assetUrl=%2Fsites%2Fwebpublishing%2FMeeting%20Documents%2F2302241036281819%2F06-02%20-%20Methodology%20-%20Draft%20List%20of%20ESRS%20Data%20Points%20-%20Implementation%20Guidance%20-%20final%20SRB%20meeting%20231115.pdf.

enhanced data processing and data validation,[109] as well as the functioning of financial markets more generally.[110]

By introducing the CSRD with the European Sustainable Reporting Standards, the EU has decided to develop its own standards and not rely on international regulations such as GRI or IFRS to ensure the effective implementation of the principle of double materiality. This is particularly significant given that to date the International Sustainability Standards of the International Sustainability Standards Board adopt a single materiality approach. In principle the development of the EU standards promises an improvement in data comparability and reliability, in comparison to the current approach under the NFRD without a mandatory standard. However, the implementation of the ESRS results in three regulatory gaps.

First, the CSRD will not close the current gap in data. As data under the NFRD is insufficient and Article 8 TR only partly implemented, there is little reliable corporate sustainability data in the market. A retrospective analysis of sustainability data is therefore not possible in many cases, leaving regulators blind.[111] Investors are also unable to analyse market developments, forcing them to make costly use of ESG data providers.

Second, an analysis of the ESRS does not suggest that all regulatory issues will be solved after its introduction – in particular consistent data measurement under the standards will be an issue due to the design of the materiality assessment.

As illustrated in Part II regarding corporate reporting under the CSRD in conjunction with the ESRS, reporting for many data points will only be mandatory if the data point is considered material, and materiality will depend on thresholds set by the entities themselves. Although the ESRS further specifies the aspects upon which the materiality assessment will be based,[112] in the end it will still depend on the entity, almost certainly resulting in different thresholds being set by comparable entities.

Third, besides the materiality assessment, the ESRS lacks clear procedures regarding data measurement. Although the ESRS display extraordinary granularity with numerous metrics and explanations, the reporting entity

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[109] See R. Buckley, D. Arner & D. Zetzsche, *FinTech: Finance, Technology, and Regulation* (Cambridge University Press 2024).

[110] See D. Arner, G. Castellano & E. Selga, "Financial Data Governance", 74 University of San Francisco (Hastings) Law Journal 235-292 (2023).

[111] For an overview, see Dirk A. Zetzsche and Linn Anker-Sørensen, 'Regulating Sustainable Finance in the Dark', EBOR 2022, p. 67 et seq.

[112] Negative impact materiality: severity of impact based on scale, scope and irremediability (ESRS 1, No. 45); Positive impact materiality: scaled and scope of the impact, accompanied by likelihood for potential impacts (ESRS 1, No. 46); financial materiality based on likelihood of occurrence and the potential magnitude (ESRS 1, No. 51).

will have the final say in how each measurement is conducted, as they themselves determine the final composition of the calculation for the metrics and the methodologies used. The requirement to disclose the respective methodologies and assumptions used,[113] does not resolve the problem that if different methodologies and assumptions are chosen for the calculation, the comparability and validity of the final reporting data will be lost.

The problem of measurement, and the accompanying regulatory depth of the CSRD/ESRS, can best be illustrated with an example: according to ESRF E1-7, No. 56(a) the removal and storage of GHG[114] in the company's operations and the upstream and downstream value chain must be disclosed. The metric to be used is tonnes CO2 equivalent.

This is where things become challenging: how is the metric to be calculated in practice and how can the comparability of calculations by different reporting entities be ensured? The ESRS sets mandatory application requirements that provide further insights into the methodology to be used. In this case the entity should, among others, use the GHG Protocols where applicable.[115] In the future the EU regulatory framework on the certification of CO2 removals should be applied,[116] allowing for calculation and certification of the removals. A look at the draft presented by the Commission[117] shows that a net carbon removal benefit is to be calculated with the formula: CRbaseline – CRtotal – GHGincrease > 0.[118] However, this formula does not provide definitive clarity, as for instance CRbaseline refers to the carbon removal performance of comparable activities,[119] but the questions as to 'what are comparable activities' or 'what is their

[113] ESRS 2, No. 73 et seq.

[114] GHG removals and storage are defined in ESRS Annex II as "(Anthropogenic) removals refer to the withdrawal of GHGs from the atmosphere as a result of deliberate human activities. These include enhancing biological anthropogenic sinks of CO2 and using chemical engineering to achieve long-term removal and storage. Carbon capture and storage (CCS) from industrial and energy-related sources, which alone does not remove CO2 from the atmosphere, can remove atmospheric CO2 if it is combined with bioenergy production (Bioenergy with Carbon Capture & Storage - BECCS). Removals can be subject to reversals, which are any movement of stored GHG out of the intended storage that re-enters the atmosphere. For example, if a forest that was grown to remove a specific amount of CO2 is subject to a wildfire, the emissions captured in the trees are reversed."

[115] ESRS E1, AR 58(a).

[116] ESRS E1, AR 58(b).

[117] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a Union certification framework for carbon removals, COM/2022/672 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0672.

[118] Art. 4 (1) Proposal for carbon removals.

[119] Art. 4 (5) Proposal for carbon removals.

performance', remain. In addition, many other factors are to be included in the calculation, such as the *emissions caused by the removal activity* including those from transport and storage, or the accounting of removals that stem from the operations owned by the company, and from those over which it has control or to which it contributes.[120] This raises many more questions: how is "contributes to" to be interpreted, what amount of removal arising from a third party activity to which only a minor contribution has been made should be accounted for, and which transport activities are to be included. The list of questions, resulting uncertainty, and consequential loss of comparability, appears massive.

At this point it should be evident that the Sustainable Finance Framework displays an incredible depth of regulation, but ultimately relies on factors that are not accessible for standardized calculation or at least generally accepted ways to conduct these standardizations are yet to be established.

Fourth and finally, the problem of measurement worsens in areas where there are no mandatory metrics, and the entity is free to determine them. For example, in the case of material impacts on "biodiversity and ecosystems change",[121] the regulation itself introduces uncertainty:

> "The undertaking shall disclose metrics that are verifiable and that are technically and scientifically robust considering the appropriate time scales geographies, and may disclose how its selected metrics correspond to those criteria".[122]

4. The Need for Data Validation

After the challenges of data measurement come the issues of data validation, and this has a particular temporal element. A limited assurance standard is to be adopted by the Commission no later than 1 October 2026 and a reasonable assurance standard not before 1 October 2028,[123] and it is only at this time that auditors should assess whether the company complies with the ESRS and the reporting requirements under Article 8 TR.[124]

Beyond this, however, a more fundamental issue can be identified due to the policy gap regarding data measurement. If measurement methods

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[120] ESRS E1, AR 58(a)-(i).

[121] ESRS E4-5, AR 27(a).

[122] ESRS E4-5, AR 28.

[123] Art. 26a Directive 2006/43/EC of the European Parliament and of the Council of 17 May 2006 on statutory audits of annual accounts and consolidated accounts, amending Council Directives 78/660/EEC and 83/349/EEC and repealing Council Directive 84/253/EEC, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006L0043-20230105.

[124] CSRD, Recital 60 (3).

relating to sustainability data are ambiguous, auditors cannot validate the disclosed data against a widely accepted methodology as is the case with financial reporting. Accordingly, quantitative data and the standardization of data measurement is a prerequisite for the application of data validation.

Data validation is in any case needed to further trust in the disclosed data and with that in the financial products constructed with this data. Besides, the introduction of data validation in the EU Sustainable Finance Framework will potentially limit greenwashing by monitoring compliance with the detailed reporting standards.

It is therefore surprising that within the Sustainable Finance Framework only the corporate disclosure under the CSRD requires an audit by external providers. To maintain a coherent strategy, third party assurance should also be mandatory under the SFDR, which would exceed the current validation provided through national authorities that approve the SFDR data disclosed in prospectuses, and eventually provide a further barrier against greenwashing.

5. Regulatory Complexity

The EU Sustainable Finance Framework is characterized by regulatory complexity in at least three respects.

First, the sheer volume of legal acts already enacted, their depth and detail, results in a complex regulatory framework. This is reinforced by the short introductory timelines.

Second, there are considerable problems of clarity within the individual legal acts as non-lawyers write, or at least determine the content of, binding legal text. Undefined legal terms are regularly used, the interpretation of which is only gradually specified in certain aspects by way of iterative questions and responses from various regulators on national and/or EU level, which inevitably leads to further uncertainty and advisory costs for reporting entities and financial intermediaries. Additional complexity arises from the multi-level Lamfalussy regulatory process employed to shape the EU sustainability framework. The segregation of the regulatory details in Level 1 directives or regulations, delegated implementing acts and standards, and additional guidelines for regulators, often formed by expert groups with uncertain expertise in financial regulation, renders a comprehensive understanding more difficult. Moreover, the parallel forming of these delegated acts risk inconsistencies between the legal acts.

Complexity is also caused by cross-references between the respective legal acts. For example, the Green Bond Regulation refers to the Taxonomy Regulation, and MiFID to the Taxonomy Regulation and to SFDR, while SFDR refers to MiFID, AIFMD and UCITSD, to name but a few examples.

Regulatory complexity can cause several problems, including a poor understanding of the overall framework by both regulated entities and regulators, resulting in an overly cautious approach by some, or outright avoidance of certain issues by others, eventually furthering an increased risk of non-compliance and potentially systemic impacts.

The highest level of regulatory complexity appears in the European Sustainability Reporting Standards (ESRS). The 12 separate standards are divided into i.) cross-cutting standards providing general information on reporting, and ii.) topical standards (5 Environmental Standards, 4 Social Standards and 1 Governance Standard). In the future iii.) sectoral-specific standards will be added. The existing draft standards provide topics, sub-topics and even sub-sub-topics, each accompanied by detailed metrics and targets to be used, resulting in 84 reporting requirements with a total of 1178 qualitative and quantitative individual data points to be disclosed,[125] expressed over some 245 pages. This illustrates the extent to which reporting requirements are being expanded. Attenuation of the regulatory burden is brought through the materiality assessment – for most data points the entity will only be required to report if it assesses the point to be material based on the principle of double materiality. Given these standards have been composed in less than two years, as EFRAG was not established prior to 2022, as regulatory lawyers we cannot reasonably estimate how many inaccuracies, inconsistencies and practical difficulties will be found in them, but we expect there to be many.

The gradual extension of the scope of application to SMEs as of 2026,[126] and the requirement for certain EU subsidiaries of third-country entities to report under the CSRD will further enlarge the flow of the massive river of data,[127] and the respective regulatory burden for everyone involved.

IV. Building Sustainable Finance Data Ecosystems: Policy Recommendations

In the previous Part we have identified that the Sustainable Finance Framework is at its core a datafication project which under the current and forthcoming legal acts will require considerable attention to the standardization and quantification of data as well as data validation. In the following section we attempt to present policy considerations to mitigate these gaps.

[125] https://www.wpk.de/nachhaltigkeit/kompass/regulatorische-anforderungen/csrd/.

[126] Art. 5(c)(i) CSRD.

[127] Art. 40a Accounting Directive.

1. Green FinTech, RegTech and SupTech

The use of technologies in the financial sector, known as FinTech,[128] has emerged as a transformative pattern in finance in recent decades. Technological developments, with ever greater data storage capacities and processing powers, has enabled the accumulation of vast amounts of digitized data and the automated processing and analysis of this data (ie. datafication), spurring the emergence of new business models based on the usage of data. In the last two decades, in response to the intensified regulation following the financial crisis of 2007-2008, the usage of technology for regulation (RegTech) and for supervision (SupTech) has become commonplace by the regulated to improve rates of compliance and lower compliance costs and by regulators and supervisors to achieve greater efficiency and effectiveness of policy objectives.[129] RegTech and SupTech have also enmerged in the EU over the last decade as a result of the combination of a series of unrelated regulatory initiatives ranging from e-Identity to data protection to financial regulation.[130] Common to all these fields is that a large amount of data needs to be analyzed, understood and disclosed, in the shadow of significant regulatory pressure by way of fines and sanctions.

The EU Sustainable Finance Framework is the driver of FinTech and RegTech in sustainable finance:[131] Data issues and complexity, paired with a risk of significant penalties for incorrect reporting and greenwashing, as well as reputational and legal risks due to public shaming and climate change litigation, drive reporting entities to resort to technological solutions to ensure compliance (see Section II).

The use of technology is not only inevitable from the side of intermediaries, but also essential for the functioning of the invisble hand of the capital markets: as said transactions costs impact capital flows. RegTech, besides enabling higher compliance rates and lower compliance costs, is a precondition for offering sustainable products more competitively due to reductions in the additional reporting costs relative to non-green products. Due to RegTech, products such as EUGBs, Climate Benchmarks and Articles 8 and 9 Funds become more attractive for issuers and

[128] DW Arner, J Barberis and RP Buckley, "The Evolution of FinTech: A New Post-Crisis Paradigm?", (2016) 47 (4) Georgetown Journal of International Law, 1271-1319.

[129] See Buckley, Arner & Zetzsche (CUP 2024); D. Arner, J. Barberis & R. Buckley, "FinTech, RegTech and the Reconceptualization of Financial Regulation" 37 Northwestern Journal of International Law and Business 371, 371-414 (2017).

[130] See Zetzsche et al (CMLR 2020).

[131] See DW Arner, RP Buckley, K Charamba, A Sergeev & DA Zetzsche, "BigTech and Platform Finance: Governing FinTech 4.0 for Sustainable Development", (2022) Vol 27 (1) Fordham Journal of Corporate and Financial Law 1-71.

administrators, which should result in improved availability of, and competition in, green products.

In addition, technological progress offers new possibilities for data assurance. For example, cash flows could in the future be fused with their underlying sustainability data via tokenization.[132]

Likewise, understaffed regulators and supervisors can and should use RegTech and SupTech to keep up with the rapidly increasing amounts of data. This provides opportunities as the amount of data allows deep insights into structures at micro and macro levels, thereby enabling the better recognition of sectoral and systemic risks and supporting precise adjustments to be made to existing regulations. Real-time regulation becomes ever more achievable.[133]

Looking forward, the next major impetus towards datafication of sustainable finance and the evolution of RegTech and SupTech will come with the implementation of the European single access point (ESAP), a major pillar in the EU's wider digital finance and sustainable finance strategies.[134] The Regulation establishing a European single access point[135] (ESAP) was adopted on 13 December 2023, and introduces a centralized platform for the public to access financial and sustainability-related information of entities and their products in a standardized and machine-readable format by 10 July 2027.[136] ESAP mandates that all information disclosed under EU regulations – among them those of the Sustainable Finance Framework – are bundled together for electronic access, with data points being tacked for easy detection and analysis. The integrity of the submitted data will be examined by collection bodies with the capacity to

[132] Dirk A. Zetzsche and Linn Anker-Sørensen, 'Building Blocks of a Green Fintech System – Towards an Regulatory Antidote to Greenwashing' (July 14, 2022), available at SSRN: https://ssrn.com/abstract=4163002.

[133] Regarding the new opportunities for regulators resulting from Fintech: Herwig C.H. Hofmann, Dirk A. Zetzsche and Felix Pflücke, 'The changing nature of 'Regulation by Information': Towards real-time regulation?' Eur Law J. 2022, p. 172-186, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4488391&download=yes.

[134] ESMA, ESMA Data Strategy 2023-2028, 15 June 2023, ESMA50-157-3404.

[135] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a European single access point providing centralised access to publicly available information of relevance to financial services, capital markets and sustainability, COM/2021/723 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC072.

[136] Art. 1 ESAP.

reject as insufficient data with regard to its format or content,[137] and ensured through the use of technology in the form of a qualified electronic seal.[138]

Starting in 2030, additional voluntary data will be able to be submitted to the ESAP, if in a format and substance comparable to that disclosed on a mandatory basis and defined by the ESA's implementing technical standards.[139] An incentive for voluntary disclosure will be that disclosing entities can demonstrate themselves to be even more sustainable through the provision of this additional data.[140]

Although ESAP will not remedy the problems of data measurement, it will contribute greatly to the Sustainable Finance Framework and the datafication project by providing reliable accessibility of data to market participants and the full range of stakeholders free of charge at a source tailor made for digital retrieval and analysis. In particular, the availability of data in either a data extractable or machine-readable format,[141] will simplify retrieval and comparison, and could ultimately render data intermediaries such as data providers and rating providers obsolete. This would be desirable insofar as these intermediaries lead to additional costs and currently sustainability ratings lack comparability and integrity.

2. Towards Best Practice

The EU Sustainable Finance Framework process prompts the question of how standardized and effective measurement can be achieved. The path taken by the EU to publish extremely detailed standards in a short timeframe with little practical testing by means of the ESRS is not optimal, insofar as there is a lack of data on which indicators are relevant for investors and can be measured effectively. Vague terms and an overabundance of regulations result in legal uncertainty.

While a more cautious and less burdensome approach would be preferable, the approach adopted will result in a considerable amount of data on the basis of which the most relevant metrics and measurements can potentially be identified. However, this will not happen in the next few years, given the testing of metrics and measurements will require a test and learn-approach

[137] Art. 5 (2) and (3) ESAP. A further subsequent review is to be carried out by ESMA (cf. Art. 10 ESAP).

[138] Recital (24) ESAP.

[139] Art. 3 ESAP.

[140] Recital (5) ESAP.

[141] Art. 5 (1)(c)(i) ESAP.

on all sides which we have referred to as a 'sandbox approach'.[142] Trial and error will prevail for years, and significant amounts of capital are likely to have to be expended, and often misallocated, in the interim.

We believe a more market-oriented approach could achieve the same ends in a faster and more cost-effective manner. For example, sectors could agree on a limited number of the most relevant metrics to be reported, instead of the abundant number of metrics currently specified. The lower number of metrics would save resources, allowing regulators and market participants each to put more resources into better monitoring and improvement of the fewer metrics being used. Where the metrics prove insufficient, investors could agree with reporting entities on additional or alternative metrics, and regulators could broker the dialogue. This approach would further the testing of any given metrics by those with expertise to test and develop effective measurement methods and impact models for the respective industry-specific metrics in dialogue with the regulators.

The advantage of an industry-led standard that emerges as best practice would be the broad agreement and certainty of reporting and presumably an openness to new developments. Methodologies that are created through the expertise of individual sectors are based on their needs and limitations. At the same time, we acknowledge that industry-led standards may be too friendly to industry, and hence regulators are needed to broker and monitor development of standards. This seems a better way forward than the current model, which has regulators *drafting* the standards.

3. Proportionality and Official Estimates

The principle of proportionality must underpin further regulatory measures. In the Sustainable Finance Framework implemented to date, proportionality raises two questions: first, how can data be measured by SMEs without imposing excessive reporting costs, and second how can consistency be ensured in data measurement in the supply and value chain.

For SMEs the main concern is the expense of data measurement, data storage and updated data systems. These costs disproportionately burden smaller enterprises and the need to expend them could lead to the destruction of vital businesses and jobs in the EU. Further costs from the need to adjust to future regulatory measures will burden SMEs.

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[142] Dirk A. Zetzsche and Ross P. Buckley, Douglas W. Arner and Janos N. Barberis, 'Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation' (August 14, 2017), 23 Fordham Journal of Corporate and Financial Law, also available at SSRN: https://ssrn.com/abstract=3018534; Dirk A. Zetzsche and Marco Bodellini, 'A Sustainability Crisis Makes Bad Law! - Towards Sandbox Thinking in EU Sustainable Finance Law and Regulation' (July 4, 2022), available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4147295.

This poses a serious challenge to the objectives of the Sustainable Finance Framework to create a competitive market for green financial products and to transform the real economy towards sustainability. It must be assumed that disproportionate costs for SMEs would lead to a competitive disadvantage in comparison to larger undertakings, that due to their size and resources can more easily implement the measures necessary for compliance, and thereby unwillingly negatively affect competition.

This assumption is supported by quantitative studies examining the effects of the GDPR on the economic and innovative performance of SMEs compared to larger companies. These indicate that the extensive requirements on collection and processing of consumer data result in a disproportionately impact SMEs, diminishing their financial performance and their innovative power, while enabling larger undertakings to further gain market share.[143]

This would substantially impact European economy, as SMEs represent 99.8% of European enterprises in 2022 and contributing some 64.4% of employment in the business economy.[144] SMEs need protection due to their economic significance and lack of capacity to adapt to detailed regulatory requirements.

The burden upon SMEs arises in two ways. First, the CSRD will directly apply to listed SMEs except for micro-undertakings,[145] in 2026[146]. Furthermore, Art 19a (6) Accounting Directive provides for a transitional period of two years, which allows listed SMEs to opt-out of reporting until 2028.[147] Reporting will be subject to special reporting standards to be effective by 2026. These standards are to be proportionate and relevant to the capacities and characteristics of SMEs.[148]

Second, the CSRD will indirectly require data from SMEs, as entities required to report on sustainability risks and impacts in their value chain will need data from SMEs to comply with the CSRD. SMEs that are not

[143] Chinchih Chen, Carl B. Frey, and Giorgio Presidente 'Privacy Regulation and Firm Performance: Estimating the GDPR Effect Globally' The Oxford Martin Working Paper Series on Technological and Economic Change, No. 2022-1; Knut Blind, Crispin Niebel, and Christian Rammer (2024) 'The impact of the EU General data protection regulation on product innovation' Industry and Innovation, 31:3, 311-351; Christian Peukert, Stefan Bechtold, Michail Batikas, Tobias Kretschmer, 'Regulatory Spillovers and Data Governance: Evidence from the GDPR' (2022), Marketing Science, vol. 41, no. 4, pp. 746–768.

[144] EC, Annual Report on European SMEs 2022/2023, available at: https://single-market-economy.ec.europa.eu/smes/sme-strategy/sme-performance-review_en.

[145] Defined in Art. 3 (1) Accounting Directive.

[146] Art. 5(c)(I) CSRD.

[147] Recital (21) CSRD.

[148] Art. 29c (1) Accounting Directive.

listed and would therefore not be included in the Scope of the CSRD often provide important services in the value chain as suppliers, clients or creditors of entities and would therefore fall under the indirect data demand. Through the business relationship and their prominent economic position, these larger companies can exert economic pressure on the SMEs in their value chain and thus de facto require them to report under the CSRD.

This is problematic for two reasons. First, these SMEs, although not formally within the CSRD scope, will be required by large companies to prepare data in CSRD format. Second, the reporting standards for SMEs under the CSRD are to be designed specifically for listed SMEs and therefore will ignore the needs of non-listed SMEs and those reporting indirectly, so to speak, because required to do so by large companies.

The Commission has at least identified the problem for non-listed SMEs and encourages large entities and financial intermediaries "to apply the principle of proportionality when engaging with SMEs and to exercise restraint when dealing with SME clients that are interested in raising finance for green investments or when requesting information from SME value chain partners."[149]

Striking a balance between the necessity of data creation by SMEs to provide a comprehensive data system and the constraints upon SMEs is paramount. The use of official estimates sector by sector issued by public institutions (including regulators, statistical departments and possibly academic institutions) based on scientific sources such as sector-average data could well provide a bridging solution. When an SME believes its own data is better, or more to its advantage, it can gather and disclose that data. Where this is not the case, the official estimate should provide a neutral, cost-efficient solution for SMEs.

Reliance on *official* estimates may provide the best solution for data in the supply chain, where issues arise for suppliers not familiar with the EU regulatory framework. Where the ESRS allows the use of estimates we recommend these be issued by an officially-appointed institution mandated to measure, and estimate, as independently as possible.

4. From Market-based to Mandatory?

As the EU Sustainable Finance Framework relies on the invisible hand of the capital markets, mandating sustainability preferences (including duties to prevent, avoid, and/or mitigate negative enviornmental and human rights impacts) is somewhat inconsistent with such a market-based approach. Yet,

[149] European Commission, Questions and Answers on the Sustainable Finance package, 13 June 2023, available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_3194.

we note there is a trend to move from voluntary to mandatory sustainability preferences in supply chain regulation.

Before the Sustainable Finance Action Plan was adopted in 2018, the EU had set mandatory due diligence requirements for certain goods notorious for their environmental or social impacts, such as diamonds (2002)[150], fish (2008)[151], certain minerals (2017)[152], timber (2010)[153], and most recently batteries (2023).[154] For instance, the Conflict Minerals Regulation seeks to ensure the responsible and conflict-free import of tin, tantalum, tungsten, and gold, to combat human rights violations and the operations of armed groups and criminals.[155]

This approach was generalized in the legislative efforts that led to the Corporate Sustainability Due Diligence Directive (CSDDD)[156], which mandates firms with at least 1,000 employees to monitor their supply chain with a view to ensuring compliance with a catalogue of environmental and social standards that have been adopted by international organisations. In case of non-compliance, the CSDDD facilitates private and public enforcement across the Single Market. Needless to say, the move from market-based to mandatory consideration of sustainability concerns will further propel datafication, as obliged firms as well as claimants and enforcement agencies will rely on data to make, or defend, the claim. As some of the many challenges we have outlined in the EU Sustainable

[150] Council Regulation (EC) No 2368/2002 of 20 December 2002 implementing the Kimberley Process certification scheme for the international trade in rough diamonds, Official Journal L 358, 31/12/2002 P. 0028 – 0048.

[151] Council Regulation (EC) No 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing, amending Regulations (EEC) No 2847/93, (EC) No 1936/2001 and (EC) No 601/2004 and repealing Regulations (EC) No 1093/94 and (EC) No 1447/1999, OJ L 286, 29.10.2008, p. 1–32.

[152] Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas, OJ L 130, 19.5.2017, p. 1–20, available at:

[153] Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators that place timber and timber products on the market Text with EEA relevance, OJ L 295, 12.11.2010, p. 23–34.

[154] Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC, PE/2/2023/REV/1, OJ L 191, 28.7.2023, p. 1–117.

[155] See Recital 14 of Regulation (EU) 2017/821, supra note 139.

[156] Not yet published in the OJ, see on the vote of the Parliament: EP Press Release, 'Due diligence: MEPs adopt rules for firms on human rights and environment' (24.04.2024), available at: https://www.europarl.europa.eu/news/en/press-room/20240419IPR20585/due-diligence-meps-adopt-rules-for-firms-on-human-rights-and-environment.

Finance Framework as a datafication project are remedied, we also expect courts to fill the gaps in the framework, and thus contribute to overall legal certainty in this emerging field.

V. Conclusion

We argue that the EU Sustainable Finance Strategy is first and foremost a datafication project. The extensive reporting requirements under the EU Sustainable Finance Framework are to be put into a financial context that rests on the creation, collection, assessment, evaluation and testing of sustainability data along all points of the financial value chain, establishing a sustainability data stream from the point where resources are first used through to the "end investors".

The amount and complexity of data involved is such that it can no longer be handled manually and requires an adaptation of the internal data systems and models of the reporting entities, financial intermediaries and regulators, all so as to promote Green Fintech, RegTech and SupTech, in particular through the combination of mandatory digital financial and sustainability regulatory reporting with standardization and quality processes, and centralized infrastructure (ESAP) for reporting and access. Over time, as with how financial accounting rules have developed, we predict that the current regulatory issues with regard to data measurement will be addressed by means of best practice industry standards that establish widely accepted rules allowing for higher integrity and comparability of data, supplemented by well-researched and supported insights into the limitations of these rules.

In all this, the principle of proportionality will take centre stage – especially for SMEs for which regulators should allow, in most sustainability dimensions, the further use of official estimates instead of accurate, but overly costly, measurements.