

## REGULATORY SANDBOXES FOR SUSTAINABLE FINANCE\*

Sofia Ranchordás\*\* - Roberta Meoli\*\*\*

**ABSTRACT:** *The article delves into the potential of regulatory sandboxes to enhance the effectiveness of sustainable finance policies, that is, financial policies designed to fund sustainable projects and activities including the green transition. While acknowledging the significant regulatory advancements made by the EU, this analysis highlights persistent gaps—such as greenwashing, informational asymmetries and regulatory compliance burdens—that hinder the operationalization of sustainability goals. Drawing on a selected number of examples, we explain how regulatory sandboxes, through supervised experimentation, compliance guidance and close collaboration between regulators and market participants, can support the development of sustainable finance. This article contributes both to legal scholarship and policy literature on the regulation of sustainable finance and on regulatory experimentation. This article argues that regulatory sandboxes have the potential to reconcile the need to promote economic innovation with the promotion of specific public values (including sustainability), facilitate stakeholder dialogue, and generate operational solutions, particularly within the rapidly evolving domain of green fintech.*

**SUMMARY:** 1. Introduction – 2. Regulating Sustainable Finance – 3. Regulatory Sandboxes – 4. Regulatory Sandboxes for Sustainable Finance – 5. Conclusion.

1. The pursuit of sustainable development in regulated sectors has become a growing priority for regulators and policymakers.<sup>1</sup> While finance itself cannot mitigate

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\* The Authors divided the research and writing work equally regarding the Introduction, Part 4 and Conclusion. Ranchordás is responsible for Section 3 and Meoli for Section 2.

\*\* Full Professor of Administrative Law, Tilburg Law School and Professor of Public Law, Innovation, and Sustainability at LUISS Guido Carli.

\*\*\* PhD candidate in Law & Business at LUISS Guido Carli.

<sup>1</sup>The OCED highlighted that this shift reflects a broader institutional commitment to aligning financial systems with long-term environmental and social objectives. See: [https://www.oecd.org/en/publications/global-outlook-on-financing-for-sustainable-development-2025\\_753d5368-en.html?wcmode=di](https://www.oecd.org/en/publications/global-outlook-on-financing-for-sustainable-development-2025_753d5368-en.html?wcmode=di)

directly to climate change, it is instrumental to support and advance broader sustainability policies, including the financing of climate change mitigation actions, biodiversity protection, and social inclusion.<sup>2</sup> However, the transition to a greener economy and society comes with a hefty price tag—one that public finance alone is not able to cover.<sup>3</sup> Combating climate change requires a large mobilization of capital markets at a global level, at a time when many European governments are already struggling to balance several other priorities. Despite the growing number of sustainable policies and adopted climate change policies, it soon became clear that more capital was needed than what public finance could ever offer.<sup>4</sup> Consequently, there has been a turn to private finance to support the green transition and sustainable development.<sup>5</sup> A variety of financial strategies, ranging from debt instruments and risk mitigation derivatives to asset securitization, have been considered, for example, to finance the transition to clean energy infrastructure.<sup>6</sup> Before exploring these mechanisms in detail, it is worth clarifying some key definitions

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sabled.html; For a more in-depth analysis, see also: S. LA MONACA – K. SPECTOR – J. KOBUS, *Financing the green transition* in *Journal of International Affairs*, V. 73 n. 1, 2019, pp. 17-32; M. BABIC, *Green finance in the global energy transition: Actors, instruments, and politics*, in *Energy Research & Social Science*, v. 111, n. 103482, 2024; A. MAINO, *Financing the energy transition: The role, opportunities and challenges of green bonds*, in *Oxford Institute for Energy Studies*, 2022.

<sup>2</sup>A. J. VAN NIEKERK, *Economic inclusion: green finance and the SDGs in Sustainability*, v. 16, n.3, p. 1128, 2024, p. 2.

<sup>3</sup>See European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A sustainable finance framework that works on the ground, COM(2023) 317 final, p. 1. The document highlights that, in order to meet the objectives, set by the various EU sustainable finance initiatives, approximately EUR 700 billion in additional investments will be needed each year—most of which is expected to come from private sources. These ambitious targets underscore the need for regulation to play an active role in mobilizing and guiding financial flows towards sustainable goals.

<sup>4</sup>L. AMMANNATI – A. CANEPA, *Intervento pubblico e finanza sostenibile*, in *Rivista trimestrale di diritto dell'economia*, supp. 4, 2022, p. 163.

<sup>5</sup>The European Commission confirmed this in its sustainable finance strategy: “As the scale of investment required is well beyond the capacity of the public sector, the main objective of the sustainable finance framework is to channel private financial flows into relevant economic activities”. COM(2021)390 final (n 48) 2, See also: V. COLAERT, *The changing nature of financial regulation: sustainable finance as a new EU policy objective*, in *Common Market Law Review*, n. 02, 2022, pp. 22 ff.

<sup>6</sup>S. LA MONACA, *Financing the green transition; addressing barriers to capital deployment*, in *Journal of International Affairs*, vol. 73, no. 1, 2019, pp. 17–32; Cf. F. MOLITERNI – S. PAREGLIO (Eds.), *Sustainable Investing and Green Finance: Boosting Markets by Solving Ambiguities*, in *Fondazione Eni Enrico Mattei (FEEM)*, 2018.

that underpin the overall framework.

The notion of sustainable finance, in particular, is elusive, with multiple definitions emerging across academic and policy literature.<sup>7</sup> The European Commission defines it as “the process of taking environmental, social, and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects.”<sup>8</sup> That is, sustainable finance refers to the allocation of capital towards activities that generate long-term economic value while also delivering positive social impact, promoting sound governance, and avoiding harm to the environmental system.<sup>9</sup> Sustainable finance aims thus to redefine the world of finance through ESG’s, ensuring that investments are not only guided by profit but also by sustainability.

Specific examples of financial instruments are green bonds, that is, any type of bonds committed to financing climate projects, for example, in renewable energy, pollution prevention or clean transportation; blue bonds, that is, bonds issued by governments or development banks destined to finance marine and ocean-based projects; and social bonds which are bonds committed to financing social projects.<sup>10</sup>

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<sup>7</sup>Cf. F. CAPRIGLIONE, *Clima, energia, finanza: una difficile convergenza*, Utet giuridica, 2023, p. 14; F. CAPRIGLIONE, *Il sistema finanziario verso una transizione sostenibile*, in *Rivista trimestrale di diritto dell’Economia*, n.2, 2021, p. 243; H. AHLSTRÖM, D. MONCIARDINI, *The Regulatory Dynamics of Sustainable Finance: Paradoxical Success and Limitations of EU Reforms*, in *J Bus Ethics*, n. 177, 2022; L. AMMANNATI, *Transizione energetica, “just transition” e finanza*, in *Rivista trimestrale di diritto dell’economia*, suppl. 1, 2022; V. COLAERT, *The Changing Nature of Financial Regulation: Sustainable Finance as a New EU Policy Objective*, in *Common Market Law Review*, v.6, n. 59, 2022; M. GARGANTINI, M. SIRI (Eds.), *The Cambridge Handbook of EU Sustainable Finance: Regulation, Supervision and Governance*, Cambridge, 2024; M. PELLEGRINI, *Il ruolo dello stato nella transizione della finanza verso la sostenibilità*, in M. PASSALACQUA (Ed.), *Diritti e mercati nella transizione ecologica e digitale*, Cedam, 2022; M. SEPE, *Sviluppo, sostenibilità e sana e prudente gestione in ambito finanziario*, in M. PASSALACQUA (Ed.) *Diritti e mercati nella transizione ecologica e digitale*, Cedam, 2022; Quaderno Consob, *La finanza per lo sviluppo sostenibile*, n. 1, giugno 2022.

<sup>8</sup>European Commission, *Overview of Sustainable Finance*, available at: [https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance\\_en](https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en). See also S. PELLERITI, *Il ruolo del FinTech nella transizione ecologica*, in L. AMMANNATI – A. CANEPA (Eds.), *La finanza nell’età degli algoritmi*, Giappichelli, Torino, 2023, pp. 146–148.

<sup>9</sup>Consob, Sustainable Finance description available at: <https://www.consob.it/web/area-pubblica/finanza-sostenibile>

<sup>10</sup>European Parliamentary Research Service, *Green and Sustainable Finance*, PE 679.081, 2021.

However, sustainable finance nowadays extends well beyond these traditional instruments, including also Green Fintech which harnesses digital technology to promote environmental sustainability.<sup>11</sup>

A related but narrower term is “green finance”, which refers specifically to “financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. It includes climate finance but it is not limited to it.”<sup>12</sup> Accordingly, while green finance is a way to mobilize private capital flows to promote environmental goals, the term sustainable finance is broader encompassing the mobilization of funds for other ESGs. Complementing this, “Greening finance” corresponds to the diffusion of new tools, procedures, and regulations that aim to encourage the financial system to consider climate and environmental goals in financial risk management and investment decision-making.<sup>13</sup>

Turning to the facts, in 2025, Moody’s estimated the global sustainable bond issuance to total \$1 trillion, in line with 2024.<sup>14</sup> However, this number is far below what would be needed to adequately address climate change challenges.<sup>15</sup> This discrepancy is partly explained by a combination of policy and regulatory factors. To stimulate private investment in sustainable finance, the European Union has developed several regulatory frameworks, marking a shift from broad political

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<sup>11</sup>This is the case of Green FinTech which is also discussed in this article. T PUSCHMANN – V. KHMARSKYI, *Green fintech: Developing a Research Agenda*, in *Corporate Social Responsibility and Environmental Management*, 31 (4), 2024, p. 2823-2837.

<sup>12</sup>H. WRIGHT, et al., *Banking on reform: aligning development banks with the paris climate agreement*, E3G, 2018, pp. 109–17.

<sup>13</sup>European Parliamentary Research Service, *Green and Sustainable Finance*, PE 679.081, 2021, p. 3.

<sup>14</sup>Moody’s, *What’s in store for sustainable finance and ESG in 2025*, available at: <https://www.moody.com/web/en/us/insights/credit-risk/outlooks/esg-sustainable-finance-2025.html>

<sup>15</sup>As already recognized by the 2018 Sustainable Finance Action Plan, ensuring transparency and legal certainty for investors willing to support the ecological transition proves far more complex than it may appear at first glance. For this reason, the Action Plan laid the foundations for a set of targeted regulatory initiatives aimed at reorienting capital flows and overcoming these investment gaps. See: D. BUSCH - G. FERRARINI - A. VAN DE HURK, *The European Commission’s Sustainable Finance Action Plan*, 2018; A. BROZZETTI, *Profili evolutivi della finanza sostenibile: la sfida europea dell’emergenza climatica e ambientale*, in PASSALACQUA (Ed.), *Diritti e mercati nella transizione ecologica e digitale*, Cedam, 2022, p. 197. And for an insight about the required numbers see: <https://www.climatepolicyinitiative.org/publication/top-down-climate-finance-needs/>

commitments to a more structured and binding approach. This combines protective measures, which aim to improve transparency and investor awareness, with promotional ones, which actively encourage the reallocation of capital towards ESG-aligned activities.<sup>16</sup> An important milestone in this transition was the 2015 Paris Agreement, which provided a global framework for climate action and committed Member States to limiting global warming and enhancing climate resilience through coordinated public and private efforts.<sup>17</sup> This was reinforced by the adoption of the United Nations 2030 Agenda for Sustainable Development, which outlined a comprehensive set of goals for inclusive and sustainable growth, establishing a global benchmark for policy alignment.<sup>18</sup> In 2018, the European Commission launched the Sustainable Finance Action Plan (SFAP), a foundational document aimed at reorienting capital flows towards sustainable investments. This policy document aimed at integrating sustainability into risk management, and foster transparency and long-termism in economic decision-making.<sup>19</sup> The Action Plan was key in the integration of ESG considerations in the regulatory framework of European financial markets. This strategic vision was subsequently embedded within the broader policy context of the European Green Deal, unveiled in December 2019, which set the EU's overarching objective of achieving climate neutrality by 2050.<sup>20</sup> The Green Deal not

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<sup>16</sup> V. TROIANO, *Regolamentazione finanziaria, finanza sostenibile e obiettivi ESG*, in *Rivista trimestrale di diritto dell'economia*, n. 4, 2023, p. 592.

<sup>17</sup> The Paris Agreement, aimed at countering climate change by acknowledging its link to human activity. Article 2 frames the global response within sustainable development and poverty eradication. See IPCC, *Fifth Assessment Report – Summary for Policymakers* (2013).

<sup>18</sup> The 2030 Agenda for Sustainable Development, adopted by the UN General Assembly on 25 September 2015, is a global action plan structured around 17 Sustainable Development Goals (SDGs) and 169 specific targets. It promotes an integrated model of economic, social, and environmental sustainability, emphasizing a holistic and cross-sectoral approach involving governments, the private sector, and civil society. Unlike the Millennium Development Goals, it applies universally to all countries and introduces monitoring indicators and reporting mechanisms to track progress.

<sup>19</sup> European Commission, COM(2018)97, of the 8 march 2018; See also: M. COSSU, *Delle scelte di investimento dei Post-Millennials, e del difficile rapporto tra analfabetismo finanziario e finanza sostenibile*, in *Rivista delle Società*, 2021, pp. 1270–1271; and, previously, for an in-depth analysis of the same Plan, see also: M. SIRI – S. ZHU, *L'integrazione della sostenibilità nel Sistema europeo di protezione degli investitori*, in *Banca, Impresa, Società*, 2020, pp. 6 ff.; On long termism policy see M.S. RICHTER, *Long-termism*, in *Rivista della Società*, vol.1, no.1, 2021, pp. 16 ff.

<sup>20</sup> M. PASSALACQUA, *Green deal e transizione digitale. Regolazione di adattamento a un'economia sostenibile*, in *Analisi Giuridica dell'Economia*, n.1, 2022; A. SIKORA, *European Green Deal: legal*

only provided a normative and political framework for the ecological transition, but also mobilized substantial financial resources, over €1 trillion for the 2020–2030 period.<sup>21</sup>

Building on these foundations, the EU introduced a series of legislative initiatives to implement its objectives. The most important one was the Taxonomy Regulation (Regulation EU 2020/852), which establishes a unified classification system for environmentally sustainable economic activities—offering a common language for investors, issuers, and regulators alike.<sup>22</sup> Closely linked is the Sustainable Finance Disclosure Regulation (SFDR) (Regulation EU 2019/2088) which imposes mandatory disclosure requirements on financial market participants regarding the integration of sustainability risks and the adverse impacts of their investment decisions.<sup>23</sup> To support this regulatory framework, existing regulations were amended (e.g., MiFID II and the Insurance Distribution Directive (IDD)<sup>24</sup> and new directives were adopted regarding corporate reporting (e.g., Corporate Sustainability Reporting Directive (CSRD)<sup>25</sup>. These developments in the regulation of sustainable finance were accompanied by other financial policies, namely the COVID-19 recovery packages (for example, the NextGenerationEU recovery package)<sup>26</sup> and in July 2021, this evolving

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*and financial challenges of the climate change*, in *Era forum*, v. 21., n. 4, Springer Berlin Heidelberg, 2021.

<sup>21</sup>A. BROZZETTI, *Il Green deal europeo: rinnovate prospettive per intermediari finanziari ed imprese*, in *Studi in onore di Sabino Fortunato*, vol. IV, Bari, 2023, pp. 2957 ff.

<sup>22</sup>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. On the Taxonomy Regulation see C. GORTSOS, *The Taxonomy Regulation: More Important Than Just as an Element of the Capital Markets Union*, in *European Banking Institute, Working Paper Series*, No. 80, 2020.

<sup>23</sup> 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.

<sup>24</sup> In parallel, sustainability preferences have been formally incorporated into investment and insurance advice through amendments to sectoral legislation. Specifically, changes to the Markets in Financial Instruments Directive II (MiFID II) and to the Insurance Distribution Directive (IDD), implemented in 2021 and 2022 respectively, require financial advisers and product manufacturers to take into account clients' sustainability preferences in the provision of services and product governance.

<sup>25</sup> Directive EU 2022/2464: which extends the scope and depth of sustainability disclosure obligations, introducing harmonized European Sustainability Reporting Standards (ESRS) applicable to a broad range of entities, including listed companies and large undertakings.

<sup>26</sup> This unprecedented financial instrument allocates over €700 billion in grants and loans to Member States, conditional on the adoption of National Recovery and Resilience Plans (NRRPs) that dedicate

regulatory architecture was further consolidated with the adoption of the Sustainable Finance Strategy, which expanded the EU's approach to four key areas: transition finance, inclusiveness, resilience, and the global alignment of financial flows with sustainability goals.

This evolving framework reflects an ambitious and far-reaching attempt to redefine the role of finance in sustainability. Nevertheless, its operationalization continues to encounter a number of unresolved challenges. First, the rising popularity of sustainable financial products has been accompanied by an increased risk of 'greenwashing', that is, exaggerated, partly unsupported or false claims on the integration of environmentally responsible practices into investment strategies.<sup>27</sup> Greenwashing is often explained by a second shortcoming of the regulation of sustainable finance: the existence of significant information asymmetries between financial intermediaries and investors, particularly regarding the true environmental and social value of sustainable-labelled products.<sup>28</sup> These asymmetries are further exacerbated by the lack of shared and reliable data, the divergent interpretations of

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at least 37% of total expenditure to climate-related objectives. The RRF has effectively elevated sustainability to a criterion for accessing EU funding, further reinforcing the alignment between financial support and environmental goals.

<sup>27</sup>Recital 11 of the Taxonomy Regulation describes greenwashing as the practice of “gaining an unfair competitive advantage by marketing a financial product as environmentally friendly, when in fact basic environmental standards are not met.” Similarly, Recital 16 of Commission Delegated Regulation (EU) 2022/1288 of 6 April 2022 defines greenwashing as “the practice of gaining an unfair competitive advantage by recommending a financial product as environmentally friendly or sustainable, while in fact it does not meet basic environmental or other sustainability standards.” On the impact of the Sustainable Finance Disclosure Regulation on greenwashing, see R. ABOUARAB – T. MISHA – S. WOLFE, *Does the EU sustainable finance disclosure regulation mitigate greenwashing?* In *The European Journal of Finance*, 2025, p. 1–33.

<sup>28</sup>In its recent Final Report on greenwashing, ESMA underscored the close link between this phenomenon and the communication of inaccurate or misleading information to investors. The report suggests that combating greenwashing requires not only the enforcement of sustainability-specific obligations, but also the broader application of rules aimed at preventing the spread of deceptive or unclear disclosures. See EUROPEAN SECURITIES AND MARKETS AUTHORITY, *Final Report on Greenwashing. Response to the European Commission's request for input on “greenwashing risks and the supervision of sustainable finance policies”*, ESMA 36-287652198-2699, 2024, pp. 2–3; The issue has been expressly identified as a priority within the scope of supervisory and oversight action. See EIOPA, *Final Report on Greenwashing. Response to the European Commission's request for input on “greenwashing risks and the supervision of sustainable finance policies”*, EIOPA-BoS-24-159, 2024; A. DAVOLA, *Informativa in materia di prodotti finanziari sostenibili, tutela dell'investitore e contrasto al greenwashing: le criticità dell'assetto europeo tra norme primarie e disciplina di dettaglio*, in *Riv. dir. banc.*, III, 1, 2022.

what constitutes a genuinely sustainable activity, and the widespread marketing of financial products as “sustainable” in the absence of robust and verifiable evidence. Greenwashing in sustainable finance is further intensified by fragmented and inconsistent ESG metrics and the absence of harmonized and universally accepted methodologies.<sup>29</sup> Eco-washing, as it is also known, is not merely a reputational issue for individual actors; it constitutes a structural challenge, undermining the credibility of the entire regulatory framework and obstructing the alignment of financial markets with the transition imperatives of the real economy.<sup>30</sup> Second, the implementation of the EU Taxonomy has proven to be problematic because it fails to capture the diversity and complexity of economic realities and provide clear guidance to financial actors.<sup>31</sup> Its rigid, binary classification fails to account for transitional activities or sector-specific challenges, resulting in distortions and uncertainty for financial actors. Third, although sustainable finance regulation has evolved from initial “nudging” strategies to more mandatory obligations, including extended disclosure and reporting duties, existing rules remain weak in terms of regulatory enforcement.<sup>32</sup> For example, in many cases, there are no tangible consequences for failing to invest in ESG goals. Additionally, the transition is still too often conceptualized through an individual or firm-level lens, which overlooks the need for a broader and collaborative perspective in which sustainability is recognized as a collective responsibility shared across public and private actors.<sup>33</sup>

These challenges highlight the need for a normative shift that goes beyond

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<sup>29</sup>M. BODELLINI, *Greenwashing and the misapplication of Article 8 and 9 of the Sustainable Finance Disclosure Regulation*, available at <https://ssrn.com/abstract=4499639>.

<sup>30</sup>M. BODELLINI, *Servizi di investimento, prodotti finanziari e rischio di greenwashing*, in F. RIGANTI (Ed.), *Sostenibilità e mercati vigilati: regolatori e operatori nella “galassia” ESG*, Giappichelli, Torino, 2024, pp. 407 ff.

<sup>31</sup>F. CAPRIGLIONE, *Clima, energia, finanza: una difficile convergenza*, Utet, 2023, p. 76; D. ZETSCHÉ – M. BODELLINI – R. CONSIGLIO, *The EU Sustainable Finance Framework in Light of International Standards*, in *Journal of International Economic Law*, 2022, p. 11.

<sup>32</sup>D. A. ZETSCHÉ – M. BODELLINI, *Sustainability Sandbox: Designing a Safe Regulatory Environment for ESG Innovation*, in *European Banking Institute Working Paper Series*, n. 124, 2023, pp. 109 ff.

<sup>33</sup>R. MEOLI, *Finanziamenti pubblico-privati: una leva per lo sviluppo sostenibile*, in *Luis Law Review*, n. 1, 2024, pp. 123 ff.

technical or financial considerations, embracing ethical and methodological dimensions rooted in principles of responsibility, accountability, and intergenerational solidarity.<sup>34</sup> This shift should also promote more transparency, evidence-based policymaking and foster stronger collaboration among regulators, financial intermediaries, investors, and sustainability stakeholders. It also suggests the need for non-traditional, adaptive, collaborative, and experimental regulatory instruments that are well suited for a field characterized by innovation, uncertainty, and rapid transformation. It is in this context that regulatory sandboxes emerge as a promising institutional response in the field of sustainable finance.<sup>35</sup>

Recently, there has been a growing interest in novel regulatory instruments that are adaptable, innovation-friendly, and collaborative.<sup>36</sup> Regulatory sandboxes are a key example of this.<sup>37</sup> They have been used for different purposes over the last

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<sup>34</sup>An ethical rethinking of finance has been proposed, calling for a shift from a self-referential and profit-centric model to one grounded in solidarity and sustainability. In this view, the governance of financial markets should be reframed through ESG principles to foster a more responsible allocation of resources, aligned with the overarching equilibrium of the economic system and the legitimacy of pursued goals. See F. CAPRIGLIONE, *Concorrenza e stabilità nel paradigma digitale*, in *Rivista Trimestrale di Diritto dell'Economia*, n.3, 2023, pp. 13 ff. This line of reasoning, grounded in the moral dimension of financial activity has long been central to the work of F. CAPRIGLIONE, who already in the late 1990s stressed the need for a finance rooted in ethical principles and responsive to the challenges of globalization and systemic transformation. The author has further developed these considerations in recent years, particularly in light of the sustainability agenda and post-pandemic recovery. See F. CAPRIGLIONE, *Etica della finanza e finanza etica*, Bari, 1997; ID., *Etica della finanza mercato globalizzazione*, Bari, 2004; ID., *Il dopo CoViD-19: esigenza di uno sviluppo sostenibile*, in *Nuova giur. civ. commentata*, n. 5/2020, Speciale; ID., *Clima Energia Finanza. Una difficile convergenza*, UTET Giuridica, 2023; Recently, the author has defined sustainability as an essential good, marked by a strong ethical dimension and increasingly recognized as such by society. This perspective highlights its enduring value as a normative reference capable of reconciling profit maximization with the collective social interest, within a long-term vision in F. CAPRIGLIONE, *Sostenibilità mercato ambiente. Una riflessione introduttiva*, in A. ANTONUCCI – S. CAVALIERE – A. DAVOLA – G. LUCHENA, *Sostenibilità, finanza, mercati, ambiente. Spunti di riflessione*, Cacucci Editore, 2025, p. 27.

<sup>35</sup>L. BROMBERG – A. GODWIN – I. RAMSAY, *Fintech sandboxes: Achieving a balance between regulation and innovation*, in *Journal of Banking and Finance Law and Practice*, vol. 28, n.4, 2017, pp. 314-336.

<sup>36</sup>S. MONDONÇA *Creative Regulatory Environments: Sandboxes at the Intersection of Regulation and Innovation in an Era of Transition*, in T. DEVEZAS – J. LEITÃO – A. SARYGULOV – D. J. LEPOIRE – B. KHUSAINOV, *Global Energy Transition and Sustainable Development Challenges*, v. 1., World-Systems Evolution and Global Futures. Springer, Cham, 2024.

<sup>37</sup> See, for example, R. N. MARKELLOS, et al., *Worldwide Adoption of Regulatory Sandboxes: Drivers, Constraints and Policies: Drivers, Constraints and Policies*, 2024; A. MIGLIONICO, *Regulating Innovation through Digital Platforms: The Sandbox Tool*, in *European Company and*

decade. While there is no agreed definition, regulatory sandboxes generally refer to “regulatory tools allowing businesses to test and experiment with new and innovative products, services or businesses under supervision of a regulator for a limited period of time.”<sup>38</sup> Indeed, regulatory sandboxes may serve different roles: first, they can be employed to foster business learning, that is, the development and testing of innovations in a real-world environment; second, they can be deployed to support regulatory learning, i.e. experimental regulation and policy can be used to guide and support businesses in their innovation activities under the supervision of a regulatory authority; third, they can enable closer cooperation between different stakeholders and regulators, allowing them to address regulatory challenges such as information asymmetries.<sup>39</sup> Regulatory sandboxes first emerged in 2015 in the financial sector, where they quickly gained traction as controlled environments for safe testing in Fintech innovations in a safe and supervised way.<sup>40</sup> Nowadays, more than 60 jurisdictions have used this instrument to promote innovation in the financial sector (among others), often alongside innovation hubs and accelerator programs.<sup>41</sup>

Thus far, regulatory sandboxes do not seem to have been employed widely in sustainable finance. This is, nonetheless, puzzling as regulatory sandboxes have

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*Financial Law Review*, v. 19, n. 5, 2023, p. 828-853; T. MORAES, *Regulatory Sandboxes as Tools for Ethical and Responsible Innovation of Artificial Intelligence and their Synergies with Responsive Regulation*, in *The Quest for AI Sovereignty, Transparency and Accountability-Official Outcome of the UN IGF Data and Artificial Intelligence Governance Coalition*, 2023; H. J. ALLEN, *Sandbox boundaries*, in *Vand. J. Ent. & Tech. L.* 22, 2019, p. 299.

<sup>38</sup>S. RANCHORDÁS, *Experimental lawmaking in the EU: Regulatory sandboxes*, in *EU Law Live*, n. 12, 2021.

<sup>39</sup>T. MADIEGA – A. L. VAN DE POL - *Artificial intelligence act and regulatory sandboxes*, in *European Parliamentary Research Service*, PE 733.544, 2022, see: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733544/EPRS\\_BRI\(2022\)733544\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733544/EPRS_BRI(2022)733544_EN.pdf)

<sup>40</sup>B. LIM - C. LOW, *Regulatory Sandboxes in Fintech*, in J. MADIR (Ed.) *FinTech. Law and Regulation*, Cheltenham, UK: Edward, 2019; A. ALAASSAR - A.L. MENTION, T. HELGE AAS, *Exploring a new incubation model for FinTechs: Regulatory sandboxes*, *Technovation*, 103, 2021; D. AHERN, *Regulators Nurturing Fintech Innovation: Global Evolution of the Regulatory Sandbox as Opportunity-Based Regulation*, *Indian Journal of Law and Technology*, v. 15, Iss. 2, Article 4, 2019; D. A. ZETZSCHE, et al., *Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation*, in *FORDHAM J. CORP. & FIN. L.* 31, 2017.

<sup>41</sup>J. IVO – S. DUFF, *How to Build a Regulatory Sandbox: A Practical Guide for Policy Makers, Technical Guide*. Washington, D.C.: CGAP, 2020. See also G. CORNELLI – S. DOERR – L. GAMBACORTA – O. MERROUCHE, *Regulatory Sandboxes and Fintech Funding: Evidence from the UK*, in *Review of Finance*, v. 28, Issue 1, 2024, pp. 203–233.

become widely disseminated, for example, in the context of the energy transition.<sup>42</sup> Drawing on literature, policy reports, and best practices from various sustainability-related domains—as well as a limited number of identified examples in the sector of sustainable finance, this article posits that regulatory sandboxes offer significant strategic value to both regulators and other stakeholders in the field of sustainable finance. Regulatory sandboxes — when properly designed and effectively implemented — may be particularly well-suited to support the governance of sustainable finance. Furthermore, by fostering structured experimentation within a supervised environment, regulatory sandboxes hold the potential to support initiatives that embed sustainability objectives at the core of financial practices, contribute to the consolidation of long-term approaches in sustainable finance, and help combat greenwashing through closer cooperation between different stakeholders.<sup>43</sup> Given the experimental nature of many ESG-driven financial practices, and the urgency of aligning private investment with sustainability goals, sandboxes can also play a strategic role in enabling regulators to respond more flexibly to emerging risks, identify gaps in the current framework, and test new approaches in a context of controlled exposure. Indeed, they can serve as effective instruments to direct private capital flows towards sustainable goal, by creating a safe regulatory space where innovative solutions can be tested and refined before reaching full market deployment. This is particularly important in a field where finance is increasingly viewed as a tool to advance collective goals such as climate action, ecological resilience, and social equity.

In this article, regulatory sandboxes are presented as regulatory structured environments in which new financial products, services, or business models can be

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<sup>42</sup>F. GANGALE – A. MENGOLINI – L. COVRIG – S. CHONDROGIANNIS – R. SHORTALL, *Making energy regulation fit for purpose. State of play of regulatory experimentation in the EU*, in *Publications Office of the European Union*, Luxembourg, 2023.

<sup>43</sup>J. TRUBY. et. al., *A sandbox approach to regulating high-risk artificial intelligence applications*, in *European Journal of Risk Regulation*, Vol. 13(2), 2021; On the contrast between short-term and long-term value creation, see: M.E. PORTER – M.R. KRAMER, *Creating Shared Value*, in *Harvard Business Review*, 2011, pp. 62 ff.

tested under close supervisory oversight, prior to their full-scale authorization.<sup>44</sup> Yet, their significance in the sustainable finance context extends beyond technical experimentation. Their aim in this field should not only be to enable experimentation but also to generate feedback for regulators, improve compliance tools, and foster mutual learning between public institutions and market participants.<sup>45</sup> Sandboxes offer a collaborative platform through which regulators and market actors can co-develop and calibrate regulatory instruments, enabling a preventive and anticipatory governance capable of identifying risks, closing normative gaps, and improving rule design.<sup>46</sup> Crucially, the sandbox model allows regulators to reconcile the need for innovation with other public values such as sustainability, consumer protection, and legal values including legal certainty. This contribution is particularly relevant at a time when the Italian Ministry of Economy and Finance, through the proposed reform of the 2025 regulatory sandbox, aims to simplify the experimental framework and remove procedural burdens, particularly to better integrate FinTech innovations — including those aligned with sustainability goals — into the national and European regulatory architecture.<sup>47</sup> This article contributes to the growing body of literature on regulatory sandboxes, FinTech regulation, and sustainable finance by proposing a novel experimental approach to regulating sustainable financial instruments.<sup>48</sup>

The article is structured as follows: Section II outlines the conceptual foundations and regulatory developments of sustainable finance within the European

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<sup>44</sup>S. RANCHORDÁS, *Experimental regulations and regulatory sandboxes: Law without order?*, in *Law and method*, Faculty of Law University of Groningen Faculty of Law Research Paper Series, n. 10, 2021.

<sup>45</sup>L. A. FAHY, *Fostering regulator–innovator collaboration at the frontline: A case study of the UK's regulatory sandbox for fintech*, in *Law & Policy*, v. 44, n. 2, 2022, p. 162-184.

<sup>46</sup>L. AMMANNATI, *Regolatori e supervisori nell'era digitale: ripensare la regolazione*, in *Giurisprudenza Costituzionale*, fasc. 3, 2023, p.5.

<sup>47</sup>See the public consultation launched by the Italian Ministry of Economy and Finance on the reform of the regulatory sandbox regime: *Consultation on the FinTech regulatory sandbox reform*, available at: [https://www.dt.mef.gov.it/it/dipartimento/consultazioni\\_pubbliche/consultazioni\\_in\\_corso/consultazione\\_fintech/index.html](https://www.dt.mef.gov.it/it/dipartimento/consultazioni_pubbliche/consultazioni_in_corso/consultazione_fintech/index.html) We thank Paolo Longo for further information on this.

<sup>48</sup>On regulatory sandboxes, see, for example, F. BAGNI, *The Regulatory Sandbox and the Cybersecurity Challenge: from the Artificial Intelligence Act to the Cyber Resilience Act*, in *Rivista Italiana di Informatica e Diritto*, n. 2, 2023.

Union. Section III explores the evolution of regulatory sandboxes in financial regulation, illustrating their main features and objectives. Section IV focuses on the intersection of sandbox regimes and sustainable finance, discussing examples from various jurisdictions and assessing critically their potential. The final concludes with policy recommendations for the integration of regulatory sandboxes to support the sustainable transformation of financial systems.

2. The gradual integration of sustainability into financial regulation has profoundly influenced the evolution of the European legal and economic landscape.<sup>49</sup> In the case of sustainable finance, regulatory frameworks aim to encourage investments that promote sustainability. By shaping incentives and defining clear standards, the regulatory framework of sustainable finance seeks to reorient capital flows towards activities aligned with long-term sustainability objectives. However, even if these efforts mark an important shift towards a greener and more socially responsible financial architecture, the practical implementation of this ambition remains fraught with significant complexity, regulatory fragmentation, and persistent uncertainty. In this section, we discussed the main pillars of this framework in order to understand why some regulatory shifts may be required to further promote sustainable finance. As the European Commission has explained: “Major private and public investments are needed to transform the EU economy to deliver on climate, environmental and social sustainability goals, including the Paris Agreement and the UN Sustainable Development Goals (SDGs). Sustainable Finance is an important

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<sup>49</sup>H. AHLSTRÖM, D. MONCIARDINI, *The Regulatory Dynamics of Sustainable Finance: Paradoxical Success and Limitations of EU Reforms*, in *J Bus Ethics*, n. 177, 2022; V. COLAERT, *The Changing Nature of Financial Regulation: Sustainable Finance as a New EU Policy Objective*, in *Common Market Law Review*, 6, 59, 2022; M. GARGANTINI, M. SIRI (Eds.), *The Cambridge Handbook of EU Sustainable Finance: Regulation, Supervision and Governance*, Cambridge, 2024; With particular reference to sustainability in the exercise of banking activities, see R. LENER – P. LUCANTONI, *Sostenibilità ESG e attività bancaria*, in *Banca, Borsa e Titoli di Credito*, n. 1, 2023; R. CALDERAZZI, *La sostenibilità nell'impresa bancaria*, in *Rivista Trimestrale di Diritto dell'Economia*, Supplement n. 4, 2022, pp. 168 ff.

component of the European Green Deal.”<sup>50</sup> Sustainable finance integrates ESG factors into financial decisions, driving investment towards climate-neutral, energy- and resource-efficient, and circular economy projects. The regulation of sustainable finance is composed by a set of EU regulations and directives.<sup>51</sup>

At the core of this framework lies the EU Taxonomy Regulation (Regulation (EU) 2020/852) and its package of delegated acts such as the Climate Delegated Act<sup>52</sup> and the Environmental Delegated Act<sup>53</sup>, which introduces a technical classification system for identifying which economic activities can be considered environmentally sustainable.<sup>54</sup> The Taxonomy sets out a common language for financial and non-financial market participants, enabling greater transparency and comparability in the sustainability disclosure. By setting out clear parameters for what qualifies as a "green" activity (e.g., afforestation), it seeks to guide investment decisions, foster credibility in sustainable financial products, and enhance investors' trust. Under the mentioned regulation, an activity can be deemed sustainable only if it contributes substantially to at least one of the six environmental objectives, complies with the "do no significant harm" principle, and with minimum safeguards related to social and governance standards. Indeed, it facilitates the development of coherent EU policies in the field of sustainability, and it acts as a catalyst for market transformation by

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<sup>50</sup>See: [https://finance.ec.europa.eu/document/download/385df525-a170-4275-bf07-515719385076\\_en?filename=200108-financing-sustainable-growth-factsheet\\_en.pdf](https://finance.ec.europa.eu/document/download/385df525-a170-4275-bf07-515719385076_en?filename=200108-financing-sustainable-growth-factsheet_en.pdf)

<sup>51</sup>C. BRESCIA MORRA, *Chi salverà il pianeta: Lo Stato o le grandi corporation? ESG: una formula ambigua e inutile*, in *Rivista Trimestrale di Diritto dell'Economia*, 2022, pp. 78 ff.;

<sup>52</sup>Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021, supplementing Regulation (EU) 2020/852 by establishing technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or adaptation. Available at: [https://eur-lex.europa.eu/eli/reg\\_del/2021/2139/oj/eng](https://eur-lex.europa.eu/eli/reg_del/2021/2139/oj/eng)

<sup>53</sup>Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023, supplementing Regulation (EU) 2020/852 by establishing 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, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems.

<sup>54</sup> On the Taxonomy Regulation, see F. SCHUTZE – J. STEDE, *The EU sustainable finance taxonomy and its contribution to climate neutrality*, in *Journal of Sustainable Finance & Investment*, 2021; C. GORTSOS, *The Taxonomy Regulation: More Important Than Just as an Element of the Capital Markets Union*, European Banking Institute Working Paper Series, No. 80, 2020, D.A. ZETZSCHE – M. BODELLINI – R. CONSIGLIO, *Towards A New European Social Taxonomy: A Counterproposal Based On A Three-Step Approach*, University of Luxembourg, Working Paper, 2022.

promoting environmentally and socially responsible investment practices. It helps direct capital flows towards economic activities aligned with the Sustainable Development Goals (SDGs) and provides a foundation for building a financial system that supports the ecological transition. However, the practical implementation of the taxonomy has revealed several structural limitations and conceptual tensions.

Although the Taxonomy regulation aspires to objectivity through its reliance on science-based criteria, it has sparked controversy over its internal coherence and practical implementation. One point of criticism concerns the narrow scope of sustainability assessments, which often focus on the final output of an activity while neglecting its full life-cycle impact. For instance, an activity may be classified as sustainable based on the nature of its final product, despite using highly polluting or energy-inefficient production processes.<sup>55</sup> These inconsistencies highlight the need for a more holistic and integrated approach, one that captures both the environmental and social dimensions of sustainability with greater precision. Without such refinement, there is a risk that the taxonomy may inadvertently legitimize unsustainable practices, or fail to deliver the regulatory certainty needed to mobilize large-scale private investment in the green transition.

The Sustainable Financial Disclosure Regulation (SFDR) is the second pillar of EU sustainable finance regulation. It was conceived as a response to the growing demand for reliable and standardized information on the sustainability profile of financial products. Its objective is to improve market transparency, reduce the risk of greenwashing, and strengthen investor trust in sustainable investment offerings. It imposes a set of obligations on financial market participants and advisers concerning how they integrate sustainability risks and impacts into their investment processes. Additionally, it distinguishes between products that merely promote environmental, social and governance (ESG) characteristics (Article 8) and those that pursue a

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<sup>55</sup>For example, activities such as electric vehicle manufacturing may qualify as sustainable based on low-emission outputs, while the environmental impact of battery production, energy sources, and end-of-life disposal remains largely unaccounted for.

sustainable investment objective as their core purpose (Article 9).<sup>56</sup> In theory, this differentiation is intended to guide investor choice and reduce the risk of greenwashing. In practice, however, the distinction has proven ambiguous, leaving considerable interpretative discretion to financial actors.<sup>57</sup> Consequently, products labelled as “sustainable” may differ substantially in their actual environmental or social impact, and the lack of standardized reporting formats and data sources further undermines comparability. The SFDR’s effectiveness has thus been weakened not only by its technical shortcomings but also by the fragility of the broader ESG data infrastructure on which the entire sustainable finance framework relies.

A more robust response to the need for sustainability-related disclosure is found in the Corporate Sustainability Reporting Directive (CSRD), which replaces and strengthens the previous non-financial reporting framework.<sup>58</sup> The CSRD extends reporting obligations to a broader range of companies. It also introduces the use of common European Sustainability Reporting Standards (ESRS) and incorporates the principle of double materiality, requiring firms to disclose both the impact of environmental, social, and governance (ESG) factors on their financial performance and the effects of their own activities on society and the environment.<sup>59</sup> This directive

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<sup>56</sup>For an analysis of the SFDR, see D. BUSCH, *Sustainability Disclosure in the EU Financial Sector*, European Banking Institute Working Paper Series, No. 70, 2020; For an in-depth analysis of the greenwashing related risks and the SFDR see M. BODELLINI, *Greenwashing and the Misapplication of Article 8 and 9 of the Sustainable Finance Disclosure Regulation*, 2023, available at SSRN: <https://ssrn.com/abstract=4499639>

<sup>57</sup>M. BODELLINI, *Servizi di investimento, prodotti finanziari e rischio di greenwashing*, in F. RIGANTI (Ed.), *Sostenibilità e mercati vigilati: regolatori e operatori nella “galassia” ESG*, Giappichelli, Torino, 2024. pp. 408 ff.; A. DAVOLA, *The promise and perils of sustainable disclosure for retail investors. Does the SFRD framework tackle, or rather promote, product greenwashing?*, in *Eusfil Working Paper Series*, 3, 2022; T. ECKETT, *SFDR ‘opens door’ to greenwashing*, su [www.etfstream.com](http://www.etfstream.com), 2021.

<sup>58</sup>Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 on corporate sustainability reporting. For an insight analysis see: M. RISPOLI FARINA, *La direttiva UE sulla rendicontazione di sostenibilità delle imprese. Un Quadro ricostruttivo*, in A. ANTONUCCI – S. CAVALIERE – A. DAVOLA – G. LUCHENA, *Sostenibilità, finanza, mercati, ambiente. Spunti di riflessione*, Cacucci Editore, 2025, p. R. ROLLI, *Dalla Corporate Social Responsibility alla Sustainability, alla Environmental, Social and Governance (ESG)*, in *Corporate Governance*, 1/2022, p. 179.

<sup>59</sup>C.A. ADAMS et al., *The Double Materiality Concept: Application and Issues*, in *Global Reporting Initiative*, 2021, pp. 6 ff.; H.B. CHRISTENSEN – L. HAIL – C. LEUZ, *Mandatory CSR and Sustainability Reporting: Economic Analysis and Literature Review*, in *Rev. Acct. Stud.*, 2021, 26,

introduced considerable technical and organizational challenges, especially for firms not yet equipped to assess their broader sustainability footprint. The obligation to provide externally assured sustainability disclosures, while essential for enhancing data reliability and investor confidence, may also lead to new asymmetries between firms with access to sophisticated verification mechanisms and those that lack such resources, potentially exacerbating existing market inequalities.<sup>60</sup> The CSRD aims to elevate ESG information to the same level of importance, consistency, and verifiability as traditional financial data.<sup>61</sup> Additionally, there is a risk of over-reporting, where companies, in an attempt to ensure compliance or improve their ESG ratings, may inundate reports with excessive or non-material information, thereby undermining clarity and usability.

The Green Bond Regulation (Regulation (EU) 2023/2631) unifies the framework for the issuance of European green bonds (EuGBs), setting out clear criteria to ensure that proceeds are allocated exclusively to projects that align with the EU Taxonomy for environmentally sustainable activities.<sup>62</sup> The regulation aims to enhance investor confidence, increase market credibility, and foster the growth of a robust and transparent green bond market capable of supporting the financing needs of the ecological transition.<sup>63</sup> By standardizing the definition and use of green bonds,

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1176, 1178; M. BODELLINI, *Tra principi generali e standards internazionali di soft law: la disciplina europea sulla finanza sostenibile e l'inizio di una nuova stagione per il "Brussels effect"*, in *Rivista Trimestrale di Diritto dell'Economia*, n.3, 2023.

<sup>60</sup>M. RESCIGNO, *Note sulle regole dell'impresa sostenibile. Dall'informazione non finanziaria all'informazione sulla sostenibilità*, in *Analisi giur. Econ.*, 2022, pp. 180 ff.; M. COSSU, *Sostenibilità e mercati: la sostenibilità ambientale dell'impresa dai mercati reali ai mercati finanziari*, in *Banca Borsa, tit. cred.*, 2023, IV, pp. 558 ff.

<sup>61</sup>M. CAPELLI, *Il recepimento della Corporate Sustainability Reporting Directive nell'ordinamento interno*, in F. RIGANTI (Ed.), *Sostenibilità e mercati vigilati: regolatori e operatori nella "galassia" ESG*, Giappichelli, Torino, 2024, pp. 87 ff.

<sup>62</sup>*Green bonds* are fixed-income financial instruments whose proceeds are exclusively used to finance or refinance projects that have positive environmental and/or climate benefits. These typically include investments in renewable energy, energy efficiency, clean transportation, sustainable water management, and green buildings. See S. KIM PARK, *Investor as Regulators: green bonds and the governance challenges of the sustainable finance revolution*, in *Stanford Journal of International Law*, 2018; C. VALENTI, *The EU Green Bond Standard*, in E. MACCHIAVELLO, M. SIRI, *Sustainable finance and financial education: a snapshot*, Torino, 2024.

<sup>63</sup>D. DE FILIPPIS, *Transizione ecologica e mercati finanziari: i green bonds*, in *Nuovo dir. soc.*, 2023, p. 871.

the regulation seeks to address the risk of greenwashing and to differentiate genuinely sustainable financial instruments from those making unfounded or exaggerated claims.<sup>64</sup> However, there are several concerns regarding the voluntary nature of the regulation, which allows issuers to continue marketing green bonds outside the official EuGB label. Additionally, the use of external reviewers—introduced to ensure adherence to sustainability standards—raises issues of reliability and consistency, as their methodologies are not harmonized, and their governance is not subject to supervisory oversight. These weaknesses could be mitigated through the adoption of a unified regulatory framework at the European level.<sup>65</sup> In addition, the strict alignment requirement with the EU Taxonomy for the use of proceeds has raised concerns for being overly rigid, potentially discouraging the adoption of the EuGB label.<sup>66</sup>

Another relevant instrument gaining traction in sustainable finance is the Sustainability-Linked Bond (SLB), which, unlike green bonds, does not earmark proceeds for specific projects, but instead links the bond's financial characteristics—such as coupon rates—to the issuer's achievement of predefined ESG performance targets. This more flexible approach aims to incentivize sustainability across a company's operations rather than in isolated projects. Nevertheless, the SLB model also raises concerns about transparency and accountability, particularly regarding the credibility of the selected Key Performance Indicator and the lack of a binding framework for verifying performance.<sup>67</sup>

Beyond these instruments, the EU has developed a broader regulatory

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<sup>64</sup> M. MAUGERI, *Le obbligazioni “verdi”: problemi e prospettive*, in *Riv. dir. comm.*, n. 3/2024, p. 373 ; S. GILOTTA, *Green Bonds: a legal and economic analysis*, in T. KUNTZ, *Research handbook on Environmental, Social and Corporate Governance*, Elgar, 2024.

<sup>65</sup>D. DE FILIPPIS, *La revisione esterna nella disciplina delle obbligazioni verdi europee*, in F. RIGANTI (Ed.), *Sostenibilità e mercati vigilati: regolatori e operatori nella “galassia” ESG*, Giappichelli, Torino, 2024, pp. 366 ff.

<sup>66</sup>N. MARAGOPOULOS, *Toward a european green bond standard: a european initiative to promote sustainable finance*, in D. RAMOS MUÑOZ, A. SMOLENSKA, *Greening the Bond Market. A European Perspective*, Palgrave Macmillan, 2023.

<sup>67</sup>For an in-depth analysis on the sustainability-linked bonds see: D. FOA', *Sustainability-linked bonds: allineamento degli incentivi tra autonomia privata e vincoli normativi*, in *Rivista Trimestrale di Diritto dell'Economia*, supplement n.3, 2024, pp. 434 ff.

ecosystem that includes the Corporate Sustainability Due Diligence Directive (CS3D),<sup>68</sup> the Deforestation-Free Products Regulation, and a series of delegated acts amending core financial frameworks such as MiFID II, UCITS, AIFMD, IDD, and Solvency II. These measures reflect an increasingly systemic approach to embedding sustainability into the financial and corporate governance architecture.<sup>69</sup>

A cross-cutting concern of this entire framework is the persistence of information asymmetries between financial intermediaries and end investors.<sup>70</sup> These asymmetries manifest in several forms: through the opacity of ESG ratings and methodologies; through the lack of standardized benchmarks; and through the misalignment between the sustainability claims made by financial products and their underlying economic substance. Adding to this, the absence of harmonized criteria has made it difficult for investors to assess which products genuinely meet sustainability standards, further weakening their ability to make informed choices.<sup>71</sup> When sustainability-labelled products are used as marketing tools rather than instruments of transformation, financial actors may gain privileged access to capital without implementing real and meaningful changes in strategy, governance, or operations.<sup>72</sup> This dynamic distorts capital allocation, erodes investor trust in the system, and ultimately compromises the legitimacy of the sustainable finance agenda.

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<sup>68</sup>Regulation (EU) 2024/825 of the European Parliament and of the Council of 28 February 2024 amending Directive 2005/29/EC and Directive 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and better information; On the CSDDD See M.S. RICHTER Jr – M.L. PASSADOR, *Corporate Sustainability Due Diligence: Supernatural Superserious*, in *Osservatorio del diritto civile e commerciale*, 1/2024, pp. 235-256.

<sup>69</sup>V. COLAERT, *Integrating Sustainable Finance into the MiFID II and IDD Investor Protection Frameworks*, in D. BUSCH – G. FERRARINI – S. GRÜNEWALD, *Sustainable Finance in Europe Corporate Governance, Financial Stability and Financial Markets*, Palgrave Macmillan, p. 637 ff.

<sup>70</sup>Hence, it's important to enable investors to clearly identify the features that make an investment sustainable. See M. PELLEGRINI, *Mercati finanziari e sviluppo sostenibile*, in M. PELLEGRINI, *Diritto pubblico dell'economia*, Milano: Wolters Kluwer, 2023, p. 320. Cf. A. DAVOLA, *The promise and perils of sustainable disclosure for retail investors. Does the SFRD framework tackle, or rather promote, product greenwashing?*, in *Eusfil Working Paper Series*, 3, 2022.

<sup>71</sup>A. DAVOLA, *Informativa in materia di prodotti finanziari sostenibili, tutela dell'investitore e contrasto al greenwashing: le criticità dell'assetto europeo tra norme primarie e disciplina di dettaglio*, in *Riv. dir. banc.*, III, 1, 2022, p 518.

<sup>72</sup>A. DAVOLA, *Ibid*, pp. 525 ff.; on the role and structure of prospectus disclosure, see P. LUCANTONI, *L'informazione da prospetto. Struttura e funzione nel mercato regolato*, Milano, 2020.

Despite the importance of the EU’s regulatory framework to reshape market incentives and promote responsible finance, it is fraught with methodological inconsistencies, fragmentation of data sources, uneven regulatory enforcement, insufficient supervisory resources, and a limited capacity for empirical validation of ESG claims. Without robust mechanisms to address these challenges—through better data governance, supervisory coordination, and capacity-building—the transformative potential of the EU’s sustainable finance agenda risks remaining largely aspirational. Nevertheless, addressing these limitations requires not only regulatory refinement, but also more agile, collaborative, and adaptive mechanisms capable of fostering innovation while reducing uncertainty. As the next section will explore, regulatory sandboxes may offer a promising institutional response to this need.

3. Cybersecurity professionals define sandboxes as isolated testing environments where code or applications can be safely analyzed to understand their behavior without impacting the operational network.<sup>73</sup> Similar to a physical sandbox for children, these digital spaces enable experimentation with potentially harmful software, such as suspicious attachments. If the code attempts to compromise the server, self-replicate, or exhibit other malicious activities, researchers can identify and address the threat. Developers also utilize sandboxes to test applications and updates before widespread release.

Two decades ago, regulatory sandboxes were an unknown reality. Their closest relative—experimental regulation, which allows for the temporary derogation from existing rules for a certain group or geographical region, had been employed throughout the world on several occasions and in different fields from education to road traffic regulation, but was viewed with skepticism and remained relatively

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<sup>73</sup>A. GUIO, *Regulatory sandboxes in developing economies An innovative governance approach*, Project Documents(LC/TS.2024/59), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2024. Available at:<https://repositorio.cepal.org/server/api/core/bitstreams/960a7e7d-ab60-4c3e-b4b2-c7a302e2ea16/content>

underused.<sup>74</sup> Part of the critique to experimental regulations was connected to their casuistic application, the absence of a clear methodology, and the deviation from the key goals of any experiment: to gather information on a novel solution, manage risks, and learn from trying through trial and error.<sup>75</sup> Fast-forward to 2015: regulatory sandboxes enter the regulatory toolbox of regulators to promote flexibility and innovation-friendly solutions in the context of Fintech regulation.

Some clarifications are required. First, contrary to experimental regulations, regulatory sandboxes do not always involve an experiment, they may or may not contain an experimental character. Also, each sandbox is unique as the regulatory framework, the regulatory requirements for participation, the participants, and the conditions of participation will vary from sandbox to sandbox. Second, besides the uniqueness of each sandbox, there are different types of sandboxes. Some regulatory sandboxes include only a temporary relaxing of existing regulatory frameworks, for example, through waivers of certain rules such as limiting accountability (for example, reduced liability, customized guidance regarding compliance, guarantee that the regulator will refrain from taking legal action for specific infringements that refer to the participation in a sandbox). Ultimately, each sandbox is different because the goal is to customize regulation to the needs of stakeholders and a specific sector. As such, regulatory sandboxes can be experimental in nature and act as platforms for experimentation that temporarily relax or waive regulatory requirements, while gathering evidence for potential regulatory changes.<sup>76</sup> Regulatory sandboxes can also have a more compliance emphasis and focus on providing compliance support to businesses that would have otherwise limited compliance capacity.

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<sup>74</sup>S. RANCHORDÁS, *Experimental regulations and regulatory sandboxes: Law without order?*, in *Law and method*, 2021.

See also S. RANCHORDÁS, *Sunset clauses and experimental legislation*. Edward Elgar, 2014.

<sup>75</sup>S. RANCHORDÁS, *Experimental regulations and regulatory sandboxes: Law without order?*, in *Law and method*, 2021.

<sup>76</sup>A. GUIO, *Regulatory sandboxes in developing economies An innovative governance approach*, Project Documents (LC/TS.2024/59), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2024, available at: <https://repositorio.cepal.org/server/api/core/bitstreams/960a7e7d-ab60-4c3e-b4b2-c7a302e2ea16/content>

Regulatory sandboxes are also regularly defined by reference to innovation as a “safe space” to test innovations without immediate regulatory consequences, focusing on minimizing risks while fostering innovation.<sup>77</sup> At the resemblance of experimental regulations, they seek to regulate under controlled conditions, limiting legal uncertainty and the potential negative and systemic risks.<sup>78</sup>

This legislative tendency towards experimental and adaptive governance has found increasing recognition at the EU level. A clear example is offered by the European Commission’s Digital Finance Package (adopted on 24 September 2020), which explicitly encourages Member States to establish and coordinate national regulatory sandboxes in order to support innovation while preserving financial stability and consumer protection.<sup>79</sup> Sandboxes are presented as a key mechanism for testing emerging digital financial services—such as blockchain-based products or AI-powered investment tools—under regulatory oversight, thus enabling a more agile and risk-sensitive approach to rulemaking in a rapidly evolving financial environment.<sup>80</sup> The European Union's Digital Finance Package introduces several initiatives aimed at promoting innovation in the financial sector, including the DLT Pilot Regime.<sup>81</sup> This regime represents a form of regulatory sandbox designed for market infrastructures that use distributed ledger technology (DLT) to trade and settle financial instruments issued, recorded, and transferred using DLT. The DLT Pilot

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<sup>77</sup>D. QUAN, *A Few Thoughts on Regulatory Sandboxes*, available at: <https://paccenter.stanford.edu/a-few-thoughts-on-regulatory-sandboxes/>

<sup>78</sup>C. PONCIBO’ – L. ZOBOLI, *Il diritto della concorrenza nei mercati digitali fra eccessi di regolamentazione ed esperimenti normativi: il caso delle regulatory sandboxes*, in *Concorrenza e Mercato*, n. 1, 2022. p. 59. See also Council Conclusions on Regulatory Sandboxes and Experimentation Clauses as tools for an innovation-friendly, future-proof and resilient regulatory framework that masters disruptive challenges in the digital age 2020/C 447/01, p. 10.

<sup>79</sup>European Commission, *Digital Finance Package*, 24 September 2020, COM(2020) 591 final, available at: [https://finance.ec.europa.eu/publications/digital-finance-package\\_en](https://finance.ec.europa.eu/publications/digital-finance-package_en)

<sup>80</sup>Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU.

<sup>81</sup>The DLT Pilot Regime was implemented in Italy through Decree-Law No. 25 of 17 March 2023, which introduced national provisions to align with Regulation (EU) 2022/858. For a detailed commentary on the Italian transposition and its implications for digital financial markets, see V. LEMMA, *DLT Pilot: verso il mercato degli strumenti finanziari digitali* in *Diritto bancario*, 2023.

Regime allows such infrastructures to operate under temporary exemptions from existing regulations, thereby enabling testing and learning about the application of current rules within the DLT context.<sup>82</sup>

Their importance has also been underlined in the EU AI Act ('AIA'),<sup>83</sup> which enables Member States to establish general AI regulatory sandboxes.<sup>84</sup> The AI Act presents the regulatory sandboxes in Articles 57, 58, and 59 as an innovation-friendly instrument that seeks to promote regulatory learning, accelerate market access, improve legal certainty, and contribute to evidence-based regulatory learning.<sup>85</sup> Specifically, Article 57 defines a regulatory sandbox as “a controlled environment that fosters innovation and facilitates the development, training, testing and validation of innovative AI systems for a limited time before their being placed on the market or put into service pursuant to a specific sandbox plan agreed between the providers or prospective providers and the competent authority”.

While regulatory sandboxes were primarily developed in the financial sector, these instruments are flexible enough to be tailored to many other sectors, offering unique and holistic approaches to specific regulatory challenges and able to foster the advancement of new technologies and their legal frameworks.<sup>86</sup> Regulatory sandboxes have expanded to several sectors such as energy, healthcare, and

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<sup>82</sup>F. ANNUNZIATA – A. C. CHISARI – R. P. AMENDOLA, *DLT-Based Trading Venues and EU Capital Markets Legislation: State of the Art and Perspectives under the DLT Pilot Regime*, in *Bocconi Legal Studies Research Paper*, No. 4344803, 2023.

<sup>83</sup>The Artificial Intelligence Act was formally adopted by the European Parliament on 13 March 2024 and by the Council on 21 May 2024. The regulation entered into force on 1 August 2024 and will become fully applicable after a transitional period of 24 months. For further details, see Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 March 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts.

<sup>84</sup>European Parliament, P9\_TA(2023)0236, *Artificial Intelligence Act, Amendments adopted by the European Parliament on 14 June 2023 on the proposal for a regulation of the European Parliament and of the Council on laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts* (COM(2021)0206 – C9-0146/2021 – 2021/0106(COD)).

<sup>85</sup>For an in-depth analysis: <https://digi-con.org/regulatory-sandboxes-in-the-ai-act-between-innovation-and-safety/>

<sup>86</sup>G. CENTEMERO – O. LONGO, *Regulatory sandbox Analisi e prospettive parlamentari della sperimentazione normativa nel nuovo millennio*, Maggioli, p. 86-87.

telecommunications.<sup>87</sup> They have also been used to innovate the legal profession in the United States, Canada, and the United Kingdom.<sup>88</sup> While at first sight this last application may seem problematic, Christie Ford and Quinn Ashkenazy have recently argued and demonstrated based on comparative research that legal innovation sandboxes “may actually be possible to foster legal innovation, advance the public interest, and take meaningful steps to address the access to justice crisis.”<sup>89</sup> Regulatory sandboxes have also been considered for the promotion of sustainable development and responsible innovation in the last ‘Green Deal Industrial Plan for the Net-Zero Age.’<sup>90</sup>

Not all—if any—regulatory sandboxes are playgrounds for free experimentation, as the term may suggest. Indeed, each regulatory sandbox has its own specific design, which means that it may be difficult to compare between different sandboxes and transplant findings due to the existence of fragmentation.<sup>91</sup>

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<sup>87</sup> See, for example, [https://energy.ec.europa.eu/publications/regulatory-sandboxes-energy-sector\\_en..](https://energy.ec.europa.eu/publications/regulatory-sandboxes-energy-sector_en..) The U.K. Office of Gas and Electricity Markets launched a regulatory sandbox in 2017. Innovation Sandbox Service Overview, Off. Gas & Elec. Mkts. (Feb. 27, 2020), [www.ofgem.gov.uk/publications/innovation-sandbox-service-overview](http://www.ofgem.gov.uk/publications/innovation-sandbox-service-overview). For healthcare, see E. LECKENBY et al., *The Sandbox Approach and Its Potential for Use in Health Technology Assessment: A Literature Review*, in 19 *Applied Health Econ. & Health Pol’y* 857 (2021). Since it mobilizes real-world deployment as a means for information gathering, some have compared the U.S. Food and Drug Administration (FDA)’s Emergency Use Authorization (EUA) program for COVID-19 treatments and vaccines to a regulatory sandbox. See J. SHERKOW, , *Regulatory Sandboxes and the Public Health*, U. Ill. L. Rev. 357, 2022. In the Canadian context, see I. E. VURAL et al., *From Sandbox to Pandemic: Agile Reform of Canadian Drug Regulation*, 125 *Health Pol’y* 1115 (2021).

<sup>88</sup>In North America, legal sandboxes have launched in Utah, and the Canadian provinces of British Columbia, Ontario, and Alberta. The Office of Legal Servs. Innovation, [utahinnovationoffice.org](http://utahinnovationoffice.org) ; Innovation Sandbox, Law Soc’y of B.C., [www.lawsociety.bc.ca/our-initiatives/innovation-sandbox](http://www.lawsociety.bc.ca/our-initiatives/innovation-sandbox); Access to Innovation (A2I), Law Soc’y of Ont., <https://lso.ca/about-lso/access-toinnovation>; Law Society of Alberta Introduces Innovation Sandbox, Law Soc’y of Alta. (Oct. 1 2021), <https://www.lawsociety.ab.ca/about-us/key-initiatives/innovationsandbox/>. The United Kingdom also has a legal sandbox: Multi-Million Investment to Turbocharge Growth of Technology in Legal Services, U.K. Gov’t, [www.gov.uk/government/news/multi-million-investment-to-turbocharge-growth-of-technology-in-legalservices](http://www.gov.uk/government/news/multi-million-investment-to-turbocharge-growth-of-technology-in-legalservices).

<sup>89</sup>C.FORD – Q. ASHKENAZY, *The Legal Innovation Sandbox*, in *The American Journal of Comparative Law*, Vol. XX, 2025, p. 1.

<sup>90</sup>Brussels, 1.2.2023 COM(2023) 62 final, *Communication from the European Commission, A Green Deal Industrial Plan for the Net-Zero Age*, available at: <https://eur-lex.europa.eu/legal-content/EN/TX/T/?uri=celex:52023DC0062>

<sup>91</sup>A. ATTREY - M. LESHER - C. LOMAX , *The role of sandboxes in promoting flexibility and innovation in the digital age*, OECD Going Digital Toolkit Notes, No. 2, OECD Publishing, Paris,

Some sandboxes place greater emphasis on experimentation, thus entailing temporary derogations from specific rules. Others, by contrast, are primarily designed to assist small and medium enterprises (SMEs) in navigating and complying with complex regulatory frameworks. Although there are some differences across jurisdictions and sectors, regulators generally follow a common set of steps when establishing them.

The process typically begins with a call for applications, in which regulators define a timeline and specify the terms of participation, including the entry and exit requirements. At the time of writing, a regulation on Fintech is under consultation in Italy, which proposes allowing admission requests to be submitted on a rolling basis rather than during specific windows.<sup>92</sup> This would serve as a non-compulsory alternative to the traditional fixed application windows. Another general key starting point of regulatory sandboxes is the articulation of the eligibility criteria—specifying who can apply (e.g., only startups or SMEs), the expected benefits and objectives (e.g., enhancing the safety of a product), and the innovative features of the proposed project. At this stage, regulators may also request a feasibility assessment and a detailed testing plan, which should outline key performance indicators (KPIs), testing objectives (particularly if the sandbox is testing-focused), and a risk mitigation strategy.

The next step is the selection of participants. Regulators evaluate the submitted applications and identify a cohort of eligible participants. Once the sandbox begins, regulators may support participants in various ways, depending on the sandbox's goals and thematic focus. Support could include temporary waivers from

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2020. Available at: [https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/06/the-role-of-sandboxes-in-promoting-flexibility-and-innovation-in-the-digital-age\\_ddcd3d40/cdf5ed45-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/06/the-role-of-sandboxes-in-promoting-flexibility-and-innovation-in-the-digital-age_ddcd3d40/cdf5ed45-en.pdf), p. 7

<sup>92</sup>See the public consultation launched by the Italian Ministry of Economy and Finance on the reform of the regulatory sandbox regime: *Consultation on the FinTech regulatory sandbox reform*, available at: [https://www.dt.mef.gov.it/it/dipartimento/consultazioni\\_pubbliche/consultazioni\\_in\\_corso/consultazione\\_fintech/index.html](https://www.dt.mef.gov.it/it/dipartimento/consultazioni_pubbliche/consultazioni_in_corso/consultazione_fintech/index.html)

certain regulatory requirements or the issuance of a non-action letter—an assurance that no enforcement action will be taken during the sandbox period, provided participants comply with the sandbox conditions. A defining feature of regulatory sandboxes is the regulator’s ongoing supervisory oversight. Participants are expected to collect data on their performance and report regularly to the regulator. At the conclusion of the sandbox period, the outcomes are evaluated—this includes assessing the product or service’s innovativeness, its potential benefits, and the effectiveness of risk mitigation measures. Based on these insights, the regulator provides feedback and may, in some cases, consider adjustments to existing regulations as part of a broader process of regulatory learning. A common element to many regulatory sandboxes is their collaborative character. Regulatory sandboxes strengthen the regulatory learning and reduce information asymmetries as they promote a better exchange of information between industry, regulators, and other relevant stakeholders.

Regulatory sandboxes can take up different forms such as testing zones where rules are not applied temporarily to a specific geographical area or to a specific group (the cohort of participants). To illustrate, in 2021, the Danish government designated GreenLab, a green industrial park in Skive, as an official regulatory energy test zone. This involved exempting this park from existing electricity regulations. This enabled the experimentation of innovative solutions aimed at integrating substantial amounts of renewable energy into the energy system. This designation allowed GreenLab and its partners to test new business models and technologies that were previously constrained by current regulations.<sup>93</sup> By October 2022, GreenLab had successfully integrated 80 MW of wind power into its industrial park, directly supplying renewable energy to its industrial partners and forthcoming Power-to-X facilities.<sup>94</sup> In 2024,

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<sup>93</sup> See: <https://stateofgreen.com/en/news/new-danish-test-zones-show-the-way-for-european-energy-transition/>

<sup>94</sup> See: <https://www.greenlab.dk/knowledge/80mw-renewable-energy-for-industrial-production-and-power-to-x/>

GreenLab activated its regulatory test zone status. Additionally, another GreenLab's projects is GreenHyScale, which is exploring the use of pressurized alkaline electrolysis for large-scale onshore and offshore green hydrogen production<sup>95</sup>.

While many regulatory sandboxes have been created to foster innovation and competitiveness, several have also been designed with sustainability in mind, alongside financial considerations. For instance, in November 2022, the Hellenic Competition Authority launched a sandbox aimed at promoting innovation and competition while supporting environmental sustainability in the Greek economy. The initiative focuses on innovations that contribute to environmental goals and align with the objectives of the European Green Deal. The Greek regulator explained that the aim of the sandbox was “to increase legal certainty regarding the application of competition law for undertakings willing to invest in green transformation, to create new green products, to set green standards for the production of products, services, energy, etc., by facilitating their development through this initiative, for instance in order to raise funds from financial markets.”<sup>96</sup> When reviewing the applications, the Hellenic Competition Commission considered whether the proposal could “contribute positively to the public interest”, devoting particular attention to excluding potential anti-competitive practices that “simply contain[ed] some reference or a low contribution to sustainable development without overcoming the damage to competition caused (e.g. “green-washing” practices). On the contrary, [the sandbox] ma[de] it possible to fully evaluate practices which make a significant contribution to the public interest by enhancing sustainable development.”<sup>97</sup> This sandbox is an example of how regulatory sandboxes can be used to promote it.

4. In the context of sustainable finance, regulatory sandboxes can play a crucial role in accelerating the development of financial solutions that support the green and

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<sup>95</sup> See: <https://greenhyscale.eu/the-project-info/>

<sup>96</sup> See: <https://epant.gr/en/information/sustainability/sandbox.html>

<sup>97</sup> Ibid.

social transition. By enabling controlled experimentation, regulatory sandboxes could allow financial actors to design and test novel instruments and business models aligned with sustainability imperatives, while managing associated risks in a safe and adaptive manner. This section examines how regulatory sandboxes can be specifically tailored to support the sustainable transition and strengthen the effectiveness of the sustainable finance framework, thereby highlighting the importance of expanding their use in this domain.<sup>98</sup>

Despite the growing policy and market interest in sustainable finance, regulatory sandboxes have so far received limited attention. As a result, their application in this field remains relatively underexplored and has yet to reach its full potential. However, some pioneering initiatives are beginning to emerge, offering valuable insights into how sandboxes can be structured to meet the unique demands of the green transition. For instance, in 2021, the Financial Conduct Authority<sup>99</sup> launched a sustainability-focused digital sandbox to support firms and regulators in developing technologies that improve ESG data transparency, automate sustainability disclosure and help consumers better understand the ESG characteristics of financial products, hence to overcome some of the challenges associated with the green transition.<sup>100</sup> The initiative demonstrated that collaboration and access to data can stimulate beneficial innovation in the market, and the FCA is committed to

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<sup>98</sup>D. A. ZETZSCHE – M. BODELLINI, *A Sustainability Crisis Makes Bad Law! - Towards Sandbox Thinking in EU Sustainable Finance Law and Regulation*, in *EU Sustainable Finance Law and Regulation*, 2022, Available at:<http://dx.doi.org/10.2139/ssrn.4147295>

<sup>99</sup>The Financial Conduct Authority (FCA) is the UK's independent financial regulator, responsible for overseeing conduct in financial markets and protecting consumers.

<sup>100</sup>The FCA's Digital Sandbox Sustainability Pilot, conducted between November 2021 and March 2022, demonstrated the potential of digital testing environments to accelerate ESG-related innovation through enhanced collaboration, access to synthetic data, and expert mentorship. Participants welcomed the opportunity to test early-stage solutions and engage with a diverse ecosystem of stakeholders. However, limitations in data availability and thematic breadth posed challenges—some datasets were not sufficiently tailored or available in time, and collaboration between teams decreased as the pilot progressed. Platform engagement also remained relatively low. These findings highlighted not only the value of such initiatives, but also the need for more structured, scalable and data-rich testing environments going forward. See: <https://www.fca.org.uk/firms/innovation/green-fintech-challenge-and-digital-sandbox-which-service>

establishing a permanent digital testing environment, even though some important limitations were also identified.<sup>101</sup> Another example can be found in Kuwait, where in 2022, the Central Bank declared that priority would be given in its Regulatory Sandbox to the testing of products and services that support sustainability standards.<sup>102</sup> Indeed, through its Woloj Innovation Hub, the CBK launched a new application round for sandbox participation, explicitly encouraging proposals in the field of sustainable finance.<sup>103</sup>

While these examples highlight the early integration of sustainable finance within regulatory sandboxes, such initiatives remain limited in number and scope. To better understand the transformative potential of this model when applied to sustainable finance, it is useful to look at the more mature and widespread experience of sandboxes in the FinTech sector.<sup>104</sup>

In this sector, regulatory sandboxes emerged in response to the rapid pace of technological innovation and the need for supervisory authorities to adapt without stifling market development. Over the last few years, financial technology has been considered one of the most topical areas in the global financial services industry. Innovations such as distributed ledger technology, big data, smart contract, peer-to-peer lending platforms, biometrics, and new digital has motivated innovation in the financial services industry, prompting the need for flexible and adaptive regulatory frameworks. In this context, regulatory sandboxes have enabled the supervised testing of a wide range of innovative financial services—such as digital payments, blockchain-based solutions, and alternative credit scoring—under controlled conditions. These experiences have provided valuable insights into how flexible,

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<sup>101</sup> See the Final Report <https://www.fca.org.uk/publication/corporate/digital-sandbox-sustainability-pilot-report.pdf>

<sup>102</sup> See: <https://www.cbk.gov.kw/en/cbk-news/announcements-and-press-releases/press-releases/2022/11/202211240800-cbk-regulatory-sandbox-adopts-sustainable-fintech-products-and-services>

<sup>103</sup> See: <https://www.cbk.gov.kw/en/legislation-and-regulation/innovation-hub/apply>

<sup>104</sup> C. FORD – Q. ASHKENAZY, *The legal innovation sandbox*, in *the American journal of comparative law*, 2025, available at: <https://doi.org/10.1093/ajcl/avae029>

experimentation-based regulatory environments can foster financial inclusion, support competition, and inform more effective rule-making. This successful application of sandboxes in the FinTech space has laid the groundwork for extending their use to other areas of strategic importance—most notably sustainable finance.

Indeed, the sandbox model, which has proven effective in navigating innovation in FinTech, could be just as valuable in the sustainable finance domain—where rapid regulatory evolution, complex data requirements, and the imperative to align financial activity with environmental goals demand equally adaptive and innovation-friendly frameworks. Hence, the integration of financial innovation with sustainability objectives offers policymakers a valuable pathway to achieve ESG considerations when making investment and financing decisions, particularly when supported by adaptive regulatory tools such as sandboxes.<sup>105</sup> As the transition toward a greener and more inclusive economy gains momentum, the financial sector is increasingly called upon to mobilize capital in support of environmental and social goals. In this context, sandboxes can serve as structured environments for co-developing and testing new green financial instruments, helping to reduce regulatory uncertainty and overcome barriers to market uptake—all while maintaining oversight and safeguarding investor protection.

Furthermore, regulatory sandboxes have the potential to address several of the key problems of sustainable finance briefly identified earlier in this article. The first set of problems is the challenges faced by firms to raise capital, overcome information asymmetries, and comply with regulatory burdens. Regulatory sandboxes facilitate the exchange of information between regulators and sandbox participants, increasing information disclosure. Furthermore, there is evidence from UK Fintech sandboxes that sandbox participants see an increase of 15% in capital raise

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<sup>105</sup>N. NAIFAR – A. ELSAYED, N. NAIFAR – A. ELSAYED (Eds.), *Green Finance Instruments, FinTech, and Investment Strategies*, Springer, 2023, p. 261 available at: <https://link-springer-com.tilburguniversity.idm.oclc.org/book/10.1007/978-3-031-29031-2>

post-entry, higher survival and patenting rates, partly due to the existence of lower information asymmetries, reduced regulatory costs, and additional support.<sup>106</sup> Regulatory sandboxes could be particularly valuable to attract capital for specific sectors, promote eco-friendly investments, and engage with clients that support these goals. In the United Kingdom, the FCA launched a Green Fintech that has enabled a number of firms to test services in the field of sustainable finance. For example, the firm Tred used this regulatory sandbox to start building a UK green neobank. Its first product was a green debit card “that plants trees” as consumers spend, that is, it rewards ecofriendly behaviors and lets consumers track, reduce, and offset their carbon footprint.<sup>107</sup> While Tred no longer exists, it has inspired the creation of green cards in other countries (for example, in Korea). In the investment sector, Civeq also used this Green FinTech sandbox to develop its green investment service. Civeq is a decentralized green investment platform that monetizes the added value of natural climate solutions alongside clean energy. In partnership with Regener8 Earth, it verifies ecological and climate impacts using distributed ledger technology (DLT) to link verified outcomes with investors.

Second, there is growing support for experimentation initiatives as a means to encourage innovation in Europe. In the context of accelerating the integration of AI into the European industry, the Draghi report mentions explicitly that “Experimentation should be encouraged via the opening up, EU-wide coordination and harmonization of national “AI Sandbox regimes” to companies participating in the plan. These experimental “sandboxes” would enable regular assessments of regulatory hindrances deriving from EU or national legislation and provide feedback

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<sup>106</sup>G. CORNELLI – S. DOERR – L. GAMBACORTA – O. MERROUCHE, *Regulatory Sandboxes and Fintech Funding: Evidence from the UK*, in *Review of Finance*, Volume 28, Issue 1, 2024, pp. 203–233. See also J. IVO – K. LAUER, *Regulatory sandboxes and financial inclusion*, CGAP, Washington, DC, 2017.

<sup>107</sup>See: <https://www.fca.org.uk/firms/innovation/green-fintech-challenge#:~:text=our%20eligibility%20criteria.-,Ten%20firms%20have%20been%20accepted%20into%20the%20Green%20FinTech%20Challenge,that%20will%20benefit%20from%20our>

from private companies and research centers to regulators.”<sup>108</sup> Besides this emphasis on AI, the Draghi report also discusses the need to adopt new strategies to improve the financing of the “massive investment needs that transforming the economy will entail.” Although the report does not explicitly address sustainable finance, it discusses the need to make fundamental choices about how to pursue its decarbonization policies while preserving the competitive position of its industry.<sup>109</sup> Given that sustainability is one of the core values of the European Union, this dimension should also be taken into account when interpreting Draghi’s recommendations in reshaping EU’s regulatory approach to innovation. The use of regulatory sandboxes as a tool to foster innovation suggests that regulation and innovation are not inherently in conflict. Rather, it highlights the importance of adopting an appropriate regulatory approach tailored to support innovative activity.

Third, legal scholarship has posited that regulatory sandboxes can be used to balance the need to promote innovation with the promotion of other public interests such as sustainability.<sup>110</sup> For example, the Monetary Authority of Singapore has a Fintech regulatory sandbox that though focused on innovation while also supporting projects that contributed to impactful sustainable finance ventures (Sandbox Plus).<sup>111</sup> This regulatory sandbox launched the ESG FinTech grant as part of the Financial Sector Technology and Innovation (“FSTI”) scheme to foster the financial sector’s adoption of ESG technology solutions.<sup>112</sup> Through the grant, MAS aimed to encourage financial institutions to adopt solutions to key ESG data and infrastructure challenges, and to support their mobilization of capital towards sustainable activities and tracking

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<sup>108</sup>The future of European competitiveness, 2024. See: [https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961\\_en?filename=The%20future%20of%20European%20competitiveness%20\\_%20A%20competitiveness%20strategy%20for%20Europe.pdf](https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en?filename=The%20future%20of%20European%20competitiveness%20_%20A%20competitiveness%20strategy%20for%20Europe.pdf), p. 34.

<sup>109</sup>Ibid, p. 41.

<sup>110</sup>A. ARMANDO, *Introduction*, in F. BAGNI – F. SEFERI (Eds.), *Regulatory Sandboxes for AI and Cybersecurity: Questions and answers for stakeholders*, Maggioli, 2025, p. 8.

<sup>111</sup> See: <https://www.globallegalinsights.com/practice-areas/fintech-laws-and-regulations/singapore/>

<sup>112</sup> See: <https://www.mas.gov.sg/schemes-and-initiatives/fsti-esg-fintech-grant>

of their net zero transition plans and programmes.<sup>113</sup> In South America, several regulatory sandboxes have also sought to combine the promotion of innovation with the advancement of sustainability. In 2018, Colombia’s financial regulator, the Superintendencia Financiera (Superfinanciera), launched a strategy to promote sustainable and responsible innovation within the financial sector.<sup>114</sup> As part of this initiative, it established *LaArenera*, a regulatory sandbox that enables firms to test new technologies and business models under appropriate regulatory oversight. According to a study by the Inter-American Development Bank, FinTech activity has grown significantly across Latin America, with Colombia ranking third—after Brazil and Mexico—in the number of FinTech companies and initiatives as of 2018. A key objective of *LaArenera* is to support financial inclusion by encouraging innovative business models in areas such as payment systems, remittance services, and access to finance. Notably, Colombia has also advanced the use of blockchain technologies in its financial ecosystem, including through the issuance of its first blockchain-based bond within *LaArenera*. We find another relevant example in Kazakhstan. Established in 2018, the Astana International Financial Centre (AIFC) is a regional financial hub based in this country, designed to attract international investment and promote financial innovation. It operates under a unique legal framework based on English common law and hosts its own independent court and international arbitration center, ensuring legal certainty and investor protection. The Astana Financial Services Authority (AFSA) serves as its regulatory body, overseeing licensing, supervision, and market conduct.

Fourth, regulatory sandboxes have also been used to test novel products and services that can help change consumers’ and other stakeholders’ behavior but for which further information is required. For example, the firm Karfu proposed to test

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<sup>113</sup> See: [https://www.globallegalinsights.com/practice-areas/fintech-laws-and-regulations/singapore/#\\_edn18](https://www.globallegalinsights.com/practice-areas/fintech-laws-and-regulations/singapore/#_edn18)

<sup>114</sup> See: <https://www.iadb.org/en/news/idb-group-and-davivienda-bank-issue-colombias-first-blockchain-bond>

their services that aimed to “helps consumers save money and uncover the financial and environmental costs of their mobility choices, beyond private car ownership, by showcasing more sustainable and local alternatives. The algorithm is led by user preferences, including environmental and sustainability interests.”<sup>115</sup> Other participants were more focused on promoting access to green finance. For example, the firm Dodo tested a service that “help[ed] companies to reach net zero by rapidly measuring their carbon footprint and using this data to facilitate access to green finance.”<sup>116</sup>

Fifth, regulatory sandboxes can serve as a preventive mechanism against greenwashing by allowing financial products and sustainability claims to be tested under supervisory oversight before being introduced to the market. We acknowledge that this potential can also come true if sandboxes are well designed from a methodological perspective, its results are interpreted within the limits of the testing environment, and it does not generate systemic risks. Within a sandbox, firms are required to demonstrate the coherence between their ESG claims and the underlying data, methodologies, and impact metrics used. This controlled setting allows regulators to assess the credibility of sustainability labelling practices, promote transparency, and establish clearer interpretative guidance. In doing so, sandboxes reduce the scope for misleading environmental claims and enhance investor trust in ESG-labelled products. At the same time, they contribute to narrowing information asymmetries among investors by promoting the development and testing of clearer, standardized, and verifiable disclosure practices, thereby levelling the playing field and enhancing transparency across the market.

Additionally, several of the challenges identified within the EU sustainable

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<sup>115</sup> See: Karfu, *What is Karfu*, <https://karfu.com/about/karfu>

<sup>116</sup> See: New Energy Nexus, Dodo a platform helping companies reduce emissions wins first Climate Fintech Cards & Payment Challenge, 18 November 2021, <https://www.newenergynexus.com/news/do-do-a-platform-helping-companies-reduce-emissions-wins-first-climate-fintech-cards-payments-challenge/>

finance framework (See Section II) could be at least partially addressed through the targeted use of regulatory sandboxes. First, the technical rigidity of the EU Taxonomy, especially its binary structure and its limited capacity to reflect sector-specific or transitional pathways, could be explored in a sandbox setting. These controlled environments allow firms and regulators to jointly test more holistic and dynamic classification approaches, including life-cycle-based assessments and context-sensitive criteria. The empirical evidence gathered through such experimentation may inform future refinements to the taxonomy framework, supporting a more flexible, credible, and proportionate regulatory evolution. Second, the ambiguity of the SFDR product classification—particularly between Article 8 and 9—could be addressed through the use of regulatory sandboxes to test disclosure models, ESG scoring methodologies, and communication strategies. Such experimentation would help reduce interpretative uncertainty and mitigate the risk of greenwashing. Third, the complexity and reporting burdens introduced by the CSRD could be eased by allowing them to prototype reporting practices, test data collection processes, and build internal capacity. Regulatory sandboxes can also mitigate the risk of over-reporting by allowing firms to test and calibrate their sustainability disclosure practices in a supervised setting. Through iterative feedback with regulators, companies can foster the development of scalable tools and proportional frameworks tailored to the needs and capacities of market actors as well as identify which information is material and decision-useful, thereby avoiding excessive or irrelevant data that may obscure core ESG impacts. This contributes to more targeted, comparable, and efficient reporting aligned with the principles of proportionality and clarity. Fourth, in the case of the Green Bond Regulation, sandboxes could support the testing of impact verification methods and performance-based instruments, helping refine KPIs and increase market credibility. More broadly, sandboxes provide a setting to tackle persistent data asymmetries and inconsistencies by experimenting with new ESG data models, verification systems, and digital technologies such as AI or blockchain. In the absence of a dedicated regulatory framework for sustainability-

linked bonds, sandbox experimentation can also serve as a preliminary step toward future standard-setting. For instance, India has recently launched a targeted support scheme offering grants of up to INR 7.5 million for the development of sustainable finance solutions, including sustainability-linked finance and ESG investment mechanisms—demonstrating a proactive approach that could be complemented by sandbox-based regulatory pilots.<sup>117</sup> Beyond their experimental function, regulatory sandboxes also serve as institutional mechanisms for regulatory learning. In this sense, the insights generated through sandbox experimentation could also inform a broader reflection on the enforceability of sustainable finance regulations, helping to identify obstacles to consistent supervision and supporting the design of more effective compliance and enforcement mechanisms. By enabling evidence-based testing under real-world conditions, they allow for the development of more proportionate, adaptive, and context-sensitive rules—grounded not only in abstract principles but in the complexity of actual market dynamics and sustainability goals.

Rather than suspending the law, sandboxes offer a space for regulatory calibration, where risks can be assessed in real time and appropriate safeguards gradually developed. By fostering structured dialogue and controlled exposure, they contribute to reducing uncertainty, enhancing transparency, and facilitating compliance — not merely by testing the market, but by shaping it. In this respect, several jurisdictions, including Italy, are currently revising their sandbox regimes to improve accessibility, simplify admission procedures, and differentiate levels of experimentation (real, predefined, simulated environments) based on the complexity of the project and market involvement.<sup>118</sup> As a result of this process, the role of public authorities has evolved: they are no longer merely regulators, but also facilitators and

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<sup>117</sup>See: <https://www.mondaq.com/india/fin-tech/1471602/empowering-financial-innovation-ifsc-fintech-incentive-scheme>

<sup>118</sup>See the public consultation launched by the Italian Ministry of Economy and Finance on the reform of the regulatory sandbox regime: *Consultation on the FinTech regulatory sandbox reform*, available at: [https://www.dt.mef.gov.it/it/dipartimento/consultazioni\\_pubbliche/consultazioni\\_in\\_corso/consultazione\\_fintech/index.html](https://www.dt.mef.gov.it/it/dipartimento/consultazioni_pubbliche/consultazioni_in_corso/consultazione_fintech/index.html)

actively engaged actors in the transition.<sup>119</sup> This shift reflects a broader understanding of regulation as a dynamic process—capable not only of controlling risks, but also of enabling solutions. In the specific context of sustainable finance, expanding the use of regulatory sandboxes would help promote sustainable financial innovation, validate new ESG metrics and technologies, and ensure that regulatory evolution remains grounded in the practical challenges of the sustainable transition. Supporting such initiatives—through dedicated funding schemes, cross-border cooperation, or integration within broader sustainable finance strategies—may prove essential to bridging the gap between market and regulatory ambition and market implementation.

Regulatory sandboxes are nonetheless far from perfect instruments. There is the risk that the conclusions will be drawn too quickly from limited testing environments, the evidence produced is biased or limited to the cohort of sandbox, and that regulators will be captured through sandboxing. We acknowledge thus the potential shortcomings of regulatory sandboxes, namely their limited scope and duration, and their inability to capture systemic problems.<sup>120</sup> However, with a constructive dialogue between regulators and private actors and a careful methodology, we also see the potential for important contributions to the field of sustainable finance.

5. Numerous regulatory and policy initiatives have been introduced to support sustainability. However, many of them fail to adequately address the need for capital mobilization and the creation of serious incentives for private investment in sustainable development. Regulatory sandboxes can help bridge this gap by

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<sup>119</sup> M. PELLEGRINI, *Mercati finanziari e sviluppo sostenibile*, in M. PELLEGRINI, *Diritto pubblico dell'economia*, Milano: Wolters Kluwer, 2023, p.321.

<sup>120</sup>For a critical perspective on regulatory sandboxes, see E. BROWN & D. PIROSKA, *Governing Fintech and Fintech as Governance: The Regulatory Sandbox, Riskwashing, and Disruptive Social Classification*. *New Political Economy*, 27(1), 2021, pp. 19–32, available at <https://doi.org/10.1080/13563467.2021.1910645>; S.T. OMAROVA, *Technology v technocracy: Fintech as a regulatory challenge*, in *Journal of Financial Regulation*, 6.1, 2020, pp. 75-124.

supporting the effective implementation of ESG goals, contrasting the greenwashing, addressing the problem of information asymmetries between intermediaries and investors, and reducing regulatory compliance burdens, while generating insights that can support the evolution of the current regulatory framework (see also Section 2). Scholars such as Dirk A. Zetsche and Marco Bodellini have also emphasized this potential, arguing that the “mutual learning” dynamic inherent in regulatory sandboxes could play a crucial role in advancing the sustainability transformation of the EU’s financial sector.<sup>121</sup>

This article has argued that regulatory sandboxes could emerge as a necessary complement to the regulation. By enabling controlled experimentation, adaptive supervision, and stakeholder co-design, sandboxes provide a pragmatic space for testing, refining, and aligning sustainable finance tools with real-world dynamics. They hold the potential to reduce uncertainty, foster compliance, and generate evidence for more proportionate and effective rule-making. Above all, regulatory sandboxes enable regulation to evolve not merely in response to risk, but through an ongoing dialogue with innovation—thereby paving the way for a regulatory framework inspired by ethical values. This reflects Capriglione’s scholarship on the potential for both economic activity and financial discipline to be imbued with value-based principles.<sup>122</sup> In an area as complex, urgent, and interdependent as sustainable finance, the flexible and learning-oriented approach presented in this article may help reconcile normative ambition with operational feasibility, thus making sustainable finance not only a policy goal, but a credible, trusted, and functional reality.

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<sup>121</sup>D. A. ZETZSCHE – M. BODELLINI, *A Sustainability Crisis Makes Bad Law! - Towards Sandbox Thinking in EU Sustainable Finance Law and Regulation*, in *EU Sustainable Finance Law and Regulation*, 2022, pp. 32 ff., available at: <http://dx.doi.org/10.2139/ssrn.4147295>

<sup>122</sup> According to the Author, it is once again the reference to ethics in behavioral choices that represents the anchor for his ambition to redefine the strategic orientations of politics and finance, with a view to integrating protection with the environmental and energy transition. See: F. CAPRIGLIONE, *Etica della finanza e finanza etica*, Bari, 1997; ID., *Etica della finanza mercato globalizzazione*, Bari, 2004.