The Climatization of Finance: Decarbonizing Legal Narratives

Abstract

The IPCC report in AR6 has given the world until 2030 to craft transformational change, notably by reforming energy systems and re-designing regulatory instruments to tackle the present ecological crises. In response, regulators scramble to shape Paris-aligned and 2030 Agenda-responsive incentives at the industrial level. At the same time, global banks and other financial institutions, including members of net-zero alliances, continue to provide fossil fuel finance that outweigh green finance. Even if investing in fossil fuel assets is financially risky, regulatory barriers remain for renewable energy investment to prove it will outperform, or be as profitable as, investments in fossil fuel–based sectors. Accordingly, this article interrogates the dominance of climate risk as the prevailing narrative guiding financial responses to climate change, and highlights its failure to catalyze sufficient capital reallocation toward decarbonization, in particular for the energy transition. Drawing on the original concept of the climatization of finance, it explores how cognitive and policy narratives can be restructured to align financial flows with decarbonization goals. Rather than prescribing a full policy design, the paper proposes a reframing of financial incentives, electricity market governance, and cleantech innovation policies to better reflect shifting economic and technological landscapes, and to help future-proof the societal foundations of decarbonization laws.

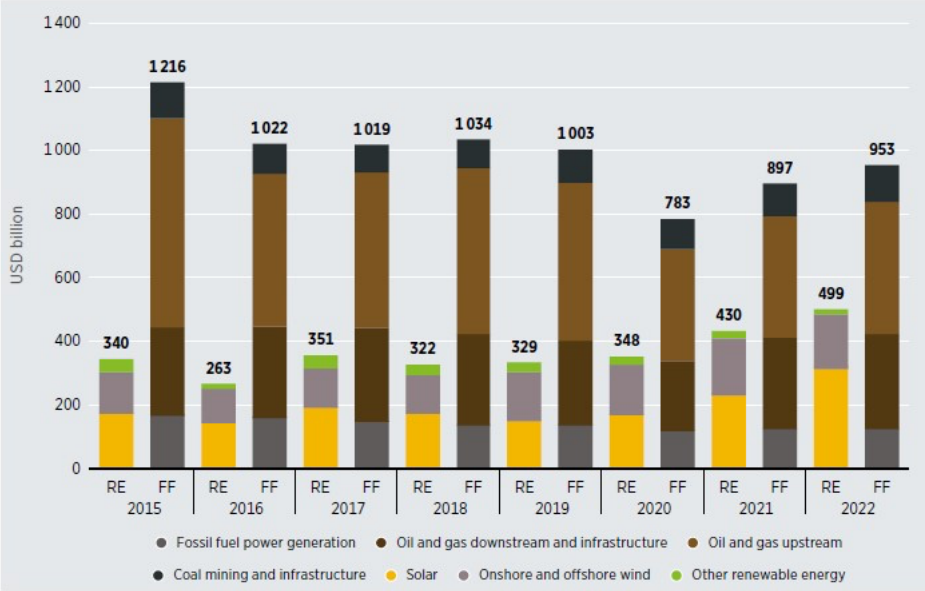
1. Introduction

The Paris Agreement is the first international treaty to require a principled approach to address climate change within the financial sector. One of the Paris Agreement's overarching objectives lies in scaling up climate finance and entails the consistency of finance flows with decarbonization and resilience pathways (Art. 2(1)(c) of the Paris Agreement on Climate Change 2015). Aligning financial flows with mitigation pathways shall be read jointly with the pledge to aim for a balance between emissions and carbon sinks by the second half of the century (Art. 4 of the Paris Agreement, para 1, on Climate Change 2015). Along the same lines, financial consistency with net-zero pathways builds on the International Energy Agency's (IEA) first 1.5°C-aligned scenario ruling out new post-2021 fossil fuel extraction projects to keep a 50% chance of limiting temperature increase to 1.5°C (IEA 2021). Mobilizing private finance is crucial also to ensure the climate-resilience of infrastructure and assets, and to unlock investments in projects that are aligned with the National Determined Contributions (NDCs), which are states' short- and long-term ambitions under the Paris Agreement.

Climate finance has more than doubled between 2018 and 2022, reaching USD 1.46 trillion (pp. 2 and 13 CPI 2024). A further fivefold increase, however, is required to arrive to the USD 7.4 trillion needed on average each year through 2030 under the 1.5°C scenario (pp. 2 and 13 CPI 2024), reaching up to $11.7tn annually by 2035, according to estimates by the UN Environment Programme (UNEP), equalling about 10% of the global economic output (p. 43 UNEP 2024). In particular, adaptation finance has reached only one-third of the volume required each year from 2024 to 2030 in emerging markets and developing economies alone (p. 5 CPI 2024).

Notwithstanding, from 2019 to 2021, G20 nations and major multilateral development banks spent double as much for fossil-fuel related spending compared to clean energy spending (Elton 2022). Similarly, in 2022, investment in fossil fuels almost topped pre-pandemic levels, with an estimated USD 953 billion spent (p. 11 IRENA and CPI 2023), while consumer fossil fuel subsidies amounted to USD 1.4 trillion in 2022 (IISD and OECD 2023), and investments in new fossil fuel production and distribution achieved USD 1 trillion that year (IEA 2024a). According to the International Monetary Fund (IMF), in 2022, the world spent USD 7 trillion

on direct and indirect fossil fuel subsidies, counting for almost 10% of the global economy (Black et al 2024).

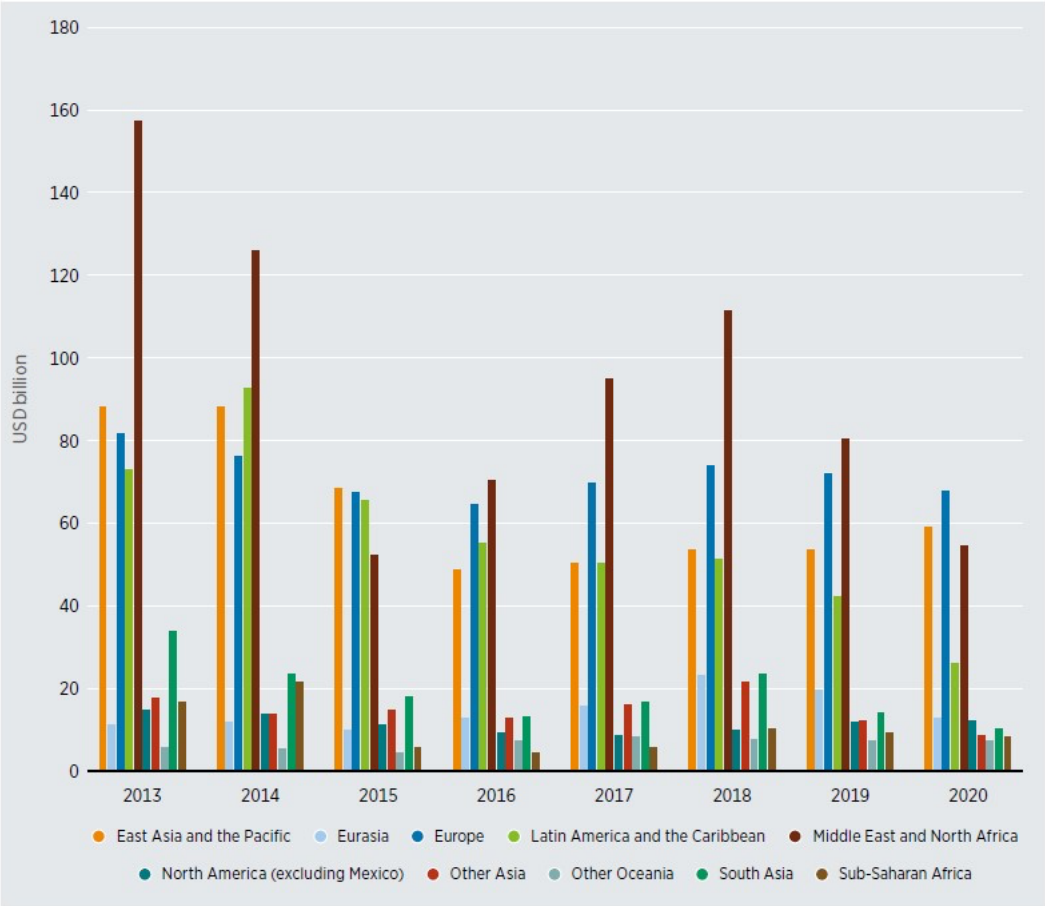


Note: FF = fossil fuel; RE = renewable energy.
Based on: CPI (2022a) and IEA (2022b).

Fig. 1 Annual investment in renewable energy vs. fossil fuels, 2015-2022 (IRENA and CPI (2023), p. 11, figure S.2)

Still, under the Glasgow Public Finance Statement, 39 public institutions and states—including the European Investment Bank (EIB), many European countries, and the United States—committed to ending new international direct public finance for fossil fuels by 2022 (COP26 Statement on Clean Energy 2021). Although the commitment was not binding, it could have shifted public finance in the likes of USD28 billion per year toward a just energy transition (p. iv Dufour et al 2022). And yet, subsidies are persisting, with Europe being the region providing the most fossil fuel subsidies in 2020, totaling USD113 per person

(p. 12 IRENA and CPI 2023).



Source: Fossil Fuels Subsidy Tracker (2022).

Fig. 2 Annual fossil fuel subsidies by region, 2013-2020 (IRENA and CPI (2023), p. 12, figure S.3)

Globally, until 2030, expenditures on new oil and gas development are projected in the likes of USD570 billion per year (p. 11 IRENA and CPI 2023). Further, implementing unconditional and conditional scenarios in the NDCs will result in a temperature increase of 2.6°C and 2.4°C (p. xvi UNEP 2022; p. 11 IPCC 2023). Continued current policies will limit temperature increase to 3°C, and meeting conditional and unconditional pledges under the Paris Agreement will only lower the estimate to 2.5°C, with a further reduction to 2°C if all net-zero pledges are achieved (p. xvi UNEP 2022; p. xii UNEP 2023).

Climate-related losses and damages have already risen from $895 billion in the 1978–97 period to a 150% increase in the following decade (UNDRR 2018). In the euro area alone, delaying decarbonization after 2030 would lead to over 12% in real GDP loss by 2050, compared to an orderly low-carbon transition (Gourdel et al., 2022).

To avert the worst impacts of climate change, it is imperative to have at least $0.7 trillion investments being redirected every year from fossil fuels to energy-transition-related technologies (p. 11 IRENA and CPI 2023) to avoid lock-ins. Accordingly, the 2022 UNEP Emissions Gap Report shows that governments should also ensure that market rules are fit for high shares of renewables in the electricity system, while planning for a just transition away from fossil fuels (p. xxiv UNEP 2022). The Report continues by suggesting that investors, including banks, should either engage with or divest from fossil fuel utility companies and invest in low-carbon energy and related technologies.

Within this context, finance-related issues are increasingly framed as related to anthropogenic climate change and relevant to climate finance—a phenomenon that this paper

conceptualizes as the "climatization of finance." In this sense, 2024 was an historical year, when Copernicus data signaled the reaching of 1.5 degree Celsius temperature increase (Copernicus 2024), bringing several to consider the Paris Agreement a failure (Saporiti 2025).

Only by considering Europe, one of the most advanced regions in terms of sustainable finance legislation, it was revealed that capital is more than sufficient, ranging between two and six times the required capital for energy transition scenarios compatible with climate neutrality (Egli et al 2022). Notwithstanding the merit of mandating climate neutrality by 2050, the world-acclaimed European Climate Law is lacking a "principled priority" for climate policy to be vertically and horizontally integrated across all policy areas (Kulovesi et al. 2024). Further, it misses the opportunity to operationalize the European Green Deal's pledge to "do no harm," for instance, by monitoring the alignment of financial flows with the climate neutrality goal (Kulovesi et al. 2024, p. 13). Importantly, climate investment programs by both the EU and its Member States were found to cover less than half of the investment needs (p. 4 Monasterolo et al. 2025). Net investment needs for net-zero technologies are also missing notwithstanding attempts through the Green Deal, the Next Generation EU, the Net-Zero Industry Act, the Strategic Technologies for Europe Platform (STEP) and the most recent Clean Industrial Deal. Commenting on the missing link between net-zero and financing, in June 2023, the European Court of Auditors stated that EU countries had vague climate plans and were compromizing the EU targets of reducing emissions 55% below 1990 levels by 2030, due to a relevant financing gap (ECA 2023). In 2024, commenting on the EU hydrogen strategy, one key issue criticized by the European Court of Auditors was again funding: the Commission lacked a comprehensive understanding of the required investments and the available public funding. Further, EU hydrogen funding, estimated by auditors at €18.8 billion for the 2021-2027 period, was spread across various programs, complicating the process for companies to identify the most appropriate funding for their projects (ECA 2024).

This article proposes reform suggestions on how cognitive and policy frames can credibly redirect finance where it should. It was shown that policy announcements that are overly ambitious, but are not followed up by credible plans, could tip the economic system toward a vicious circle of credibility loss, carbon-intensive investments and increasing risk perceptions, ultimately leading to a failure of the transition (Campiglio, Lamperti and Terranova 2024). Mitigating and adapting to climate change require large investments and coherent policies (IPCC 2022), although a concrete policy pathway is lacking.

Starting from transformative (positive) narratives for climate action (Hinkel 2020), I will explore how finance can be leveraged through decarbonization legal narratives based on a better calibration of demand-side policies, which are aimed at reducing the consumption of fossil fuels, and supply-side climate policies, which are aimed at reducing the extraction of fossil fuels (van Asselt 2021; Helm 2017). The focus lies in European Union (EU) law and investments in clean-energy-related technologies, with a focus on citizen-oriented inclusion in energy systems. Scoping this paper on the EU stems from the cognitive dissonance in Europe's policies, having provided the most fossil fuel subsidies per capita in 2020, notwithstanding its ambitious climate goals (*supra* 1). Moreover, the regulatory work presently ongoing in the EU is critical to implementing innovative tools of interest for other countries, such as the first green bonds regional regulation worldwide (Regulation (EU) 2023/2631). Within this context, the paper questions how the EU can escalate cleantech investments as a decarbonization opportunity, beyond the narrative of climate risk, by aligning regulation with the energy transition. Focus on investments in clean energy technology lies in the fact that the power system is the single largest source of energy-related CO_2 emissions globally (IEA 2022), and has the highest finance needs and average mitigation potential by 2030 (p. 15 CPI 2024). To this end, the article explores the novel concept of climatizing finance and fetters out three interconnected packages for a better foundational ground to climatize finance. Each of the

packages includes the role of citizens. The focus on citizen-oriented inclusion lies in science-based directions on how to get net-zero right (Fankhauser et al. 2022), as well as foundational regulatory frameworks on the future of energy systems in Europe, which call for solutions to the currently highly centralized energy systems toward their progressive democratization and decarbonization (European Commission 2015, European Commission 2023).

2. The Narrative of Climate Risk

2.1 From the story to its epidemic character and institutionalization

The intersection between climate and finance is presently dominated by the issue of climate-related financial risk. The latter is the main framework through which companies, investors, and regulators engage with the problem of climate change (Wetzer, Stuart-Smith and Dibley 2024).

This article holds that climate risk is not only a framework. It is a narrative, with related implications for institutions and policy. The problem with dominant climate narratives is that they mainly hinge on doom and gloom scenarios, which emphasize problems, rather than solutions (Hinkel et al. 2020), and are no antidote to techno-optimism viewing climate change as another engineering problem (pp. 131ff Mann 2021).

Narratives are vectors of swift change in culture, *zeitgeist*, and behavior (Shiller 2019, p. xii). Studying narratives enables to understand how certain stories and misperceptions go viral and drive a whole epoch, or some of its macro-events (Shiller 2019, p. x). Specifically for the purpose of this article, economic narratives allow for examining the role of public beliefs in major economic events, which traditional economic approaches stop short of analyzing (Shiller 2019, p. xv). In this sense, Nobel Laureate and economist, Robert J. Shiller, has broken new ground by showing how economists can facilitate a more effective restructuring of institutions and policy by understanding and developing the art of narrative economics (Shiller 2019, p. xv). In this narrational art, this article distils three moments: the story originating the narrative, its epidemic character, and its institutionalization.

As for all economic narratives, in fact, climate risk starts with a story (pp. xi and 74 Shiller 2019). The story here incepts with the speech that former Governor of the Bank of England, Mark J. Carney, delivered to the insurance market Lloyd's of London on September 29, 2015. Evokingly called "Breaking the tragedy of the horizon – climate change and financial stability," the speech displays the limitations of the narrative concerning "the tragedy of the commons" that has classically assisted environmental economics (Carney 2015). Whereas for other environmental problems, policy solutions lie in property rights and supply management (Carney 2015), for climate risk there exist little direct incentives for current generations of policymakers or financial actors to fix the problem. Climate consequences span beyond the business cycle's horizon (3 years), the political cycle's horizon (4–5 years), monetary policies' horizon (2–3 years), and financial stability's horizon (max. a decade) (Carney 2015). As Carney's speech goes, the paradox is that when climate change becomes defining for stability, it may already be too late and too expensive to tackle it (Carney 2015).

On the same day as it was delivered, the speech quickly started becoming epidemic, making the headlines in major newspapers (Elliott 2015). In the terms coined by Shiller for narrative economics, the epidemic of this new narrative became visible also in economic, legal, and policy research as Carney's discourse provided the contexts and point of departure for concrete analyses of climate risk problems and policy solutions (e.g., Sjåfjell 2018). Such direct engagement with Carney's theory on the "tragedy of the horizons" was not only fomented by its ability to capture an unexplored phenomenon of our global society, and relate it to mainstream theory (the tragedy of the commons). In fact, research interest had also been

spurred by Carney's explicit considerations of the need for more and better disclosure regulation "to develop consistent, comparable, reliable and clear disclosure around the carbon intensity of different assets" (Carney 2015).

The new narrative was institutionalized when Carney proposed the establishment of a new taskforce on November 9, 2015, only over a month since the historic speech at Lloyd's. The taskforce was appointed on December 4, 2015 (FSB 2015). Presented as an industry-led task force on climate-related financial disclosures (TCFD) under the chairmanship of Michael R. Bloomberg, the initiative sustained media interest until and past the release of its Recommendations Report on December 14, 2016, and Final Recommendations on June 29, 2017.

The 2017 TCFD Recommendations have long represented the most influential, albeit non-binding, conceptualization of climate-related financial risk (Midttun 2022). Pursuant to the Recommendations, climate-related financial risk concerns the physical risk to the assets of states and non-state actors, and the transition risk determined by the policy changes that are required to transition our global society to net-zero emissions by 2050 (TCFD 2017). The Recommendations gained endorsements from private actors, governments, financial regulators (TCFD 2022), as well as international organizations (Connell et al. 2018), constituting one of the main tractions behind the climatization of finance (*infra* 3). In July 2023, the FSB has formally invited the International Sustainability Standards Board (ISSB) to take over the TCFD's work and role considering the publication of two standards heavily drawing on the TCFD's work, with the ISSB accepting the invitation (Bouvier 2023), and now providing two sets of disclosure requirements, the first (IFRS S1) on sustainability-related risks and opportunities, and the second (IFRS S2) on climate-related disclosures.

To emphasize the pivotal role of the TCFD's work for existing and future policymaking, one of the most influential manuals of international environmental law grouped the TCFD instruments among the "techniques for implementing international principles and rules" (pp. 657 and 717 Sands et al. 2018). Particularly, the manual defined the Task force "an important forum for the standardisation of environmental auditing and accounting standards in key areas such as carbon risk disclosure" (p. 717 Sands et al. 2018). Overall, the rise of awareness on climate-related financial risk has been driven by the contagion of a simple narrative on transnational self-regulation, which is parallel, yet not alternative, to states' efforts on climate finance undertaken within the international climate regime. Climate finance is currently seen as one of the four core areas of international climate change law, along with mitigation, adaptation, and oversight (the latter consisting of implementation, compliance, and effectiveness) (pp. 15–16 Bodansky, Brunnée and Rajamani 2017). Nonetheless, within the international climate regime, climate finance has proved an issue of frustration and little intergovernmental consent (Pflieger 2023), with short to none interest in cooperating to regulate climate-related financial risk and comparable regulatory frameworks at the international level (Zahar 2017). Similarly, the TCFD initiative has only started the framing of issues around finance, rather than offering targets and metrics to limit market failures within financial institutions and prompt reliable decarbonization alignment through regulatory compliance pulls. In this sense, the study of its narrative helps sense the limited future impact of the climate-related financial risk narrative to equip policymakers with tools for anticipating economic events.

2.2 Why Climate Risk is an Aporetic Narrative

Albeit lately internationalized in mandatory rules, notably in national and regional law (Nowiski 2018), the narrative of climate risk is *per se* insufficient to set an effective decarbonization pathways due to at least three shortcomings. First, the TCFD is meant to be an

instrument of climate risk disclosures, under the assumption that markets efficiently react to disclosed information on existing risk, and that the latter will be painstakingly reported (p. 1113 Christophers 2017). Yet, information is a public good that is subject to market failure, and climate risk is still lacking a detailed, comparable, and reliable data framework concerning sustainability across businesses and financial institutions (Esty 2022). Moreover, disclosures are reporting duties entwined with risk assessment, and do not necessarily include risk management, which is particularly significant to achieve. In fact, due to their short sightedness, markets do not rationally respond to information and fail to adequately account for climate externalities into the pricing of assets. The mistaken transparency assumption, however, still underpins the sufficiency of disclosures under the adage that disclosed information will let markets shift from brown to green assets. Conversely, what is key for redirecting finance to hit decarbonization targets is managing risk through comprehensive due diligence and independently verified transition plans (pp. 22ff. UN HLEG 2022). Notwithstanding references to due diligence (Colombo 2022), the TCFD lacks commitment to due diligence as well as an established process, including, for instance, the requirement of a sustainability policy, the risk assessment and risk management of sustainability impacts ensuing from corporate activities, the integration of the findings into appropriate corporate policy action, as well as the tracking and monitoring by third-party audits on the basis of comparable targets and metrics. Further, regulatory frameworks on sustainability-related due diligence for financial entities are presently either non-existing or inadequate (p. 21 UNDRR 2021; pp. 12 and 17 OECD 2022). Even one of the most ambitious regulatory proposal in this sense, in the European Union (EU), makes finance due diligence optional for Member States (Kilimcioğlu 2023, Allenbach-Ammann 2022).

Second, climate risk constitutes a policy conundrum, to which no future-proof policy response has been achieved yet. Policy cannot ignore that climate risk constitutes a disruptive factor. Forecasting is particularly fallible as climate risk is distributed with "fat tails," where past data cannot help predict future climate-related events, and the likelihood of catastrophic outcomes does not allow for comfort (p. 286 Weitzman 2011). Further, climate risk can be "systemic," sparking breakdowns in the entire financial system (Kaufman and Scott 2003; Aglietta and Éspagne 2016) and requiring an integrated policy approach where "decision-making processes, finance and actions are integrated across governance levels, sectors, and timeframes" (p. 25 IPCC 2023). But a climate risk narrative has yet to lead to policy integration, for instance across finance, innovation, and markets, toward at least guaranteeing a level playing field of economic conditions between fossil fuel-based and renewable energy actors.

Third, climate risk assessment is agnostic over innovation, and possibly allows financial institutions to postpone the mobilization of private finance toward riskier, albeit more promising, innovation technologies concerning energy generation, such as demand-side energy management through storage and efficiency improvements. Commercial banks, for instance, are usually motivated by shorter time horizons, focusing on quarterly returns to shareholders and old-styled collaterals, such as immovables (p. 6 Mikheeva and Ryan-Collins 2022). In this context, participative energy initiatives, in the likes of community initiatives (Kauffman 2014) or gender-lens financing, are still little appetible (Colombo 2021).

Overall, climate risk exemplifies an *aporetic* narrative in the classical Greek sense, a conundrum that is internally irresolvable and reveals the limits of existing epistemic and institutional structures (p. 1 Karamanolis and Politis 2018). In the context of climate risk, this aporia emerges from the paradoxical effort to reduce all climate-related financial aspects to risks in a technocratic, and yet still little granular way. Accordingly, the aporetic character of climate risk emerges also from the fact that risk assessment tools cannot meaningfully capture "deep uncertainty" (Knight 1921, Stirling 2010). As a result, climate risk discourse risks conflaing risk and uncertainty, while reifying the future instilling a false sense of control.

Conclusively, with the dominating narrative of climate risk, it is no surprise that tracked climate finance is still insufficient to achieve the capital flows levels needed to limit warming to below 2°C or to 1.5°C across all sectors and regions (p. 11 IPCC 2023).

3. The Climatization of Finance

It was previously found that the narrative of climate risk has contributed to the institutionalization of efforts toward climate risk assessment, as epitomized by the Taskforce for Climate-Related Financial Disclosures (TCFD) (*supra* 2). In this sense, along with the Paris Agreement's overarching financial provision (*supra* 1), the TCFD has been one of the most powerful forces behind what this paper conceptualizes as the "climatization of finance."

The climatization of finance entails the increasing framing of issues as related to anthropogenic climate change and relevant to climate finance. Therefore, emphasis rests on how climate change is impacting finance, rather than on how finance is and will be impacting the climate system (Colombo 2023). Broadly stated, the climatization of finance follows two further processes, concerning the financialization of the economy and the climatization of politics, respectively.

Over the past 40 years, the financialization of the economy has meant the expansion of financial markets to domains and assets previously unthinkable, from tax revenues to ecosystems, with pervasive social effects, notably on increased global interconnectedness, commodification, and inequality (Davis and Kim 2015; Kemp-Benedict and Kartha 2019). The financialization of the economy has made financial markets even more short-sighted, with their inability to fully account for risks, especially when distant and systemic (Stiglitz 2022). As a phenomenon, the financialization of the economy is also responsible for the stalemate of climate risk as a decarbonization narrative. In fact, ignoring long-term risks generates too little investment in resilience, and increases social, economic, and environmental costs for society (Stiglitz 2022).

Parallelly, through the climatization of politics, climate change has incorporated new issues into climate governance, including corporate actors' role in contributing to the achievement of intergovernmental climate targets (p. 511 Aykut and Maertens 2021). As such, the climatization of politics is deeply entwined with the narrative of climate risk and related climatization of finance. It sustains the narrative of progress under the flag of "carbon reductionism," where every ton of CO_2 counts. Notwithstanding, the problem of carbon reductionism is that it ultimately rebuts criticism on insufficient corporate action, for instance under the banner that "perfection should not be the enemy of the good," thus protecting the *status quo* of a profoundly unequal world (p. 511 Aykut and Maertens 2021).

Rather than a narrative, the climatization of finance is an increasingly engaged framework, spanning from IPCC reports to COP negotiations and corporate voluntary pledges. In the climatization of finance, the increasing role of climate change in financial matters limbs all possible climate-related matters, rather than only climate risk and opportunities. As an engaged framework, rather than a dominant narrative, it can help focus on important sustainability-related areas related to all planetary boundaries, rather than climate change only (Richardson et al 2023). Beyond the deadly embrace of climate risk with climate disclosures, 'climitizing' finance is a phenomenon still open to several policy solutions, and decarbonization law can be one of such.

4. 'Climitizing' Finance through Decarbonization Law

As seen above, climate-related financial risk disclosures are yet to materially inform investment decisions for the majority of investors and bank lenders (p. 7 Mikheeva and Ryan-Collins 2022). Rather, since the entry into force of the Paris Agreement and the issuance of the 2017 TCFD Recommendations, financers have increased their fossil fuel lending (p. 7

Mikheeva and Ryan-Collins 2022; p. 11 IRENA and CPI 2023). The narrative of climate risk is presently failing to drive action in financial institutions, neglecting internal and external legal commitments, as well as participative and energy justice approaches, as reiterated by the IPCC Synthesis Report (p. 20 IPCC 2023). Accordingly, the previous section confirmed that climate financial flows are insufficient across all sectors and regions, and yet, the resulting gaps create many opportunities (p. 35 IPCC 2023). Beyond the reductionism of climate risk, this section confronts how decarbonization law can integrate a more effective policy narrative based on transition opportunities.

Law can be a crucial enabler to decarbonizing societies. Generally speaking, decarbonization entails "a process by which countries, individuals or other entities aim to achieve zero fossil carbon existence (i.e., reduction of the carbon emissions associated with electricity, industry and transport)" (Matthews et al. 2018). Decarbonization initiatives have flourished as such at least since the mid-2010s, notably through policy and legal models guiding sectoral decarbonization (Gerrard and Dernbach 2019; DDPLAC Consortium 2020). As a legal field of study, decarbonization law has been methodologically analyzed only recently given the radical and systemic restructuring in law and legal thinking that it requires (Huhta and Romppanen 2023). It avouches the conflicts that it engenders, for instance in two disciplines acknowledged as both enabling decarbonization: climate and energy law. While climate law usually decarbonizes through legally binding objectives, such as net zero societies by the second half of the centuries, energy law is characterized by sustainability more broadly, as well as competitiveness and security (p. 660 Huhta and Romppanen 2023). Net-zero objectives, however, have been informing the legal field more than decarbonization, giving rise to net-zero law (Allen et al 2022, Pleming et al. 2025).

While net-zero is target first hammered out in climate science in 2009 (Meinshausen et al. 2009), net-zero law is a relatively novel concept alluding to the recent rise of domestic net-zero legislation, which is made of regulatory tools containing net-zero targets or equivalent (Allen et al. 2022; Helm 2021). By 2022, net-zero pledges covered over ninth tenth of the global economy (91%) (p. 17 NewClimate Institute et al. 2022) and, by February 2023, 27 countries had enacted net-zero legislation (Chan and Higham 2023). Implications for private companies can be substantial, for instance through a legal requirement for companies to either become net-zero by 2050 (Switzerland) or to achieve annual carbon emission reduction targets in line with national action plans (Nigeria) (Chan and Higham 2023).

Net-zero law can offer a more effective narrative for policymaking, compared to the narrative of climate risk. Climate risk has reinforced the role of financial policy as one of correcting market failures, enabling and de-risking private finance, a so-called market-*fixing* approach, while maintaining the assumption that the markets can regulate themselves, notably through self-reporting, codes, and frameworks. Conversely, net-zero law is a response to such self-norming approach, in particular the growing number of non-state actor net-zero commitments and the relative "accountability gap" on whether such commitments will ever be lived up to (Chan and Higham 2023; IPCC 2022 TS-11). Further, net-zero law posits the complexity of policy design and policy packages, where financial policy can support the sustainability transition by shaping the market through "strategic policy coordination across fiscal, industrial, financial and monetary policy agencies," which involves inter-agency deliberation and even dissent in long-term-oriented policy objectives (p. 30 Mikheeva and Ryan-Collins 2022). Within such a market-*shaping* approach to finance, the norms that are written through net-zero law can also attend to market failures that were originally under the purview of market-fixing approaches, but ended up without being fixed (p. 138, fn 4, Esty 2022).

However, the narrative of net-zero has come under fire. To guide and track progress in aligning the economy with the Paris Agreement goals, emissions targets can be deceptive as

they the remaining emissions across incumbent companies, rather than providing for "innovation capacity," namely emissions that are left for future innovators (pp. 388-389 Robiou du Pont 2024). Under less scientific premises, actors of anti net-zero populism have emerged at least since 2021 to attack net-zero through policy dismantling (Paterson, Wilshire and Tobin 2023). In fact, compared to "green jobs" or the narrative of "a green industrial revolution," net zero is perceived as "more technocratic, less connected to imaginaries of national revival and green jobs, and is more easily associated with ideas of restriction and challenges to traditional freedoms" (p. 335 Paterson, Wilshire and Tobin 2023). Moreover, the narrative of net-zero law is usually linked up to decarbonization narratives for companies mainly (Zipse et al 2023, Sharma and Kumar De 2023).

Conclusively, decarbonization seems a broader narrative than net-zero and is here preferred because it extends beyond net-zero mitigation objectives, it avoids the narrow accounting of emissions for incumbents, and is less prone to policy dismantling techniques. Further, several narratives can be nested within decarbonization.

5. Decarbonizing Finance Through Demand- and Supply-Side Policies

With such underpinnings, finance can be decarbonized based on a better calibration of demand-side and supply-side policies. While climate policies have historically over-relied on demand-side policies, which are aimed at reducing the consumption of fossil fuels, supply-side policy levers remain underutilized and lead to underperformance in the goal of reducing the extraction of fossil fuels (Prest 2022). If pursued as standalone policies, either demand-side or supply-side policies generate leakages (Prest 2022). Conversely, when jointly implemented, supply-side and demand-side climate policies are allies, with supply-side policies supporting and lowering the cost of demand-oriented mitigation action (p. 2 van Asselt 2021).

Calibrating supply- and demand-side policies yield benefits of at least three types (Lazarus and van Asselt 2018). First, joint supply-side and demand-side measures may increase the tools available to policy makers, thus widening the mitigation cost curve (Lazarus and van Asselt 2018; Lazarus, Erickson and Tempest 2015). Taking the case of finance, an example can be offered by green bonds and complementing policies. By fashioning standards and verification for green bonds (demand-side policy), while phasing out fossil fuel subsidies (supply-side policy) can help financial actors realize the systemic under-pricing of climate-related risks, and reduce mismatches between available capital and investment needs (p. 35 IPCC 2023). In such a context, supporting robust regulatory frameworks for green bonds would be more than a demand-side policy supporting the financing of renewable energy projects (Lazarus, Erickson and Tempest 2015). It would rather be a policy mix with supply-side features whereby investors, by being incentivized to invest elsewhere than in fossil fuels, would be shielded from the fluctuations of fossil fuel prices and business cycles. Conversely, through financial benefits, they would be incentivized toward sustainable economic activities (Beyene, Delis and Ongena 2022; Ongena et al. 2021; Lichtenberger, Braga and Semmler 2022; OECD 2020). Such a policy mix would also help direct credit towards strategic industrial priority sectors, possibly snowballing innovation, and the limitation of credit to less desirable sectors (pp. 28-9 Mikheeva and Ryan-Collins 2022; Liscow and Karpilow 2017).

Second, supply-side policies will tend to slow investment in fossil fuel production and related infrastructure, curbing the extent of carbon lock-ins that are due to fossil fuel over-production (p. 4 Lazarus and van Asselt 2018). If we take the case of finance, equipping policies with renewable energy subsidies (which is a type of demand-side policy) is insufficient if electricity markets are not redesigned also in terms of supply. For instance, utilities can serve a better societal and business purpose if they act as systems integrator (Kauffman 2017), which can be achieved by tying their compensation to positive incentives for the energy transition,

such as (i) the integration of distributed energy resources, (ii) energy efficiency, and (iii) renewables.

Redesigned electricity markets may also avert reactions to gas price spike such as those induced by the Ukrainian war, where, for instance, the wholesale market priced electricity at the highest marginal cost of technology, in this case gas, even when a large part of electricity was provided by wind, solar, and nuclear (Carbon Tracker 2023).

Third, supply-side policies may help direct future innovation toward the energy transitions. In the case of finance, pollution externalities that are either untaxed or inadequately taxed through demand-side policies have provided dirty-tech with an unfair advantage over clean-tech (p. 418 Liscow and Karpilow 2017). To adjust this lopsided result, supply-side policies can provide a clear rationale for public policymaking to intervene, even when a carbon tax is in place. What public policy can do, for instance, is clearly incentivizing architectural innovation for utilities to build IT systems for the integration of flexibility technologies, such as renewable energy storage within the grid, thereby directing future innovation towards cleantech and away from dirtytech (p. 65 Henderson 2020; European Commission 2022).

Importantly, it is worth emphasizing that the widening of policy tools through supply-side policies can mobilize public support for climate action due to the higher visibility of action (e.g., avoidance of lock-ins), actors (e.g., polluting industries), and consequences (e.g., cleantech innovation push), as well as to the reduced administrative and transaction costs, compared to demand-side policies (Lazarus and van Asselt 2018).

Overall, in the decarbonization narrative, regulation is called upon to *regulate* corporate emitters including financial entities on their net zero pledges, including mandatory annual progress reporting and incentivizing schemes (p. 7 UN HLEG 2022). In this sense, the relationship between norms and narratives is circular: norms stem from narratives and are in the position to change them (p. 5 Cover 1983; p. 5 Hilson 2021) while shaping opinions and preferences (Fløttum and Gjerstad 2017).

The narrative of decarbonization law is no panacea. Still, compared to the narrative of climate risk, it can instill a longer-term policy frame in decision-making, as well as better implementation mechanisms to climate action. While "a doom and gloom" narrative, underscoring risks, costs and adverse impacts, is the dominant narrative in climate change policy today, the narrative of decarbonization is potentially "transformative" because it articulates a vision of "where we want to go" and provides some solutions to achieve this vision, rather than emphasizing problems to avoid (p. 495 Hinkel et al. 2020; Tàbara et al. 2018).

6. Conclusions

This article's aim was to reform suggestions on how cognitive and policy frames can credibly redirect finance where it should. A trajectory on the climatization of finance proved necessary to show the often-overlooked implications of climate risk as an economic and policy narrative and the possibility to integrate it with more transformative narratives, entailing stronger policy signals and standardized compliance pulls. The aim was not to offer a comprehensive policy design toolkit, but rather to contribute to future-proofing decarbonization law with an emphasis on climate finance, electricity markets, and cleantech innovation. This type of future-proofing hinges on adapting regulation to changing economic and technological realities across domains, rather than dictating legislative strategies. Such an approach comes in response to the three shortcomings that have been found to plague the climate risk narrative (*supra* 2) and builds on the calibration of supply-side and policy-side policies (*supra* 3). At a challenging historical juncture when the EU is reshaping its regulatory frameworks to enliven and implement the European Green Deal (Higham et al. 2023), a focus on EU's role in the decarbonization narrative seemed particularly timely.

In light of its aims, the paper's findings are two-fold. First, this paper found that policy design is by essence anticipatory because it uses foresight to reduce risk and increase capacity to respond to events at early, rather than later, stages of their development (Fuerth 2009). Anticipation is crucial in public policy, especially in the age of the regression to the tail that we are experiencing, where "no matter how extreme the most extreme event is, there will always be an event even more extreme," notably in climate matters (Flyvbjerg 2020). The age of the regression to the tail requires policymakers to do two things: to "cut the tail," which entails reducing risk by mitigation, and to practice the precautionary principle, meaning to avoid tail risk altogether by taking a cautious approach (Rochon, Kappes and Vallet 2022).

Second, the effects of narratives are difficult to discern in the long run, but at least both climate risk and decarbonization law can help bring the future forward, which will be essential to ensure that policymaking is fit for purpose to tackle our polycrisis era (Colombo 2023; Derbyshire 2022). What seems undeniable is that the narrative of climate risk and decarbonization law can and should complement one another. On the one hand, the narrative of climate risk can help cut the tail whenever its implementation eventually shifts from the current self-norming approach toward a type of self-limitation of the markets logics that is externally enforced through policy direction (Teubner and Korth 2012). On the other hand, the narrative of decarbonization law can possibly embody the precautionary principle through the support of effective policy design, as shown above (*supra* 5).

7. References

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8. Declarations

Conflicts of interest. The author has no relevant financial or non-financial interests to disclose. The author acknowledges support from the European Union's Horizon 2020 Research and Innovation Programme under the Marie Sklodowska-Curie grant agreement No 101028505 (RE-DESIGN). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Ethics approval and consent to participate. The author has taken care to abide by all ethics guidelines outlined on the journal's website and EU-funded research.

Consent for publication of figures. The author has asked for permission in the use of figures.

Data. No new dataset was generated during and/or analysed during the current study.