

OPINION

Policies for climate finance: Status and research needs

Bjarne Steffen^{1,2*}, Axel Michaelowa^{3,4}

1 Climate Finance and Policy Group, Institute for Science, Technology and Policy, ETH Zurich, Switzerland,

2 Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology, Cambridge,

MA, United States of America, **3** Institute for Political Science, University of Zurich, Zurich, Switzerland,

4 Perspectives Climate Research, Freiburg, Germany

* bjarne.steffen@gess.ethz.ch



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Reaching a greenhouse gas emissions pathway in line with the Paris Agreement commitments will require a fundamental transformation of global economies along with massive investment needs [1]. In the energy sector, for example, a 2°C pathway translates into an annual investment need of 2–4 trillion USD until 2050 [2]. At the same time, the severe impacts of climate change require investments for adaptation. Accordingly, inducing climate finance flows ranks highly on the climate policy agenda. A growing community of public policy scholars aims to provide evidence-based advice for policymaking with respect to climate finance. Important insights have been gained (e.g., the collection of research and practitioners' experiences in [3]), although we believe that many aspects are still severely understudied.

The international policy discourse considers climate finance from two related but distinct perspectives. First, since 1997 when the Kyoto Protocol enabled developing countries to generate revenues from the sale of emission credits through the Clean Development Mechanism (CDM), policies that mobilize climate-related monetary transfers from developed to developing countries have been deemed necessary. After all, many developing countries have contributed very little to climate change but are heavily affected by its consequences. Finance has been very prominent in UNFCCC negotiations since 2009, when the concept of public international climate finance was enshrined in the Copenhagen Accord's goal of mobilizing 100 billion USD by 2020. This goal subsequently led to the creation of the Green Climate Fund. The Paris Agreement addresses this through Article 9 (provision of financial resources) and in Article 6 (voluntary collaboration through international carbon markets and non-market approaches). Second, and more recently, awareness is increasing that policy interventions are required to re-direct finance flows from high-carbon to low-carbon assets worldwide. In this sense, climate finance has received much attention within the financial sector since the negotiation process for the Paris Agreement [4], and it resulted in the Agreement's Article 2.1c explicitly calling for the re-direction of finance flows.

Both perspectives on climate finance policies have been taken by extant research. Building on the insights gained thus far, we believe that future work can help policymakers by (ex-ante) developing new *policy designs* to induce climate finance flows on the international and national levels, and by (ex-post) measuring the *effectiveness* of policy interventions more rigorously.

Concerning climate finance in the sense of **international monetary transfers** (PA Art. 9), as discussed in [3], accounting remains heavily contested, with many observers stating that only a fraction of the 100 billion USD target has actually been achieved. Additionally, adaptation finance has lagged behind mitigation finance, probably due to the absence of universally agreed-upon metrics. Allocation seems to be linked not only to the actual needs of vulnerable

groups but also to the interests of donors. While some bilateral funding programs, such as Germany's IKI, have performed well, multilateral development banks and dedicated climate funds have been criticized for cumbersome procedures and inconsistent monitoring approaches. A more 'polycentric' approach involving actors with legitimate stakes in ownership and accountability of funding beyond contributor and recipient governments could resolve some of these challenges. However, the appetite of voters and policymakers to underwrite significant transfers abroad may be limited [5]. The negotiations on the goal of international climate finance after 2025 will illustrate this clearly. Critical topics needing more research include policy designs for the *blending of climate finance and international carbon markets* [6], the evaluation of the effectiveness of interventions, particularly regarding *adaptation finance* [7], and resulting institutional learning of funding agencies and the *political economy of climate finance allocation*.

Concerning climate finance in the sense of **re-directing finance flows** (PA Art. 2.1c), policy output has high momentum, particularly in OECD countries, with the aim of making low-carbon assets more attractive for financiers than high-carbon assets [4]. While such policies are being enacted at a fast pace, substantial research is needed on how best to design them. Past work has led to a solid understanding of what works to *mobilize finance for new low-carbon assets*, such as renewables; for example, policy designs that simultaneously address return and risk characteristics [8] and direct market activity from Green State Investment Banks [9]. The literature has also studied potential drivers to reduce the cost of capital for clean energy technologies [10]. Much less is known about how to effectively *discourage investment in high-carbon assets*, an imbalance that future research should address. Recent work scrutinized drivers for fossil fuel divestment decisions [11] and other mechanisms for investor impacts on the climate [12], but the role of climate finance policies in discouraging high-carbon investment remains largely elusive.

While some assets are clearly climate friendly (e.g., renewables) or unfriendly (e.g., new coal power plants), there are many technologies and business models "in between." Here, governments can leverage their information nodality by defining *taxonomies and labels* [4]. The European Union (EU) is a frontrunner in this regard, and researchers have put great effort into defining a science-based foundation for the EU Green Taxonomy (e.g., via the Platform for Sustainable Finance [13]). Unfortunately, recent key aspects of the taxonomy have been softened in the political process; we need a better understanding of the underlying politics that influence climate finance regulations in the EU and beyond, which is another area for future research.

Abstracting from specific technologies, other policy interventions attempt to improve companies' *climate-related financial disclosures* in general [4]. The underlying idea that increased transparency on climate impacts will lead to a re-allocation of investments is contested [14], and, indeed, we lack evidence as to what extent such information mandates are actually effective. Finally, the economic literature increasingly considers the role of *central banks* in climate finance, and research on "green" monetary policy designs is gaining traction [15].

In sum, it is encouraging to see the momentum in climate finance policymaking—although policy activity alone is not a guarantee for actual progress in mitigation and adaptation. Policies need to be well designed and continuously evaluated for their effectiveness. Following the agenda described in this piece, climate policy scholars can contribute to this important endeavor.

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