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Catalyzing Capital for the Transition toward Decarbonization: Blended Finance and Its Way Forward

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The Sustainable Finance Initiative works with public, private and development institutions to engage Stanford researchers in developing the finance and policy tools needed for the transition toward a decarbonized and climate-resilient global economy.

List of Abbreviations and Acronyms

ADB	Asian Development Bank
BAU	Business-As-Usual
BEIS	Department of Business, Energy and Industrial Strategy of the UK Government
C&I	Commercial and Industrial
CDM	Clean Development Mechanism
CI1	Climate Investor One
CI2	Climate Investor Two
CIF	Climate Investment Funds
CP3	Climate Public Private Partnership
CPI	Climate Policy Initiative
DAC	Development Assistance Committee
DFCD	Dutch Fund for Climate and Development
DFI	Development Finance Institution
DFID	Department for International Development of the UK Government
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIF	European Investment Fund
ESS	Environmental and Social Safeguards
ESMS	Environmental and Social Management System
ESG	Environmental, Social, and Governance
EU	European Union
EUR	Euro
FoF	Fund-of-funds
GBP	British Pound Sterling
GCF	Green Climate Fund
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GEF	Global Environment Facility
GFO	GEEREF Front Office
GHG	Greenhouse Gas
HMIC	High Middle-Income Countries
IFC	International Finance Corporation
IFC AMC	IFC Asset Management Company
LCCR	Low-Carbon Climate Resilient
LDC	Least Developed Countries
LICs	Low-Income Countries
LMICs	Lower Middle-Income Countries
LP	Limited Partner
LPA	Limited Partner Agreement
LUC	Land-use Change
MDB	Multilateral Development Bank
MENA	Middle East and North Africa
M&E	Monitoring and Evaluation
NDCs	Nationally Determined Contributions
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
PV	Photovoltaic
R&D	Research and Development
RE/EE	Renewable Energy and Energy Efficiency
SCAF	Seed Capital Assistance Facility
SDGs	Sustainable Development Goals
SME	Small and Medium-size Enterprises
UK	United Kingdom
UMIC	Upper Middle-Income Countries
US	United States
USAID	United States Agency for International Development
USD	United States Dollars
WBG	World Bank Group
WWF	World Wildlife Fund

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Executive Summary

Climate finance is at the center of discussions about how the international community can shift to low-emission, climate-resilient development pathways. The world needs to invest trillions of dollars annually in order to keep warming within 1.5°C. Current global climate finance flows, however, are vastly inadequate. The demand for additional capital is particularly acute in developing countries, where choices to be made over the next decade will play a major role in determining the future course of the global climate system.

Blended finance, a structuring mechanism with potential to mobilize significant capital and investment from diverse actors, has emerged as one promising solution to help economies decarbonize and deliver the goals of the Paris Agreement. As blended finance has gained traction in the past few years, its principles and characteristics have also been extensively assessed, with its promises increasingly promoted as well as questioned. Attention on blended finance thus far has largely focused on volumetric contributions of blended finance, partly because of the quantitative financial targets set by the international community. Often missing is a qualitative assessment of blended finance that examines the processes and mechanisms through which sources of capital are mobilized and operationalized. Having a clearer picture of the internal governance configuration of blended finance vehicles and their investment strategy will greatly facilitate efforts to assess and determine additionality, scalability, and transformative impact of climate finance. Only then can public and private actors effectively determine the ways to mobilize, structure, and coordinate flows of climate finance towards sustainable and decarbonized development pathways at scale.

This paper explores blended finance both in principle and in practice based on extensive literature review and case studies of blended finance vehicles. Specifically, the paper examines the role and application of blended finance for decarbonization in developing countries, organizing them around five themes: 1) changing features of climate finance, where we observe a shift from a model of direct investment to a layered mechanism with thicker and lengthened value chains; 2) governance of blended finance, focusing on how blended vehicles originate, structure, and function; 3) transparency, which has significant implications on monitoring and evaluation, scalability, and impact; 4) additionality, whose interpretation and application need to be broadened to improve the quality and effectiveness of climate finance; and 5) transformative impact, which every blended finance vehicle strives to achieve but with various interpretations and applications. The paper investigates, and draws insights from, three cases: the Global Energy Efficiency and Renewable Energy Fund (GEEREF), the Climate Public Private Partnership (CP3), and Climate Investor One (CI1). The paper concludes with a proposed research agenda that can assist in enhancing the potential for blended finance.

I. Introduction

Over the past 30 years, climate change has evolved from a science problem (e.g., how do we prove it?) to an economic problem (e.g., how do we account for emissions externalities?) to a finance problem (e.g., how do we manage risk and get capital where it's needed?). Climate science today is well developed and capable of measuring, analyzing, and assessing what we do and do not know about the causes and consequences of climate change (Levin et al. 2012). With the scientific consensus on the anthropogenic contributions to rising global temperatures solidifying in the 2000s, the international community has shifted its focus to designing and implementing solutions, particularly through market-based mechanisms of the 1997 Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC).[1] Market-based mechanisms work on the principle that assigning property rights to greenhouse gas (GHG) emissions and creating a market for them will enable emission reduction in the most efficient way (Bernstein 2002). Accordingly, national and sub-national governments have turned to market-based policies, principally emissions trading and carbon tax (World Bank 2019a). These efforts, despite their significance, are vastly inadequate to stop or reverse current trends in GHG emissions, especially if they enable only voluntary or incentive-based mechanisms domestically (Bernstein 2002; Ball 2018). Furthermore, the costs of wind and solar power have come down drastically,[2] making emissions trading and carbon tax less critical for decarbonization.

Today, climate change is increasingly understood as a capital allocation problem that arises from a significant mismatch between the supply of and demand for financing for low-carbon and climate-resilient projects and programs. This problem is particularly acute in developing and emerging countries that have significant GHG growth potential and/or are at high risk for climate-related disasters. Recognizing the widening financing gaps and the urgency to fill them, the international community is now actively exploring ways to align financial flows with the requirements of the Paris Agreement of the UNFCCC in order to limit global temperature increase to well below 2°C while pursuing efforts to limit the increase to 1.5°C.

Blended finance, a structuring mechanism that strategically uses public and/or philanthropic capital to catalyze additional private capital and increase private investment, has emerged as a promising solution to help deliver the goals of the Paris Agreement and achieve the Sustainable Development Goals (SDGs). For example, blended finance has been promoted as a tool that can mobilize trillions of dollars of private capital using billions of dollars of official development assistance (ODA) [3] – known as the "Billions to Trillions" agenda in the international development community (African Development Bank et al. 2015). As blended finance has gained traction in the past few years, various research endeavors have assessed the principles and characteristics of blended finance, either promoting or questioning its promises (Convergence and Business & Sustainable Development Commission 2017; IFC et al. 2018; OECD 2019b; Tonkonogy et al. 2018; Andersen et al. 2019; Eurodad 2013; Attridge and Engen 2019; Jenkins 2018; Runde, Savoy, and Milner 2018; Kapoor 2019; Meltzer 2018; Kenny 2019). Given the various perspectives proposed around blended finance, there is a great need to collect and connect what has been argued in principle and implemented in practice, and identify common themes to serve as a basis for

1 The three market-based mechanisms under the Kyoto Protocol are: emission trading, joint implementation, and clean development mechanism (CDM).

2 For example, between 2009 and 2018, the cost per unit of electricity from onshore wind and photovoltaic (PV) solar power plants has dropped about 70 and 90 percent, respectively (Lazard 2018). As of 2019, prices for typical PV power plants in the US are at parity with the cost of deploying and running a new combined cycle turbine plant burning cheap shale gas (Brandily 2019).

3 ODA is defined as government aid designed to promote the economic development and welfare of developing countries. ODA may be provided bilaterally, from donor to recipient, or channeled through a multilateral development agency. ODA includes grants, "soft" loans (where the grant element is at least 25 percent of the total) and the provision of technical assistance.

future discussions on blended finance's potential to realize climate impacts in developing countries.

Attention thus far has largely focused on volumetric contributions of blended finance, partly because of the quantitative financial targets set by the international community. What is often missing is a qualitative assessment of blended finance that examines the processes and mechanisms through which sources of capital are mobilized and operationalized. Having a clearer picture of the internal governance configuration of blended finance vehicles and their investment strategy will greatly facilitate efforts to assess and determine additionality, scalability, and transformative impact of climate finance. Only then can public and private actors effectively determine the ways to mobilize, structure, and coordinate flows of climate finance towards sustainable and decarbonized development pathways at scale.

Against this backdrop, this paper assesses blended finance by focusing on five themes: changing features of climate finance, governance of blended finance, transparency, additionality, and transformative impact. Through selected case studies, published data, and expert interviews,[4] the paper aims to raise issues and questions that can help frame a research agenda, which in turn can assist in setting the right course and expectations for blended finance.

What follows is a background on the requirements for decarbonization and the definition, characteristics, and role of blended finance in meeting those. The paper then assesses each theme by way of three case studies. In so doing, we investigate how flows of capital are organized and directed through blended finance and consider implications from current practice. The final section offers conclusions and proposes directions for future research.

1. Requirements for Decarbonization

Delivering the Paris Agreement and limiting temperature increases to below 1.5°C requires achieving net-zero carbon dioxide (CO_2) emissions by 2050 (IPCC 2019b; Sachs, Schmidt-Traub, and Williams 2016).[5] The 1.5°C scenario also involves deep reductions in non-CO_2 emissions, including methane, nitrous oxide, black carbon, and aerosols from agriculture, waste, and other sectors (IPCC 2019b). The largest sources of global GHG emissions are energy production (approximately 35 percent) and agriculture, forestry, and other land uses (23 percent) (IPCC 2014; 2019a).[6] Within the energy sector, most emissions originate from generation of electricity that is, in turn, used in other sectors (Victor et al. 2014).

The decarbonization transition cuts across all sectors and requires drastic changes to the status quo. Under the 1.5°C scenario for energy systems, renewables are projected to supply 70 to 85 percent of electricity in 2050. By 2060, the power sector would have to be virtually decarbonized, with 98 percent of power generation coming from low-carbon sources and the use of coal close to zero percent (IEA 2017; IPCC 2019b). Industries would also need to reduce CO_2 emissions by 65 to 90 percent in 2050 (IPCC 2019b). These figures necessitate more than incremental improvements in energy and process efficiency (IPCC 2019b). Enabling conditions such as strengthened multi-level governance, institutional capacity, policy instruments, technological innovation, and behavioral change must also underpin these transitions. Among these, mobilization and transfer of finance is the linchpin without which progress cannot be made, and involving all types and sources of capital is fundamental to enable the paradigm shift (WEF 2019).

4 All interviews were conducted in confidentiality and the names of interviewees are withheld by mutual agreement.
5 To limit global warming to below 2°C, CO_2 emissions need to decline by about 25 percent by 2030 and reach net zero around 2070.
6 Global CO_2 emissions from land-use change (LUC) are less strongly linked to economic activity and more uncertain due to changes in climatic conditions and constrained input data (Le Quéré et al., 2018). For these reasons, CO_2 emissions from LUC are often considered independently from emissions from fossil fuels and industrial processes.

The gap in global investment in clean energy has been estimated to be multi-trillions of USD in the energy sector alone (Zindler and Locklin 2016). Annual investments in low-carbon energy need to supply USD 1.6 to 3.8 trillion per year globally to 2050 to meet 1.5°C pathways, overtaking fossil investments globally by around 2025 (McCollum et al. 2018). Yet, the flows of climate finance have averaged USD 579 billion in 2017/2018 (Buchner et al. 2019).[7] While this figure represents a 25 percent increase from 2015/2016, it is still considerably insufficient. Realizing a 1.5°C scenario would therefore require a major shift in investment patterns, focusing on catalyzing diverse sources for investment that can match investors' risk-return requirements across an array of asset classes.[8]

Developing countries face an even bigger and more pronounced need for climate financing to transition to low-carbon economies. Developing countries did not play a major role in contributing to climate change in the past, but today they are half of the 20 biggest emitters (UNEP 2018; Friedrich and Damassa 2014). Even on a per capita basis, emissions from upper-middle income countries (UMICs) have been rising steadily over the last decade, with some having per capita emissions comparable to those of industrialized nations (Victor et al. 2014). For this reason, even in the case where developed countries stopped all emissions by 2050, warming would still exceed 2°C by the end of the century if developing countries carried on as usual (Marchal et al. 2011). It is critical, therefore, to place developing countries on a development pathway that decouples the connection between income generation and GHG emissions experienced with economic development in the past.

Implementing necessary climate actions in developing countries requires financial, technological, and other forms of support to build capacity, and for which additional resources need to be mobilized (IPCC 2019b). Emerging markets will need at least USD 23 trillion in investment between 2016-2030 just to meet their Nationally Determined Contributions (NDCs), which are country-driven targets set to reduce emissions and adapt to the impacts of climate under the Paris Agreement (IFC 2016a). Yet, direct government funding is scarce, and public, financial, institutional, and innovation capabilities currently fall short of implementing far-reaching measures at scale (IPCC 2019b). To narrow the investment gap and shift current and projected "business-as-usual" (BAU) investments, developing countries will have to mobilize additional financing from new sources.

The choices developing countries and investors make over the next decade – a period over which trillions of USD will be invested in the world's energy and urban systems (The New Climate Economy 2018) – will play a major role in determining the future course of the global climate system. Industrial economies have already become locked into fossil fuel-based systems through a path-dependent process (Unruh 2000). This condition, termed "carbon lock-in," emerges through a combination of systemic forces that perpetuate fossil fuel-based infrastructures in spite of their externalities and the apparent existence of cost-effective remedies (UNEP 2019; Bulkeley, Broto, and Edwards 2014; Pierson 2004). In order to pre-empt carbon lock-in in emerging and developing countries, investments today need to account for their long-term carbon consequences. Investments that fail to do so will make avoiding

7 In 2017/2018, the vast majority of tracked finance flowed towards activities for mitigation, accounting for 93 percent of total flows. Adaptation finance made up 5 percent, while finance with both mitigation and adaptation benefits accounted for 2.1 percent.

8 Decarbonizing an investment portfolio is not synonymous with investing massively in low-emission infrastructure. While most attention on low-carbon transition focuses on stimulating niche innovations and facilitating mass production of renewable technologies, it is equally important to understand and enact the destabilization and decline of fossil fuel-based systems. Otherwise, risks associated with stranded assets, such as fossil fuel power generation and supply infrastructure, can emerge (Geels 2014; CPI 2016; CPI 2019). For example, despite rapid shifts to renewables in the power sector, there is no decline in annual power-related CO_2 emissions because of the longevity of the existing stock of coal-fired power plants that account for 30 percent of all energy-related emissions today (IEA 2019). Over the past 20 years, Asia has accounted for 90 percent of all coal-fired capacity built worldwide, and in developing economies in Asia, existing coal-fired plants are just 12 years old on average and capable of operating for decades to come (IEA 2019). Therefore, the effectiveness of climate investments would be drastically compromised unless carbon-intensive investments are also significantly reduced and phased out, perverse fossil fuel subsidies are removed, and environmental externalities arising from fossil fuel use are internalized.

catastrophic climate outcomes more expensive, technologically challenging, or even impossible within the timeframe of 2050 to 2070 (Sachs, Schmidt-Traub, and Williams 2016; UNEP 2019; Rockström et al. 2017).

2. Blended Finance

The term "blended finance" has become a buzzword in recent years in the climate and development finance community. The activities associated with blended finance, however, have been around for several decades in economic development (e.g., World Bank/IMF 2005; GEF 2019). Structuring investment deals with a mixed portfolio of public and private funds to mitigate risks and increase private investment has been a common practice for major multilateral development banks (MDBs) and development finance institutions (DFIs). The European Union (EU) was also an early active player, creating structured mechanisms and blending platforms since 2007 (Pereira 2017a). This practice, however, was not labeled blended finance at the time. Some called it a "public-private partnership" or "public-private synergy" while others simply called it a "financial mechanism" (development practitioner, correspondence with author, August 15, 2019; Zhang and Maruyama 2001; GEEREF Front Office 2017).

Efforts to leverage private funds using public funding for climate projects also existed in the 1990s, yet those efforts often faced difficulties with producing intended outcomes. For example, when the Global Environment Facility (GEF) was established in 1992, the UNFCCC looked to the GEF to provide the incremental cost[9] to leverage private funds for climate-related projects (Zhang and Maruyama 2001). A GEF performance study, however, found that there was comparatively little mobilization of capital, and the private sector's involvement was limited to providing procured equipment and advisory capacity (GEF 1998). The barriers identified included the private sector's low awareness of the GEF, a lengthy approval process, the possible disclosure of business information, and vague tangible benefits for private investors from their partnership with the GEF (GEF 1998).

The SDGs, the Paris Agreement, and the Addis Ababa Action Agenda, all launched in 2015, triggered concerted efforts to engage and mobilize the private sector in a much more strategic and proactive manner. Major international institutions, including the Organization for Economic Cooperation and Development (OECD) and the DFIs/MDBs, established a common set of principles, governance framework, and roadmap on blended finance, such as the OECD DAC Blended Finance Principles, the Governance Frameworks for the DFI Enhanced Principles, and the Tri Hita Karana Roadmap for Blended Finance (G20 International Financial Architecture Working Group 2017; IFC et al. 2018; OECD 2018c; African Development Bank et al. 2017).

Despite gaining traction, blended finance lacks a common definition. For the purpose of this paper, and based on the principles and definitions proposed thus far,[10] we define blended finance as the strategic use of concessional and non-concessional public and/or philanthropic capital to catalyze additional private capital that would otherwise not be available for climate investments in developing countries. Well-functioning blended finance vehicles achieve climate impact while delivering appropriate risk-adjusted financial returns for investors. The use of public and/or philanthropic capital should be temporary, since the ultimate goal of blended finance is to facilitate sector development, market building, and a regular flow of private investment in developing countries by providing confidence,

9 The incremental cost refers to the difference between GEF interventions and the BAU scenario. The incremental cost defines the role for the GEF in the context of the expected global environmental benefits from a proposed project (GEF 2007).

10 OECD (2018) defines blended finance as the "the strategic use of development finance for the mobilization of additional finance towards sustainable development in developing countries." In comparison, the DFI Working Group's (2018) definition refers specifically to "combining concessional finance from donors or third parties alongside DFIs normal own account finance and/or commercial finance from other investors, to develop private sector markets, address the SDGs, and mobilize private resources." IFC (2019) defines blended finance as an approach by donors that mixes or aligns official development finance or philanthropic monies with private capital to mitigate risk, rebalance risk-reward profiles, and achieve development impact.

capacities, and track record (OECD 2018c; IFC et al. 2017).

The logic behind blended finance is simple. Private investors[11] are often reluctant to invest in technologies and systems whose risk-adjusted returns cannot be confidently estimated due to high perceived and real risks.[12] In developing countries, risk uncertainty is greater due to immature local financial markets, information asymmetries, currency fluctuations, and political risk (OECD 2018b). In response to these risks and constraints, public actors and philanthropic investors can use a range of approaches to alter expected returns, including financial instruments (e.g., equity, loans, mezzanine instruments, guarantees, or grants) and mechanisms to structure or intermediate instruments (e.g., funds, syndication, securitization, or public-private partnership) to crowd-in private finance (OECD 2018b). By improving the investment's risk-return profile through catalytic capital, blended finance can make projects with climate impact commercially investable.[13]

Blending is not always the most effective or sustainable route for increasing the investments needed in developing countries (UNCDF 2019; IFC 2018). For example, some projects or sectors are best funded by public finance alone, such as the provision of many forms of basic infrastructure, research and development (R&D) expenditure for innovative technology, and strengthening the enabling environment. Other projects can be financed by private or commercial investments alone, in which case providing scarce public funding is not an appropriate measure. Blended finance is also not the solution to long-term structural issues where permanent subsidies are called for, as the ultimate goal is to create a self-sufficient and well-functioning market (IFC 2018; IFC et al. 2017). Therefore, blended finance should be used where projects cannot be structured on a fully commercial basis and when institutional and market failures prevent involvement of the private sector (IFC et al. 2018).

Blended finance transactions have grown rapidly over recent years, with the majority launched after 2009 and having mobilized USD 140 billion to date.[14] Despite growth in numbers, blended finance has yet to reach its full potential. In particular, blended finance's record on leveraging additional capital has been mixed. For example, a dollar of development funding deployed has been shown to mobilize less than 1 dollar to more than 20 dollars of private capital (WEF 2016). In another study, each dollar of public investment from MDBs and DFIs in blended finance has mobilized only 75 cents of private investment in low-income countries (LICs) and middle-income countries (MICs) (Attridge and Engen 2019). Another assessment of MDB financing indicates that a dollar of MDB financing crowded in 80 cents of private capital in 2016. This figure drops to 12 cents of private capital if only direct mobilization is considered (Blended Finance Taskforce 2018).

Energy and financial services are the most frequent target sectors for blended finance. Renewable energy accounts for the majority of the energy transactions, reflecting the alignment between project finance and blended finance and highlighting the role of blended finance in creating financing structures that are attractive to investors (Figure 1; Convergence 2019). The increasing number and popularity of blended finance vehicles correspond to their growing importance in the financial market, particularly in the

11 For the purpose of this paper, private investors can be classified as institutional investors (pension funds, insurance companies, investment funds, endowments, and sovereign wealth funds) and commercial banks.
12 For a comprehensive review of risks and barriers associated with investing clean energy in developing countries, refer to Tonkonogy et al. (2018).
13 Even when blended finance is needed, its use should be limited and with minimum concessionality to help develop commercial markets that are sustainable (IFC 2018: IFC et al. 2017). This approach allows one to minimize the opportunity cost incurred for other uses of catalytic capital and the possibility of crowding out the domestic financial sector in the host country or creating a moral hazard situation for the private sector that may cause long-term damage to domestic markets.
14 One estimate reports that 92 percent of blended finance transactions were launched between 2006-2019, particularly after 2009 (Convergence 2019).

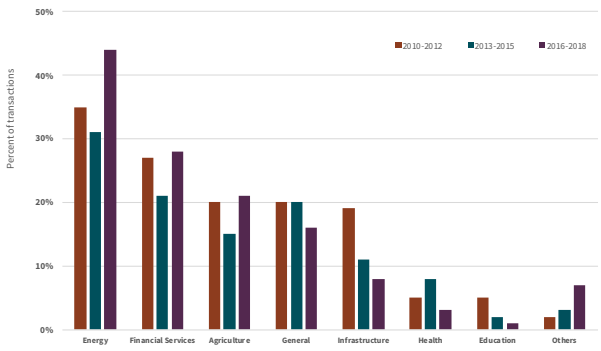

Figure 1. Blended finance transactions by sectors (2010-2018)
Source: Convergence (2019)

climate finance arena where the window of opportunity to achieve net-zero emissions by mid-century is closing fast. The challenges and limitations of blended finance, nonetheless, highlight the need to reassess the landscape, governance, and flow of finance to understand these gaps and support improvements in knowledge, information, and implementation.

3. Case Studies

This paper investigates three blended finance vehicles as a qualitative assessment of the current landscape. The three cases are: 1) the Global Energy Efficiency and Renewable Energy Fund (GEEREF), 2) the Climate Public Private Partnership (CP3), and 3) Climate Investor One (CI1) (Table 1).

GEEREF was conceived in 2006 and launched at the end of 2008 by the European Commission to mobilize private investments for RE/EE projects in developing countries.[15] GEEREF is a public-private partnership fund-of-funds (FoF) with a total size of EUR 222 million. In light of a general lack of equity finance for small projects, GEEREF has addressed this gap by providing capital for private equity funds to finance projects requiring up to EUR 10 million of equity financing (Behrens, Bird, and Fischer 2009).

Table 1. Comparative Chart of Cases

Case	Sector	Target countries	Catalytic financing sources	Financing structure
GEEREF	Renewable energy and energy efficiency (mitigation)	DAC list of ODA recipients,* with priority in countries with an environment conducive to private sector engagement	European Union, Governments of Germany and Norway	Fund-of-funds
CP3	Low-carbon climate resilient sectors (mitigation and adaptation)	DAC list of ODA recipients	Governments of United Kingdom, Canada, and Norway	Fund-of-funds (Catalyst Fund) Direct investment (Asia Climate Partners)
CI1	Renewable energy and energy efficiency (mitigation)	70 percent low-income countries and lower middle-income countries, and 30 percent upper middle-income countries	Government of the Netherlands, European Union, Green Climate Fund, Nordic Development Fund, and USAID	Operationally linked Development Fund, Construction Equity Fund (with three capital tiers), and Refinancing Fund

* The Development Assistance Committee (DAC) List of ODA Recipients shows all countries and territories eligible to receive ODA. These consist of all low- and middle-income countries recognized by the World Bank, with the exception of G8 members, EU members, and countries with a firm date for entry into the EU. The list also includes all of the Least Developed Countries (LDCs) as defined by the UN (http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/daclist.htm).

15 GEEREF was launched as a direct follow-on from the Patient Capital Initiative (PCI), which had been launched in 2004 in the context of the Johannesburg Renewable Energy Coalition. The aim of the PCI was to promote renewable energy in developing countries, targeting projects of a size that did not normally attract commercial investors. The PCI's structure was to provide equity with return requirements that were delayed in time or lower in profitability than normal commercial thresholds (Behrens, Bird, and Fischer 2009).

CP3 was launched in 2012 by the Government of the United Kingdom (UK) to increase low-carbon climate resilient (LCCR) investments that span climate mitigation and adaptation in developing countries. As an innovative investment platform to deliver UK's ODA, CP3 has participated in two private equity funds as an equity investor: the Catalyst Fund with a size of USD 418 million and the Asia Climate Partners with a size of USD 447 million.

CI1, initiated by the Dutch Development Bank FMO, closed its final fundraising in June 2019. CI1 is a capital-recycling facility focused on delivering renewable energy infrastructure projects in developing countries in an accelerated manner. CI1 develops, constructs, and operates these projects through its whole-of-life financing solution.[16] With a size of USD 850 million, CI1 established itself as one of the world's largest blended finance platforms and significant renewable energy development and financing initiatives for developing countries.

All three blended finance vehicles aim to mobilize additional private capital and investments into underlying climate mitigation projects in developing and emerging countries, particularly in the renewable energy and energy efficiency (RE/EE) sectors.[17] The vehicles concentrate on mature, proven technologies – such as solar, hydro, and on-shore wind – with a downward cost-of-energy trend. These cases were selected because they illustrate distinct and innovative structures, with sizable investment portfolios and targets, as subsequently explored. The level of detail in assessment depends on the availability of data, which inevitably varies across cases. Each case provides an explanation of how blending has been applied, focusing not only on the sources and the amount mobilized, but also the financial structure, terms of financing, and decision-making processes of the vehicle.[18]

II. Blended Finance: Five Themes

1. Changing Features of Climate Finance

The increasing promotion and applications of blended finance is changing the features and configurations of the climate finance landscape. In alignment with concerted efforts by major international institutions on blended finance, as explored in Section I.2, donor governments and philanthropies are also actively refining key policies and approaches to blended finance. What had been a direct grant-based approach to deliver public benefit became more layered and complex (development practitioner, correspondence with author, August 15, 2019). Furthermore, because donor governments and philanthropies often blend capital with private investors through intermediaries, the climate finance landscape is now crowded with diverse actors, including DFIs, MDBs, and other platforms managed by third parties. With these institutional developments, we also observe an increasing degree of devolution of authority and decision-making power taking place – from donor countries, philanthropies, and private investors to intermediaries and fund managers – on critical aspects of blended finance structuring, transactions, and implementation. As a result, the delivery chain of climate finance is lengthening and thickening, with increasingly less control over investments by investors. In this section, we observe this phenomenon through the case studies.

16 The CI1 model was developed within the Global Innovation Lab for Climate Finance (the Lab) in 2014-2015 and was among the first four Lab instruments to receive development support and endorsement (The Lab 2019).
17 CP3 is an exception, as it has a wider scope that encompasses both climate mitigation and adaptation. However, adaptation makes up only 2 percent of the CP3 portfolio (CPI and LTS International 2018).
18 For each case, information was drawn from publicly available sources and interviews with experts and key stakeholders. Due to the limited detail provided in public documents, this paper was not able to assess the entire portfolio or internal operations of all three cases. The project portfolios of GEEREF and CP3 were assessed to the extent possible, while CI1, as a newly launched vehicle, has not advanced enough to have an extensive portfolio. For CI1, ex-ante assessment on indicative and target investment was prioritized to determine its implementation and impact potential.

Through CP3, the UK government sought to demonstrate a new approach to deliver its ODA and work with the private sector to deliver climate finance (UK DFID 2012). CP3 is a joint initiative of the Department for International Development (DFID) and the Department of Business, Energy and Industrial Strategy (BEIS) of the UK, funded by the UK's International Climate Finance (UK DFID 2016).[19] Nonetheless, the UK was largely "hands-off" on investment choices and the management of CP3 in order to ensure that investment decisions would be on a purely commercial basis (UK government official, correspondence with author, September 12, 2019; UK DFID 2012). Instead, experienced fund managers – such as the International Finance Corporation (IFC) Asset Management Company (AMC) and a consortium of the Asian Development Bank (ADB), the Japanese diversified financial services group ORIX Corporation, and the Dutch asset management firm Robeco – manage the Catalyst Fund and the Asia Climate Partners, respectively.

The Catalyst Fund and the Asia Climate Partners of CP3 have different structures. While the Catalyst Fund is a FoF that invests in LCCR private equity funds that in turn invest in projects, the Asia Climate Partners carries out direct investments in companies and projects, giving investors relatively more direct control over investments than the Catalyst Fund (CPI and LTS International 2018). For its activities, CP3 brought together an ecosystem of institutions supporting LCCR investments in emerging markets. CP3 has mobilized more than 90 public investors and 140 private investors, including the GEF, the Overseas Private Investment Corporation, Bank of China, General Insurance Corporation, the Grantham Foundation, and Banco Agricola (Figure 2; CPI and LTS International 2018).

Similar to the UK with its approach to CP3, the EU, Germany, and Norway allocated their ODA to GEEREF rather than providing finance directly to the target groups. As the Catalyst Fund does, GEEREF engages in creating funds to invest monies across a range of private equity managers (Wang et al. 2013). GEEREF originally intended to invest both in funds and directly in projects, but it eventually invested exclusively in funds to utilize the FoF structure's ability to finance more projects and build capacity for first-time fund managers (GEEREF Front Office, correspondence with author, September 18, 2019). The GEEREF Front Office (GFO), housed within the European Investment Bank (EIB), handles daily operations of GEEREF.

The FoF structures used by the Catalyst Fund and GEEREF are particularly relevant to the lengthening and thickening of the climate finance delivery chain in a vertical manner. A FoF structure consists of three levels – the top tier that pools capital of public and private investors; the middle tier of sub-funds, regional funds, or investee funds that attract additional co-investors; and the bottom tier of projects supported by equity and debt finance (Figure 2). This structure allows investors to efficiently deploy sizeable amounts of capital through one vehicle, and helps them gain exposure to, and learn about, unfamiliar sectors and geographies by delegating investment responsibility to an experienced FoF manager (Ahmad and Klein 2014). Therefore, with this structure, the Catalyst Fund and GEEREF could attract several investor classes at multiple levels, creating a highly diversified portfolio of projects (Monk and Provaggi 2013).

19 UK International Climate Finance refers to collective resources from DFID, BEIS, and the Department for Environment, Food and Rural Affairs (Defra) committed to support developing countries to respond to climate change. CP3 forms part of the UK's contribution to the pledge made by developed countries to mobilize USD 100 billion of climate finance a year by 2020.

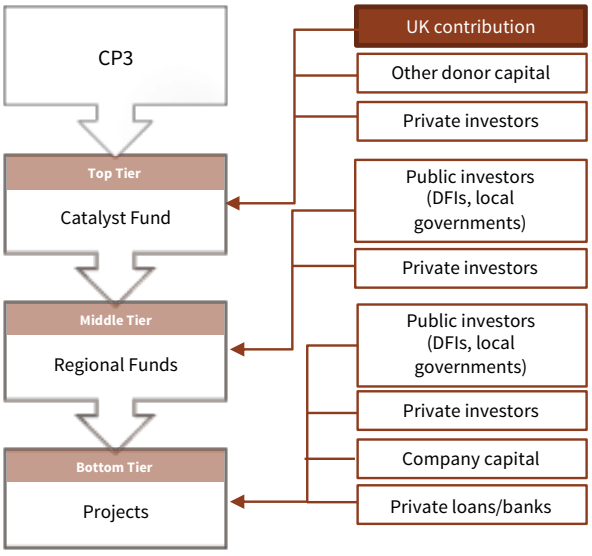

Figure 2. Stylized representation of the Catalyst Fund as a FoF
Source: Author compilation based on CPI and LTS International (2018). Asia Climate Partners and the Technical Assistance Facility have been omitted for the purpose of this figure.

CI1 demonstrates that the delivery chain of climate finance can extend horizontally as well. As a facility that encompasses separate funds that are operationally linked, CI1 offers financing for the entire lifecycle of a project, from design to construction and into operations through a post-construction refinancing (Figure 3). For example, the Development Fund managing a pipeline of projects is funded with donor capital, while the Construction Equity Fund is composed of three tiers of capital to attract multiple investor classes, including commercial and institutional investors, DFIs, and donor governments (see Section II.2 for more details). This innovative structure, therefore, attracts a diverse set of investors grouped and aligned with the risk profile of the different project life stages, while also enabling coordinated and timely deployment of capital (Climate Fund Managers, correspondence with author, May 2, 2020).

Climate Fund Managers, a newly formed intermediary, spearheaded the design and implementation of this structure. As a non-discretionary manager, Climate Fund Managers monitors and reviews the performance of CI1 and makes recommendations regarding investments to each fund within CI1. Climate Fund Managers adds further value by making use of in-house expertise on engineering, ESG, and financial structuring (Climate Fund Managers, correspondence with author, December 10, 2019). Authority and decision-making power on structuring, transactions, and implementation, therefore, have been delegated from public and private investors to intermediaries, such as IFC AMC, GFO, and Climate Fund Managers.

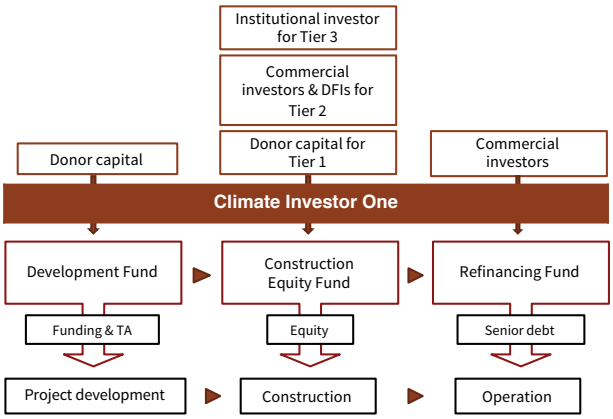

Figure 3. CI1 Financing Structure
Source: Author compilation based on Climate Fund Managers, correspondence with author, December 10, 2019.

Despite the advantages of bringing in more actors and their financial and non-financial contributions, these new structural features of blended finance introduce a different set of risks. For one, the lengthened and thickened value chain provides less control over investments for investors, making donor countries wary of diluting the original mandate (CPI and LTS International 2018; see UK's contribution in Figure 2). Second, each layer of the chain adds fees and illiquidity. Finally, tracing and monitoring financial flows and outcomes become more challenging as the delivery chain grows longer (OECD 2018b), possibly hindering the efforts to enhance transparency of blended finance practice, as explored in Section II.3.

Therefore, as blended finance enjoys rising popularity, it is experimenting with innovative financing structures, delegating authority and decision-making power that used to be exercised solely by donor countries and

investors and bringing in actors who have traditionally been at the periphery of the climate finance landscape. These changes, in turn, are changing the configuration and features of the climate finance delivery chain, affecting the management of, and the real and perceived transparency of, blended finance. The impact and implications of these shifts in investment trends of climate finance, therefore, need to be further assessed.

2. Governance of Blended Finance Vehicles

With the proliferation of intermediaries, the question of governance becomes more paramount. Specifically, it is useful to understand the parties involved, the terms and conditions under which they blend their capital and the decision-making processes they agree to undertake. This section delves into the three vehicles in detail to examine how they tackle questions of governance and identify common themes and lessons.

Global Energy Efficiency and Renewable Energy Fund (GEEREF)

GEEREF was set up as an independent legal entity, registered as Luxembourg-domiciled SICAV, SIF.[20] By establishing GEEREF as a separate entity, the European Commission avoided creating top-heavy and expensive structures, while facilitating necessary management and control options (Commission of the European Communities 2006). Accordingly, GEEREF does not have a separate fund manager and is instead managed by the GEEREF Board. The Board has delegated final investment decisions to the Investment Committee, which consists of seven members from public and private sectors.[21] The European Investment Fund (EIF) is the advisor to the Board and the Investment Committee and recommends proposals to the Investment Committee for approval. The European Investment Bank (EIB) is the sub-advisor, responsible for identifying and recommending investment opportunities as well as portfolio monitoring (GEEREF Front Office, correspondence with author, September 18, 2019; Commission of the European Communities 2006). The EIB's regional offices also provide accessibility to local knowledge and expertise (GEEREF Front Office, correspondence with author, September 18, 2019).

GEEREF's day-to-day operations, including fund screening, due diligence, and monitoring activities, are led by the GFO. In doing so, GFO is supported by the EIB Group, which consists of the EIF and the EIB. The EIF and the EIB play an advisory and operational role, building on each organization's complementary expertise in fund investment and global clean energy investment, respectively. Both the EIB and EIF services are consulted throughout the investment approval process (Figure 4; Table 5 in Annex).

GEEREF was launched in 2008 with funding from the EU (EUR 78 million), Germany (EUR 24 million) and Norway (EUR 10 million), totaling EUR 112 million.[22] The financial crisis in 2008-2009, however, triggered a highly unfavorable investment climate for fundraising from private investors. The situation necessitated that GEEREF wait until 2013 to initiate its fundraising, which was completed in May 2015 (GEEREF Front Office, correspondence with author, September 18, 2019; Green Climate Fund 2017). Delays in private fundraising, nonetheless, gave time for GEEREF to commit to a first group of six funds and allowed fund managers to build their portfolio and track record on the ground, facilitating site visits and interviews by investors by the

20 SICAV is a type of open-ended investment fund in which the amount of capital varies according to the number of investors (Monk and Provaggi 2013). The use of a separate legal entity is common practice in the risk-capital sector, which structures investments in special purpose vehicles.
21 The Investment Committee consists of public investors and technical experts, each from the European Commission, Germany, and Norway, as well as an additional independent member with market expertise, as requested by private investors (GEEREF Front Office, correspondence with author, September 18, 2019).
22 EU invested an additional EUR 20 million in GEEREF in early 2019, but those EUR 20 million were used not to fundraise but to invest directly in funds (GEEREF Front Office, correspondence with author, January 8, 2020).

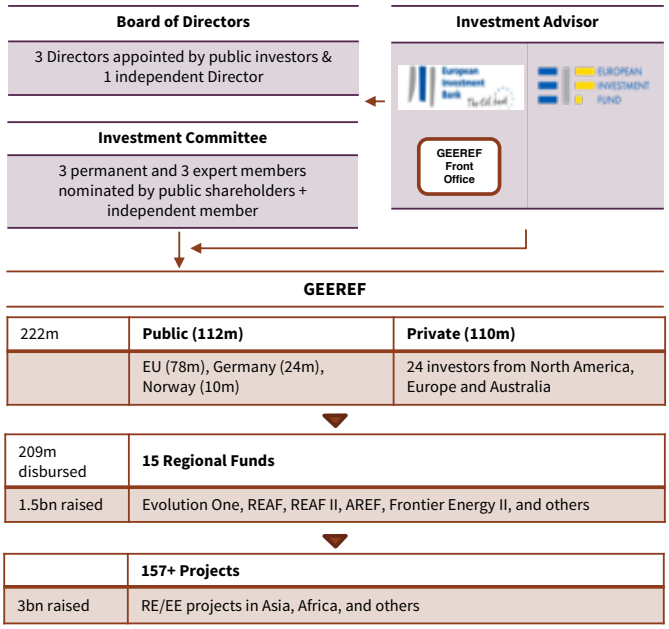

Figure 4. GEEREF Governance Structure and Volumes of Co-investment. Monetary values are in Euros.
Source: Author compilation based on Annual Impact Report, the GEEREF website, and GEEREF Front Office, correspondence with author, January 17, 2020.

time the fundraising took place (GEEREF Front Office, correspondence with author, January 8, 2020).

Although many considered it a flagship vehicle, GEEREF still faced difficulties attracting investors due to a combination of risks associated with the FoF structure, construction and operation of RE/EE projects, investing in developing and emerging countries, and the long-term investment horizon (GEEREF Front Office, correspondence with author, September 18, 2019). As a result, GEEREF approached 964 private investors during the two-year fundraising period and got 24 of them, approximately 2.4 percent, to commit (Green Climate Fund 2017). The 24 private investors – a diversified group of asset managers, family offices, and pension funds in Australia, Canada, Europe, and the US – committed EUR 110 million, bringing the total size of GEEREF to EUR 222 million.[23]

By the end of 2019, GEEREF had disbursed EUR 209 million to 15 funds, which in turn raised a total of EUR 1.5 billion for their own respective funds. These funds, in turn, raised more than EUR 3 billion for project financing, with 20 percent from fund managers; 17 percent from other, mostly private investors; and 63 percent from DFIs, national development banks, and private local banks (GEEREF Front Office, correspondence with author, January 8, 2020; GEEREF Front Office 2017).

To overcome the risk aversion and regulatory constraints of private investors, the investment-return structure of GEEREF offered private investors priority on reflows and a preferred return (Figure 5). In GEEREF's return structure, private investors or B unit-holders are repaid first and receive an initial preferential reflow of +4 percent per annum (Steps 1 and 2). Further reflows go to public investors or A shareholders until they have received their invested capital back (Step 3). Private investors receive a second preferred distribution of +6

23 EUR 110 million (including EUR 10 million from the EIB) that were raised over a two-year period from 24 private investors were against the original target of EUR 112 million (Green Climate Fund 2017).

percent per annum until a pre-established threshold (Step 4). After this point, 95 percent of remaining distributions are allocated on equal terms between A shares and B units as final reflows, with 5 percent of remaining distributions allocated as carried interest to the EIF (Step 5) (GEEREF Front Office, correspondence with author, September 18, 2019; Monk and Provaggi 2013).

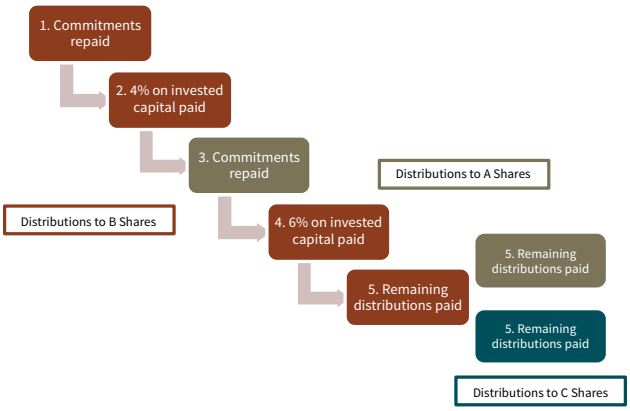

Figure 5. GEEREF Preferred Distribution of Cash Flows (the "Waterfall")
Source: Author compilation based on GEEREF Front Office, correspondence with author, January 17, 2020

GEEREF's approach has been unique in two aspects: First, it has focused on first-time fund managers, working closely with them at each stage of transaction development. This includes deep engagement on terms and conditions to ensure the fund's marketability to private investors, technical review of the fund's environmental and social safeguards (ESS), staff planning to ensure alignment with international best practices, and continuous feedback and monitoring, including site visits when necessary (GEEREF Front Office, correspondence with author, September 18, 2019; GEEREF Front Office 2017). Second, GEEREF has acted as an anchor investor in every fund except one by joining funds before their first close (GEEREF Front Office, correspondence with author, September 18, 2019). These strategic engagements with fund managers and decisions to invest early have greatly facilitated GEEREF's success as a FoF, particularly with respect to ensuring a quality pipeline of projects, as illustrated further in Section II.5.

Climate Public Private Partnership (CP3)

CP3 consists of two separate funds:[24] The Catalyst Fund, a FoF, and the Asia Climate Partners, which carries out direct investments in companies and projects (Figure 6). The UK has allocated GBP 110 million of equity investment in both the Catalyst Fund (GBP 50 million or USD 80 million) and the Asia Climate Partners (GBP 60 million or USD 100 million). As of 2019, the Catalyst Fund had invested in 12 funds[25] that received co-investment of USD 1,800 million. At the project level, the 12 Catalyst Fund portfolio funds, together with the Asia Climate Partners, had invested in 102 projects (98 from Catalyst Fund, four from Asia Climate Fund), which in turn received USD 6,274 million co-investment (see Tables 8 and 9 in Annex for CP3 portfolio). The majority (71 percent) of co-investment came from private sources (CPI and LTS International 2018).

The Catalyst Fund raised capital from eight investors, including the UK as an anchor investor. Others include the governments of Canada and Norway, the Japan Bank for International Cooperation, IFC, two private pension funds from Australia and Germany, and the sovereign wealth fund of Azerbaijan. Meaningful initial commitments from public-sector investors, albeit on commercial terms, enabled successful fundraising from commercial sources (Ahmad and Klein 2014). The Catalyst Fund held its final close at USD 417.8 million in 2014 and closed its investment period in 2018 (UK DFID 2019b).

The Asia Climate Partners, with the UK as an anchor investor, raised capital from ADB (USD 100 million), ORIX, Bank of Tokyo Mitsubishi, Sompo Japan, Pacific

24 In addition to the investments in the private equity funds, the UK Government allocated GBP 19 million to a partially revolving technical assistance facility to undertake policy and regulatory initiatives and support schemes for first-time fund managers in LCCR sectors. Under this technical assistance scheme, the GBP 9m Seed Capital Assistance Facility (SCAF) focuses on pipeline development and seed financing for PE funds and project development companies (CPI and LTS International 2018).
25 The UK opted out of four of the 12 investments that did not fit the mandate of CP3 (UK DFID 2019b).

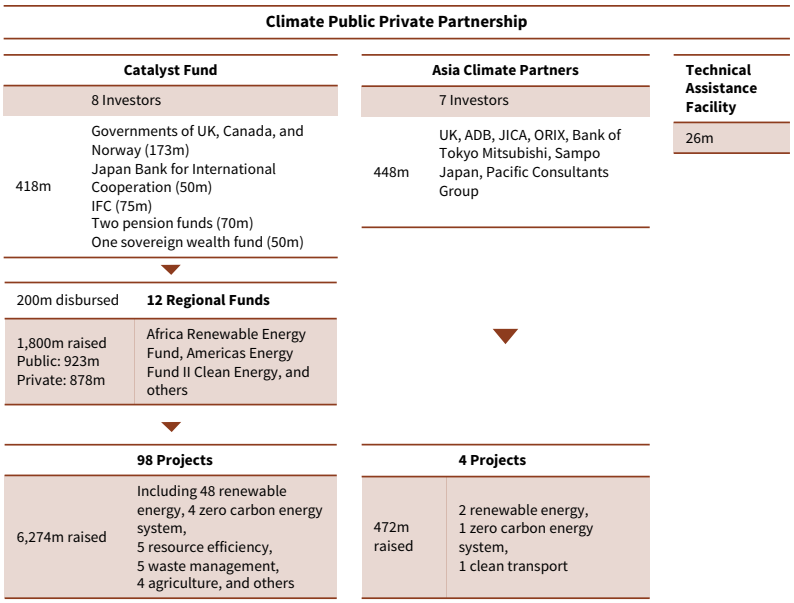

Figure 6. CP3 Governance Structure and Volumes of Co-investment. Monetary values are in USD.
Source: Author compilation based on UK DFID (2019a; 2019b), CPI and LTS International (2018), and Ahmad and Klein (2014).

Consultants Group, and the Japan International Cooperation Agency (JICA), reaching financial close in May 2017 at USD 448 million (UK DFID 2019b). This figure was significantly lower than the targeted USD 750 million set in 2012, which was already revised down from the original target size of USD 1.5 billion (UK DFID 2019b; 2019a). The failure to reach its original target was attributed to four reasons: First, the Asia Climate Partners was managed by a consortium of fund managers who had not worked together; second, the target size of the fund was too ambitious; third, market environment was difficult for a fund launch; and fourth, fund jurisdiction in the Cayman Islands prevented some investors from participating (UK DFID 2019a).

Even after launching, the Asia Climate Partners faced challenges related to investment. The investment period for the Asia Climate Fund came to an early end in 2018. This earlier-than-anticipated termination of investment period was attributed to various factors, including the rapidly changing landscape of renewable investments (UK government official, correspondence with author, September 12, 2019; CPI and LTS International 2018). Investment in renewable energy increased dramatically in Asia after the launch of CP3, and evidence from the Asia Climate Partners and other investors indicate that it was increasingly difficult to secure opportunities in the rapidly growing and competitive markets (UK DFID 2019b; CPI and LTS International 2018).

As the chief architect of CP3, the UK provided part of the impetus that led to the creation of the funds, approaching ADB and IFC as potential partners and managers (CPI and LTS International 2018; UK government official, correspondence with author, September 12, 2019). The design and launch process of CP3, however, was not without challenges. In fact, CP3 had a very long gestation period, taking more than 10 years to operationalize from the initial idea (UK government official, correspondence with author, September 12, 2019). Nonetheless, CP3 was launched in 2012 with a unique governance structure that involves two funds, each with an MDB with a strong on-the-ground presence. CP3 capitalizes on the fact that MDBs are strategic investors and can play a catalytic role given their development mandate (Brown and Jacobs 2011). The business case of CP3 also acknowledges that having a reputable MDB on board is critical to doing business in emerging markets, particularly in the case of infrastructure (UK DFID 2012). All Catalyst Fund

investments, for example, follow IFC's policies with regard to ESS, integrity due diligence, and other matters (Ahmad and Klein 2014).

From the beginning, CP3 was designed to run on a commercial basis with no public sector interference in decision making in order to attract private sector investors (UK DFID 2012). Therefore, all investors – both public and commercially oriented – invest *pari passu* (i.e., public sector contributions are invested on equal terms and suffer losses at the same time as private investments). The IFC AMC did consider the potential benefits of including a subsidy in the Catalyst Fund's waterfall, but decided against it, because they wanted a greater private sector leverage impact and determined that private investors are not accustomed to that type of structure (Ahmad and Klein 2014).

Although the UK's involvement was kept to a minimum in the management of CP3, the UK could secure more influence than other limited partners (LPs) through a series of discussions related to the conception and operation of CP3, such as negotiations of the limited partner agreement (LPA), the advisory board meetings, and the annual meetings of LPs. The UK shaped CP3's mandate, which focuses on developing markets and LCCR. The UK's involvement also influenced the target countries. For example, CP3 does not invest in Russia, which does not qualify for UK's ODA. The Catalyst Fund also excludes India and China to avoid duplication of efforts and enhance additionality (UK government official, correspondence with author, September 12, 2019).[26] For CP3 activities, the UK has ensured that stringent monitoring and evaluation (M&E) criteria be included, and that the best ESG practice was mainstreamed (UK government official, correspondence with author, September 12, 2019).

Climate Investor One (CI1)

In 2019, after a successful two-year fundraising period and four previous closes, CI1 raised beyond its original target of USD 530 million, following a notable investment by the Green Climate Fund (GCF). The Ministry of Foreign Affairs of the Netherlands, the EU, the Nordic Development Fund, and the United States Agency for International Development (USAID) also provided cornerstone support, which was augmented four-fold by capital committed on commercial terms from twelve institutions from Africa, Europe, and the UK (Climate Fund Managers, correspondence with author, September 19, 2019; The Lab 2018). With a final close at USD 850 million in June 2019, the facility established itself as one of the world's largest blended finance facility and significant renewable energy development and financing initiatives for developing country investments (Climate Fund Managers, correspondence with author, May 2, 2020; FMO 2018).

Climate Fund Managers, a joint venture between FMO and a South African infrastructure investment company Sanlam InfraWorks, manages CI1. The three funds that comprise CI1 are the Development Fund, the Construction Equity Fund, and the Refinancing Fund, each tailored to finance a stage in the project's lifecycle: development, construction, and operations, respectively (Figure 3; Table 2). CI1 generates its own proprietary pipeline through the use of the Development Fund before advancing projects to the Construction Equity Fund for construction financing. The Refinancing Fund provides post-construction operational debt to projects. The whole-of-life financing structure under a single management is intended to overcome several market barriers associated with project finance, including the lack of access to development capital and the complexity of project structuring at the construction phase.

26 Because the Asia Climate Partners' geographical scope covers India and China, the Catalyst Fund was mandated to exclude those two countries. However, the exclusion of the Catalyst Fund investing in India and China (with UK capital) was temporarily lifted in January 2014 due to delays in initiating the Asia Climate Partners. The temporary lifting of the exclusion was so that the Catalyst Fund could consider opportunities in China and India that might otherwise have been foregone. The exclusion was reinstated on 31 December 2014 to mitigate the risk of doubling up UK capital investment in Indian and Chinese funds when the Asia Climate Partners became operational (UK DFID 2019b).

The Development Fund is a development financing and technical assistance vehicle that provides financial assistance of up to 50 percent of development costs, enabling the developer to focus less on capital raising and more on core project development activities. Development costs include, but are not limited to, feasibility studies, scoping studies, financial modeling, legal support, and impact assessments. The Construction Equity Fund provides financing to the project company in the form of equity for the construction phase. The Fund can finance up to 75 percent of project funding needs, removing the need for the project company to source debt during the construction phase and enabling the project company to move into construction quicker with a simpler and more robust capital structure (Climate Fund Managers, correspondence with author, May 2, 2020). The equity investment is financed by all three tiers of capital in a defined proportion of 20/20/40 from Tier 1, Tier 2, and Tier 3, respectively (Climate Fund Managers, correspondence with author, May 2, 2020; Table 2). Return of income and investment capital from an investment is allocated to the Tiers in accordance with a waterfall (Figure 7).

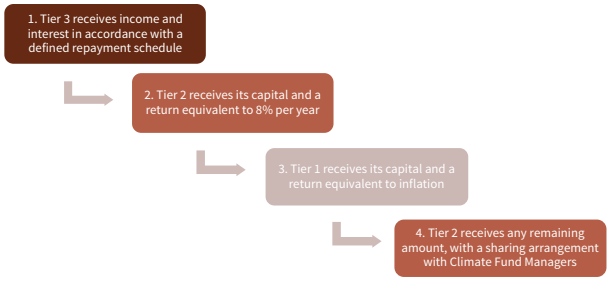

Figure 7. CI1 Construction Equity Fund Waterfall
Source: Climate Fund Managers, correspondence with author, May 2, 2020.

Having a tranche structure provides a distinct risk-return profile for each Tier of capital and specifically gives the Tier 2 tranche investors an acceptable risk-return combination. Without the provision of Tier 1 capital, Climate Fund Managers viewed that the investment proposition would be considered too risky for mainstream commercial capital, given the higher risk target markets that CI1 is seeking to address, especially at the construction stage of a project's lifecycle (Climate

Table 2. CI1 Financing Structure and Capital Sources

	Size (USD)	Capital Source and Structure
Development Fund	50m	Donor capital in the form of reimbursable grants. The development funding provided to the project company is repaid when the construction commences. Once repaid, the capital is then reinvested in the next project development. The Development Fund seeks capital preservation and not profit.
Construction Equity Fund	800m	**Tier 1** (160m from donor capital) Tier 1 holds a junior equity position, absorbing a higher portion of risk and acting as the principal enabler to attract commercial capital. All Tier 1 funding is routed through the Development Fund, which is the sole investor in the Tier 1. This structure allows donors, who also provide indirect political risk protection with their status, to easily invest and provide catalytic capital to both the Development Fund and the Construction Equity Fund.
		Tier 2 (320m from commercial investors and DFIs) Tier 2 is an ordinary equity tranche, which is risk-enhanced by the first loss role of Tier 1. Tier 1 effectively provides limited downside protection to Tier 2 investors at a hurdle rate threshold.
		Tier 3 (320m from institutional investors) Tier 3 is a senior equity tranche that provides investors with a guaranteed return, backed by a guarantee issued by an Export Credit Agency. This is the most senior ranking tranche and is designed for investors with no or minimal prior investment experience in developing markets.
Refinancing Fund	800m	Yet to be established.

Source: Author compilation based on Climate Fund Managers (2019) and author correspondence with Climate Fund Managers, May 2, 2020.

Fund Managers, correspondence with author, December 10, 2019; Green Climate Fund 2018). Furthermore, by having this structure, investors, particularly those in Tier 3 of the Construction Equity Fund, can gain an understanding of new markets and build track record, shared knowledge, and experiences that can reduce real and perceived risks in developing markets. Climate Fund Managers anticipated that these investors, based on the exposure and experience, may find subsequent climate finance and emerging-markets investments more compelling than they would have without the CI1 experience (Climate Fund Managers, correspondence with author, December 10, 2019).

The Refinancing Fund plans to provide long-term senior debt instruments during the operational phase to optimize project structures, reduce the cost of capital, and replenish the Construction Equity Fund. Once constructed and operational with stable cashflows, the Refinancing Fund will provide debt as a partial refinancing to the project company (Climate Fund Managers, correspondence with author, December 10, 2019). This Fund plans to provide access to stable operating investments for investors who seek yield-only type investments without development or construction risks. The introduction of the Refinancing Fund at project company level will result in a release of capital back to the Construction Equity Fund. This process ensures that the Construction Equity Fund is replenished and retains the ability to finance further projects. Remaining equity will be directed back to the Construction Equity Fund upon sale of the asset with any capital gains achieved on the investment. The Refinancing Fund, once raised, will complete the lifecycle financing concept of CI1.

The governance structure of CI1 has been designed to ensure appropriate supervision and investor representation in each Fund, to guarantee adequate expertise, as well as to create alignment of interest and control (Green Climate Fund 2018). Climate Fund Managers makes recommendations regarding investments to each Fund, and the Investment Committee of the respective Fund decides whether to proceed. In this model, each Fund and the members of the Investment Committee assume the overall responsibility of such investment decisions. Two separate Investment Committees have been established for the Development Fund and the Construction Equity Fund, respectively, to ensure independence and avoid conflict of interest (Figure 8; Climate Fund Managers, correspondence with author, September 19, 2019).

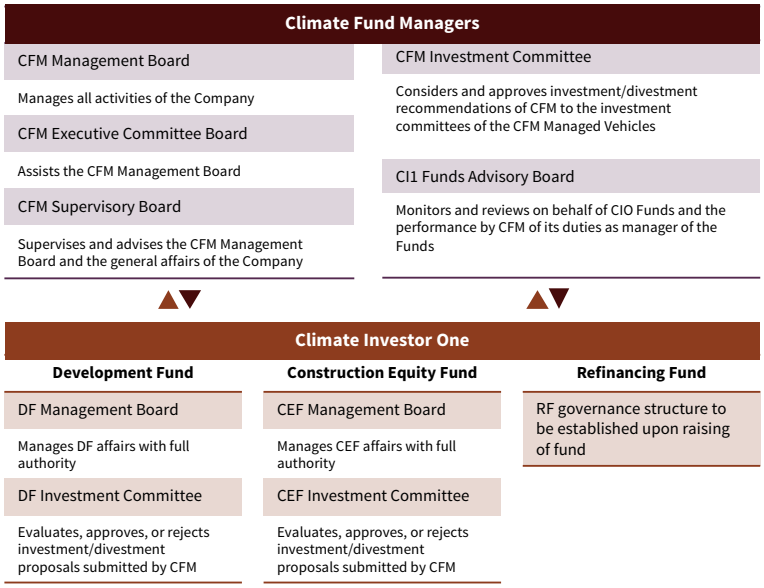

Figure 8. CI1 Governance Structure.
Source: Author compilation based on Climate Fund Managers, correspondence with author, March 13, 2020.

Lessons from Governance: Non-financial Contributions, Size and Timing of Commitments, and Alignment of Interests

We identify three lessons based on the assessment of governance:

1. The presence of and endorsements by well-established donor countries and reputable MDBs can have a substantial risk-mitigating effect because of their expertise, knowledge, and track record of experience with developing countries. For example, the UK participation in the design, capitalization, and governance of CP3 and the IFC AMC and ADB presence created comfort for other investors (UK government official, correspondence with author, September 12, 2019; CPI and LTS International 2018). The highly established donor status of Germany and Norway and the expertise of the EIB Group for GEEREF, and the participation of FMO, the Government of the Netherlands, and the European Union for CI1 had a similar effect of providing comfort and confidence for private investors. Public and philanthropic actors can also play a role in alleviating the potential imbalance in investments, because their investments tend to be driven by considerations of geographical or sectoral balance, as well as principles such as equity and fairness.[27]

Relatedly, the involvement of established donor countries, MDBs, and multilateral climate funds can have far-reaching and systemic consequences of enforcing ESG standards. The donor and development communities require funds and projects that benefit from their contributions to follow strict ESG standards. For example, GEEREF requires that its underlying funds and projects satisfy the EIB Environmental and Social Standards throughout the process, from initial stages to the final project development and execution (GEEREF Front Office, correspondence with author, January 17, 2020). Further, the ESG requirement contributes to the dissemination of related standards and the creation of new policies and capacities to support the implementation. ColdEX, a refrigerated transport company in India, selected the Asia Climate Partners of CP3 to develop its environmental and social management system (ESMS) and ESG systems (CPI and LTS International 2018). Commercial investors also increasingly recognize that structuring ESG components into an investment reduces the risk profile of investment and can serve as an effective risk mitigant in immature and nascent markets (Climate Fund Managers, correspondence with author, December 10, 2019). Therefore, by familiarizing themselves with and implementing ESG standards and requirements imposed by blended vehicles, private sector investors can better understand risks and actively protect their current and future investments.

2. The size and timing of commitment can determine the survival and effectiveness of blended finance vehicles. The size of early commitments by the UK as an anchor investor for CP3, for example, provided credibility with private investors, facilitated initial conversations around fundraising, and enabled the Catalyst Fund and the Asia Climate Partners to reach their first close (UK government official, correspondence with author, September 12, 2019; CPI and LTS International 2018). Relatedly, for CI1, the Dutch bank FMO provided institutional support to get CI1 off the ground, and the Government of the Netherlands provided bridge capital to source initial investments (Climate Fund Managers, correspondence with author, December 10, 2019). While not an anchor investor, GCF and its sizeable contribution to CI1 unlocked further funding capacity and commitment from commercial and institutional investors, significantly contributing to CI1's fundraising beyond its original target (Green Climate Fund 2019). The GCF's participation has also helped CI1 map specific markets of focus in terms of geographical area (Green Climate Fund 2019).

3. Blended finance inherently necessitates that stakeholders with different mandates and interests collaborate, potentially creating an

27 Based on experience with private climate finance to date, including from CDM (Wang et al. 2013; OECD 2014).

underlying tension and possible trade-offs in investment decisions. On one hand, private investors in CP3 initially expressed wariness about investing with the public sector due to potential political interference and onerous restrictions on commercial operations (UK government official, correspondence with author, September 12, 2019; CPI and LTS International 2018). This corresponds to other experiences where the involvement of public funds is often confronted with bureaucracy and a lengthy process of project identification and approval for funding (Zhang and Maruyama 2001). On the other hand, public investors noted the difficulty of working with commercially oriented stakeholders, especially when funds run into challenges (UK government official, correspondence with author, September 12, 2019). Commercial investors also have a stronger bias toward enforcing rights and legal protections than their donor co-investors (Climate Fund Managers, correspondence with author, May 2, 2020). Although regular communications can resolve tension among stakeholders, it is more important to prioritize and secure the alignment of interests from the beginning, particularly in preparation for external factors that create commercial pressure. The design phase of a blended finance vehicle, therefore, needs to address and institute a strong mechanism that can attract the right type of investors and mitigate possible tension. A well-balanced investment committee and regular involvement of the LPs, together with frequent reiteration of the core pillars of alignment of interest, can help manage this (UK government official, correspondence with author, September 12, 2019; Climate Fund Managers, correspondence with author, May 2, 2020).

In sum, these cases show that blended finance is not simply about mixing public and private resources into a structured financial instrument. Rather, it involves a range of actors working together to design and implement effective governance structure, facilitate fundraising, identify the target sectors and countries, and ensure that the activities are aligned with their respective objectives. Therefore, managing a blended finance investment to fruition can be complicated, fraught with coordination challenges and transaction costs (Snyders and Currey 2018). This section has demonstrated how success can be achieved, highlighting a different set of capacities and skills of each stakeholder and the alignment of interests among them.

3. Transparency

Climate finance flows through a system that makes it extremely difficult to track (Varma et al. 2011; Brunner and Enting 2014). Furthermore, climate finance data tend to be of low quality, fragmented, and unverified (Clapp et al. 2012; Stadelmann, Michaelowa, and Roberts 2013). While there are a number of significant endeavors that track and document sources of climate finance and their ex-ante investment targets,[28] the actual disbursement of capital through ex-post investment data, portfolio information, and impact data is relatively undisclosed and under-investigated. Blended finance for climate impact is no exception. The level of transparency is low in blending, particularly with respect to investment and impact data, because blended finance transactions are commercial in nature and often involve complex financing arrangements. This is problematic because without proper information disclosure and evaluation, it is difficult to determine accountability, effectiveness, and efficiency of blended finance. This section explores the current status of transparency in blending and how the cases correspond to or counter the trend.

Blended finance exhibits low levels of transparency. An assessment of more than 500 blended finance transactions shows that nearly 40 percent do not publicly disclose impact outcomes at any interval (Convergence 2019). For those that do, the most common medium is an annual report (28 percent). Only 14 percent of blended finance transactions to date

28 For example, OECD's work on tracking climate finance, CPI's Global Landscape of Climate Finance series, and Climate Analytics' Tracking Climate Finance series. For private finance accounting, see Stadelmann, Michaelowa, and Roberts (2013).

have published a baseline study, and 10 percent have published a final evaluation (Convergence 2019). Above all, self-reported data and evaluation cannot be taken as definitive evidence (Carter, Van de Sijpe, and Calel 2018). The lack of publicly available impact data, the dearth of independent baseline and evaluation studies, and the resultant lack of vibrant knowledge sharing can raise questions about the effectiveness and added value of blended finance and suggest significant room for improvement.

There are a number of reasons for the relatively low levels of transparency in blending. The blended finance transaction is commercial in nature, and many DFIs are subject to national legal frameworks that do not allow them to publish names of investee companies (Lonsdale, Seghers, and Dodd 2019). Furthermore, as illustrated in Section II.1, blended finance has attracted greater degrees of intermediation, complex financing arrangements, multi-layered capital structure, and a number of new players. For these reasons, monitoring financial transactions and climate impacts has become highly complicated.

A lack of transparency is problematic because it impedes measuring and determining the effectiveness and efficiency of blended finance in meeting the global goals and commitments. A paucity of return data on blended finance transactions, particularly for the commercial layers of capital, can also be a hindrance to attracting new investors into the field (Savoy and Milner 2018). Investors often cite both the lack of transparency of past transactions and a proven track record when deciding not to get involved (private investor, correspondence with author, September 25, 2019). For these reasons, the need for greater availability of information on the transactions and impact of blended finance projects, including ex-post evaluations, has been repeatedly emphasized (OECD 2018b; Jenkins 2018; Blended Finance Taskforce 2018).

Transparency has implications on accountability as well. Because blended finance brings together stakeholders with different goals and interests, tensions can emerge from balancing financial risk/return and climate outcomes. If not managed effectively, these sets of different pressures can expose projects to certain integrity risks. Integrity risks are defined as the risk of engaging with external institutions or persons whose activities may have adverse reputational and financial impact (Jenkins 2018). Evaluations of blending have generally overlooked these risks, focusing instead on issues such as value for money, financial barriers, and financial additionality (Jenkins 2018). As blended finance initiatives vary greatly in their composition, strategies, and approaches, as shown in Section II.2, it is important to consider integrity and other risks at various stages of raising and disbursing capital.

Enforcing stringent M&E can be one way to mitigate these risks. M&E measures the impact of projects on the ground and identifies deviations during the implementation phase. M&E also performs other useful functions, such as enabling accountability or collecting data that should allow for the correction of any deficiencies and for the improvement of future projects (Pereira 2017). Enhanced level of transparency not only facilitates fulfilment of investors' fiduciary duties, but also enables oversight by civil society, competitors, and beneficiaries to reduce the risk of fraud, bribery, and embezzlement (Le Houérou 2019). Studies have also shown that companies that disclose more information enjoy increased investor confidence, particularly for long-term value creation (DeBoskey and Gillett 2013; Firth, Wang, and Wong 2015; Principles for Responsible Investment and United Nations Global Compact 2016).

The cases in this study exhibit some degree of transparency. Through dedicated websites, annual reports, M&E reports, and other publicly available documentation such as funding proposals submitted to the GCF, the cases disclose information on their target geography, sectors, actors involved, ESG impact, investment strategy, and/or project portfolio. For example, GEEREF's ESG performance, required by the EIB Environmental and Social Standards, is reported in annual impact reports (GEEREF Front Office, correspondence with author, January 17, 2020).

GEEREF's portfolio data available on the GEEREF website and annual impact reports indicate that GEEREF has invested in 15 funds across Africa, Asia, Latin America, the former Soviet Union, and Middle East & North Africa (MENA), with more than 157 RE/EE projects, creating over 3 GW of new clean-energy generation capacity (Table 6 in Annex). GEEREF focused on DAC countries due to the nature of ODA capital from Germany and Norway (GEEREF Front Office, correspondence with author, September 18, 2019). Funding went to DAC countries with appropriate policies and regulatory frameworks on RE/EE that created an environment conducive to private sector engagement (GEEREF Front Office 2019; Table 7 in Annex). All portfolio data are collected annually from GEEREF's fund managers and analyzed by the GFO.

CP3 has uniquely published a mid-term M&E report to generate evidence for impact and synthesize lessons learned for DFID and BEIS. Climate Policy Initiative (CPI) and LTS International have been contracted as M&E agents to CP3 over a four-year period between 2014 and 2018 (CPI and LTS International 2018). The objective is to re-focus and adapt elements of CP3 where necessary, and to inform similar projects undertaken by other donors or under other funds (CPI and LTS International 2018).

The CP3 portfolio has made 102 investments in companies and projects as of 2019 (UK DFID 2019b; Tables 8 and 9 in Annex). The portfolio is much more concentrated on mitigation than originally anticipated, with adaptation making up only two percent of the CP3 portfolio (UK DFID 2019b). Nonetheless, CP3 investments have produced development impacts that exceeded expectations, deploying 3,989 MW of renewable energy capacity, creating 8,758 jobs, and reducing 4.5 million tCO_2 emissions (CPI and LTS International 2018). In terms of the geographic focus, the CP3 investment portfolio is significantly skewed towards lower middle-income countries (LMICs) and LICs, with the combined total of 47 percent, compared to global trends of 8 percent (CPI and LTS International 2018; Escalante et al. 2018). Regionally, investments have strongly focused on Asia with 35 percent of the total capital invested, followed by Africa (26 percent), the Middle East (16 percent), Latin America (10 percent) and companies headquartered in developed markets with intent to expand to developing markets (12 percent) (CPI and LTS International 2018). The investment strategy that guides CP3's investment decisions does not provide direction about which objective should be prioritized in terms of technology or development impact, or even between returns and wider climate and environmental impacts (CPI and LTS International 2018). This approach, in turn, may have contributed to the diverse composition of the portfolio.

CI1 has yet to have extensive investment-portfolio data given its recent launch. Nonetheless, CI1 has published specific investment strategy, criteria, and restrictions as publicly available information (Table 10 in Annex). For its portfolio, CI1 plans to diversify across renewable energy technologies with a primary focus on wind, solar, and run-of-river hydro. CI1 will invest in a range of developing countries across Africa, Asia, and Latin America with an optimal balance among risk, return, and impact (Green Climate Fund 2018). Investments are targeted based on certain geographical distribution, with no more than 25 percent of aggregate fund capital into one country, no more than 40 percent in each of Africa, South and Southeast Asia, and Middle and South America. In terms of income level, CI1 is mandated to allocate 70 percent in LICs and LMICs and 30 percent in UMICs (Green Climate Fund 2018).

Upon full deployment of capital, CI1 is expected to deliver an estimated 1,700MW of additional capacity, generating approximately 5,100 GWh of electricity per annum, serve in the region of 13 million people, and avoid GHG emissions by 1.9 million tCO_2 or equivalent per year (Climate Fund Managers 2019). With the Development Fund and the Construction Equity Fund fully operational, CI1 has invested in the development of a number of projects, with four assets having received construction financing as of early 2020: Cleantech Solar, currently a 137MW pan-Asia commercial and industrial (C&I) rooftop solar platform; Africa Hydro Holdings, a

42MW run-of-river hydro project in Uganda; Tra Vinh Wind Power Company, a 48MW near-shore wind project in Vietnam; and Red Sea Power, a 59MW wind project in Djibouti (Climate Fund Managers, correspondence with author, December 10, 2019).

As these cases illustrate, transparency and data accessibility are beginning to emerge among blended finance vehicles, though reporting standards remain insufficient and incoherent. Project-level reporting, as opposed to fund-level reporting, is still highly limited. Due to the relative lack of disclosed project information, blended finance projects are considerably less transparent than projects funded using other forms of ODA (TUDCN 2016). Deeper and more actionable blended finance data would help donors and investors justify and increase their participation, improve M&E, and drive investment at scale. Increased transparency and consistency in reporting would also better elucidate the current and potential role of blended finance, and enhance the understanding of the effectiveness and success rates of such efforts.

4. Additionality

Additionality is an easy concept to understand but difficult to operationalize (Escalante et al. 2018; Carter, Van de Sijpe, and Calel 2018). Simply put, an investment is additional when it demonstrates a strong deviation from a counterfactual or BAU scenario (Escalante et al. 2018). In blended finance, additionality is defined by key financial and non-financial inputs brought by blended vehicles to make the project or investment happen, make it happen much faster than it would otherwise, or improve its design and/or climate impact (African Development Bank et al. 2018). Accordingly, additionality is one critical indicator for determining the effectiveness and value of an intervention. In this section, we delve into the definition and operationalization of additionality in blended finance.

Additionality can be delineated into two categories: financial additionality and value, or non-financial, additionality. Financial additionality describes a situation where an intervention is providing a form of finance that the market would not (OECD 2016). For example, if the private investor would not have engaged without public-sector or philanthropic involvement, the intervention can be considered financially additional. Financial additionality is often the determinant for blended finance, because based on the definition of blended finance, an intervention would not be considered as blended finance if it fails to establish some degree of financial additionality. Furthermore, given the limited amount of ODA and philanthropic contributions, financial additionality is the subject of most external commentary and political salience, as well as the cornerstone of global financing for development and climate strategy (Carter, Van de Sijpe, and Calel 2018; African Development Bank et al. 2015). The exclusive focus on financial additionality, however, may risk reinforcing the tendency to emphasize quantity-oriented, transaction- and project-based perspective rather than the quality-oriented intervention aimed at systemic changes that are required for transformative impact.

Achieving value additionality may be equally important, particularly from the decarbonization perspective. Value additionality in this context refers to inputs that are additional in value that the alternative financiers would not offer, and that will lead to better climate or systemic outcomes.[29] In other words, if the intervention increases the climate impact of a project or its potential to replicate or scale up relative to the BAU scenario, the intervention can be considered as additional in value (UKAN 2015).[30] Value additionality in blended finance can include, among other things, strong ESS,

29 European Bank for Reconstruction and Development (EBRD)'s Evaluation Department (2018) acknowledges broader interpretations of additionality that go beyond financial dimensions and bring in MDB influence on the design and functioning of the project, but also notes that these interpretations have never been universally accepted.

30 Under the Kyoto Protocol, the (CDM) project would be considered additional if "anthropogenic GHG emissions are reduced below those that would have occurred in the absence of the registered CDM project activity" (UNFCCC 2005, Paragraph 43). In this context, CDM's additionality was determined solely by the GHG emissions avoided with respect to the baseline.

institutional change, standard-setting, capacity building, potential for market creation, or other positive externalities (OECD 2016; Table 3).[31]

Contributors of value additionality are not limited to donor governments and philanthropic investors. Private investors in blended finance transactions bring more than their capital, although discussions on engaging the private sector to materialize public goods often stop at the volume of financing that can be leveraged. For example, private investors' expertise and networks play critical roles in meeting the investment demands in developing and emerging countries. The private sector also embodies the urgency with which it deals with money, hence the ability for rapid growth in blended finance deals (Savoy and Milner 2018). This is particularly relevant to the time-sensitive nature of infrastructure and energy projects and their carbon lock-in effects.

The objective of blending determines where the intervention should target in terms of particular geographic locations and sectors. If the objective of blending is to achieve the greatest financial additionality, then investing in UMICs and HICs would not achieve that goal and may even risk crowding out existing private capital in the market, because financial additionality would be low in countries that already have robust private sectors (Escalante et al. 2018). Instead, financial additionality would be much higher in regions where the BAU scenario is difficult to attract

Table 3. Types and Examples of Financial and Non-financial Additionality

Types of additionality	Examples
Financial	Offering better terms, longer maturities, countercyclical finance, lower price, subordination, holding riskier portfolios, and guarantees to enhance returns and reduce risks.
Non-financial	
Standards	Promoting high environmental, social, and governance standards in investee companies, financial institutions, funds, and at industry level.
Market building	Strengthening policy environment, supporting ecosystem and market infrastructure, generating market data, and supporting industry research.
Demonstration	Supporting innovation pacesetter to de-risk new business models and attracting capital in lower-income, fragile countries and frontier markets that are not yet able to attract significant level of commercial capital.
Public good-oriented mandate	Targeting sectors and geographic locations that have the greatest GHG mitigation potential and/or climate adaptation benefits.
Knowledge	Strengthening the quality of the investment model and technology, increasing the capacity of local partners, facilitating technology transfer, and publicly sharing experiences and learning beyond project boundaries.
Signaling	Providing a stamp of approval and credibility, attracting other investors, and acting as honest broker.
Inclusivity	Influencing design to reach traditionally neglected market segments, reducing inequalities, improving local participation, and generating employment.
Aggregation	Supporting projects at regional or global level by aggregating opportunities and diversifying risk.

Source: Author compilation based on Koenig and Jackson (2016), EBRD Evaluation Department (2018), and OECD (2016).

31 For instance, EBRD has applied the concept of the demonstration effect as one of the bank's criteria to appraise transformational impacts of climate-related projects the bank invests in. The EBRD's criteria on demonstration effect include the effect of new products (e.g., new energy- efficiency tools and services), new ways of financing, and new laws and compliance with them (Kato et al. 2014).

private investors because of country-specific real or perceived risks.

A trade-off between financial and value additionality may be necessary, however, if the objective is climate mitigation and decarbonization. Even if blended finance partially displaces private capital, investing in MICs with high growth potential of GHG emissions and growing energy demand would not only be highly justifiable but also preferred if the intervention shifts the emissions trajectory and avoids significant carbon lock-in. In other words, if blended finance interventions successfully change the nature of investments by enforcing stringent requirements that shift the investment pattern to be more compatible with decarbonization, then the objective of blended finance has been met, even if it was at the expense of financial additionality. The case studies illustrate tensions that emerge from balancing financial and value additionality. All of them strive to achieve the biggest climate mitigation impact. Yet, both GEEREF and CP3 target MICs with a relatively favorable investment environment, while CI1 has an explicit target of allocating the majority of its finance (70 percent) to LICs and LMICs.

Value additionalities, such as demonstrating project viability and accelerating market evolution, can also significantly improve future transactions, even in immature markets and high-risk contexts where the scope for mobilization can be limited (OECD 2018a). For example, one of the objectives of CP3 is to prove that climate investments can be profitable (UK DFID 2012), signaling CP3's intention to achieve a significant demonstration effect to other investors. Notably, the CP3 M&E Report determined that GEEREF investments may have been more additional to the market and more impactful for fund managers than CP3, because some of GEEREF's funds – Armstrong, REAF II, and AREF – later received investments from the Catalyst Fund of CP3, indicating that GEEREF came in at an earlier stage (CPI and LTS International 2018). With its focus on LICs and LMICs, CI1 is also likely to provide demonstration effect and learning opportunities to improve future transactions. In these cases, there may be a trade-off between the ability to mobilize additional capital and scalability in terms of future transactions. CI1's investments may have a limited leverage effect and co-financing ratio given its geographic focus, but they can contribute to changing the risk perception and market conditions, as well as provide learning opportunities for future transactions. Investments, therefore, can aim to alter risk perception by investors through value additionality, creating a greater catalytic effect on subsequent investments.

Determining additionality is highly complex and multi-dimensional. Therefore, when determining the effectiveness of blended finance, it is important to assess the comprehensive framework that goes beyond volumetric financial contributions. As the cases illustrate, depending on the objective and targeted geography, trade-offs can take place among financial additionality, value additionality, and scalability. Exclusive focus on the leverage ratio and financial additionality can easily miss the qualitative aspects of blended finance, including its role in creating self-sustaining markets in sectors and countries with the largest potential for impact.

5. Transformative Impact

Transformation, defined as the altering of fundamental attributes of a system (IPCC 2012, 564), is a fundamental objective of blended finance. The ultimate goal of blended finance is to create or transform markets so that the impact of the intervention is sustained or enhanced without the use of public and/or philanthropic contributions. Scaling and replicating successful climate finance interventions can be an efficient and effective way to achieve transformation.[32] This section examines the interpretations and applications of scaling in the context of transformation for decarbonization, and explores

32 Replication refers to activities that explicitly attempt to reproduce a specific intervention in a different location(s). Scaling-up and replication are not the same, but might overlap. In some cases, replication can be one step to achieve scaling-up of a project or program, whereas in other cases replication involves completely different processes from scaling-up (Kato et al. 2014).

strategies to address one of the persistent barriers to investment at scale.

Scaling can have multiple meanings and applications. Scaling can range from a goal within a single project (e.g., can public money scale the investment for a project by catalyzing private capital?) to an objective that transcends projects (e.g., can a project be scaled into a larger project with bigger impact?). Scaling can also refer to specific activities, including expanding reductions in GHG emissions or energy consumption; increasing revenue generated; mitigating risks; serving more stakeholders; providing more money, assets, goods, and services; and/or expanding geographies (Kato et al. 2014). The interpretation and application of scaling, however, is often limited to the financial size of an intervention (private investor, correspondence with author, September 25, 2019), signaling a strong focus on financial and transaction-level measurements instead of impact-oriented and systemic-level measurements. Scaling can and should mean more than increasing total dollar amounts, because such a focus may narrow attention to increasing the size of investment rather than the quality, verification, and sustainability of its impact.

Two examples – GEEREF and CI1 – illustrate different interpretations and applications of scaling.[33] As a scaled-up version of GEEREF, GEEREF NeXt is currently being operationalized by the EIB Group to continue mobilizing private capital for RE/EE asset class. Using the same FoF structure, GEEREF NeXt plans to make commitments to funds managed by first-time fund managers as well as established fund managers, especially those who have follow-on funds of GEEREF (Green Climate Fund 2017). As GEEREF did, GEEREF NeXt will take an anchor-investor position to catalyze additional resources at the regional fund and project levels. Unlike GEEREF, however, GEEREF NeXt will blend public and private finance at a ratio of 1:2, moving away from GEEREF's 1:1. In other words, for every dollar of public funding, the EIB will seek to raise up to 2 dollars of private capital (Table 4). Although the new ratio between public and private investors provides a relatively smaller first-loss cushion for private investors, this adjustment is based on the lessons learned from operating GEEREF and other factors, such as changes in market condition, increased appetite and interest from the private sector, and the fund managers' higher understanding of the market (GEEREF Front Office, correspondence with author, September 18, 2019). The EIB requested USD 250 million from the GCF and got it approved, making the total target size of GEEREF NeXt USD 750 million. The EIB expects that, by the third or fourth iteration of the GEEREF-type vehicle, public support would no longer be required for RE/EE investments in emerging markets, because by then the business case would be clear and risk-return profile would be comfortable enough for the private sector (Green Climate Fund 2017). Therefore, with the iterations of GEEREF-type vehicle, the EIB expects that the RE/EE market in emerging economies will have been transformed.

Table 4. The GEEREF Financing Structure

	GEEREF (EUR)	**GEEREF NeXt (USD)**
Commitments at the Top Tier Fund Level Public and private commitments	ODA: 112m Private: 110m	GCF: 250m Private: 500m (expected)
Commitments at the Regional Fund Level Total commitments secured by beneficiary funds	1.5bn	4.5bn*
Commitments at the Project Level Total capital employed into clean energy capacity	3bn	30bn*

Source: Green Climate Fund (2017) and GEEREF Front Office (2017)
* Extrapolation based on the multiplier achieved by GEEREF. The calculation is based on deployable capital.

33 For CP3, no fund managers supported by the Catalyst Fund are fundraising for direct follow-on funds, which would be a clear indicator of success for scaling up (M&E Report). The IFC is also in the market-testing stage for a potential follow-on FoF vehicle, albeit with a broader environmental mandate than climate change (UK government official, correspondence with author, September 12, 2019; CPI and LTS International 2018).

CI1's scaling exhibits a deviation from that of GEEREF because it targets different sectors. From the beginning, CI1 intended to be the first in a series of blended finance vehicles focused on providing capital to climate mitigation and adaptation sectors in developing countries (Green Climate Fund 2018). For this reason, and based on the success of CI1 in raising capital, the next vehicle is being developed to address adaptation challenges focusing on water, sanitation, and ocean systems. The new vehicle, Climate Investor Two (CI2), aims to demonstrate that risky and challenging markets can offer new commercial business opportunities to improve water management and boost the health of freshwater and ocean ecosystems (Climate Fund Managers, correspondence with author, December 10, 2019). CI2 has already secured EUR 75 million in cornerstone funding from the Dutch Fund for Climate and Development (DFCD), along with a EUR 160 million commitment for the period 2019-2022 for climate adaptation and mitigation.[34] CI2 is expected to create a USD 50 million Development Fund, a USD 1 billion Construction Equity Fund, and a Refinancing Fund, which will be established at a later date (Climate Fund Managers, correspondence with author, December 10, 2019).

As GEEREF/GEEREF NeXt and CI1/CI2 demonstrate, the interpretation of scaling and replicating can vary. While both are considered scaled-up versions of the initial vehicle, GEEREF NeXt is a follow-on vehicle that focuses on the same sector with a substantial increase in its investment size. CI2 has moved on to an entirely different set of sectors in climate adaptation.

The cases also exhibit diverse approaches to tackling one of the most persistent barriers to climate investment at scale: the lack of a good project pipeline. Investors continue to participate in one-off projects instead of engaging in multiple and/or follow-on transactions, despite the merits of scaling and its potential to achieve transformative impacts. For example, the majority of investors (64 percent) have participated in only one blended finance transaction, while only 20 percent have participated in three or more.[35] In addition to the risks and barriers discussed earlier, investors frequently point to an insufficient pipeline of deals – in terms of number, size, and quality – to explain their decision not to invest in climate projects in developing countries (Fay et al. 2015; Savoy and Milner 2018; private investor, correspondence with author, September 25, 2019). The lack of a good project pipeline is a structural problem stemming from many factors, including the long, politically and technically complex, and financially costly project-preparation period and limited resources for technical assistance (Nnadozie and Jerome 2019). As a result, there is a lot of capital chasing too few projects (private investor, correspondence with author, September 25, 2019; Beal, Dhar, and Young 2018).

It is critical, therefore, to position blended finance within the project lifecycle starting from project origination. Using financing from donors and philanthropies to help prepare projects in a way that attracts more private financing is an ideal mechanism to increase the number and quality of blended finance projects. The cases in this study actively address the challenges associated with securing a pipeline of bankable projects, albeit with limited implications for long-term sustainability and scalability. For example, CP3's GBP 9 million Seed Capital Assistance Facility (SCAF) supported fund managers and companies with their financing and development of early stage projects, although with limited success due to its size (CPI and LTS International 2018). CI1, by having a dedicated fund to generate its own proprietary pipeline, addressed the pipeline challenge, at least for the vehicle itself. Despite not having a dedicated technical assistance facility, GEEREF ensured that first-time fund managers develop quality projects that are aligned with GEEREF's mandate by

34 A consortium of FMO, World Wildlife Fund Netherlands, SNV Netherlands Development Organization, and Climate Fund Managers has won the tender to manage DFCD (Climate Fund Managers 2020).

35 Figure from the Convergence website, as of April 2020 (https://www.convergence.finance/blended-finance).

working closely with and hand-holding managers on various elements ranging from pipeline development to technical review (GEEREF Front Office, correspondence with author, September 18, 2019). The GFO also actively facilitated the strengthening of a project team on the ground by providing non-recurrent resources (GEEREF Front Office, correspondence with author, January 17, 2020). GEEREF's lessons highlight that simply providing technical assistance funding alone cannot solve the pipeline challenge. Only with the effective strategy to develop the pipeline from the project origination phase can blended finance scale as it strives to.

Another fundamental way to ensure long-term sustainability of intervention and lasting impact is by actively engaging with developing countries and aligning financial solutions with their priorities. Some point out that too many blended finance solutions have been implemented without sufficient local involvement from developing countries and with little or poor coordination with national development strategies (Convergence and Business & Sustainable Development Commission 2018; Kapoor 2019). They emphasize that the lack of participation and poor representation of developing country governments in the decision-making processes may not only create an obstacle to ensuring accountability of project funders but also lead to ad-hoc investments with limited scalability (Pereira 2017b; Kapoor 2019). This, however, is not equivalent to blindly advocating for country ownership for blended finance solutions. For instance, private sector solutions that mandate country ownership can give an impression that public officials can micro-manage private projects (climate finance practitioner, correspondence with author, January 17, 2020). Some practitioners also argue that national and local permits, licenses, and authorization requirements provide more than enough control for national and local authorities to ensure alignment with their priorities and plans (climate finance practitioner, correspondence with author, January 17, 2020).

Still, blending should be done within a clear country framework. Blending is designed to address market failures, which are often country specific and require tailored actions (Pereira 2017b; former energy official, correspondence with author, August 5, 2019). Situating blended finance transactions within a programmatic approach – which is a long-term and strategic arrangement of individual yet interlinked projects that aim at achieving large-scale impacts through pooled or platform solutions (GEF 2008; OECD 2018b, 57; 2019a, 55) – can be one mode of reducing processing costs, leveraging economies of scale, and ensuring context-specificity and potential for scalability. For scalability and transformative impact, a delicate balancing act is needed between ensuring that solutions are aligned with national and local regulations, licensing requirements, and long-term country priorities on one hand, and building a functioning market without unnecessary and restrictive regulating authority on the other.

III. Conclusion

Achieving global, national, and local climate mitigation goals requires fundamental changes to the world's infrastructure and energy systems, and the amount of investment needed to facilitate these changes has been extensively documented. Blended finance has emerged as a catalytic tool that can address some of the market failures and uncertainties that are stifling private investment in developing and emerging countries.

Blended finance is not a silver bullet. It is a tool to bring together international and local partners to leverage and direct the flow of capital and other resources to where it is most needed. This paper addresses the under-investigated features and characteristics of blended finance, organized around five themes through three case studies. Our aim is to shift the focus from quantitative assessments to qualitative investigations in order to better understand why and how capital has been mobilized and where it has been targeted. Our findings can be summarized as follows:

1. Blended finance increases the complexity of the climate finance landscape. The landscape has

transitioned from a model of direct investment to a layered mechanism with thicker and lengthened value chains. While these features can leverage additional finance at multiple points, they also have implications on the effectiveness and transparency of climate finance.

2. Blended finance research has been focused on the sources and recipients of investments rather than on the composition, terms and conditions, and decision-making processes governing blended finance vehicles. Understanding how the vehicles originate, structure, and function can help stakeholders maximize impact. The design phase of blended finance vehicles needs to address and institute strong mechanisms to attract aligned investors and mitigate tensions.

3. Transparency of investment and impact data is limited. Other than ex-ante targets and stated aspirations, relatively little is known about where and how investment flows are actually deployed. Measuring inputs is easier than measuring outcomes. Shifting our attention and efforts to the opaque parts of the value chain can improve the quality of M&E, accountability, effectiveness, and scalability of blended finance. Our cases illustrate transparency to a certain degree and exhibit a promising direction for increased data accessibility, although reporting standards vary and inconsistencies arise from the heterogeneity in their approaches to blended finance.

4. It is important to assess blended finance beyond a traditional concept of financial additionality. Due to the quantitative financial targets set by the international community, such as the "Clean Trillions" needed to deliver the Paris Agreement (Ceres 2018) or the less robust but politically agreed goal of mobilizing USD 100 billion per year by 2020 (Brown and Granoff 2018), attention has been focused on volumetric measurements. This leads to our fixation on financial additionality (e.g., USD 100 million leveraged from private investors) at the expense of value additionality (e.g., shifting focus to segments of the market with highest and systemic GHG-mitigation potential). Blended finance, by its definition, should demonstrate some level of financial additionality. However, stakeholders and evaluators should also focus on the value additionality actors bring to the table. Blended finance can facilitate changing the nature of investment so that the investment has more significant and lasting climate impact. A renewed focus, therefore, is needed on the role of blended finance in improving the quality of climate finance.

5. Transformative impact requires interventions that are systemic and well-aligned, and scaling and replicating effective climate interventions. One-off projects or ad-hoc interventions with incremental and short-term impact are insufficient for industrializing economies to avoid carbon lock-in. Scaling should cover more than total dollar amounts leveraged and instead emphasize interventions that alter fundamental attributes of a fossil fuel-based system. The cases illustrate different interpretations of scaling that go beyond the capital mobilized, with focus on different sectors and structures. The cases also show different approaches to address the pipeline challenge, acknowledging the need to contextualize blended finance starting from the project-origination phase within project lifecycles. Aligning blended finance investments with country priorities and institutional frameworks can also be a useful way to reduce transaction costs and ensure long-term and systemic impact.

In sum, a gap still persists between the principles and the practice of blended finance. The role of stakeholders and the governance structures deserve more attention, as they have significant implications on resource mobilization, operation, and investment decisions. Possible trade-offs among the ability to leverage, financial and value additionality, climate impact, and scalability need to be more carefully considered based on the objective of blending. Attention is still focused on how much additional capital can be mobilized through blended finance, when the ultimate goal of blended finance should be about creating or transforming market so that it is self-sustaining with private stand-

alone investment and to permanently shift the BAU emissions scenario to a decarbonized one.

Directions for Future Research

Several research pathways emerge from this paper. First, while this paper has focused on the RE/EE sector, addressing land-use change (LUC) is also highly critical in achieving decarbonization. Emissions from agriculture and LUC account for nearly a quarter of anthropogenic emissions (IPCC 2014), while forests absorb one-third of GHG emissions annually (Pan et al. 2011). Blended finance solutions that address LUC, such as restoration of natural ecosystems or soil carbon sequestration, can not only mitigate GHG emissions but also provide co-benefits such as improved biodiversity, soil quality, and local food security. Financing solutions for LUC increasingly aim at landscape-level investments to reduce transaction costs, enhance the scale and permanence of outcomes, and avoid leakage of detrimental activities outside the project area (Linden et al. 2012). Assessment of innovative blended finance vehicles that target the LUC-related sectors can provide useful and complementary insights from the decarbonization perspective.[36]

Second, information asymmetry among investors, financial intermediaries, and project developers, and challenges in securing a pipeline of good-quality projects have been persistent issues for blended finance, as assessed in Sections II. 3 and 5. There is a need for greater transparency in the blended finance market to build the evidence base for investors, particularly institutional investors, to justify participation (Savoy and Milner 2018). This evidence base, however, cannot be built without a good quality of pipeline projects. One solution to address these dual challenges is to create spaces for greater information exchange among current and potential stakeholders, particularly with regard to project concepts and proposals, investor profiles, expectations, and restrictions, among others. The idea of creating spaces to bring together diverse actors for pipeline development and transparency has been around for more than a decade (sustainable finance practitioner, correspondence with author, November 7, 2019) but has yet to materialize to a significant level.

A marketplace or a platform would be an appropriate means through which participants can access relevant information and find a match between the demand for and the supply of climate finance. These activities, in turn, can greatly reduce uncertainty, as well as transaction and opportunity costs that currently hinder investment from scaling for climate impact. The same platform can also be used for experienced investors to proactively disclose portfolio information, including detailed project description, stakeholder-engagement efforts, monitoring reviews, type and amount of investment, information about other investors, and nature of complaints received (Jenkins 2018). Proactive disclosure of these types of information can increase accountability and contribute to closing the information gap for future investors. Identifying the critical features that a platform should have and the barriers to realizing this concept can be a highly useful and relevant endeavor for practitioners.

Finally, as this paper has used blended finance vehicles as a unit of analysis, examining the approach and governance of blended finance using different units can further enhance the understanding of blended finance for decarbonization. For example, the GEF, GCF, and Climate Investment Funds (CIF) represent more than 90 percent of multilateral climate finance (Meltzer 2018). As these multilateral climate funds have a specific mandate to mobilize private sector capital and have transformative impact, assessing their activities and structuring mechanisms can be a useful extension of the efforts made in this paper.

36 For example, Terra Silva, a new USD 90 million FoF backed by the Packard and MacArthur foundations and a mission-driven private investor, will help eight to ten investment fund managers prove that sustainable tropical forests are a profitable bet for commercial investors.

MDBs and DFIs are increasing their already significant emphasis on climate finance, and have embraced blending within their overall financing approach. The World Bank, which set the goal of increasing climate-related finance to 28 percent of its portfolio by 2020, has already exceeded this target by reaching 30 percent in 2019. This total – roughly USD 17.8 billion across the World Bank Group – is the result of an institution-wide effort to mainstream climate considerations into all development projects (World Bank 2019b). The DFI Working Group on Blended Finance was formed to ensure the effective and efficient use of concessional resources in private sector projects and avoid market distortion or crowding out private capital (IFC et al. 2017). MDBs also play a significant role in managing climate funds with blended finance activities, such as the GEF and the CIF.

Developing and emerging countries are also recognizing the significant role of blended finance in attracting additional finance. Colombia's 4G road project, for example, offers a notable success story that can be applied in other sectors and countries (IFC 2016b; SFI 2019). Brazil's Green Receivables Fund (Green FIDC) also offers interesting insights on using the existing institutional framework to mobilize additional finance for climate impact (The Lab 2017).

Private philanthropy is a growing and important source of climate finance, complementing contributions from donor governments. Philanthropic giving is already significant for development objectives. An assessment of 130 major foundations shows that their contributions averaged USD 7.8 billion per year between 2013-2015, and the majority (86 percent) was channeled through third parties (OECD 2017). Today, philanthropic foundations are actively moving to address challenges associated with climate change. In 2018, the Packard and MacArthur foundations collectively pledged to fill capital gaps and move "the needle in the climate fight beyond what any one foundation can do alone" (MacArthur Foundation 2018). The Rockefeller Foundation already has an extensive portfolio in blending climate finance, and organizations such as Prime are partnering with philanthropists to invest, through blended finance, in pioneering companies that address climate change. Philanthropies are important actors in blended finance due to their relatively low levels of risk aversion and their willingness to invest in innovative business concepts and financing models (OECD 2018b). Assessment on philanthropies and impact investors, therefore, can offer insights unique to them.

The demand for blended finance for climate change will only increase. With these research efforts on multiple fronts as outlined in this paper, public and private actors will be able to more effectively determine the mechanisms through which they can mobilize, structure, and coordinate the flows of climate finance towards sustainable and decarbonized development pathways.

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Annex

Global Energy Efficiency Renewable Energy Fund

Table 5. GEEREF Investment Process

	Deal sourcing	Due diligence	Investment decision
GEEREF Front Office	• GFO originates pipeline investments • Pipeline fund investments are fed into pipeline database • GFO screens pipeline investments based on GEEREF investment criteria • Investments are selected to proceed to due diligence	• GFO prepares Appraisal Authorization (AA) note, which is reviewed by EIF • AA gets sent to the GEEREF Investment Committee (IC) for no-objection • GFO conducts due diligence through meetings and site visits, and produces report with project summary and identified risks and mitigating measures • GFO prepares Request for Approval (RA)	• Request for Approval is submitted to the IC for approval • IC meeting held for discussion and decision on RA • Key terms are agreed • Legal details are specified and completed during the negotiation of legal documentation and investment agreements
EIB and EIF	• Technical review of the proposals and participation in meetings with investee fund managers • Preliminary risk, compliance and legal reviews	• Independent risk, compliance, and legal reviews	• Risk, compliance, legal, and technical inputs are integrated into legal documentation

Source: Green Climate Fund (2017)

Table 6. Summary of GEEREF Portfolio

Fund	Regions/Countries	GEEREF Commitment (USD M)	Final Close Amount (USD M)
Evolution One	Southern Africa	11	77
Renewable Energy Asia Fund (REAF)	India, Philippines	14	95
DI Frontier Market & Carbon Fund	East Africa	11	66
Emerging Energy Latin America Fund II	Latin America	14	39
Armstrong South East Asia Clean Energy Fund	Southeast Asia	11	163
MGM Sustainable Energy Fund	Central America and Caribbean	11	63
Africa Renewable Energy Fund (AREF)	Sub-Saharan Africa	19	206
SolarArise India Projects Private Limited	India	13	100
Renewable Energy Asia Fund II (REAF II)	India, Philippines, Thailand, and Indonesia	16	205
Catalyst MENA Clean Energy Fund	MENA	16	58
Caucasus Clean Energy Fund	Georgia	13	63
Evolution II Fund	Sub-Saharan Africa	21	218
Frontier Energy II	Sub-Saharan Africa	21	232

MGM Sustainable Energy Fund II	Latin America and Caribbean	17	80
ARCH Africa Renewable Power Fund	Sub-Saharan Africa	20	128
Total		**228**	**1793**

Sources: Green Climate Fund, "Funding Proposal, Decision B.16/02,"the GEEREF website, and GEEREF Front Office, correspondence with author, January 8, 2020.

Table 7. List of countries with GEEREF-funded projects (as of the end of 2018)

Asia	India, Indonesia, Philippines, Thailand, Vietnam
MENA*	Jordan, Egypt
Non-EU, ex-USSR**	Georgia
Africa	Burundi, Cameroon, Djibouti, Ethiopia, Ghana, Kenya, Madagascar, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, Pan-Africa
Latin America	Colombia, Costa Rica, El Salvador, Mexico, Panama

Source: GEEREF Front Office, correspondence with author, September 18, 2019. It is expected that approximately five more countries are added to the list by the time all GEEREF funds have deployed their capital.
* Middle East & North Africa
** Union of Soviet Socialist Republics

Climate Public Private Partnership

Table 8. Portfolio of the Catalyst Fund

Investment	Investment Year	Target Region	Sector
Africa Renewable Energy Fund	2018	Turkey	Renewable Energy
Alcazar Energy Partners & Gaia Energy Limited	2015	Middle East, Turkey & Africa	Renewable Energy
Americas Energy Fund II Clean Energy	2015	Latin America	Renewable Energy
Armstrong South East Asia Clean Energy Fund	2013	Southeast Asia	Renewable Energy
Asia Environmental Partners II	2014	Asia	Resource Efficiency
China Environment Fund IV	2013	China	Resource Efficiency
Full Truck Alliance (Co-investment)	2016	China	Logistics
GRC SinoGreen Fund III	2014	China	Resource Efficiency
Latin Renewables Infrastructure Fund	2014	Latin America	Renewable Energy
Mainstream Renewable Power Africa Holdings/Lekela	2016	Africa	Renewable Energy
Renewable Energy Asia Fund II	2016	Asia	Renewable Energy
RMB Westport Real Estate Development Fund II	2017	Africa	Resource Efficiency
TPG Alternative and Renewable Technologies Partners	2014	Global EM	Resource Efficiency

Source: IFC AMC website https://www.ifcamc.org/funds/ifc-catalyst-fund

Table 9. Portfolio of the Asia Climate Partners

Investment	Investment Year	Target Region	Sector	Activity
ColdEx	2016	India	Cold Chain Logistics	India's largest organized integrated food supply chain and distribution company
NantEnergy	2016	Indonesia	Energy	Energy storage solutions to serve as the core of distributed commercial and industrial energy management systems, remote microgrids, and reliable backup power systems to critical wireless infrastructure
Skeiron	2017*	India	Renewable energy (wind)	Increase accessibility to sustainable power
Panda Green Energy Group Limited	2017	China	Renewable energy (solar)	Investment and operation of solar farms and renewable energy business

Source: ACP website
* Skeiron was acquired by Greenko Energy Holdings

Climate Investor One

Table 10. CI1 Investment Strategy, Criteria, and Restrictions

Technology Scope
No less than 20 percent and no more than 45 percent of aggregate Fund capital into Project Companies using wind as an energy resource
No less than 20 percent and no more than 45 percent of aggregate Fund capital into Project Companies using solar as an energy resource
No less than 10 percent and no more than 40 percent of aggregate Fund capital into Project Companies using run-of-river hydro as an energy resource
Not more than 10 percent of aggregate Fund capital into Project Companies using other forms of renewable energy resources, including biomass and geothermal
Geographic Scope
No more than 25 percent of aggregate Fund capital into one single country
No more than 40 percent of aggregate Fund capital into Africa
No more than 40 percent of aggregate Fund capital into South and South-East Asia;
No more than 40 percent of aggregate Fund capital into Middle and South America;
No more than 10 percent of aggregate Fund capital in other regions and;
No more than 30 percent of aggregate CEF capital in upper-middle-income countries across the above geographies.

Source: Adapted from Green Climate Fund (2018)