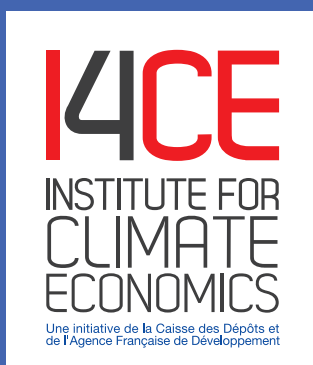




September 2017

Using credit lines to foster green lending: opportunities and challenges

Igor Shishlov | Till Bajohr | Mariana Deheza | Ian Cochran

Produced with support from:



CONTENTS

EXECUTIVE SUMMARY	4
GLOSSARY	9
INTRODUCTION	10
1. BARRIERS TO GREEN LENDING	12
1.1. Barriers stemming from the general investment environment	12
1.2. Demand-side barriers	14
1.3. Supply-side barriers	15
2. FUNCTIONING AND CURRENT USE OF GREEN CREDIT LINES	17
2.1. Green Credit Lines: dedicated to environmental objectives	17
2.2. Different approaches to selection and approval of loans	18
2.3. Current use of Green Credit Lines by PFIs	19
3. DOCUMENTED BENEFITS OF EXISTING GREEN CREDIT LINES	22
3.1. Financial incentives of Green Credit Lines	22
3.2. Non-financial benefits of Green Credit Lines	23
3.2.1. <i>Technical assistance provided to LFI</i>	24
3.2.2. <i>Technical assistance provided to end-borrowers</i>	25
4. EXISTING AND FUTURE CHALLENGES FOR THE DEPLOYMENT OF GREEN CREDIT LINES	27
4.1. Market distortions	27
4.2. Short- and long-term sustainability of green lending	28
4.3. Assessment of environmental impacts	29
4.4. Managing risks	30
4.5. Increasing LFI's capacity to finance adaptation investments	30
CONCLUSIONS	32
BIBLIOGRAPHY	34





I4CE – Institute for Climate Economics

I4CE is an initiative of Caisse des Dépôts and Agence Française de Développement. The Think Tank provides independent expertise and analysis when assessing economic issues relating to climate & energy policies in France and throughout the world. I4CE aims at helping public and private decision-makers to improve the way in which they understand, anticipate, and encourage the use of economic and financial resources aimed at promoting the transition to a low-carbon economy.

AUTHORS

Igor Shishlov, I4CE – Institute for Climate Economics
Till Bajohr, I4CE – Institute for Climate Economics
Mariana Deheza, I4CE – Institute for Climate Economics
Ian Cochran, I4CE – Institute for Climate Economics

ACKNOWLEDGEMENTS

The authors would like to thank all the interviewees and reviewers for taking time to provide valuable inputs to this report:

Johannes Alexeew (Adelphi), Bastien Bedossa (AFD), Félix Bergel (CAF), Laurent Biddiscombe (AFD), Onur Bilgin (Halkbank), Beryl Bouteille (AFD), Rodney Boyd (OECD), Isabelle Braly-Cartillier (IDB), Ksenia Brockmann (EBRD), Christian Calov (KfW), Luca De Lorenzo (Stockholm Environment Institute), Jason Deschamps (I4CE), Christopher Head (World Bank), Sergiy Khudiyash (Ukreximbank), Mustapha Kleiche (AFD), Hakan Lucius (EIB), Daniel Magallon (BASE), Aaron Maltais (Stockholm Environment Institute), Maria Netto (IDB), Wolfgang Ryll (KfW), Lucila Serra (IDB), Esteban Suarez Rosales (IDB), Alexander Vasa (IDB), Charles Wetherill (Nordic Development Fund), Julia Zyder (KfW).

DISCLAIMER

I4CE – Institute for Climate Economics is an initiative of Caisse des Dépôts (CDC) and Agence Française de Développement (AFD). This think tank provides independent expertise and analysis when assessing economic issues relating to climate & energy policies in France and throughout the world. I4CE aims at helping public and private decision-makers to improve the way in which they understand, anticipate, and encourage the use of economic and financial resources aimed at promoting the transition to a low-carbon economy.

The research presented in this publication was carried out by I4CE on an independent basis. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the CDC group, AFD or the IDB group, their Boards of Directors, or the countries they represent

Executive summary

◀ Contents

This scoping report aims to improve the understanding of the role played by credit lines in enhancing the access to finance for green investment projects.

To date, most research on climate finance focuses on developing “innovative” financial instruments. This study investigates how a somewhat “classic” instrument is being used in innovative ways. Indeed, Public Financial Institutions (PFIs)¹ have extended credit lines to Local Financial Institutions (LFIs)² for subsequent on-lending to end-borrowers for many years. More recently, PFIs have started to tailor this product to support “green lending”, i.e. lending to green projects, including renewable energy, energy and resource efficiency, sustainable transport, waste management, and in some cases climate change resilience (adaptation). These tailored credit lines are referred to as “Green Credit Lines (GCLs)” throughout this report.

This scoping study aims at identifying the opportunities and the challenges related to the deployment of GCLs by PFIs to support the low-carbon climate-resilient transition in developing countries. The first part of

this report summarizes the market barriers that inhibit green lending in developing countries. Second, diverse characteristics and types of GCLs are described and their current uses by major PFIs are presented. Third, the conceptual advantages of GCLs and their potential to address the barriers to green lending are explored. The final Section of the report looks at the limitations and challenges to the deployment of GCLs by PFIs and introduces questions for future research. The methodology for this study is based on a review of the relevant academic and applied literature, an analysis of the publicly available information on GCLs extended to date, and interviews with representatives of several PFIs and LFIs, as well as industry experts.

Several barriers currently impair the market development of debt financing for green investments (Table 1).

Firstly, an unfavorable investment environment – including economic, financial and regulatory factors – can undermine the relative competitiveness of “green” investments versus “brown” alternatives. Secondly, a lack of bankable projects to finance and capacity to structure them on the side of project developers can result in insufficient demand for debt products. Finally, the limited knowledge and capacity in these sectors of financial actors and a lack of suitable lending products can limit the supply of capital for green investments. Often, these barriers are even more acute for projects developed by small- and medium-sized enterprises (SME) given the constraints on these types of actors in general.

¹ For this purpose of this paper, Public Financial Institutions (PFIs) is a general term used to refer to National Development Banks (NDB), Bilateral Cooperation Agencies or Multilateral Development Banks (MDB). It includes both Tier 1 institutions that extend funds directly to end-borrowers and Tier 2 institutions provide funds to Local Financial Institutions (LFIs) for on-lending to end-borrowers.

² Throughout the paper, the term Local Financial Institutions (LFIs) will refer to commercial banks, investment funds, micro-finance institutions and public specialized financial institutions. These institutions have different mandates and roles in the local financial sectors where they operate.

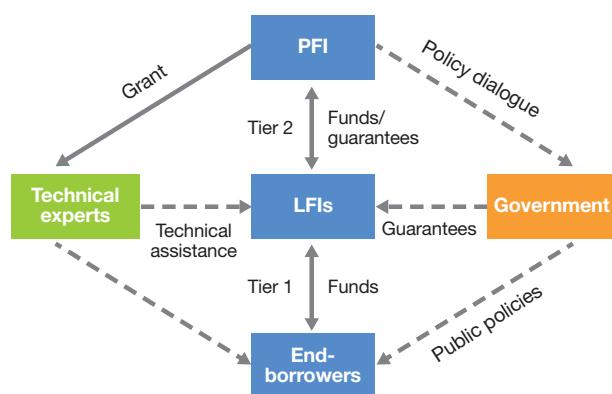
TABLE 1. BARRIERS TO DEVELOPMENT OF GREEN LENDING BY LOCAL FINANCIAL INSTITUTIONS (LFIS)

General investment environment barriers <i>(at the national and subnational level)</i>	• Economic barriers: low risk-adjusted returns for green investments due to weak, unstable or absent climate and environmental policy, fossil fuel subsidies • Financial barriers: high real and perceived risks, large upfront investment needs, high cost of capital for low-carbon investments compared to returns • Legal barriers: insufficient financial sector regulations and debt resolution regimes curtailing credit creation, lack of integration of climate risks into the financial sector
Demand-side barriers <i>(from project developers' side)</i>	• Low awareness: lack of understanding of climate investment opportunities • Prevailing business practices: preference for near-term benefits instead of long-term savings and revenue streams • Lack of in-house capacity to develop sound investment proposals for LFIs
Supply-side barriers <i>(from Local Finance Institutions' side)</i>	• Lack of access to long-term capital for matching long-term climate investment horizons • Low awareness and lack of capacity to perform the operational steps involved in green lending • Unsuitable lending practices of banks that do not match the requirements of private climate investments • Lack of risk management mechanisms, including credit ratings and risk transfer and pooling instruments • High up-front costs and risks for developing new business lines in green lending

Source: authors

Green credit lines are a financial intermediation tool with a twofold objective. First, they aim at fostering lending to projects with environmental benefits often referred to as ‘green lending’. Second, they aim at building capacity in LFIs to expand the local green lending market after the credit line is closed. Under a GCL, funds are typically extended by a PFI to participating LFIs that in turn on-lend them to developers of eligible green projects. GCLs may include advantageous financial conditions, such as reduced interest rates, longer tenors, increased grace periods or incentive payments. GCLs may also include technical assistance (TA), which is usually funded by the PFI and aims at building the capacity of local banks to provide loans to green investment projects and/or capacity of end-borrowers to structure investment proposals. Finally, GCLs may include targeted policy dialogue with governments in recipient countries aimed at improving the general investment climate for green projects (Figure 1). The characteristics and the loan eligibility criteria included in a GCL can differ depending on the objectives of a given PFI, the sectors being financed, and/or specific national circumstances.

FIGURE 1. SIMPLIFIED GREEN CREDIT LINE SCHEME



Source: authors

Different financial components of GCLs can help address some of the supply-side and general investment environment barriers to green lending (Table 2). Concessional terms of finance that may be part of a GCL provided to LFIs address their lack of access to affordable and/or long-term financing. Notably, below-market interest rates are often accessible through a GCL and can enable intermediaries to reduce the rates charged to end-borrowers, partially compensating for the higher (real

or perceived) risk of green investments. In addition, extended tenors can be provided through GCLs to better match the time horizons of economic benefits of green investment opportunities: long-term revenue streams are matched with a longer loan repayment schedule. In turn, longer grace periods can better match the lifecycle of green projects: large upfront investments and delayed accumulation of revenues or savings. Finally, some PFIs provide concessionality indirectly through incentive payments that usually target end-borrowers and are typically structured as ex-post grants that reimburse parts of the investment financed by the GCL. The disbursement of such grants is usually made conditional on the fulfillment of particular performance outcomes, such as project completion, reduced energy consumption, environmental impact reduction, or the implementation of investment advice and energy audits. Indirect concessionality in the form of credit-enhancement mechanisms can also be implemented through complementary instruments such as guarantees, which reduce real and perceived risks of engaging in green lending and help mobilize domestic financial resources.

In addition to financial incentives of GCLs, technical assistance to LFIs can help overcome some of the supply-side barriers to green lending via capacity building (Table 2). During the identification stage of the lending process, technical assistance can support LFIs in identifying investment opportunities. In some instances, loan applications already in a bank's pipeline can be scrutinized to identify eligible projects. During the appraisal phase, TA can build the capacity of bank personnel to accurately evaluate green investment opportunities. During the product delivery stage, TA can allow LFIs to design innovative product characteristics corresponding to clients' specific needs. After the loan disbursement, TA can be used to support LFIs in monitoring and evaluating GCLs' operations as well as in developing LFIs' own monitoring capabilities. Finally, this support can assist LFIs in the development of marketing and communication materials for stimulating demand for green loans among new and existing clients. Overall, capacity building activities under TA can help develop sustained green lending practices in recipient countries after the GCL is closed, as well as demonstrate that green lending can be a profitable business for LFIs. The key objective in this sense is for GCLs to perform as a driver to foster sustainability within the local financial sector itself with a wider leverage outreach.

TABLE 2. HOW GREEN CREDIT LINES CAN ADDRESS BARRIERS TO GREEN LENDING

Barrier category	Barrier	How green credit lines can help address the barrier
General investment environment barriers	Economic barriers due to weak climate and environmental policy	Targeted policy dialogue in recipient countries may help support the implementation of policies improving the enabling environment for green investments
	Financial barriers related to real and perceived risks, and the financial structure of green investments	Provision of concessional funds, longer tenors and grace periods as well as the use of complementary risk-management mechanisms may help better match green investments needs
	Legal barriers	N/A
Demand-side barriers	Low awareness: lack of understanding of climate investment opportunities	TA to end-borrowers, for example, in the form of energy audits or providing information on financing options may help increase the interest in pursuing green investment opportunities
	Prevailing business practices: preference for near-term benefits instead of long-term savings and revenue streams	Incentive payments structured as ex-post grants that reimburse parts of the investment financed by the GCL may help motivate end-borrowers to develop green projects
	Lack of in-house capacity to develop sound investment proposals for LFI	TA to end-borrowers may support them in drafting business plans and loan applications and accompany green investment projects along their lifecycle
Supply-side barriers	Lack of access to long-term capital in LFI	Provision of concessional funds, longer tenors and grace periods
	Low awareness and lack of capacity in LFI	TA to LFI, for example, in the form of market studies or portfolio assessments, as well as institutional capacity building may boost the development of green lending in LFI and ensure long-term sustainability of green lending practices.
	Unsuitable lending practices	Concessional funding with longer tenors and grace periods may allow LFI to provide end-borrowers with products better matching the time horizons of economic benefits (revenues and savings) of green investment projects
	Lack of risk management mechanisms	Complementary instruments such as guarantees or insurance may help reduce real and perceived risks of engaging in green lending for LFI
	High up-front costs and risks for developing new business lines in green lending	TA to LFI can support them in designing, testing and deploying new financial products, while concessionality can offset the additional transaction costs

Source: authors

GCLs can also include the provision of technical assistance to end-borrowers, addressing some of the demand-side barriers (Table 2). Firstly, it can assist project developers in the identification of investment opportunities. Independent energy audits and modeling, for example, can enable industrial companies and other energy-intensive commercial firms to better understand their energy usage and the potential savings and productivity increases that could be achieved by investing in more modern and efficient equipment. By simultaneously marketing available financing channels to prospective borrowers, PFI can thus systematically foster demand for financing under a GCL. Secondly, TA is

often needed to assist project developers in structuring attractive business plans or loan applications as they may lack the necessary skills. For example, this can include calculating expected future cash flows/savings or support to comply with reporting requirements. Thirdly, once a loan application is approved, technical personnel can assist end-borrowers in the implementation of the investment project, including the training of companies in the operation of new equipment or technology. Lastly, TA may be required to fulfill the requirements involving GCLs with incentive payment schemes involving an ex-post assessment of project outcomes as well as marketing activities.

TABLE 3. CHALLENGES TO THE DEPLOYMENT OF GREEN CREDIT LINES

Challenge	Potential solutions
Market distortion due to concessionality	• Using commercial terms for GCLs • Setting appropriate on-lending conditions
Ensuring that green lending is sustained and expanded after the closure of a GCL	• Fostering improved policy frameworks • Capacity building to create green lending units and improve green lending skills in LFI
Difficulty in assessing the efficiency of use of funds and their environmental impacts	• Development of harmonized monitoring and evaluation practices
Risk management	• Development of risk-management tools such as currency swaps and insurance products
Increasing adaptation finance	• Analysis of opportunities for adaptation debt finance • Concessional funding for adaptation

Source: authors

There is a number of challenges that LFIs and PFIs are facing when deploying GCLs (Table 3). From an LFI perspective, the challenges include financial risks – e.g. foreign exchange risks – and difficulties in development of in-house capacity and centers of competence to promote the new financial product, as well as technical and methodological difficulties in putting in place the necessary procedures for the implementation of green lending. The main challenges from a PFI's perspective include avoiding market distortions, ensuring that GCLs are not crowding out existing financing and that they are fostering sustained green lending practices in recipient countries that will continue after the credit line closes. Finally, environmental impact assessment, monitoring and evaluation, as well as development of lending for adaptation projects remain challenging.

By providing funds on concessional terms, PFIs may unintentionally subsidize LFIs if the latter fail to pass on the benefits of concessionality terms to end-borrowers. Some facilities therefore provide commercially-priced GCLs to limit market distortions that may arise from concessional financing, although the definition of these “commercial” or “market” terms depends on the institution. To avoid the risk of subsidizing LFIs, PFIs can also influence on-lending conditions directly, for example by setting caps on interest rates extended to end-borrowers making sure the concessionality is passed-on. Interest rate caps may, however, contribute to market distortions in the long-run. Another way of indirectly providing concessionality is the provision of incentive payments directly to end-borrowers subject to the performance of investment projects; this could however increase transaction costs for the PFI involved.

Even if the benefits are passed on to end-borrowers, a GCL may not foster the expansion of green lending in the long run – raising questions about its efficiency and environmental impact. There has been anecdotal evidence of long-term impacts of GCLs, for example, through the creation of specialized units for green lending in LFIs. However, there is only a small body of existing studies and empirical research that has looked at this issue in detail. Results to date are inconclusive on whether the extension of GCLs by PFIs leads to the increase in the share of green loans in LFIs' after a credit line is closed. Thus, the question of whether there is a business case for green lending without the concessional support by PFIs remains unanswered and merits further investigation. Moreover, a comparative assessment of current approaches to monitoring the performance of underlying investment projects and evaluating environmental impacts could be useful as this is often a challenge for PFIs to conduct.

This scoping report demonstrates that GCLs, and more generally financial intermediation instruments, can be useful tools in addressing some of the barriers to green lending. Nevertheless, barriers related to the general investment environment require broader policy interventions and usually cannot be addressed by financial intermediation instruments alone. GCLs are therefore not a “silver bullet”, but rather one component of a broader support package tailored to each market that may include such tools as guarantee schemes, associated insurance mechanisms, and tools that allow the leveraging of equity. Moreover, challenges remain regarding the long-term contribution of this instrument to sustained green lending practices after the closure of a GCL, the efficiency of funds' utilization

and the evaluation of its environmental performance. Furthermore, there is an increasing need to finance climate change adaptation projects, which to date have not been the focus of GCLs.

Moving forward, more in-depth research and evaluation is needed to understand the long-term impact of GCLs. This report has documented how GCLs hold potential to create both direct and indirect benefits for LFIIs and facilitate the achievement of “green” policy objectives. Suggestions for future research could include a systematic survey among different types of intermediaries to identify how financial and non-financial benefits can be passed on to end borrowers and how the long-term sustainability of green lending can be ensured, once the provision of funding and/or capacity building through TA is phased out. Furthermore, in-depth case studies of GCLs in specific sectors and regions could reinforce the analysis providing sector specific recommendations to PFIs, notably the evaluation of the leverage potential and credit performance of GCLs. Finally, a deeper analysis of complementary instruments such as guarantees and insurance can help better understand how PFIs can combine available tools to maximize their impact and increase the efficiency of GCLs. Beyond additional research, fostering a broader dialogue among PFIs to exchange best practices and lessons from both successes and failures appears to be a natural and useful next step in the development of green lending.

Glossary

[◀ Contents](#)

AFD	Agence Française de Développement
DFI	Development Finance Institution
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
EIB	European Investment Bank
GCL	Green Credit Lines
GHG	Greenhouse gases
IDB	Inter-American Development Bank
IDFC	International Development Finance Club
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
LFI	Local Financial Institution
MDB	Multilateral Development Bank
MENA	Middle East and North Africa
NDB	National Development Bank
PFI	Public Financial Institution
RE	Renewable Energy
SEFF	Sustainable Energy Finance Facility
SME	Small, and Medium Enterprises
TA	Technical Assistance

Introduction

Limiting the rise in average global temperatures to 2°C, let alone 1.5°C, and reducing the vulnerability of economies, ecosystems and societies to the adverse effects of climate change requires an unprecedented reorientation of economic activity towards a low-carbon development pathway. For example, the International Energy Agency estimates the total cumulative investment needs in energy supply and efficiency at USD48 trillion in the baseline scenario and USD53 trillion in the 2°C scenario over the next twenty years. At the same time, the total infrastructure investments required to meet development needs – whether low- or high-carbon – are estimated at an average of USD6 trillion annually over the next 15 years. Achieving these needs through essentially low-carbon infrastructure options would increase the investment needs by USD270 billion annually (NCE 2014). Furthermore, if operating costs, such as reduced cost of fossil fuels, are taken into account, savings may outweigh the additional capital investment needs. A principal challenge for the financial sector will therefore be to shift existing investment flows from traditional carbon-intensive sectors towards the low-carbon economy.

The lion's share of these climate investments – up to three quarters – will need to be done by the private sector (WEF 2013). Today, private actors, including international corporations, small and medium enterprises (SMEs) and households, invest more than USD240 billion annually, representing almost two thirds of total climate finance flows (Buchner et al. 2015). Looking to move to scale, a number of challenges exist to unlocking private investment that can be addressed through implementing various policy support schemes, and employing targeted financial instruments, including green bonds and public guarantees. However, the majority of these instruments focus on large-ticket investments and projects, with relatively limited attention to the smaller-scale projects and investments. Yet, smaller investments in renewable energy and energy efficiency by households, SMEs and other actors constitute a significant portion of required climate investments. For example, energy efficiency, which is typically characterized by comparably small ticket sizes, is forecasted to contribute almost half to greenhouse gas (GHG) abatement under the International Energy Agency's 2°C scenario (IEA 2015).

To facilitate these small-scale investments, Local Financial Institutions (LFIs) including commercial banks, investment funds, micro-finance institutions and local public financial institutions have the potential to play a key role in the provision of necessary affordable finance.

However, due to barriers and challenges on both the supply and demand sides, debt financing for green investments falls short of desired levels – particularly in developing and emerging economies. Public financial institutions (PFIs)³ including Development Finance Institutions (DFIs), Multilateral Development Banks (MDBs) as well as National Development Banks (NDBs) have consequently developed a diverse suite of financial intermediation tools to engage LFIs in debt financing of green investment projects.

PFIs have extended credit lines to LFIs for subsequent on-lending to end-borrowers for many years. More recently, however, PFIs have started to tailor them to support “green lending”, i.e. lending to green investment projects including such sectors as renewable energy, energy and resource efficiency, sustainable transport, waste management, and in some cases climate change resilience (adaptation). These tailored credit lines are referred to as “Green Credit Lines (GCLs)” throughout this report. These GCLs can be combined with technical assistance (TA) provided to LFIs and/or directly to end-borrowers. PFIs use TA to target several constraints along the value chain for green lending, including a lack of capacity to evaluate green projects, an overestimation of investment risks and a lack of suitable lending products, to name only a few. If properly implemented, GCLs can thus offer benefits for all actors involved in the process and drive the expansion of green lending.

This scoping study aims to provide an overview of opportunities and challenges related to the deployment of GCLs by PFIs to support the low-carbon transition in developing countries. The first part of this report summarizes the market barriers that inhibit green lending in developing countries. Second, diverse characteristics and types of GCLs are described and their current uses by major PFIs are presented. Third, conceptual advantages of GCLs and their potential to address the barriers to green lending are explored. The final Section of the report looks at the limitations and challenges to the deployment of GCLs by PFIs and introduces some questions for future research. The methodology for this study is based on a review of the academic and grey literature, the analysis of publicly available information on GCLs extended by major PFIs and interviews with representatives of several PFIs and LFIs.

³ For this purpose of this paper, Public Financial Institutions (PFIs) is a general term used to refer to National Development Banks (NDB), Bilateral Cooperation Agencies or Multilateral Development Banks (MDB). It includes both Tier 1 institutions that extend funds directly to end-borrowers and Tier 2 institutions provide funds to Local Financial Institutions (LFIs) for on-lending to end-borrowers.

This scoping report is the first stage of a broader research program on financial intermediation that I4CE aims to pursue following the identified research gaps. The second stage of this research could include a more detailed survey aiming at deepening this initial scoping exercise and case studies of GCLs extended by PFIs throughout the world in order to document best practices and lessons learned in this area. Next stages may also include collaborative work with PFIs and LFIs on exploring concrete ideas on how to tackle barriers to the deployment of GCLs and to improved environmental impact particularly focusing on the level of LFIs.

1. Barriers to green lending

◀ Contents

Several barriers (Table 4) impair the market development of green lending, i.e. debt financing for green projects. Firstly, an unfavorable investment environment – including economic, financial and regulatory impediments – can undermine the relative competitiveness of “green” investments versus “brown” alternatives. Secondly, a lack of “bankable” or economically viable projects to finance and capacity to structure them on the side of project developers results in insufficient demand for debt product. Finally, the inadequate knowledge and capacity in these sectors of financial actors and a lack of suitable lending products can limit the supply of capital to projects. The latter is further aggravated by the lack of business incentives for LFIIs to develop green lending. Often, these barriers are even more acute for small- and medium-sized project developers given the constraints on these types of actors in general. Each of these barriers is briefly discussed in this section.

1.1. Barriers stemming from the general investment environment

General barriers to green lending – not specifically related to supply or demand of capital – can be roughly grouped into three areas: economic, financial and legal. Economic barriers mainly include unpriced environmental externalities and countervailing incentives. For example, fossil fuel subsidies put low-carbon investments in a disadvantage compared to

their carbon-intensive alternatives. Financial barriers are related to often higher upfront capital needs for green investments and higher (real and perceived) risks, which in turn result in an increased cost of capital. Legal barriers include inadequate financial sector regulations that may preclude long-term lending to low-carbon projects, inefficient debt resolution regimes and lack of integration of climate risks into investment decision-making. Since these factors constitute the broader investment environment, most cannot be directly addressed by financial intermediation instruments, such as credit lines extended by PFIs, and may therefore require broader policy interventions.

A weak policy environment can hamper private lending and investment in green projects by negatively affecting their economic viability. Green investments are generally disadvantaged compared to “brown” incumbent alternatives due to negative externalities of the latter – air pollution, GHG emissions, etc. – that are not taken into account by the market (Stern et al. 2006). Carbon pricing mechanisms, such as carbon taxes and emission trading schemes, aim to internalize the negative externalities of carbon intensive industries and to level the playing field for green investments. Despite recent progress, carbon pricing schemes cover only 11% of energy-related emissions worldwide with the average carbon price of USD 7 per ton of CO₂. At the same time, 13% of CO₂ emissions are covered by consumption subsidies for fossil fuels averaging USD 115 per ton of CO₂ (IEA 2015). Complementary climate policies beyond

TABLE 4. BARRIERS TO LENDING FOR ACTIVITIES WITH TARGETED ENVIRONMENTAL OUTCOMES

General investment environment barriers <i>(at the national and subnational level)</i>	• Economic barriers: low risk-adjusted returns for climate-friendly investments due to weak, unstable or absent climate and environmental policy, fossil fuel subsidies • Financial barriers: high real and perceived risks, large upfront investment needs, high cost of capital for low-carbon investments compared to returns • Legal barriers: insufficient financial sector regulations and debt resolution regimes curtailing credit creation, lack of integration of climate risks into the financial sector
Demand-side barriers <i>(from project developers' side)</i>	• Low awareness: lack of understanding of climate investment opportunities • Prevailing business practices: preference for near-term benefits instead of long-term savings and revenue streams • Lack of in-house capacity to develop sound investment proposals for LFIIs
Supply-side barriers <i>(from Local Financial Institutions' side)</i>	• Lack of access to long-term capital for matching long-term climate investment horizons • Low awareness and lack of capacity to perform the operational steps involved in green lending • Unsuitable lending practices of banks that do not match the requirements of private climate investments • Lack of risk management mechanisms, including credit ratings and risk transfer and pooling instruments • High up-front costs and risks for developing new business lines in green lending

Source: authors

direct carbon pricing or emission trading schemes – e.g. fuel efficiency standards, subsidies for renewable energy power generation, carbon labeling, tax rebates, etc. – are also necessary (Grubb 2014).

While low-carbon infrastructure and fixed capital investments – such as in the case of renewable energy or energy efficient actions in buildings – may require lower operating costs compared to carbon-intensive infrastructure, it typically requires large volumes of upfront capital. For example, the upfront investment costs of wind energy projects total close to 80% of the overall costs; comparatively the investment costs for gas power represent about 15% (Waissbein et al. 2013). Other studies put the estimates of upfront capital costs at 84-93% of total project costs for wind, solar, and hydro energy as opposed to 66-69% for coal and 24-37% for gas (Nelson and Pierpont 2013). The availability of large volumes of upfront financing is therefore crucial for low-carbon investment projects and the lack thereof can be a major barrier.

As low-carbon and climate-resilient infrastructure investments are capital intensive, the cost of financing can be higher compared to carbon-intensive alternatives. For example, the share of cost of financing in the total cost of renewable electricity generation is sometimes estimated as high as 50-70% (OECD 2015). Even small changes in the cost of capital – whether during initial investment and construction or later during the refinancing phase – could play a significant role in facilitating project development and increasing overall investments in the low-carbon transition.

Lack of knowledge and familiarity with green technologies, particularly in developing countries, can result in higher (real and perceived) risks and higher capital costs. Furthermore, the lack of scale and mature ecosystems of players along all relevant segments of the value chain of green investments increases transaction costs and dents the confidence of potential private investors. This combined with other risks may limit the interest of many investors in low-carbon projects – particularly using technologies or in geographic areas where clear returns on investment have not been demonstrated yet (FTF 2015; Noothout et al. 2016).

The perception of risk of “green” investments may be further aggravated by unstable climate policy frameworks. Indeed, there is still a strong perception that the economic attractiveness of green investments depends on public support (Campiglio 2014). Long-

term climate targets, for example in terms of GHG emissions reduction or commitments through such instruments as sovereign green bonds, signal political will and foster governments’ accountability (Shishlov, Morel, and Cochran 2016). Conversely, sudden policy changes – such as the withdrawal of renewable energy support in Spain in 2014 or in the UK in 2016 – resulted in increased policy and regulatory risks and thus the returns demanded by investors. Instability of political positions of major countries concerning climate change – as demonstrated by the uncertainty around the continuity of climate policies following the 2016 US presidential election – can further aggravate policy risk perception.

National and international regulations to curtail the financial sector’s risk exposure in the aftermath of the financial crisis affect the supply of long-term funds available to green lending. The Basel Accords paved the way to more stringent requirements for banks’ capital structure, risk assessment procedures and exposure, as well as liquidity reserves. The resulting system-wide deleveraging efforts can discourage the creation of credit in general and long-term loans for green investment more specifically (Campiglio 2014). The magnitude of these constraints can vary depending on the country and the applicability of Basel Accords. Finally, many accounting standards, including cash-accounting or mark-to-market accounting, tend to disadvantage illiquid investment opportunities with long payback periods and therefore many green investment projects (Kaminker et al. 2013).

Insufficient financial sector regulations and infrastructure can constrict green lending other than through inducing capital constraints. For example, credit reporting systems provide reliable and centralized information to lenders for assessing borrowers’ creditworthiness. However, countries with generally shallow domestic financial sectors do not possess supportive credit reporting systems and lack other components of a supportive financial infrastructure (IFC 2012). This may in turn result in a more complicated process for investigating a borrower’s credit history and/or increase the collateral demanded.

Ineffective insolvency and debt resolution regimes impose costs and increase credit risk for lenders, although this constraint is not specific to green lending. In less advanced markets, debtor and creditor rights – as well as transparent rules for the timely recovery of funds from non-performing loans – may not be sufficiently defined in the financial sector regulations. Insolvent debtors in these cases might face a higher

possibility of full business liquidation in the absence of a solid restructuring framework. Conversely, when banks know they can recover at least some of their funds in case of failing companies, they are more willing to provide loans. Effective insolvency regimes are therefore associated with increased availability of credit and a lower cost of credit, as demonstrated, for example, by the experience of the bankruptcy law reform in Brazil (World Bank 2014).

Finally, climate risks, including physical and transition risks, are generally not integrated by the financial sector and related regulations are not yet in place. This results in potential underestimation of risks related to carbon-intensive assets and puts climate-friendly assets at a disadvantage. Financial regulators at national and international levels have started to look into possibility of mandating ‘climate stress testing’ frameworks. For example, the French Energy Transition Law adopted in 2015 requires companies and financial institutions to report their climate risks (Article 173 of the French Law Relative to the Energy Transition). On the international level, the G20 Financial Stability Board’s Task Force on Climate-Related Financial Disclosures (TCFD) is currently developing a framework for voluntary climate-risk disclosure by companies. Nevertheless, regulations related to climate risk integration remain largely undeveloped on a global scale (Nicol and Cochran 2017).

1.2. Demand-side barriers

Total demand for green finance is predominantly determined by trends at the macro-economic level, including an economy’s development and sectoral composition, its reliance on energy imports, its vulnerability to climate-related shocks, and, of course, climate policy (Wolff, von and Phalpher 2014). However, individual private investors might not look for financing options even with favorable economic conditions for green investments due to several demand-side barriers. The barriers discussed in this Section are mainly related to low awareness and information availability, prevailing business practices and lack of in-house capacity to develop investment proposals.

Households’ and commercial users’ awareness and understanding of the environmental and economic potential of green investments are low in many markets. Borrowers are often not aware of the environmental impact and climate risk exposure of their activities. Additionally, they may not know of

the existence of suitable technologies to mitigate them or lack trust in new technologies and their providers due to their lack of experience. Borrowers also tend to underestimate energy and cost savings potential of, for example, energy efficiency measures, which can stem from a lack of capacity to perform accurate measurements (OECD 2016). Moreover, demand for green investments such as energy efficiency may simply not develop in markets with constantly low (and possibly subsidized) energy prices for fossil fuels due to a lack of incentives, particularly when future price increases are not taken into account.

Business preferences can also play a major role in inhibiting otherwise economically sound investment in addition to informational asymmetries. Consumers and project developers and even financial officers working in banks are prone to favor investments in well-known technologies due to existing preconceptions and inexperience with new alternatives. Companies typically prefer investing in the expansion of core business activities that provide comparably predictable short-term increases in revenue over investments in cost-saving measures, even when both alternatives equally impact profitability (OECD 2016). This deems such investments as those aimed at improving energy efficiency relatively unattractive, as financial payoffs manifest as savings that slowly accrue over time rather than initial increases in revenues (IDB 2016a).

Borrowers, particularly in lower-income countries, may lack the capacity to draft sound business plans and investment proposals in these green sectors. While for SMEs this is often the case for every type of investment, it can be exacerbated for climate investments. Moreover, the assessment of many green investment opportunities requires specialized auditing skills and valuation metrics. In addition, borrowers need to comply with LFIs’ environmental reporting requirements, while green technologies themselves demand particular operational competencies, such as expertise in energy management. However, companies and SMEs in particular may lack this capacity due to the relative newness of the sector and its technologies. A lack of capacity and a short track record on the borrower’s side can also imply higher interest rates, considering a larger risk of project failure. Furthermore, smaller companies may lack general business and financial skills, particularly in lower-income countries with large informal financial sectors. Loan applications therefore do not necessarily fail due to companies’ lack of skills specific to green investments, but often due to

their inability to comply with accounting standards and tax schemes and to propose banks a viable business case (Switch Asia 2015; Adam Smith International 2013).

1.3. Supply-side barriers

In addition to various factors restraining demand for green lending from end-borrowers, LFI face several barriers in supplying climate finance. These barriers (discussed below) can be related to the underdevelopment of capital markets in some emerging economies or related to their own internal capacities and the lack of suitable financial products.

In those low-income countries where capital markets are illiquid, LFIs encounter difficulties in raising adequately-priced equity or debt at tenors that match green investment time horizons. The limited market funds are accordingly invested in relatively large opportunities offering high returns within a short period and for a lower perceived risk, which often rules out small-scale green loans (World Bank 2013). Stringent application procedures and strict reporting requirements further impede financial intermediaries' accessibility to long-term finance for green lending (Dalberg 2015). In the case where LFIs are able to raise capital on international markets, for example using Eurobonds, they are exposed to significant currency depreciation risks, when end-borrowers repay their loans in local currency, if no risk management strategies are employed.

LFIs, particularly in low-income countries, lack the capacity required to perform the operational steps involved in green lending. LFIs are generally unfamiliar with the technologies and the market for green investments due to its relative novelty and are consequently unable to identify, assess and target investment opportunities. A lack of technical knowledge concerning energy consumption levels of different types of industrial equipment, for example, makes it difficult to differentiate market segments and to develop focused marketing efforts. Once a pipeline of bankable projects is available, however, banks may also lack the necessary skills and objective information for accurately appraising their financial benefits and technical risks and for performing other due diligences. As a result, green investment opportunities tend to be generally perceived as riskier and in many cases financially unattractive (Dalberg 2015; Switch Asia 2015). This lack of information and capacities does not only limit banks' ability or strategic interest to assess the GHG

emissions reduction potential and other co-benefits of green investments but also for evaluating their existing portfolio's climate risk exposure, including through credit scoring systems, and for the identification of new investment opportunities.

Banks' conventional lending practices often do not match the requirements of private green investments. As discussed earlier, renewable energy and energy efficiency expenditures are characterized by relatively high up-front investments and long payback periods. Given the high level of up-front capital necessary, particularly small- and medium-sized actors are unable to cover a substantial portion of investment costs with their own equity. This implies both an increased recourse to lending compared to traditional investments and longer required tenors. In many markets, access to suitable funding is often not available on the market, particularly if LFIs themselves have only limited access to long-term finance (Naudet and Oktar 2012). Moreover, when funding is available LFIs may lend funds to green projects at high interest rates. This may be linked to the capacity of actors to appropriately assess and price perceived technology risks – which is not currently done sufficiently in practice – combined with a premium for longer tenors. Thus, conventional lending practices may lead to high financing costs for private developers, and as a result making many green investment opportunities unprofitable.

Lack of credit history for both end-borrowers and LFIs limits access to low-cost debt financing for a number of investments including green investments. The majority of green projects are too small to be financed using a project financing structure due to associated transaction costs, yet too large to be funded purely by equity or by existing debt funds (IDB 2016a). As a result, private investors need to finance investments from their balance sheet by taking out new loans from LFIs. However, the collateral value of, for example, energy efficiency equipment is often low and generated cash flows from energy savings tend to be small, long-term, and difficult to measure. Banks therefore require additional collateral or need to consider debtor's general creditworthiness (IDFC 2013), the latter being difficult given the lack of credit history. There is thus a disconnect between long-established risk management approaches and green investment characteristics.

Overall there is a lack of business incentives for LFIs to launch green lending. Indeed, developing loan products suitable for financing green investments can be a costly and initially unprofitable undertaking

for LFIIs (OECD 2016). For example, during the early stages of the product development lifecycle, LFIIs need to conduct market studies to assess the product's potential and understanding the regulatory environment. In addition, internal information and credit risk assessment processes need to be evaluated and possibly adapted, as well as rolled-out across the organization as for any new product they want to include in their financial offer. Finally, establishing proper environmental monitoring practices, as it is often required as part of the impact reporting when engaging with international climate finance fund providers, such as PFIs, may be cumbersome. Banks thus incur higher transaction costs and operational efforts due to missing standardization and processes. Compensating for these additional costs would require LFIIs to see a clear business incentive in launching dedicated green lending.

Innovative risk transfer mechanisms, such as asset-backed securitization of small infrastructure investments through the issuance of green bonds, are immature and rarely used. Indeed, by pooling and transferring risk of individual projects, such instruments could enable investors to access additional sources of long-term funding and lower the cost of capital for individual project developers (Shishlov, Morel, and Cochran 2016). In a similar model IDB provided USD50 million through LFIIs to ESCOs in Mexico. The resulting portfolio of standardized energy efficiency investments was securitized through the issuance of green bonds on local capital markets and covered by a partial risk guarantee of USD19 million from the Clean Technology Fund. Today, however, such tools remain less developed – for example, asset-backed securities account for a tiny fraction of the green bonds market (Climate Bonds Initiative 2015).

The barriers discussed in this Section – whether related to the general investment environment or stemming from specific demand- and supply-side issues – inhibit the expansion of green lending, particularly in less developed countries. Barriers related to the general investment environment require broader policy interventions and therefore usually cannot be directly addressed by financial intermediation instruments, such as credit lines extended by PFIs. Conversely some of the demand- and supply-side barriers can be tackled by PFIs through targeted use of intermediation tools, such as GCLs, notably through the provision of concessional financing and technical assistance. How exactly GCLs function and how they can address these barriers will be discussed in the following two sections.

2. Functioning and current use of Green Credit Lines

◀ Contents

Green credit lines (GCLs) are a financial intermediation tool aimed at fostering green lending. Under a GCL, funds are typically extended by a PFI to participating LFIs – such as commercial banks, specialized financial institutions and non-banking credit organizations – that in turn on-lend them to developers of eligible green projects. GCLs may include special financial conditions, such as reduced interest rates, longer tenors, increased grace periods or incentive payments. GCLs may also include technical assistance (TA), which is usually funded by a PFI and aims at building capacity of local banks to provide loans to green investment projects and/or capacity of end-borrowers to structure investment proposals. Apart from GCLs, a targeted policy dialogue with local governments aimed at improving the general investment climate for projects with environmental outcomes may also be performed by PFIs. The characteristics and the loan eligibility criteria included in a GCL can differ depending on the objectives of a given PFI, the sectors being financed, and/or specific national circumstances. This Section reviews the key components of a typical GCL and looks at how this instrument is used by major PFIs.

2.1. Green Credit Lines: dedicated to environmental objectives

A credit line is a financial tool that involves one financial institution providing a flexible loan scheme to a second institution to, in turn, ‘on-lend’ to its customers. The borrowing financial institution can access the funds within the limits set by a given credit line – often at rates or conditions typically not available otherwise. Interest is usually paid by the borrowing financial institution only on the money actually borrowed, although sometimes a fee is charged on the unused portion of the line. PFIs extended credit lines to LFIs for subsequent on-lending to end-borrowers for many years. Recently, PFIs started to tailor them to support “green lending”, i.e. lending to green projects including renewable energy, energy and resource efficiency, sustainable transport, waste management, and in some cases climate change resilience (adaptation). These GCLs are increasingly becoming a major tool applied by national development banks and other public financial institutions, such as multilateral development banks, to foster long-term lending to projects with positive environmental outcomes.

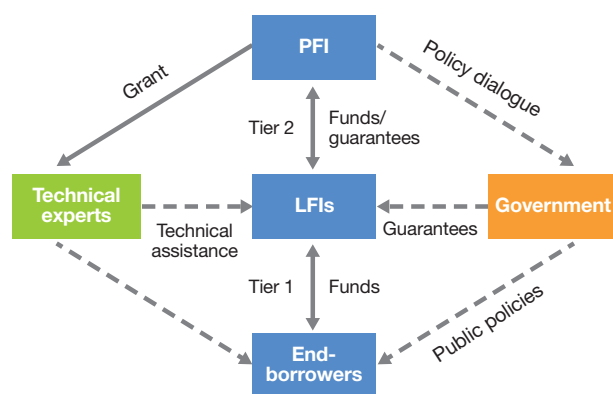
Under a GCL, funds are extended by a PFI to participating LFIs for subsequent on-lending to end-borrowers, including households, SMEs, industrial enterprises, and project developers for eligible green investment opportunities. This is often referred to as Tier 2 lending and is the case for example for programs managed by the European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB) and the *Agence Française de Développement* (AFD). In other instances, international PFIs may cooperate with national development banks (NDBs) – such as in the case of the Inter-American Development Bank (IDB) and many different national public development banks in Latin America and the Caribbean. NDBs in turn extend GCLs to either LFIs for on-lending, or directly to end-borrowers. This is often referred to as Tier 3 lending.

Technical assistance constitutes the second key component of many GCLs. TA can be offered alongside GCLs’ financial support to both LFIs and end-users to address market barriers on both the demand- and supply side (Amin, Dimsdale, and Jaramillo 2013) and is carried out either using a PFI’s own capacity or, most often, by an external consulting or engineering company. The TA component is typically financed by funds from the PFI extending a GCL or with external donor funds, as it is for example the case for EBRD’s Western Balkans Sustainable Energy Financing Facility (WeBSEFF), which leverages EU grants. TA can take various forms, including market studies, support in project preparation, energy audits, administration, monitoring, investment proposal preparation, loan application assistance, pipeline development and increasing awareness. When using GCLs, practitioners tailor the overall structure, as well as financing terms and TA to market contexts and program goals. For example, the EBRD often engages closely with energy service companies (ESCOs) and local technical service providers to perform free-of-charge energy audits and project origination assistance, particularly to commercial energy efficiency and small-scale renewable energy projects. Similarly, the IDB works closely with technology providers within its Energy Savings Insurance (ESI) program in order to mitigate the underperformance risk.

Finally, GCLs may involve the engagement of PFIs in the policy dialogue in recipient countries to address the general barriers in the investment

environment. While policy engagement is not TA per se, it can be viewed as part of a broader strategy to foster sustainable development and green lending practices in target countries or regions. For example, the EBRD within its Green Economy Transition (GET) strategy is currently deepening its policy engagement in the countries of operation to provide advice to governments on their investment plans, legislation and policy. Policy engagement may thus complement the two principal characteristics of a GCL, namely provision of the funds and technical assistance (Figure 2).

FIGURE 2. SIMPLIFIED GREEN CREDIT LINE SCHEME



Source: authors

2.2. Different approaches to selection and approval of loans

In the deployment of GCLs, PFIs can target individual market failures and public policy goals by specifying project eligibility criteria and on-lending terms in partnership with LFIs. Eligibility criteria define end-borrower and investment characteristics and thus circumscribe particular market segments, for which a financing need has been identified by a market study. Eligibility criteria typically include the beneficiary's sector (for example residential housing, or industry/commercial users), adherence with credit risk indicators and legislation, technology specifications, as well as loan size limitations and measures of climate impacts and financial benefits. Target groups can also be restricted through the application of exclusion criteria. This can address, for example, a beneficiary's engagement in environmentally harming business activities. It can further be differentiated between beneficiary groups – e.g. the EBRD's SME credit lines and women in business credit lines. Intermediation terms are set in the credit line agreement between the PFI and partnering intermediaries. They may define the commercial conditions of the loans extended by LFIs to end-borrowers and may include, for example, interest rates, collateral requirements and tenor.

PFIs may require compliance of projects financed with their institutional lending policies or the development of an institution-wide sustainable development strategy. For example, the Turkish Mid-size Sustainable Energy Financing Facility (MidSEFF) jointly deployed by

BOX 1. EXAMPLE OF ELIGIBILITY CRITERIA: LOAN SIZE

The definition of eligibility criteria and PFIs' involvement in the loan approval process are important design components of a GCL. For example, many PFIs have set eligibility criteria related to the maximum size for loans to end-borrowers. Smaller maximum loan sizes allow a GCL to reach a larger number of small beneficiaries. In addition, it can also induce more organizational learning, if the loan application assessment and approval procedures are performed by the partnering LFI. Limiting the maximum loan size also lowers the GCL's portfolio risk, as its repayment is dependent on more beneficiaries and repayment risk is therefore diversified. However, it may also increase total costs for the GCL if technical assistance is provided to individual end-borrowers and individual loans are associated with other large variable costs, e.g. for a detailed evaluation of individual loan applications, thus increasing total transaction costs. It can also hamper the execution of the program if not enough smaller projects are available and the program does not allow for bigger projects. The market study is therefore important to properly calibrate this criterion. Finally, the loan size criteria can also function as a threshold – e.g. loan applications under the threshold are automatically eligible for funding, whereas the ones exceeding it are assessed individually and with the PFI involvement.

the EBRD and the EIB links loan eligibility to adherence to the environmental and social policy requirements of the EBRD's Environmental and Social Policy. This approach of requiring participating actors to adhere to institutional guidelines allows PFIs increase assurance that individual disbursements comply with their own risk management, performance or environmental and social criteria. In the case of the AFD, deployed GCL often include a requirement for participating LFI's to elaborate a broader sustainable development strategy. On the one hand, this may help expand the impact of the GCL to the overall LFI's portfolio in the long-run. For example, the Latin American development bank *Corporacion Andina de Fomento* (CAF) improved their own internal processes of due diligence, evaluation and impact assessment thanks to its exposure to PFIs policies. Furthermore, this experience helped CAF start developing its own GCLs directed to local financial institutions. On the other hand, additional requirements imposed by PFIs may be seen as an additional constraint for LFIs and may be associated with increased transaction costs. The latter may, however, sometimes be covered using TA funds.

PFIs may also use specific positive lists of eligible projects. LFIs must have a given level of capacity to perform the steps involved in the green lending process, including accurate technical appraisal and risk assessment. When partnering with less experienced banks, or when there are specific objectives for a given GCL, PFIs may employ more precise eligibility criteria. Notably, some credit lines employ standardized lists of eligible energy efficiency technologies and accredited suppliers such as in the cases of credit lines deployed by AFD, IDB, KfW, JICA and the EBRD. This approach enables participating LFIs to strengthen capacity in the design of energy efficiency loans, limit the role of the PFI and streamline the assessment process. It also helps lower the technological risk, since eligible technologies are pre-selected. Another example of selection criteria relates to application of a sole 'savings' criterion: in the frames of the Ukraine Energy Efficiency Program (UKEEP) several GCLs maintained same key eligibility criteria being Internal Rate of Return (IRR) based on energy savings exceeding 10%. Similar criterion was applied inter alia for assessment of sub-projects by UKREXIMBANK under the World Bank's Ukraine Energy Efficiency Project as well as GCPF Facility and some other transactions.

PFIs have in some countries signed more than one credit line agreement with LFIs. This is the case, for example, of the AFD in Mauritius where a third credit line is currently

under negotiation. The second credit line allowed the reinforcement of eligibility criteria and requirements in terms of institutional uptake and the third credit line is targeting the identification of adaptation-related investments linked to the country's national development plans.

2.3. Current use of Green Credit Lines by PFIs

GCLs are increasingly used by the majority of the largest international PFIs. According to the initial review of publicly available data, out of the 29 different members of the IDFC and MDBs examined in this study, 22 PFIs are engaging in the extension of GCLs. Out of them, 13 PFIs extend credit lines to partnering intermediaries (LFIs or NDBs), while 9 other institutions channel GCL funds from international sources either directly to end-beneficiaries, or via LFIs. In mid-2016, these 22 PFIs had more than 160 active GCLs for which public information was available. These credit lines total approximately EUR 15 billion⁴ in disbursed and available funds. GCLs therefore represent an increasingly used tool for fostering climate investment, yet are significantly less deployed than, for example, direct project investments.

International PFIs target different regions when using GCLs. The largest providers of GCLs – including the EIB, the EBRD, the Inter-American development Bank (IDB), *Kreditanstalt für Wiederaufbau* (KfW), the International Bank for Reconstruction and Development (IBRD), Agence Française de Développement (AFD), the International Finance Corporation (IFC) and Japan International Cooperation Agency (JICA) – have each more than EUR 1 billion outstanding green credit lines, with IDB's, EIB's, EBRD's and AFD's active portfolios exceeding EUR 2 billion each. These major providers focus on different regions. Whereas the EIB and the

⁴ The analysis presented here includes GCLs – for which information is publicly available – that involve one or more members of the International Development Finance Club (IDFC), as well as those extended by major MDBs. However, it does not include credit lines that are designed and predominantly financed by NDBs and extended in their own country of origin. As a result, important GCLs – e.g. domestic operations of the German development bank KfW – are not included as well as other NDB operations in major OECD economies. However, several credit lines extended by EIB to European OECD member countries, including Czech Republic, France, Germany, Italy, Slovak Republic and Spain are included, totaling approximately EUR 2 billion. The numbers presented here cannot be considered exhaustive, but rather serve to provide an order of magnitude. A credit line is considered "green", when it targets investments for climate mitigation or adaptation, as well as other environmental goals, including pollution abatement and resource efficiency. The analysis counts the published total maximum volume available for a given active credit line. Volumes published in currency other than EUR were converted using the following rates: 1 USD = 0,896023 EUR, 1 Yen = 0,00867145 EUR, 1 RUB = 0,0138024 EUR

EBRD use GCLs predominantly in Western and Eastern Europe, respectively, as well as the Middle East and North Africa (MENA) region, the IDB and KfW are strongly engaged in Latin America and the Caribbean. Both the IBRD and AFD have large programs in Asia, with AFD also extending more than a quarter of its total GCL volume to banks in African countries.

Upper-, middle-, and high-income countries benefit particularly from GCLs. LFIs, regional and national development banks in large emerging economies in the MENA, as well as Latin America and Asia receive the strongest support in terms of volume, with Turkey, Brazil, India, Russia and China among the top six countries. The 10 largest countries account for approximately two thirds of the total volume outstanding, suggesting a strong concentration of GCLs among few large economies with more developed financial markets.

A third of GCLs target only one particular sector or technology, while many tend to focus on a single group of beneficiaries. Only one third of GCLs are designed to foster investment solely in energy efficiency equipment, renewable energy projects or particular green technologies, such as those for pollution abatement. The large majority of GCLs are mixed and extend financial support for a variety of investments. Some more focused GCLs do nevertheless exist. For example, in contrast to the other large providers, both KfW and the IBRD seek to foster individual sectors or subsectors with targeted programs. In fact, the IBRD commits almost two thirds of its portfolio specifically to energy efficiency credit lines.

Most GCLs focus on a single group of beneficiaries, with almost 80% targeting private industrial and commercial companies, as well as SMEs, and about 5% targeting households. This can be explained by considering that most GCLs do not only seek to mitigate GHG emissions, but typically have multiple additional development objectives. Supporting the

green local financial sector and improving economic competitiveness are among the most common. This is done through the provision of low-cost, long-term finance and the development of intermediaries' lending portfolios, as well as reducing companies' energy costs. Different green technologies can ultimately achieve these outcomes and GCLs therefore finance different types of investments. In addition, some PFIs employ intermediated lease financing as another type of credit lines aimed at fostering green investments (Box 2).

The financial characteristics of GCLs vary strongly and general conclusions are therefore difficult to draw. Some credit lines offer loan tenors to financial intermediaries of up to 40 years, whereas others can include term lengths as short as three years - such as IFC's recent credit line to Banco Pichincha CA in Ecuador. Grace periods can extend up to half a GCL's maturity, varying between 2 and 10.5 years. Interest rates charged by PFIs are rarely reported, yet were found to vary between 0.25-2.50% for concessional GCLs, whereas interest rates of commercially priced GCLs are generally not published. On-lending terms to end-beneficiaries are almost never publically available, although some LFIs indicated a 0.25–1.00% discount on the regular market rate. Loans can fund up to 100% of investment costs or require significant end-borrower and third-party co-financing.

Finally, some PFIs engage in a policy dialogue in recipient countries, as part of a broader strategy of fostering green investments. For example, the IFC placed a strong focus on policy development support in Russia as part of its credit lines "Sustainable Energy Finance" and "Residential Energy Efficiency". As part of this process, a report prepared by the World Bank Group facilitated the development of energy efficiency regulations in Russia (OECD 2016).

BOX 2. INTERMEDIATED LEASE FINANCING

Under a lease financing structure, a PFI typically provides a long-term loan to an LFI, normally a lease company, for the purchase of assets from technology vendors, such as production equipment or transportation vehicles. The lease company, or lessor, then provides the assets to an end-user, or lessee. In return for being granted access to and usage of the asset, the lessee agrees to pay regular installments to the lessor in addition to an optional small down payment (e.g. 10% of asset value). At the end of the leasing period the lessee can either renegotiate and renew the lease agreement on the asset, enter a new lease agreement to change the asset – e.g. upgrade to a more modern version of the equipment – acquire the asset and become its legal owner, or return the asset to the lessor.

A lease financing arrangement differs from a traditional loan structure provided under a credit line in two main dimensions. First, a clearly identified and moveable asset is at the core of every lease agreement. The asset typically generates the cash flow for the lessee to service lease installments and additionally serves as a collateral. The default risk for the lease is therefore primarily linked to the profitability of the leased asset itself rather than to the overall balance sheet and creditworthiness of the lessee. Secondly, the lessor remains the legal owner of the asset throughout the lease period. The upfront costs of purchasing the equipment, which can pose a significant financing barrier particularly for smaller companies, are thus borne by the lessor, allowing end-users to access otherwise unaffordable technologies. Similar to GCLs, many intermediated leasing arrangements also involve a technical assistance component, which supports partnering leasing companies and builds their capacity in identifying and appraising leasing opportunities, as well as in developing and marketing leasing products.

Several PFIs have successfully partnered with leasing companies to support green investments. For example, the ADB opened its Green Bus Leasing Program totaling USD275 million in 2013 to foster low-carbon urban transportation in China in partnership with three leasing companies. Local bus operators in China often rely on governmental subsidies and are highly indebted, which limits their ability to obtain affordable long-term loans from LFIs to fund investments in new low-carbon buses. The ADB aims at bridging this financing gap through intermediated leasing, as it does not require local transportation companies to finance the entire cost of the vehicles up-front (ADB 2014).

In another example of intermediated lease financing, the IFC targeted textile manufacturing and metal production sectors in Turkey through its Commercializing Sustainable Energy Finance Program (CSEF), which blended USD21 million of the Clean Technology Fund (CTF) with USD 100 million of IFC's commercially-priced funds. Although several major leasing companies were already operating in the Turkish market and had established a strong client base, they did not engage in leasing of energy efficient equipment. The IFC therefore provided CTF-funded technical assistance to three leasing companies for building capacity and training personnel in identifying, assessing and marketing energy efficiency leasing opportunities (IFC 2014).

3. Documented Benefits of Existing Green Credit Lines

◀ Contents

Green credit lines can provide a number of financial and non-financial benefits across the value chain of actors involved in the green lending process. Concessionality and other financial characteristics of GCLs can help address some of the supply-side and general investment environment barriers to green lending, such as high cost of capital, high risk and a mismatch between loan products and needs of green investment projects. In addition to financial benefits of GCLs, TA may help tackle some of the supply- and demand-side barriers to green lending. More broadly, capacity building activities under TA may help develop sustained green lending practices in recipient countries in the future, once a GCL is closed. Key benefits of GCLs are explored in this section.

3.1. Financial incentives of Green Credit Lines

Concessionality and other financial characteristics of GCLs can help address some of the supply side and general barriers to green lending (Figure 3). Most notably, access to lower interest rates for both LFIs and end-borrowers can help reduce the cost of capital. These savings can cover some of the additional transaction costs of green lending (such as ring-fencing, third-party involvement, etc.) and improve the financial returns of underlying projects. Concessionality can also help LFIs compensate for the cost of hedging against the foreign exchange risk, thus allowing LFIs to provide loans in local currency. In turn,

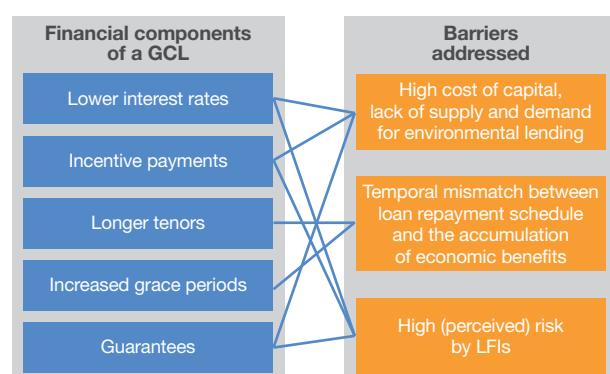
longer tenors and increased grace periods address the temporal mismatch between loan repayment schedule and the accumulation of financial benefits from green investment projects. Incentive payments can foster the uptake of green lending practices in LFIs by fostering demand and enhancing environmental performance of projects. Concessionality in the form of credit-enhancement mechanisms can also be implemented through complementary instruments such as guarantees, which reduce real and perceived risks of engaging in green lending.

PFI's access to stable sources of financing at conditions often not available on domestic capital markets allows them to extend funds to participating financial intermediaries on concessional terms at potentially limited additional cost for themselves. PFIs can generally fund credit lines by using their relatively higher credit rating to raise financial resources on international capital markets. Passing these rates on to intermediaries and, whenever possible, to end-beneficiaries allows these public actors to support green lending without direct recourse to public subsidies. Interest rates can therefore be lower than those available to LFIs on at times illiquid domestic financial markets. In addition, PFIs can leverage several sources of public financing. MDBs' shareholders, which are predominantly donor governments, provide the institutions regularly with both paid-in and callable capital. Governmental guarantees that assure PFI's creditworthiness, as well as MDB's Preferred Creditor Status, lower investor risk and thus further reduce financing costs.

PFIs may be able to leverage external public finance, provided by international donors, climate funds, or national governmental budget funds. This allows the organizations to blend commercial finance with grant components to offer more attractive terms. For example, the German Federal Ministry for Economic Cooperation and Development (BMZ) can partly subsidize the interest on loans extended by KfW (KfW 2016), and the Clean Technology Fund (CTF) has allocated more than USD 450 million in concessional funds to support credit lines.

GCLs can assist PFIs in leveraging private co-financing on multiple levels. In addition to channeling capital from international capital markets, GCLs can help PFIs leverage domestic private co-financing. For example, many GCLs require participating

FIGURE 3. FINANCIAL INCENTIVES OF GREEN CREDIT LINES



Source: authors

intermediaries to at least partially match the funds provided by PFIs. Moreover, end-borrowers finance investments with a portion of their own equity and often obtain co-financing from other financial institutions.

Lower interest rates as well as longer tenors and grace periods of a GCL can enable intermediaries to reduce the interest charged to end-borrowers, although there have been no studies to demonstrate if this is happening at a large scale. GCLs' concessional pricing can reduce the cost of capital and thus total costs associated with engaging in green lending. This can be particularly relevant to market entrants that incur first-mover costs and take significant risk and thus could otherwise provide loans only at high interest rates (Van de Ven 2016). In addition, extended tenors that may be provided through GCLs better match the incurrence of economic benefits of green investment opportunities: long-dated revenue streams are matched with a long loan repayment schedule. Finally, longer grace periods better match the temporal lifecycle of green projects: large upfront investments and delayed accumulation of revenues or savings. Some PFIs set explicit conditions – such as interest rate caps that LFI can charge end-borrowers as the KfW in the case of their domestic green lending program – to pass the financial benefits of GCLs on to the end borrowers. However, authors did not identify empirical studies that demonstrate whether the financial benefits are widely passed on to end borrowers.

Indirect concessionality in the form of incentive payments can foster the up-take of loans and support GCLs' environmental benefits. Incentive payments can target both financial intermediaries and end-borrowers and are typically structured as ex-post grants that reward LFIs for extending green loans or reimburse end-borrowers for parts of their investments. The disbursement is made conditional on the fulfillment of particular performance outcomes, such as project completion, minimum energy consumption and environmental impact reduction, or the implementation of investment advice and energy audits. For example, many of the EBRD's Sustainable Energy Financing Facilities (SEFFs) include payments to beneficiaries, which are typically linked to project completion and subsequent verification. These incentive payments to end-borrowers may range from 5% to 30% of the loan amount (OECD 2016). In addition, the EBRD at times allows LFIs to benefit from 'performance fees' of up to 3% to incite them to extend green loans. The incentive payments can also be differentiated

to foster more ambitious environmental projects – such as the example of use by KfW in its domestic programs in Germany to foster households to invest in energy efficiency upgrades beyond national efficiency norms. However, introducing incentive payments can also increase transaction costs of a GCL, particularly if projects' performance outcomes need to be independently verified. As a result, additional donor-funds along the credit line are typically required to fund external consultants to conduct the assessments.

Credit-enhancement mechanisms, such as guarantees, are used in some cases and allow greater risk mitigation, although this instrument is not part of GCLs per se. Indeed, a PFI may – by itself or involving the government of a recipient country – provide, for example, partial credit guarantees, which absorb part or all the debt service default risk (Aravamuthan, Ruete, and Dominguez 2015). For example, the AFD provides partial guarantees through its ARIZ risk-sharing mechanism (*l'Accompagnement du Risque de financement de l'Investissement privé en Zone d'intervention*). The mechanism includes two types of guarantees – a single-deal guarantee on a loan-by-loan basis and a guarantee for the portfolio of loans. Another example of risk sharing is the IDB's Energy Savings Insurance (ESI) scheme, which guarantees contractually agreed financial savings from energy efficiency investments implemented through energy service and technology providers to end-beneficiaries (see Section 4.4). Such risk mitigation mechanisms can help unlock lending to certain client segments, such as energy efficiency project developers.

3.2. Non-financial benefits of Green Credit Lines

In addition to financial benefits of GCLs, technical assistance can help overcome supply- and demand-side barriers to green lending through capacity building. TA takes various forms and can provide support to both LFIs involved in GCLs – and also end borrowers along the lifecycle of the lending process (Table 5). More broadly, capacity building activities under TA may help develop sustained green lending practices in recipient countries in the future, once a GCL is closed. The key objective in this sense is for GCLs to perform as a driver to foster sustainability within the local financial sector itself with a wider leverage outreach.

TABLE 5. TECHNICAL ASSISTANCE ALONG THE LIFECYCLE OF THE LENDING PROCESS

Stage in green lending	Technical assistance to LFIs	Technical assistance to end borrowers	Barriers addressed
Project Identification	Market studies, portfolio assessment	Energy audits, providing information on financing options	Low awareness of green investment opportunities
Appraisal	Feasibility studies, technical audits, financial assessment	Support in drafting business plans and loan applications	Lack of capacity to evaluate/draft green investment proposals
Product development	Support in design, testing and deployment of new financial products, capacity building	Accompanying end borrowers during project implementation	Unsuitable financial products and/or lending practices
Monitoring and evaluation	Development of monitoring and evaluation tools, environmental and social risk management	Support in the assessment of the project	Lack of capacity to monitor and evaluate ongoing projects
Marketing and communication	Assistance in developing marketing campaigns and best practice documents	–	Low awareness of green investment opportunities and benefits

Source: authors

3.2.1. Technical assistance provided to LFIs

Overall, capacity building TA can foster the development of sustained green lending operations.

Many GCLs focus on developing the required knowledge and technical skills of LFIs and other partnering intermediaries, for example through staff training, workshops, or knowledge sharing systems. In addition, the installation of supportive processes and tools, including for example energy efficiency investment evaluation tools, can ensure that LFIs possess the required technical capabilities and resources. This can help develop the technical expertise internally within LFIs to help establish a functioning market for green lending in the future. For example, the Sustainable Energy Finance Programmes of the IFC aim at helping LFIs develop expertise in lending to energy-efficiency projects. As part of its credit line in India, the AFD assisted the local bank SIDBI in the establishment of a dedicated energy efficiency financing unit. The creation of such specialized units in LFIs could be an indicator of the long-term sustainability of green lending beyond the timeframe of a given GCL.

During the identification stage of the lending process, TA can support LFIs in identifying investment opportunities. Market studies can be conducted in co-operation with LFIs to identify attractive market segments and to analyze the existing policy framework and investment environment at the national and/or regional level. In addition, an assessment of a LFI's established client portfolio allows for the origination of new and the identification of existing investment projects eligible for

financing under a GCL. For example, TA under AFD's GCL to African Banks included reviewing of project pipeline to assess eligibility for financing under the GCL's lending criteria, as well as technical assessments of investment projects (see Box 3).

During the appraisal phase, TA can build the capacity of bank personnel to accurately evaluate green investment opportunities.

As part of a first lending pre-assessment, feasibility studies assess projects' technical characteristics and often involve on-site audits, particularly for relatively larger investments. Projects' compliance with banks' and GCL eligibility criteria is further appraised. Once a project's general eligibility and feasibility has been confirmed, TA services can assist LFIs in the financial evaluation of the project. The development of standardized loan appraisal procedures can support independent lending operations in the long-term after a GCL is closed. The EBRD's SEFF programs, for example, work closely with LFIs to develop their capacity to evaluate investment opportunities in energy efficiency.

During the product development stage, TA can assist LFIs with the design of innovative product characteristics, which better cater for clients' financing needs.

Moreover, as banks are often hesitant to commit resources, TA can support LFIs in piloting new lending products through testing with selected clients or risk mitigation tools. For example, the IFC works closely with commercial banks in Ukraine to develop and market loan products for households to improve energy efficiency in buildings. The design of targeted marketing

BOX 3. EXAMPLE OF TECHNICAL ASSISTANCE TO LFIS: AFD GREEN CREDIT LINE TO SOUTH AFRICAN BANKS

In 2009, AFD extended a 120-million-euro GCL to three banks in South Africa, namely ABSA, IDC and Nedbank. The GCL aimed to increase energy efficiency and the share of renewable energy in the South African economy and thus reduce CO₂ emissions. AFD contracted the consulting firm Enclude to manage the technical assistance associated with the GCL. This technical assistance included:

- **Providing program management support** to AFD including the support to the development of renewable energy and energy efficiency project pipeline and ensuring that banks meet AFD's requirements;
- **Transactional support to banks**, including the initial reviews of pipeline projects, carrying out detailed technical assessments (including site visits), and supporting banks in submitting drawdown requests;
- **Capacity building support to banks**, including training assignments to the banks to enhance their capacity in sustainable energy lending;
- **Knowledge development**, including building knowledge regarding renewable energy and energy efficiency markets and disseminating results of AFD's GCL;
- **Program management & administration**, including the development of terms of references (ToRs) for specific technical assistance assignments, recruitment, contracting and payment of external service providers, supervision and quality control of short-term service providers, production of work plans and annual documentation.

Source: Enclude 2016

campaigns can further support the establishment of a pipeline of projects as they can help stimulate demand for green lending among new and existing clients.

Finally, TA can be used to support LFIs in monitoring GCLs' operations as well as in developing LFIs' own monitoring capabilities. Reliable information related to a GCL's financial results and environmental impact allows for an objective evaluation of the line's success. In addition, GCLs that involve incentive payments rely on an ex-post evaluation of individual projects. TA can therefore assist in the collection, management and analysis of relevant data as well as the implementation of supportive tools and systems at participating intermediaries. For example, under the Morocco Sustainable Energy Financing Facility (MorSEFF), co-financed by the EBRD, the EIB, KfW and AFD, as well as by the European Union, consultants are contracted to verify and monitor the successful completion of individual projects to determine incentive payments. Finally, TA can support capacity building that goes beyond a given credit line. The TA provided by the EBRD to UKREXIMBANK in Ukraine, for example, allowed the implementation of environmental and social risk management procedures across the institution. Overall, capacity building activities under TA can help develop sustainable green lending practices and project preparation skills in recipient countries in the future, once a GCL is closed, as well as demonstrate that green lending can be a profitable business for LFIs.

3.2.2. Technical assistance provided to end-borrowers

GCLs have included the provision of TA to end-borrowers, fulfilling four principal objectives. Firstly, it can assist project developers in the identification of investment opportunities, for example, through the elaboration of a list of best available technologies and equipment, such as in the cases of AFD and the EBRD. Independent energy audits, for example, enable industrial firms to gain understanding of their energy usage and the potential savings and productivity increases that can be achieved by investing in more modern and efficient equipment. By simultaneously marketing available financing channels to prospective borrowers, PFIs can thus more-systematically foster demand for financing under the GCL. Secondly, TA is often required to compose attractive investment proposals as many project developers lack the necessary skills; for example, to determine expected future cash flows or to comply with reporting requirements. Thirdly, once a loan application has been approved, technical personnel can assist borrowers in the implementation of the investment project, including the training of companies in the operation of new equipment. Lastly, TA may be required to assess whether project outcomes fulfill requirements under GCLs with incentive payment schemes.

Technical assistance is typically offered free of charge to beneficiaries and is principally grant-funded. Providers of commercially priced credit lines draw funds

from two main sources. Several PFIs co-finance TA with their own financial resources, yet access funds separate to those financing the actual GCL. For example, TA under EBRD's REENOVA+ is funded by its Special Shareholders Fund that is financed from the bank's net income. TA provided by other PFIs leverages external grant resources from concessional contributions,

including from MDB's national donors, recipient countries' governmental sources, or from international climate funds, such as the Clean Technology Fund. For example the EIB's technical assistance in Kazakhstan is funded through the Investment Facility for Central Asia, which blends EU budget grant funding with loans by the DFIs.

As documented in this section, green credit lines can help address various barriers along the lifecycle of the lending process. This is achieved thanks to different financial components of GCLs, such as, for example, concessionality or incentive payments, as well as technical assistance. However, the sustainability of green lending upon the closure of GCLs is yet to be considered. The last Section of the report will therefore look into limitations and risks of GCLs, as well as challenges for their improved deployment.

4. Existing and future challenges for the deployment of Green Credit Lines

[◀ Contents](#)

GCLs provide a number of benefits to all actors involved along the green lending cycle. However, there are a number of challenges that PFIs and LFI face when deploying GCLs (Table 6). From an LFI perspective, the challenges include financial risks – e.g. foreign exchange risks – and difficulties in development of in-house capacity and centers of competence to promote the new product, as well as technical and methodological difficulties in putting in place the necessary procedures for the implementation of green lending. The main challenges from a PFIs' perspective include avoiding market distortions, ensuring that GCLs are not crowding out existing financing and that they are fostering sustained green lending practices in recipient countries. Market distortions may occur in cases where LFIs 'capture the rent' from concessionality of GCLs; thus financial benefits are not passed down to end borrowers. Furthermore, even if the benefits are passed on to end borrowers, a GCL may not have a direct impact on the expansion of green lending by LFIs, raising questions about its measurable benefits and sustainability. Moreover, monitoring the performance of underlying investment projects and evaluating their actual environmental impacts may prove to be a challenging task for PFIs. Finally, there is an increasing need to finance climate change adaptation projects, which to date have not been the focus of GCLs.

4.1. Market distortions

By providing funds at below market rates, PFIs may unintentionally subsidize LFIs, if the latter fail to pass

on the benefits of concessionality terms to end-borrowers. In this case, LFIs may simply continue to provide business-as-usual loans to investment projects that would have been financed anyway – with or without a GCL, while at the same time reaping windfall profits. Moreover, such free-riding by LFIs on public funds may result in market distortions affecting the competition among local institutions also providing green financial products, but not part of the GCL. One of the approaches to avoid such a distortion of competition that are applied by DFIs include carefully assessing whether LFIs in target markets already engage in green lending for identifying suitable partners, or making the same offer to as many LFIs in the same area as possible.

PFIs can provide commercially priced GCLs to limit market distortions that may arise from concessional financing. Indeed, in some instances offering loans at local market conditions can mitigate the risks of subsidizing participating LFIs, crowding out private investors, or creating unfair competition among local institutions. In this case, the GCL serves to provide additional incentives such as TA for participating intermediaries to on-lend to targeted areas that are nevertheless financially attractive without grant support (OECD 2016). If a GCL is extended on commercial terms, the use of this tool by PFIs does not distort the economic incentives created by green policies and investment frameworks in recipient countries. Yet, even by providing non-concessional finance for on-lending, PFIs can address low market liquidity that some have suggested inhibits long-term investments in the aftermath of the financial crisis (Campiglio 2014).

TABLE 6. CHALLENGES TO THE DEPLOYMENT OF GREEN CREDIT LINES

Challenge	Potential solutions
Market distortion due to concessionality	• Using commercial terms for GCLs • Setting on-lending conditions
Ensuring that green lending is sustained and expanded after the closure of a GCL	• Fostering improved policy frameworks • Capacity building to create green lending units and improve green lending skills in LFIs
Difficulty in assessing environmental impacts	• Development of harmonized monitoring and evaluation practices
Risk management	• Development of risk-management tools such as currency swaps
Increasing adaptation finance	• Analysis of opportunities for adaptation debt finance • Concessional funding for adaptation

Source: authors

Another way of indirectly providing concessionality is incentive payments based on performance. A GCL can consequently include some form of concessional financial support for end borrowers, even if PFIs and LFIs cooperate on commercial terms. As a result, the risk of subsidizing LFIs is reduced and intermediaries are required to price end-borrower loans closer to or at market rates. At the same time the end-borrowers can still benefit from concessionality thanks to incentive payments – subject to successful fulfillment of criteria set by a PFI. For example, while the EBRD is employing market conditions in its GCLs, incentive payments to end-borrowers and performance fees to LFIs provide indirect concessionality (Box 4). Nevertheless, if on-lending terms can be set freely by LFIs, grant finance provided to end-borrowers could still be appropriated by LFIs through elevated interest rates. Moreover, the need to evaluate performance may increase transaction costs.

To avoid the risk of subsidizing LFIs, PFIs can also influence on-lending conditions directly, such as through the use of interest rate caps. For example, in its household energy efficiency initiative the KfW sets a maximum interest rate that LFIs can offer end-borrowers and the maximum margin that they are allowed to charge (Amin, Dimsdale, and Jaramillo 2013). A similar approach is also applied by the AFD in a number of its agreements with its partnering banks. However, this approach may unintentionally prevent intermediaries from funding projects on commercial terms, which may, in turn, constrain the natural development of lending practices by LFIs that are economically viable without the provision of concessional support from PFIs. Interest rate caps may thus create market distortions in the long-run (Westercamp, Nouri, and Oertel 2015).

4.2. Short- and long-term sustainability of green lending

While a number of GCLs are designed with an objective of fostering the emergence of a sustained green financial market in the long-run, current research and assessment does not fully answer whether this objective is reached by existing GCLs. While anecdotal evidence suggests changes in LFI behavior and organization, the available evaluations of the GCLs' contribution to the development of sustained green lending after GCLs have ended remain inconclusive. One possible mean of assessing this is to see whether LFIs pass on the concessionality conditions to end-borrowers and if the global structure of the LFIs' portfolio of loans include new and additional green lending compared to before the GCL was put into place. The available research, however, suggests that this may not occur systematically in practice. For example, a recent assessment led by the IDB's evaluation department (IDB 2016c) of three projects supporting GCLs in the Latin-American region mentions a weak link between the program and any expansion of the green portfolio for these three cases. The IDB's assessment thus concluded that it was unlikely that the share of green projects within the LFIs' portfolios increased as a consequence of the IDB's program. In another example, this issue was part of independent technical analysis of the effectiveness of the AFD's environmental credit line in Egypt deployed by a consortium of donors between 2006 and 2013⁵ (AFD 2016). Despite satisfactory results achieved by this GCL in terms of GHG emission reductions and environmental impacts through the projects it financed, the analysis indicates that this

⁵ The credit line studied corresponds to the Egyptian Pollution Abatement Project II (EPAP II) GCL funded by the World Bank, EIB, AFD and JICA.

BOX 4. EXAMPLE OF MARKET TERMS OF A GCL COUPLED WITH INCENTIVE PAYMENTS: EBRD'S SEFF

The EBRD's Sustainable Energy Financing Facilities (SEFF) extend credit lines to LFIs to foster financing of the development of small-scale energy efficiency and renewable energy projects in the commercial and residential sectors. To avoid market distortions, the EBRD extends its credit lines at terms equal to domestic market conditions. However, the SEFF is able to provide extended tenors and a system of payments that aims to provide an incentive for project development without distorting the lending market. Most notably, the program provides payments to end borrowers in the amount ranging from 5% to 30% of the loan amount. This payment is conditional on the fulfillment of different criteria. These may include, for example, the implementation of the recommended technology upgrade or conducting energy audits. In addition, the EBRD may provide LFIs with 'performance fees' up to 3% to incite them to extend green loans.

Source: (OECD 2016)

GCL did not have a significant impact on fostering the emergence of a broader industrial pollution abatement financing market in the country. Further research thus appears necessary fully assess whether GCLs have a direct impact on increasing the relative share of loans for green projects in LFI's portfolios.

Selecting partnering LFIs may also prove challenging due to a potential trade-off between their needs and their credit worthiness. Some LFIs acting in markets that require concessional funds and TA themselves may not be seen as sufficiently credit worthy and therefore not eligible for GCLs. Conversely, trustworthy LFIs may not require additional funds with strings attached (monitoring, restrictions on types of customers, size of loan, etc.), since they may be able to borrow cheaply on capital markets without additional constraints.

While GCLs may be successful during their period of operation, ensuring that environmental benefits continue beyond a given GCL's lifetime appears necessary. Actions that appear to help support this can include earmarking resources in future GCLs for building sustained models, such as structures to support collaboration between environmental authorities and LFIs, or developing the capacity of environmental regulators. Rather than making GCLs a channel to finance projects through LFIs, AFD interviewees highlighted that their work in this field targets mainly the reinforcement of local knowledge through increased collaboration with specialized local agencies and the institutional strengthening of LFI's uptake of sustainability issues. This experience highlights the importance of capacity building in LFIs and the policy dialogue as a means to address the general investment environment barrier.

However, GCLs on their own do not solve the equity problem faced by project developers who do not comply with the equity requirements to access loans. Projects targeted by green credit lines are typically too small to attract equity investors through a project finance structure and are thus typically funded from companies' balance sheets. Moreover in emerging markets with political and foreign exchange risks banks are willing to lend lesser amounts than what would be lent to the same project in a stable country with a more solid policy framework requiring a higher proportion of equity (Brown and Jacobs 2011). Instruments allowing leveraging equity to those small-scale projects such as equity capital pledge funds or subordinated equity funds need to be mobilized in a number of cases in parallel to the deployment of green credit lines.

4.3. Assessment of environmental impacts

Assessing the environmental outcomes of GCLs remains challenging for PFIs. As part of the assessment process, once a GCL is closed, a number of PFIs carry-out ex-post evaluations of impacts – e.g. GHG emission reductions or other indicators. The objective is to compare observed environmental outcomes against initial objectives. This requirement for LFIs to assess environmental outcomes is becoming common in some major PFIs, such as the AFD and the KfW, and is also strongly encouraged by some donor governments working with PFIs, e.g. the European Union. In the case of the AFD, the impact of each GCL is assessed on a case by case basis, with a contribution from AFD's technical experts and hired consultants.⁶ Notably, the AFD has implemented a dedicated reporting platform and made efforts to disseminate the carbon footprint tool. Nevertheless, the diversity of contexts makes any form of impact aggregation and comparison cumbersome. The systematization of these ex-post evaluations thus seems an important next step and could concentrate on supporting LFIs in conducting loan-by-loan assessments with the help of technical assistance.

Developing common and standardized criteria among PFIs for GCL evaluation as well as sharing best practices and experiences are necessary next steps. In a number of cases, green credit lines are funded by more than one PFI. Harmonization of evaluation requirements between PFIs could allow for the reduction of implementation costs and the establishment of a basis for comparison between different credit lines and entities. This need for benchmarks is also part of the main outcomes of the evaluation of IDB Group's programs delivered through financial intermediaries (IDB 2016b). This evaluation pointed out the need to establish reporting requirements, including not only financial parameters, but also meaningful data on development indicators to assess operations' development impact including environmental impacts. Improving coordination and the development of benchmarks among PFIs to facilitate reporting from LFIs could be a way to move forward on this issue.

⁶ For more information, see Eschaliér, Deheza, and Cochran (2015).

4.4. Managing risks

LFIs often stress the need for green credit lines to be competitive compared to other ‘mainstream’ financial tools, especially since they may imply higher risks. In this sense, when deploying GCLs LFI face risks such as foreign exchange risks. In countries with underdeveloped capital markets, GCL funds are often disbursed in a foreign currency – such as dollar or euro. However, the loan provided by the LFI will be often made in local currency given that project revenues are often in local currency. This creates a risk for the LFI in the case of strong local currency depreciation. Increased development of tools suited to help institutions manage financial risks, such as guarantee schemes, risk pooling mechanisms or currency swaps⁷ appears to be in the heart the concerns of consulted LFIs. Tier 3 intermediation through National Development Banks (NDBs) is one of the alternatives to tackle this issue, as these institutions have greater potential to take risks compared to LFIs and are able to provide long-term financing in local currency in their local credit markets (IDB 2013). The IDB’s Energy Savings Insurance is an example of an innovative instrument to manage the risks associated with energy efficiency projects (Box 5).

Additional reporting procedures and safeguards established by GCLs in order to comply with often strict eligibility criteria and conditions set by the PFIs can be perceived by LFIs as obstacles slowing down the implementation and even impede lending money to innovative projects. On this end, the possibility of engaging on enhanced tailor-made analysis beyond strict eligibility criteria established up front is perceived by interviewed LFIs as necessary for some to address atypical and innovative projects. Nevertheless, as processes become more and more standardized and replicated inside LFIs and the uptake of technical assistance is increased, there is also potential for transaction costs to decrease in the future.

⁷ An instrument of this type has been developed as part of the Global Lab for Climate Finance Innovation aiming to increase low-carbon investment in developing countries by providing foreign exchange and interest rate risk management instruments to projects and entities investing in climate relevant sectors. This instrument was successfully tested in Kenya, Tanzania and Uganda and helped supporting the development of solar electricity systems for low-income households. For more details see: <http://climatefinancelab.org/>

4.5. Increasing LFI’s capacity to finance adaptation investments

There is increasing consensus in the international community of the need to find a balance between the financing of mitigation and adaptation actions. The Paris Agreement clearly states that a balance between the financing dedicated to mitigation and adaptation should be struck. Nevertheless, according to the latest numbers aggregated by the UNFCCC Standing Committee on Finance, adaptation finance provided to developing countries accounted only for about 25 percent of total climate finance (UNFCCC 2016) and only 4% of public climate finance for adaptation was channeled to the private sector (Climate Investment Funds 2016).

Financing adaptation, however, covers a broad range of actions that extend from infrastructure investments with benefits for the public good to improvements by private actors that increase climate resilience. As such, an increasingly large body of literature and case studies indicates that different financial tools are necessary – whether direct government subsidies or commercial loans – to support a range of actors taking adaptive actions. Within the mix of relevant financial tools, further work is needed to understand how and when GCLs could be used to support adaptation actions, particularly those increasing the resilience of private businesses including SMEs, small-scale land-owners and households. Today, however, financing adaptation projects is largely excluded from GCLs in practice.

In many cases, adaptation investments are characterized by large upfront costs, long payback periods, and uncertainties related to future climate impacts. Moreover, adaptation projects may have both direct and indirect benefits that require different assessment methods than more mainstream mitigation investments. These constraints currently limit banks and other financial intermediaries’ interest in engaging into adaptation lending. Particularly in the case of the use of GCL’s to finance these actions, clear near-term returns on investment must be identifiable to justify the use of a loan-based financial instrument. As PFIs continue to play an important role in exploring financial tools to foster access to concessional and non-concessional funds for adaptation, the use of GCLs merits further exploration. As seen with other environmental outcomes, GCLs can engage LFIs in piloting investments, build their capacity to identify and evaluation adaptive actions, and develop debt-based instruments suitable to the risk-return profiles for adaptation projects.

BOX 5. IDB'S ENERGY SAVINGS INSURANCE IN LATIN AMERICA

This program, which has been supported by funds from the CTF to lower financing costs for participating SMEs and to assist participating LFI in implementing financing procedures, aims at developing a comprehensive measures package to manage the performance risk associated with energy efficiency projects. It allows SMEs to be assured that expected energy savings from their projects will generate sufficient cash flows throughout the entire payback period to repay loans and become net savings for the duration of the energy efficiency equipment lifetime. It also helps LFIs better understand the risk and return profile of energy efficiency projects and increase their appetite for their financing.

Bringing in local and international insurance companies, the program provides an insurance mechanism covering projected energy savings for specifically defined and verifiable energy efficiency measures. These measures are agreed ex-ante in a standard contract between the SMEs and energy efficiency service and technology providers. This risk-sharing mechanism compensates firms in the event that promised financial flows associated with energy efficiency savings are not realized.

As of now, this program has been implemented in Colombia and Mexico where the national development banks (Bancoldex and FIRA) performed as champions in introducing the scheme in these two pilot countries. In the case of Colombia, the program aims at promoting energy efficiency investments in hotels, hospitals and private clinic sectors and in the case of Mexico, the program targets the agribusiness sector. Local insurance companies and international reinsurers have been engaged in the program in structuring the insurance product. Within this approach, energy efficiency service and technology providers sign performance contracts with SMEs. The former are indeed the ones purchasing the insurance product to back their contractual guarantees to their SME clients on the performance of their energy efficiency products. In the case of projects engaged in SMEs of the agribusiness sector, energy savings are expected to reduce energy costs by 40% with payback periods between 2 to 5 years. As SMEs update and substitute obsolete equipment, it is expected that they reduce maintenance costs and downtimes, increasing their competitiveness.

The provision of non-reimbursable technical assistance funds for the development of standardized forms and contracts, for the release of methodologies and protocols for the structuring of projects, their monitoring, reporting and verification (MRV) have been key to streamline the process and to gain trust among the different stakeholders engaged in the process.

The ESI approach is currently being further promoted and scaled up by the IDB with support from the Danish Government to additional technologies. In the case of El Salvador, the Green Climate Fund (GCF) approved the funding proposal to establish a concessional line of financing for private sector investment projects in energy efficiency with BANDESAL, the country's national development bank. The Program is also being implemented in Brazil, Nicaragua and Peru and currently taking into consideration a total of 9 beneficiary institutions. The ESI approach is raising interest in other regions such as Asia-Pacific - e.g. in China and Vietnam, and the AFD is contemplating its replication to Mauritius, Turkey and India. According to the CPI's Climate Finance Lab, if replicated at a global scale the program has the potential to drive USD 10-100 billion in investment and provide annual emission reductions of 27-234 MtCO₂ by 2030.

Sources: ESI official website <https://www.greenfinancelac.org/esi/>; Innovative Climate Finance Lab <http://climatefinancelab.org/>

Conclusions

◀ Contents

This scoping study has aimed to identify opportunities and challenges related to the deployment of GCLs by PFIs to support the low-carbon and climate-resilient transition in developing countries. It has identified a number of the key concepts, barriers and potential benefits that merit future attention as the use of GCLs expands, lessons are drawn from experience and new programs are developed.

Firstly, market barriers that inhibit green lending can be grouped into three categories: general investment environment, demand side and supply side. An unfavorable general investment environment – including economic, financial and regulatory factors – undermines the relative competitiveness of “green” investments versus “brown” alternatives. These include, unpriced externalities, fossil fuel subsidies, high risks of low-carbon investment projects and insufficient financial regulations, to name only a few. On the demand side, a lack of capacity to structure and evaluate green investment projects precludes end-borrowers from demanding financing from banks. On the supply side, inadequate capacity of the financial sector actors and lack of suitable loan products can limit the expansion of green lending. Overall, there is a lack of business incentives for LFIs to engage in green lending. While barriers related to the general investment environment may require broader policy interventions, some of the demand- and supply-side barriers can be tackled by PFIs through targeted use of intermediation tools, such as GCLs.

Secondly, it is important to take into consideration the different characteristics and the current use of GCLs by major PFIs. Under a GCL, funds are typically extended by a PFI to participating local financial institutions that in turn on-lend them to developers of eligible green projects. GCLs may include special financial conditions, such as reduced interest rates, longer tenors, increased grace periods or incentive payments. GCLs may also include technical assistance, which is usually funded by a PFI and aims at building capacity of LFIs to provide loans to green investment projects and/or capacity of end-borrowers to structure investment proposals. PFIs thus often aim at fostering sustainable green lending by LFIs in the long term, even after a credit line is closed. Finally, GCLs may include targeted policy dialogue with governments in recipient countries aimed at improving the general investment environment for green projects.

Thirdly, financial and non-financial benefits of GCLs and ways they can help address some of the

barriers to green lending can offer some lessons, but do not yet provide all the answers on how to meet program objectives. Concessionality and other financial characteristics of GCLs can help overcome some of the supply-side and general investment environment barriers to green lending, such as higher costs of capital, higher perceived risks and a mismatch between loan products and needs of green investment projects. Credit enhancement mechanisms, such as guarantees, as well as incentive payments can support the uptake of loans by lowering perceived or real investment risks, increasing demand for environmental projects, and by channeling concessionality conditions indirectly to end-beneficiaries. In addition to financial benefits of GCLs, TA may help tackle some of the supply- and demand-side barriers to green lending. More broadly, capacity building activities under TA may help develop sustained green lending practices in recipient countries in the future – through necessary institutional transformations, such as the establishment of dedicated energy efficiency or renewable energy units in LFIs – that have the potential to persist even after the GCL is closed.

Finally, while GCLs provide a number of benefits to all actors involved along the green lending cycle, there are a number of challenges that PFIs and LFIs are facing when deploying GCLs. The main challenges from a PFI's perspective include potential market distortions, ensuring the long-term sustainability of green lending in LFIs, environmental impact assessment and development of lending for adaptation projects. Market distortions may occur in cases where LFIs “capture the rent” from concessionality of GCLs, thus not passing the benefits on to end borrowers. Even if the benefits are passed on to end borrowers a GCL may not have a direct impact on the expansion of the green lending market, raising questions about its long-term sustainability. Moreover, monitoring the performance of underlying investment projects and evaluating their actual environmental impacts may prove to be a challenging task for PFIs. Finally, there is an increasing need to finance climate change adaptation projects, which to date have not been the focus of GCLs.

This scoping report demonstrated that GCLs, and more generally financial intermediation instruments, can be useful tools in addressing some of the barriers to green lending. Nevertheless, barriers related to the general investment environment require broader policy interventions and usually cannot be addressed by financial intermediation instruments

alone. GCLs are therefore not a “silver bullet” but rather one component of a broader support package that may include such tools as guarantee schemes, associated insurance mechanisms, and tools allowing the leverage of equity, preferably following the elaboration of market studies. Moreover, challenges remain regarding the long-term contribution of this instrument to the expansion of sustained green lending practices, the efficiency of use of funds and the evaluation of its environmental performance.

Moving forward, more in-depth research is needed to understand the long-term impact of GCLs. Most notably, the existing knowledge base on GCLs would be greatly enhanced through a systematic survey among different types of intermediaries to identify how financial and non-financial benefits can be passed on to end borrowers and how the long-term sustainability

of green lending can be ensured, once the provision of funding and/or TA is phased out. Furthermore, in-depth case studies of GCLs in specific sectors and regions could help provide sector specific recommendations to PFIs, notably the regarding the evaluation of the leverage potential and credit performance of GCLs. Finally, the analysis of complementary instruments such as guarantees and insurance would help better understand how PFIs can combine available tools to maximize their impact and increase the efficiency of GCLs.

Beyond additional research, fostering a broader dialogue among PFIs to exchange best practices and lessons from both successes and failures appears to be a natural next step in the development of sustained green lending practices.

Bibliography

◀ Contents

- Adam Smith International. 2013. "Study of Mechanisms to Incentivize the Financial Sector to Scale up Financing of Green Investment in Jordan." http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Mechanisms_Financing_Green_Investment_Jordan.pdf.
- ADB. 2014. "2013 Clean Energy Investments. Project Summaries." Asian Development Bank. <https://www.adb.org/sites/default/files/publication/42598/clean-energy-investments-2013.pdf>.
- AFD. 2016. "The Effectiveness of an Environmental Credit Line in Egypt: Synergies between Market Incentive and Binding Regulations." Technical Report No.20. Agence française de développement. <http://www.afd.fr/webdav/site/afd/shared/Notes%20techniques/20-notes-techniques.pdf>.
- Amin, A-L., T. Dimsdale, and M. Jaramillo. 2013. "Designing Smart Green Finance Incentive Schemes." E3G. https://www.e3g.org/docs/E3G_Designing_smart_green_finance_incentive_schemes_FINAL.pdf.
- Aravamuthan, M., M. Ruete, and C. Dominguez. 2015. "Credit Enhancement for Green Projects." International Institute for Sustainable Development. <https://www.iisd.org/sites/default/files/publications/credit-enhancement-green-projects.pdf>.
- Brown, J., and M. Jacobs. 2011. "Leveraging Private Investment: The Role of Public Sector Climate Finance." Overseas Development Institute. <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7082.pdf>.
- Buchner, B., C. Trabacchi, F. Mazza, D. Abramskiehn, and D. Wang. 2015. "Global Landscape of Climate Finance." Climate Policy Initiative. <http://climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf>.
- Campiglio, E. 2014. "Beyond Carbon Pricing: The Role of Banking and Monetary Policy in Financing the Transition to a Low-Carbon Economy." Working Paper 160. Grantham Research Institute on Climate Change and the Environment. <http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/06/Working-Paper-160-Campiglio-20142.pdf>.
- Climate Bonds Initiative. 2015. "Bonds and Climate Change. The State of the Market in 2015." <https://www.climatebonds.net/year-2015-green-bonds-final-report>.
- Climate Investment Funds. 2016. "Private Sector Investment in Climate Adaptation in Developing Countries: Landscape, Lessons Learned and Future Opportunities." https://www.climateinvestmentfunds.org/sites/default/files/7544-wb_cif_ppcr_report-v5.pdf.
- Dalberg. 2015. "Increasing MSME Access to Climate Finance." CDKN policy brief. Dalberg. http://www.dalberg.com/wp-content/uploads/2015/10/CDKN_20150924-MSME-Policy-Brief-vF-2.pdf.
- Enclude. 2016. "Technical Assistance Facility in Support of AFD's Green Credit Line to South African Banks." <http://encludesolutions.com/engagements/technical-assistance-facility-support-afds-green-credit-line-south-african-banks/>.
- Eschalier, C., M. Deheza, and I. Cochran. 2015. "Case Study: Integration of Climate Change into the Operational Activities of Agence Française de Développement." I4CE - Institute for Climate Economics. http://www.i4ce.org/wp-core/wp-content/uploads/2015/10/I4CE-Mainstreaming-Climate-and-LCCR-by-DFIs-Paper-3_Case-Study-AFD.pdf.
- FTF. 2015. "Shifting Private Finance towards Climate-Friendly Investments." Call for Tender no. CLIMA.A.2/ETU/2013/0035. A Report for EU DG Clima. Financing the Future. http://ec.europa.eu/clima/policies/finance/docs/climate-friendly_investments_en.pdf.
- Grubb, M. 2014. *Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development*. Routledge.
- IDB. 2013. "The Role of National Development Banks in Catalyzing International Climate Finance." Inter-American Development Bank. <https://www.greenfinancelac.org/wp-content/uploads/2016/09/The-Role-of-National-Development-Banks-in-Catalyzing-International-Climate-Finance-1.pdf>.
- — — —. 2016a. "Evaluation of IDB Group's Work through Financial Intermediaries." Inter-American Development Bank. <https://publications.iadb.org/handle/11319/7541>.
- — — —. 2016b. "Evaluation of IDB Group's Work through Financial Intermediaries: Benchmarking of Development Finance Institutions." Inter-American Development Bank. <https://publications.iadb.org/bitstream/handle/11319/7544/Evaluation-of-IDB-Groups-Work-through-Financial-Intermediaries-Benchmarking-of-Development-Finance-Institutions-Background-Report.pdf?sequence=1>.
- — — —. 2016c. "Evaluation of IDB Group's Work through Financial Intermediaries: Green Lending." Inter-American Development Bank. <https://publications.iadb.org/bitstream/handle/11319/7540/Evaluation-of-IDB-Groups-Work-through-Financial-Intermediaries-Green-Lending-Background-Report.pdf?sequence=1>.
- IDFC. 2013. "Promoting Energy Efficiency." Energy Efficiency Working Group. International Development Finance Club. https://www.idfc.org/Downloads/Publications/02_other_idfc-expert_documents/IDFC_Energy_Efficiency_Paper_01-12-14.pdf.
- IEA. 2015. "Energy and Climate Change." World Energy Outlook Special Report. International Energy Agency. <https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf>.

- IFC. 2012. "Credit Reporting Knowledge Guide." International Finance Corporation. <http://www.ifc.org/wps/wcm/connect/0f572a804dde8d028f9daf7a9dd66321/Credit+Report%20ing+lowres+NEW.pdf?MOD=AJPERES>.
- ——. 2014. "Boosting Energy Efficiency in Turkey." International Finance Corporation. http://www.ifc.org/wps/wcm/connect/066c3e8046ef97db9395ff57143498e5/Project%2BSpotlight_TurkeyCSEF.pdf?MOD=AJPERES.
- Kaminker, Christopher, Osamu Kawanishi, Fiona Stewart, Ben Caldecott, and Nicholas Howarth. 2013. "Institutional Investors and Green Infrastructure Investments." OECD Working Papers on Finance, Insurance and Private Pensions. Paris: Organisation for Economic Co-operation and Development. <http://www.oecd-ilibrary.org/content/workingpaper/5k3xr8k6jb0n-en>.
- KfW. 2016. "Loans for a Sustainable Way of Doing Business." https://www.kfw.de/nachhaltigkeit/News/News-Details_332544.html#.
- Naudet, J-D., and S. Oktar. 2012. "Méta-Évaluation Des Projets « Lignes de Crédit »." Agence française de développement. <http://www.afd.fr/webdav/site/afd/shared/PUBLICATIONS/RECHERCHE/Evaluations/Evaluation-capitalisation/46-evaluation-capitalisation.pdf>.
- NCE. 2014. "Better Growth, Better Climate." The New Climate Economy Report. The Global Commission on the Economy and Climate. http://newclimateeconomy.report/2014/wp-content/uploads/sites/2/2014/08/BetterGrowth-BetterClimate_NCE_Synthesis-Report_web.pdf.
- Nelson, D., and B. Pierpont. 2013. "The Challenge of Institutional Investment in Renewable Energy." Climate Policy Initiative. <http://climatepolicyinitiative.org/wp-content/uploads/2013/03/The-Challenge-of-Institutional-Investment-in-Renewable-Energy.pdf>.
- Nicol, Morgane, and Ian Cochran. 2017. "How Should Financial Actors Deal with Climate-Related Issues in Their Portfolios Today?" Climate Brief 46. I4CE - Institute for Climate Economics. <https://www.i4ce.org/download/deal-with-climate-related-issues-in-portfolios-today/>.
- Noothout, Paul, David de Jager, Lucie Tesnière, Sascha van Rooijen, Nikolaos Karypidis, Robert Brückmann, Filip Jirouš, et al. 2016. "The Impact of Risks in Renewable Energy Investments and the Role of Smart Policies." DiaCore. <http://diacore.eu/images/files2/WP3-Final%20Report/diacore-2016-impact-of-risk-in-res-investments.pdf>.
- OECD. 2015. "Mapping Channels to Mobilize Institutional Investment in Sustainable Energy." Paris: Organisation for Economic Co-operation and Development. http://www.keepeek.com/Digital-Asset-Management/oecd/environment/mapping-channels-to-mobilise-institutional-investment-in-sustainable-energy_9789264224582-en.
- ——. 2016. "Environmental Lending in EU Eastern Partnership Countries." Organisation for Economic Co-operation and Development. <http://dx.doi.org/10.1787/9789264252189-en>.
- Shishlov, I., R. Morel, and I. Cochran. 2016. "Beyond Transparency: Unlocking the Full Potential of Green Bonds." I4CE - Institute for Climate Economics. <http://www.i4ce.org/download/unlocking-the-potential-of-green-bonds/>.
- Stern, N., S. Peters, V. Bakhshi, A. Bowen, C. Cameron, S. Catovsky, D. Crane, et al. 2006. *Stern Review: The Economics of Climate Change*. Cambridge University Press.
- Switch Asia. 2015. "Enabling SME Access to Finance for Sustainable Consumption and Production in Asia." Association for Sustainable & Responsible Investment in Asia. http://www.switch-asia.eu/fileadmin/user_upload/Publications/2015/SWITCH-Asia_and_ASrIA_Study_Green_Finance.pdf.
- UNFCCC. 2016. "Report of the Standing Committee on Finance to the Conference of the Parties." UNFCCC. <http://unfccc.int/resource/docs/2016/cop22/eng/08.pdf>.
- Van de Ven, J-W. 2016. "Green Economy Transition at the EBRD." European Bank for Reconstruction and Development. https://www.kpc-consulting.at/fileadmin/user_upload/media/kpc-consulting/Presentations_Austrian_CC_Workshop_2016/2_Public_Initiatives_Low_Carbon_Development__Climate_Resilience/2_EBRD_J.W._Van_de_Ven_Austrian_Climate_Change_WS_2016.pdf.
- Waissbein, Oliver, Yannick Glemarec, Hande Bayraktar, and Tobias S. Schmidt. 2013. "Derisking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries." United Nations Development Programme (UNDP), New York, NY (United States). <http://www.osti.gov/scitech/biblio/22090458>.
- WEF. 2013. "The Green Investment Report." World Economic Forum. http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf.
- Westercamp, C., M. Nouri, and A. Oertel. 2015. "Agricultural Credit: Assessing the Use of Interest Rate Subsidies." AFD. <http://www.afd.fr/webdav/shared/PUBLICATIONS/RECHERCHE/Scientifiques/A-savoir/29-VA-A-Savoir.pdf>.
- Wolff, von, S., and K. Phalpher. 2014. "Green Finance. Successes and Challenges - A Landscape Overview." KfW. https://www.kfw-entwicklungsbank.de/PDF/Entwicklungsfinanzierung/Sektoren/Finanzsystementwicklung/Veranstaltungen/2014_Symposium_Landscape-Study-Final-Version.pdf.
- World Bank. 2014. "Debt Resolution and Business Exit." <http://documents.worldbank.org/curated/en/912041468178733220/pdf/907590VIEWPOINT003430DebtResolution.pdf>.

I4CE

24 avenue Marceau
75008 Paris

I4CE

INSTITUTE FOR
CLIMATE
ECONOMICS

Une initiative de la Caisse des Dépôts et
de l'Agence Française de Développement

www.i4ce.org