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Effective Green Financing: What have we learned so far?

Climate Policy Initiative

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About CPI

Climate Policy Initiative (CPI) is a policy effectiveness analysis and advisory organization whose mission is to assess, diagnose, and support the efforts of key governments around the world to achieve low-carbon growth.

CPI is headquartered in San Francisco and has offices around the world, which are affiliated with distinguished research institutions. Offices include: CPI Beijing affiliated with the School of Public Policy and Management at Tsinghua University; CPI Berlin; CPI Hyderabad, affiliated with the Indian School of Business; CPI Rio, affiliated with Pontifical Catholic University of Rio (PUC-Rio); and CPI Venice, affiliated with Fondazione Eni Enrico Mattei (FEEM). CPI is an independent, not-for-profit organization that receives long-term funding from George Soros.

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Executive Summary

There are many theories about how to use public resources to combat climate change, but few empirical cases examining whether steps taken by policy makers have worked or not.

Drawing on the experience of the San Giorgio Group (See Box ES-1), the *San Giorgio Group case studies* provide observations about effective green financing and specifically, about how different policies and injections of public resources are already altering the behavior of private entities, financial institutions, and capital markets to invest in climate change mitigation.

This analysis draws out overarching lessons from these case studies for policymakers, funders and investors, and developers of clean technology and climate resilient infrastructure. In particular, they provide insight into how risks and costs are allocated among project actors to enable investment.

An overview of the case studies:

- In ***Prosol***, we look at a **financing mechanism to support the penetration of solar water heaters in the Tunisian residential sector**. In this case a state utility mitigated credit-default risks that prevented the engagement of local commercial banks. Persuading banks of the market potential of green-tech financing encouraged them to make affordable credit available to households to purchase solar water heating (SWH) systems.
- In the ***Walney Offshore Windfarms, the world's largest offshore wind farm***, we examine how well-articulated government offshore wind incentives, over a 20-year horizon, supported a financing model that enabled project developers to secure financing from nontraditional equity investors.
- In ***Ouarzazate I, a large scale concentrated solar power (CSP) plant in Morocco***, we analyze how significant early concessional lending by international financial institutions, and large subsidies from national authorities, greatly reduced project risks and production costs, resulting in a winning bid well below projected prices.
- A separate study on **investment risk and risk mitigation instruments** looks at the specific risks associated with green investments and the

effectiveness of policies designed to mitigate these.

In addition, we draw lessons from CPI's *Global Landscape of Climate Finance 2012*, which reveals emerging trends about the kinds of instruments, intermediaries, investment structures, and in some cases state-backed development mandates, that are helping to unlock new funders and investors, and move money from sources, to its end uses.

Overall, while policies and public resources are affecting the performance of investments in ways consistent with low carbon growth, more action is required to help private actors overcome real and perceived risks — in developing and developed markets — and deliver green investments at large scale.

Other early findings of the *San Giorgio Group case studies* include:

- **Well-designed public policies are clearly able to overcome real and perceived risks and make investments viable.** In other words, public interventions can improve project economics sufficiently well to attract green private investment at scales that impact emissions levels.
- **Well-articulated public policies** are necessary to transition toward low carbon systems of production and **can be delivered through multiple instruments.** That said, policies themselves can carry credibility risks that investment measures must sometimes cover or mitigate.
- **Well-designed resource injections can alter investment risks and change private behaviors at acceptable cost.** The private sector responds to well-designed policies, but because it is not a homogeneous entity, it responds with lags, costs, selectivity, and self-interest.
- **New risks** hamper scale-up of green finance and call for a **new suite of innovative risk mitigation instruments.**
- **The ability of public resources to leverage private-sector funds is one dimension of policy effectiveness, but other factors are important as well.**
- **Green investment should focus on developing markets, and particularly emerging economies,** where opportunities exist to meet growing energy demand in ways consistent with low-carbon and climate-resilient development.

By continually re-examining, systematically evaluating, and sharing lessons about how green investments are tracking toward their objectives, we aim to identify emerging financial practices that could be applied elsewhere to different technologies and asset classes at scale, to improve the performance of green investment portfolios and projects.

Over time, the lessons observed in the evidence-based database of *San Giorgio Group case studies* may become an authoritative source for the international community, offering guidance on how to design effective funding mechanisms and how to improve financial intermediation services for green, low-emissions investments. If governments understand how to get the risk-return equation right, they will become more willing to extend the resources dedicated to climate financing. The San Giorgio Group particularly hopes to encourage the view among developing countries that low-emissions and climate-resilient growth constitutes a practical and productive national development strategy.

Box ES-1. THE SAN GIORGIO GROUP

In October 2011, Climate Policy Initiative and the World Bank Group, in collaboration with CLP (China Light & Power) and the Organization for Economic Co-operation and Development (OECD), hosted the inaugural meeting of the San Giorgio Group (SGG), a new working group of key financial intermediaries and institutions actively engaged in green, low-emissions finance.

To address the scarcity of systematic, 'on-the-ground' information about what makes investments successful from financial, environmental, organizational, and political perspectives, the San Giorgio Group decided to support the development of rigorously analyzed case studies. Drawing on the experience of its members and their organizations, the Group is conducting detailed analysis of the goals and governance of public investment portfolios, and their effect upon real world projects. The analysis aims to provide information about how to align public and private incentives, manage risks, and coordinate different actors to most effectively deploy and scale-up green, low-emissions funding.

The core objective of the San Giorgio Group is to understand how to mobilize and deploy adequate and effective finance to achieve low-carbon, climate-resilient development.

For further information see CPI (2012), "*The San Giorgio Group Inaugural Meeting: Proposed Analytical Program to Support Green, Low-Emissions Finance*"

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1 Introduction

In 2011, Climate Policy Initiative's (CPI) *Landscape of Climate Finance* provided some early insights about the global climate finance flows. The key message was that private investment made up the lion's share of financial resources across the global climate finance landscape, with clear implications that public resources play a potentially crucial role catalyzing private investments (Buchner et al., 2011).

CPI's *Landscape 2012* reveals that even as many economies are struggling to manage serious fiscal constraints, national governments across the world — and especially in the emerging economies — are directing increasing public resources toward green investments to catalyze structural changes in energy systems as engines of economic growth. Interestingly, our investigation of the ownership structures of seemingly private investments indicates that a large portion of these investments incorporate significant sums of public money (Buchner et al., 2012).

While the incidence of public money standing behind private investments is particularly prevalent in China, it is true in many other countries too. Again, the implication is that well targeted public resources are an essential element of designing transformational climate investment structures. This is especially apparent when we consider the extent to which standard financial practices and a range of commonplace risk mitigation activities, have failed to sufficiently de-risk investments and unlock new sources of finance. The fact is that in market-based financial systems, investments

in technologies, geographies or financial vehicles that require higher capital costs or present new and unfamiliar risks attract only limited capital supplies and are routinely rejected as unviable investment options. In these circumstances, the public sector must intervene to restructure risks in order to attract private capital.

To shed light on the role of public finance in unlocking private finance, CPI, in collaboration with the World Bank Group, CLP and the OECD, has established the San Giorgio Group, a new working group of key financial intermediaries and institutions actively engaged in green, low-emissions finance. The core objective of the Group is to analyze how to mobilize and deploy adequate and effective finance to achieve low-carbon, climate-resilient development. To address poor understanding about climate finance effectiveness, CPI has initiated, within the San Giorgio Group, a work stream comprised of case studies to build up knowledge on elements that make investments successful from financial, environmental, organizational, and political perspectives. By building up an evidence base about what works and what doesn't, we aim to learn from the wide range of existing and evolving financing practices, to provide insights on how to scale up climate finance and spend available resources more wisely.¹

This paper offers early insights emerging from our work in the context of the San Giorgio Group (described in Box 1). It aims to stimulate reactions and thinking about what actions are needed next.

¹ For more information see <http://climatepolicyinitiative.org/venice/san-giorgio-group/>

BOX 1. THE FIRST YEAR OF SAN GIORGIO GROUP CASE STUDIES

Ouarzazate I CSP (Ouarzazate) is a large scale concentrating solar power (CSP) plant in Morocco. It is being financed with support from the Clean Technology Fund investments in the Middle East and North Africa (Falconer and Frisari, 2012).

The **Walney Offshore Windfarms (Walney)** project is the world's largest offshore wind farm located in the United Kingdom. Led by Danish utility DONG Energy, the project managed to attract institutional investors (Hervé-Mignucci, 2012).

Programme Solaire (Prosol) is a financing mechanism that is supporting the penetration of solar water heaters in the Tunisian residential sector. Prosol is a joint initiative of Tunisia, Italy, and the United Nations Environmental Program (UNEP) (Trabacchi, Frisari and Micale, 2012).

The Risk Gap reveals there are gaps in risk coverage, particularly for policy risks and financing risks (including investment liquidity/exit risks). Two types of instruments can address some of these risk coverage gaps — first loss protection instruments and policy risk insurance. (Frisari, Hervé-Mignucci, Micale and Mazza, 2012a; 2012b; CPI, 2012).

2. Preliminary Lessons about Effective Green Finance

The existence of capital within particular organizations or segments of global capital markets does not imply that its supply matches investment demand.

This is certainly true in the case of unprecedented demand for capital to fund low carbon infrastructure. For much of the 20th century, infrastructure investment in politically sensitive sectors such as energy production² was mostly managed through budgetary allocations to public monopolies in developed economies, and through concessional lending through Multilateral Financial Institutions (MFIs) to governments in developing economies.

In the last decades of the 20th century, reforms in many industrialized economies to dismantle and privatize public monopolies and boost competition among suppliers were financed through national and international capital markets. Motivated by economic rents, potential investors in conventional energy infrastructure (mostly coal and gas-fired power) developed routine finance models, or “plain vanilla finance,” to assess the risks and returns on offer and if necessary deploy a variety of instruments and financing structures to make them part of common financial practice. Today, these routines and practices have become sources of investment inertia.

Private finance is necessary to fund the bulk of the transition to low carbon economies. **But investments in new technologies, geographies, or financial vehicles have higher capital costs and present new and unfamiliar risks that are unacceptable to private actors.**

These new risks include higher vintage costs (i.e., cost of innovative, early vintage technology), performance risks (related to construction, operation, and maintenance), and policy or regulatory risks (on a national, sub-national, and international level). While the private sector has demonstrated its ability to move quickly with new products and organizations in response to changing market conditions, this has not been the case for investment in renewable energy infrastructure. “Plain vanilla finance” has been unable or slow to accommodate green investment needs, and in some cases, the lack of or weakness in domestic capital markets increases investment uncertainty – and making it difficult to attract initial finance, or to refinance existing investments.

The case studies and additional CPI work on climate

2 Other politically sensitive sectors include water, port, and transport sectors.

finance suggest six early lessons about what makes green climate finance effective.

1. Well-articulated public policies are necessary to start the transition toward low-carbon systems of production and can be delivered through multiple, varied instruments.

San Giorgio Group case studies reveal that **well-articulated policy frameworks that provide appropriate incentives are essential to provide private money with a rationale for investing in low-carbon energy generation.**³ Public policies can compensate investors for the incremental costs of renewable technologies or pay for risk premia that private actors are unwilling or unable to bear.

In all three case studies, the public financing instrument was part of a broader policy framework.

- **Walney** was commissioned against the backdrop of the **United Kingdom’s target to reduce emissions by 80% by 2050.** The UK government’s policy framework is designed specifically to reward generators of cost-effective renewable electricity.
- **Prosol** took place within the context of **long term policies** dating back almost 30 years aimed at shifting energy supply away from imported sources and exploiting Tunisia’s renewable energy potential.
- **Ouarzazate** is the first step of the ambitious **Moroccan Solar Plan (2009), which aims to install 2000 MW of CSP capacity by 2020.** The government committed to finance the cost of the plan and established the Moroccan Solar Energy Agency to develop the projects. The 2010 Energy Strategy established **complementary long term public policy goals** — including reducing reliance on oil to 40% of energy consumption by 2030, increasing energy efficiency, and increasing renewable power generating capacity to 42% by 2020.

The case studies illustrate that **policy choices vary**

3 Corfee-Morlot, J., Marchal, V., and K. Dahou (forthcoming), Towards a Green Investment Policy Framework: The case of low-carbon, climate-resilient infrastructure, Organization for Economic Co-operation and Development, OECD Staff consultation draft, 18 June 2012. http://www.oecd.org/environment/climatechange/Towards%20a%20Green%20Investment%20Policy%20Framework_consultation%20draft%2018-06-2012.pdf

widely, can target different groups of actors across a range of technologies, and may deliver finance directly or indirectly.

Finance is delivered indirectly when policies unlock reactive investment, by altering the balance of costs and returns between carbon and non carbon investments, changing private investment behavior. Feed-in Tariffs, direct subsidies and grants, and carbon taxes or cap and trade systems are some examples. **In Walney, policy instruments indirectly contributed around 60% of projected future income.** Even though financial engineering removed risks (such as construction and operating cost risks) that were unacceptable to minority equity investors, **the absence of the clear policy incentive would have reduced prospective investment returns to levels that would have been unacceptable for nontraditional investors.** Using the kind of financial engineering that private investors apply relatively easily in the absence of conventional sources of debt or equity, **Walney** developer DONG, a state-owned Danish energy group, mixed power purchase agreements (PPAs), construction management, and operation and maintenance agreements to reallocate cost downsides and shield minority investors from price uncertainty, cost overruns and delays, technology failure, and other risks. **But a green certificate policy instrument was decisive** by providing DONG with scope to engineer something close to a fixed income security (in combination with fixed-price power purchase agreements), with sufficient value to attract nontraditional minority investors.

Finance can be delivered directly when public sector investments assume ownership and/or significant financial risks. Equity investments at below-market returns, concessional loans, guarantees, and publicly provided or subsidized risk insurance can help to align public and private estimates of incremental costs and risk premia, enhance policy credibility, and minimize lags between policies and markets. **In Ouarzazate I, under a public-private partnership, the government-backed Moroccan Solar Agency (MASEN) will directly assume incremental cost and price risks that private investors are unwilling to bear, making the project viable for all parties** (Falconer *et al.*, 2012). Under two PPAs, MASEN will buy power from the partnership company at the cost of production and sell it to the power utility at much lower grid prices. **The Moroccan government will fund the viability gap through an annual subsidy,** positioning MASEN to create revenue certainty for the project developers and price certainty for the power utility.

Policies must be well-targeted in order to be effective. If public policies are poorly targeted, offer incentives that are insufficient to change private behavior, or require practices beyond the range normally applied by private actors, they will result in insignificant change, inadequate to the scale of the public problem. That said, policies themselves create risks of credibility over time that require additional investment measures to cover or mitigate. We address this in detail in section 3 below.

BOX 2. PROSOL: HOW WELL DESIGNED POLICIES CAN OVERCOME FOSSIL FUEL SUBSIDIES

Given their scarcity and the scale of the task, it is essential that international public resources, not get caught in a cycle of needing to fund the repeating incremental costs of renewable energy. This injunction does not apply in the same way to paying all or part of the expected declining costs of early vintage technology development, in order to drive the costs down to their long run minimal increment over low cost alternatives. **Prosol shows how, particularly when governments are already caught in the fossil fuel subsidy cycle, a well designed renewable energy policy can help overcome economic loss derived from expensive fossil fuel subsidies and generate net benefits.** In this case, the saving generated from the diminishing costs of fossil fuel subsidies more than covered the cost of *Prosol*.

In 2008, Tunisian petroleum-related subsidies were valued at around 1% of gross domestic product. One of *Prosol's* goals was to level the playing field and shift demand away from fossil fuel-powered water heaters by offsetting the subsidy advantage of market-leading liquefied petroleum gas-fired (LPG) systems (with 70% of heating system market share). The legislative policy framework that backed *Prosol* provided financial incentives that targeted consumer demand and lowered costs at four separate points of the value chain:

- Domestic and international public sector subsidies (Tunisian government USD 21.8 million, Italian government USD 1 million) funded 20% of the capital cost of SWHs to bring **consumers' up-front costs down**;
- The Italian government spent USD 1 million to provide a **temporary interest rate subsidy to lower the cost of credit**;
- Using the state utility to eliminate banks' credit risk encouraged **softened credit terms and made credit more affordable for consumers, but no less profitable for banks**;
- Less than USD 200,000 was spent to pay for **'accompanying measures'**. These included introducing 'quality standards' and **training suppliers to install and properly maintain SWHs, reducing failure rates and lowering household's technology risks — real and perceived.**

Installation growth rates were impressive, with annual deployment rising five-fold compared with previous initiatives, and the program economics are very attractive for the Tunisian government. In return for its USD 21.8 million investment, the shift in demand away from LPG systems saved the Tunisian government USD 15.2 million between 2005 and 2010. **Over the life of the SWHs, savings from avoided LPG subsidies are projected to reach USD 101 million** (or USD 49 million if a planned 2017 subsidy phase out is successful). This suggests that the government will achieve full pay back within 7 years. **Prosol not only pays for itself, but delivers net savings to the public purse.** This is in addition to the multiple benefits *Prosol* generates, including: 251 Ktoe and 715 KtCO₂ saved over the SWHs lifespan; the development of a domestic solar thermal industrial cluster; and possibly more than 3000 direct jobs in manufacturing.

Prosol suggests that the design, implementation and diffusion of 'improved subsidy' mechanisms may be a sweet spot for reform—particularly as there are so many developing countries with energy subsidies built into popular political expectations.

2. Well-designed resource injections can alter investment risks and change private behavior at acceptable costs.

Policies that organize public resources so that risk⁴ can be reallocated to the most suitable party are the key to leveraging and mobilizing new private investment flows.⁵ That said, the private sector is not a homogeneous entity, and it responds to policies with lags, costs, selectivity, and self interest. While the private sector can move quickly where attractive returns are clear, returns are not so readily apparent in regulated, politically sensitive sectors like energy infrastructure. In reality, regulation in different segments and a complex division of labor among financial intermediaries and associated service providers mean that the response to policy signals or market developments may be strong in some quarters of the financial system and lagged, expensive or non-existent in others. In a system of complementary specialization linked by contractual relations, partial lack of response can forestall responses across the system. Policy that does not recognize the selectivity of the private sector is likely to run into financial lethargy.

Targeted policy responses and injections of public finance, at various stages of the project lifecycle, can improve project economics and profitability. Injecting financial resources — for example, by organizing institutions to perform specific functions, contributing institutional capacity, or creating regulatory frameworks — can change the distribution of risk. The San Giorgio Group case studies provide several examples.

- In *Prosol*, the fledgling market for solar water heaters would have been unviable had local banks been unable to **overcome high credit risks**. Again, the public sector played a pivotal role, by directly involving the state owned utility as guarantor for and enforcer of consumer loans. Buying down the debt default risk and subsidizing solar water heater capital costs

opened the way for local lenders to provide USD 59.8 million in cheap loans.

- **In *Walney*, the British government's policy framework was designed to alleviate risks associated with future income uncertainty.** The design of the renewable energy obligation scheme created a market for the Renewable Obligation Certificates that will be issued to renewable energy generators such as *Walney*. Valued at around GBP 1.3-1.5 billion, proceeds from the sale of these certificates constitute more than 60% of projected future revenues over a 20-year horizon, paid for by local energy companies as they meet their own compliance obligations. Together with the assurances provided by ambitious long term deployment targets, the UK government's policy and regulatory framework attracted GBP 1.3 billion in private investment to finance the world's largest offshore wind farm. At least as important, the fungibility of the green certificates provided the project developer with scope to engineer something close to a fixed income security (in combination with fixed-price power purchase agreements). This provided sufficient security for nontraditional passive investors to purchase a 24.8% equity stake.
- *Walney* also suggests that **policy frameworks need to support project refinancing needs more effectively.** When project developers are left uncertain about the sustainability and length of policy supports, financial structures become more complex and debt or passive equity financing becomes more difficult and costly to obtain.

We should not underestimate the importance of innovation when designing the delivery of public resources. Unless incentives are tailored to overcome institutional inertia, private actors will apply common practice in evaluating investments and will underinvest in innovative technologies. Awareness about potential markets can be one of the most critical barriers. For example, had Tunisian banks been left to their own devices, they would have used heuristic or proxy financing strategies to perform due diligence, rate asset classes, and forecast performance of the investment in solar water heaters. They would almost certainly have rejected *Prosol* as a viable investment. Instead, the banks' investment earned them around USD 7.4 million between 2005 and 2010 (Trabacchi *et al.*, 2012).

4 To understand how risk and risk mitigation techniques impact green investments, San Giorgio Group case studies classified risks along three axis: development risks (associated with design and implementation of a project); operation risks (derived from the actual costs of running the project, including operations and maintenance risks); and outcome risks (linked to the overarching objectives of a project, including development, economic and environmental outcomes).

5 This is distinct from discussions about innovative risk mitigation instruments, which will be covered in a latter section.

The San Giorgio Group cases highlight that while there is no single right way to deliver public financing, the method selected should facilitate the most appropriate allocation of risk. Decisions about which mechanisms to use may turn on economies of scale, transaction costs, stage of technology development, agency costs, and monitoring and enforcement costs.

3. New and increased risks hamper efforts to scale up green finance and call for innovative risk mitigation instruments.

The case studies suggest that some governments are taking serious steps to improve incentives to attract green investment, and that some of these are working well. However the scale of the climate challenge combined with the focus of many governments on developing infrastructure as a driver of economic growth, has generated demand for low carbon infrastructure capital at unprecedented levels. **At the same time, the financial crisis in developed countries has created severe capital constraints for project developers, banks and public budgets, giving rise to increased policy risk and worsening financing risks (including access to long-term capital and investment liquidity/exit risks).**

Policy risk creates the perception (real or just perceived) of financial instability across the life of an asset. It includes prospective and retroactive changes to support policies, and can relate to factors such as unforeseen tax increases, unstable revenues and costs, and quantity and volume controls. San Giorgio Group case studies on risk found that that demand for coverage is only partially met (Frisari et al., 2012a), suggesting that conventional practices may no longer be adequate to mitigate policy risks.⁶ In turn, financing risk relates to the perception of availability of affordable capital matching the long maturity of the assets and the possibility — particularly from institutional investors' point of view — of a profitable exit from the investment when needed.

Risk mapping revealed that most of the recent reviews and amendments to support policies have concerned Feed-in-Tariff schemes, especially in developed markets. We identified two risk mitigation instruments that can overcome risks associated with structuring investments around these mechanisms and make them

more attractive for institutional investors — policy risk insurance and first loss protection mechanisms.

1. **Policy risk insurance provides coverage against the possibility that national governments may alter existing policies in ways that hurt the financial stability of projects.** Two insurance products provide examples of tools to address policy risk (Frisari et al., 2012b):
 - **Expropriation Coverage offered by Multilateral Investment Guarantee Agency (MIGA)** can indirectly address policy risk by covering a tariff reduction for equity and debt providers, if the client can prove that the policy change qualifies as an expropriatory breach of the Power Purchase Agreement (PPA) between the investor and the public off-taker.
 - Newly launched **Overseas Private Investment Corporation (OPIC) feed-in-tariff insurance** provides policy risk coverage⁷ to U.S. investors when the policy change harms the financial stability of projects by causing a breach of the PPA between the investor and the government and constitutes expropriation (or regulatory taking).

Streamlining procedures, increasing certainty about the timeliness of remedies, and significantly reducing transaction costs, would improve policy risk insurance instruments. Both the MIGA and OPIC instruments have been used successfully to secure remedies against host governments and obtain compensation for breaches. While OPIC's proposal improves traditional expropriation coverage, both instruments entail significant uncertainties about timing to enforce remedies, transaction costs, and compliance requirements, which limit their scope to large projects. These uncertainties have also made credit rating agencies reluctant to fully acknowledge their contribution to projects' creditworthiness.

2. **First-loss protection instruments shield investors from a pre-defined amount of financial losses, thus enhancing the creditworthiness and improving the financial profile of an investment.** In addition, they reduce the perception of liquidity risks by aiming to attract, in scale, institutional investors. Two recent proposals have applied first loss protection instruments to clean energy investments. The **European Commission – European Investment**

6 Conducted on behalf of the San Giorgio Group, in 2012 CPI will publish three case studies on risk; *The Risk Gap - A Map of Risk Mitigation instruments for Clean Investments; Policy Risk Instruments; and First Loss Protection Mechanisms.*

7 OPIC can insure up to 90% of an equity investment, plus an additional 180% to cover future earnings; for third party loans coverage is 100% of principal and interest (OPIC, 2012g).

Bank Project Bond Initiative (PBI), already in a pilot phase, aims to support the credit rating of individual projects with a guarantee instrument. The **Sustainable Development Bond Assurance Corporation (SDBAC)** would establish a dedicated entity to provide first-loss insurance to various project finance collateralized loan obligations (CPI, 2012). The case studies show that to be effective, first loss protection mechanisms must:

- **address specific investor needs**, matching their required risk-adjusted rate of return and allowing securities to obtain an investment-grade credit rating; and
- **address institutional investors' unique circumstances**, such as the liquidity of a secondary market and mitigation of some specific project-level risks.

To ensure such instruments have optimal impact, **proceeds of debt issuances⁸ need to be prioritized toward green investments** to avoid the risk that banks may reallocate capital toward a wide range of investment outcomes, some of which may not encourage climate friendly outcomes. It is hard to tell if first-loss protection mechanisms are real game-changers primarily because there is no way of knowing whether banks will direct proceeds toward green investments. An option might be to make sponsorship of these mechanisms contingent on earmarking part or all of the proceeds to support low carbon investment. Crucially, to have transformative potential, these instruments must also pass a fundamental reality test: establishing them will be pointless if they do not appeal to the banking sector or targeted investors, or are established too late to meet the funding challenge.

The case studies also illustrate that **credit rating agencies have an important role determining whether these kinds of instruments succeed in mobilizing and leveraging new sources of finance**. According to credit rating agencies, for example, the PBI has the ability to enhance credit rating by decreasing the probability of default and reducing the loss given default for the senior lenders. This is good news, but **the credit rating agency approach of rating investments is far from perfect**. Credit agencies prefer full financial guarantees over mechanisms that insure against or mitigate specific

⁸ A debt issuance is the financial instrument by which companies or governments raise funds by borrowing money from lenders. Debt issuances can take several forms (loans, bonds, hybrid securities) but in all cases, the company or government borrowing the money (issuing the debt) agrees to pay the lender (the bondholder) a set interest rate over a defined period. At the end of the period, the borrower pays back the lender in full.

risks, even though this increases the incentive for moral hazard (e.g. when public incentives encourage private actors to adopt excessively risky positions because they bear no associated downsides), and may even increase projects' overall level of risk. Offering a full financial guarantee is currently beyond capacity of many governments and institutions. This is particularly so given the scale of investment required, and the current depth of capital constraints.

4. The ability of public resources to leverage private-sector funds is one dimension of policy effectiveness, but other factors are important as well.

San Giorgio Group case studies show that **money is spent wisely if it substantially aligns the interests of parties, resulting in viable projects that take concrete steps to achieve public policy outcomes**. If we apply the viability test to Ouarzazate, it is clear that each stakeholder contributes fundamentally and that without any one of them, the project would fail.

- International concessional funding drives levelized costs down by 25-30% and brings with it significant technical expertise. Both factors improve the prospect of replication (so achieving economies of scale).
- The Moroccan government's heavy investment improves the confidence of donors and investors, covers incremental costs, and makes the project economically viable for all parties. All factors improve prospects for demonstrating technology components.
- Private investors, which own 75% of the power company, contribute management expertise and know-how and improve prospects for implementing the project on time and within budget.

Around the world, public resources are scarce, and governments are under pressure to demonstrate value for money. Accordingly, the rationale for spending them must always be well founded. The examined case studies provide examples of well-founded public investments paying for goods and services in which the private sector would not invest because they are: (1) public goods that have high social returns but no associated profit (e.g. green energy generation in Prosol) and/or (2), capital investments that carry risks or costs

private actors deem unacceptable (e.g. high technology costs in Ouarzazate).

In the SGG case studies, **private investors not only provided needed finance, but brought benefits associated with know-how and management expertise which in turn, helped to improve efficiency and minimize costs.**

In line with this, at the end of September, the Moroccan Solar Agency MASEN announced the selection of a successful tender for the design, financing, construction, operation, and maintenance of Ouarzazate I. A consortium led by ACWA Power International was selected with a bidding price well below original projections.

Where public money is spent to reduce costs or improve returns, leverage should be as high as possible in order to avoid moral hazard and gaming, and inefficiencies that flow when public resources crowd-out private capital and know-how. However using only leverage and mobilization ratios as measures of effectiveness would lead to insufficient investment in risky and innovative technologies in too few geographies.

True assessments of effectiveness should consider the broad context of investments and ask if injection of resources have helped to realize environmental, economic, social and development objectives. In the Ouarzazate case study, for example, the ratio of public investment relative to private investment is very high. Even with high levels of concessional financing, the cost of energy produced remains well above local grid prices, and the venture would be commercially unviable were it not for the Moroccan government's coverage of the viability gap. However, the Moroccan government has a bigger goal that may justify the expense — the goal of exporting CSP generated power to European markets. Achieving such a goal requires significant capacity, but CSP technology is still too immature and too expensive to develop at scale. In this early phase, public resources are essential to cover early development costs and additional operation costs (such as capacity building and associated grid infrastructure), over and above incremental costs.

At this initial stage, **Ouarzazate I embodies almost perfect alignment between the interests of all stakeholders** with each making exactly the same bet: that Ouarzazate will succeed as the first stage of a larger portfolio that will achieve economies of scale and its associated benefits. If this is achieved, international financing institutions can phase out their support, while the Moroccan government can wind down its subsidies in line with falling costs and begin to enjoy the economic

rewards of valuable exports. Private investors would have a foothold in a potentially lucrative export market.

The spread of resources also confirms that public resources have paid for the kinds of goods and services that governments are expected to provide — in this case, the cost of bringing commercially immature but very promising technology to market. Achieving a CSP portfolio and associated exported revenues is expected to deliver numerous social goods for citizens including local economic development (including an estimated 11,000 jobs) and improved energy security. At the same time, failure to cover early vintage costs and subsequent incremental costs would make it impossible to attract private investors capable of actually delivering the project. Both rationales suggest that money has been spent wisely. Actual implementation of the project will confirm if this early observation is correct.

Even so, as approaches are replicated and scaled up, transaction costs associated with contracting and collecting public subsidies need to fall. For example, in the case of *Ouarzazate*, costs associated with international lending packages were high. Although coordination between international lenders was good, the ability to harmonize and coordinate lending packages, for example, through loan syndication, could help to avoid excessive transaction costs, lengthy procedures, and unbearable compliance requirements. Achieving these savings would enhance the overarching effectiveness. Financial engineering in *Walney* was also complex. Other smaller utilities or wholly privately owned utilities may not have had the capacity or resources required to conclude the deal.

5. Green investments should focus on emerging economies, where energy demand is growing and opportunities exist to install green infrastructure.

Although the San Giorgio Group is still in its early phases, **some findings from our *Global Finance Landscape 2012* study have implications for where green investment should be focused to deliver greatest benefit to the global commons.** In developed countries, overlapping finance, manufacturing and jobs crises, decreasing costs for unconventional gas-fired power and the increasing capacity to extend the lifetime of existing generation assets, have stalled demand for new energy infrastructure. At the same time, rapid, government-backed industrialization is well advanced in the large and increasingly wealthy emerging economies,

and demand for new energy infrastructure is growing strongly.

The priority developing country governments attach to increasing access to energy, as evidenced by the vital role played by national financing institutions, is a powerful driver of global green investment levels.

The *Landscape 2012* indicates that National Financing Institutions (NFIs) and particularly, National Development Banks (NDBs) in some of the largest emerging economies, play a big role in global climate finance. In 2011, NFIs spent around USD 42.7 billion, or 56.7% of the total climate finance distributed globally by public actors. Of this amount, the Brazilian National Development Bank (BNDES) and the Chinese Development Bank (CDB) contributed more than 80% (Buchner et al., 2012).

With a growing proportion of low-carbon infrastructure finance located in the fast-emerging economies, the growth of innovative energy technologies at scale is likely to remain focused in these regions into the future.

As the discussion above suggests, NDBs will play a key role in building the low-carbon economy. They can directly provide a full range of financial services, usually with substantial vertical integration across investment functions, with differentiated capital costs indexed to policy objectives. These tools enable them to direct public resources smartly to bridge critical funding gaps, perform in areas underserved by the private sector, and implement national strategies set by their governments, often in partnership with other international public intermediaries. Provided the right policy frameworks are in place, emerging economies are comparatively well positioned to overcome the cost and risk barriers that continue to inhibit scale-up of green infrastructure investments.

In 2011, China, Brazil, and India were the largest recipients of global mitigation-directed climate finance flows, with USD 121 billion, close to 33% of the total

(Buchner, et al., 2012). Given these countries' significant and growing contribution to global greenhouse gas emission levels, these investments seem to have been made where they are needed most and where mitigation potential is the greatest. However, if growing investment in developing countries and emerging economies is to continue to fill the gap between current climate finance flows and global financing needs (Buchner et al., 2012), barriers associated with clean investment, and particularly cost barriers, must not be understood by them as constraints on development. The ability to increase resource productivity as a source of both growth and reduced energy and carbon intensity—so

that economies can grow without growing their emissions— must therefore become the primary objective of effective policy for climate finance.

6. Substantial gaps remain in our understanding about the climate finance landscape and the interaction of the private and public sectors.

While the case studies offer some lessons about designing effective policies to support green investment, there are some areas where we need to know more. These priority areas for further research include:

Understanding the optimal balance of political and policy costs and gains over the long term. While the case studies demonstrate that policy can help to finance early vintage technologies or commercially immature technologies at scale in the short term, it is not yet clear whether any one nation (for example, the UK and offshore wind generation) can credibly bear the political price over time. If the costs of these green technologies decline over time, reducing the subsidy return, then the risk of revenue coverage makes this an interesting and challenging case. This suggests that early vintage technologies are ideal cases for some form of collective (multilateral) cost sharing.

Gaining a more detailed understanding of the landscape of capital markets, including issues specific to particular regions or types of investment. Alternative forms of capital markets populate the landscape of global and national finance, from deeply market-based ones through to markets dominated by extensive state development banking. Without detailed knowledge of this complex landscape, public policies may not be sufficiently designed or targeted to leverage private finance in particular geographies or asset classes. A better understanding of the specific capital market context is needed to effectively deploy public funds. This will promote good alignment of public funds with the specifics of private financial organization. Strategies for effective finance may differ significantly between developed and developing country capital markets.

Understanding the role of public development banks in the green investment landscape and in specific policy contexts (Buchner *et al.*, 2012).

Involving credit rating agencies more closely in the development of instruments designed to unlock new investors. Investor groups or contracted agencies that certify investment quality exert a strong influence. If

classes of potential green investments fall beyond the boundaries of comfort zones, this will generate a higher weighted cost of private capital. Peer judgments therefore need to be informed by the real risks and prospects of green investments to rate instruments fairly and within their contexts.

Understanding how general conditions in global capital markets affect the viability of green investment projects. Even if well aligned with private financial industry practices, green investments will always compete to some degree with investments in different asset classes or other forms of infrastructure. In national systems where market organization, regulation, government policies, or corruption create incentives to invest in particular sectors or investment vehicles, the level of green investment may be significantly influenced by these factors. The financial crisis in developed countries has been exacerbated by new banking, insurance, and pension fund regulations intended to avoid or restrict practices that were associated with the causes of the financial crisis. To the extent that green projects are aggregated with classes of assets that are particularly burdened by reformed regulation, this may further discourage rates of green investment.

3. Conclusions

The lessons learned in the San Giorgio Group lie at the intersection of the policy regimes for energy (and land-use) production and distribution, capital market regulation, and the organization of the private financial sector. Change at the system level is predictably gradual, and contested because of both organizational inertia and the vested technical, political, and economic interests that are attached to infrastructure investments everywhere. Given the cyclical movements in each of these political fields and the variable state of development of institutions and sectors across nations, it would be surprising if early experiences led to easy generalizations about climate-related finance.

As we look forward, some final observations emerge:

To promote replication and scalability, public sector funders need to monitor, evaluate and learn from public expenditures and ensure lessons are captured by future interventions. Replication and scalability are not trivial problems. Each individual project or investment structure contains multiple building blocks that contribute to the project's success. Some of these, such as the role played by the state utility in *Prosol*, may be difficult to replicate and could limit the potential to scale within Tunisia or to replicate elsewhere.

In general, the San Giorgio Group case studies give us some cause for optimism. *Prosol* built on the experience of two earlier initiatives that failed to address issues related to the solar water heater market, and created mechanisms that directly addressed the reliability of technology, and the reluctance of banks to engage. The monitoring, control, supervision, governance arrangements, and skills building programs developed under *Prosol* are evidence of an effective learning feedback loop. Weak aspects of the program were identified and overcome during its life time.

Walney too, is a version of previous financing models involving pension fund investors, but has evolved a step further to bring on foreign financial investors. This financing model has been replicated by other types of investors (foundations and Japanese trading firms) and other policy environments (Germany).

Ouarzazate is the latest in a series of only moderately successful CSP projects in the region. Previous projects were fraught with construction delays, management difficulties, and inflexible financing that resulted in scaled-down projects. Lessons appear to have been learned across the board, from the Clean Technology

Fund's decision to support a small number of projects at significant scale, to the national government and local institutions' willingness to work with donors and the private sector to develop a public-private partnership that addressed cost and policy risks on one side, and management and know-how risks on the other

Significant challenges do remain — for example, discontinuing or reducing green investment policy incentives could transform any one of these cases into an unviable project for all of their backers. Viability and bankability are only achieved through the careful alignment of public and private interests, and this alignment can easily be undone. Our San Giorgio Group work illustrates that given the right public policies and investment strategies, private investors will support green investment activities. Sharing lessons from the design and implementation of these projects will encourage other governments, project proponents, developers and investors, to build on them as part of the set of new common practices that have potential to put us on track to meeting the green investment challenge.

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