

Financing Models for Soil Remediation

# Financing Soil Remediation

Exploring the  
use of financing  
instruments to  
blend public and  
private capital



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### **Financing Soil Remediation: Exploring the use of financing instruments to blend public and private capital**

July 2018

International Institute for Sustainable Development (IISD)

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Cover design is based on soil symbols used in mapping soil types.

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## **ABOUT THIS REPORT**

This is a part of a series of outputs of a four-year project, Financing Models for Soil Remediation, carried out by the International Institute for Sustainable Development (IISD), the Norwegian Institute for Water Research (NIVA) and the Chinese Academy of Environmental Planning (CAEP), in association with the Centre for International Climate and Environmental Research (CICERO) and the International Institute of Green Finance (IIGF) of China Central University of Finance and Economics (CUFE) with support from the Norwegian Ministry of Foreign Affairs. The project aims to support the implementation of China's priorities and its policy development process through institutional partnerships; mutual learning and exchange; strengthening of capacity, especially in government institutions; and the effective demonstration of results on the ground in the implementation of China's environmental priorities. The overall objective of the project is to harness the full range of green finance approaches and vehicles in the task of finding and managing the associated risks in the remediation of contaminated soils in China.

This series of reports focuses on the financial vehicles available to attract investment to environmental rehabilitation of degraded land and the financial reforms needed to make these vehicles a viable and desirable means of investing in land rehabilitation. We draw on best practices worldwide in funding environmental rehabilitation, with a special focus on the design and use of financial mechanisms to attract private investors, share the risk and offer a clear benefit for the rehabilitated land. This report was written by Oshani Perera, Laurin Wuennenberg, David Uzsoki and Andrés Cuéllar.

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Findings and opinions expressed in this paper are not necessarily shared by those contributing to the work, and any errors and omissions are the responsibility of the authors and partner institutions.

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## List of Abbreviations and Acronyms

<b>AB2M</b>	Agri Bio Energie Methanisation Du Maine
<b>BEDI</b>	Brownfields Economic Development Initiative
<b>BMZ</b>	German Federal Ministry for Economic Cooperation and Development
<b>CDBG</b>	Community Development Block Grant
<b>DNS</b>	debt-for-nature swaps
<b>DRC</b>	Democratic Republic of Congo
<b>EBRD</b>	European Bank of Reconstruction and Development
<b>EEA</b>	European Environment Agency
<b>EPA</b>	Environmental Protection Agency
<b>Fintech</b>	financial service technologies
<b>FIT</b>	feed-in tariff
<b>HIB</b>	humanitarian impact bonds
<b>HSBC</b>	Hong Kong and Shanghai Banking Corporation Limited
<b>HUD</b>	Department of Housing and Urban Development (USA)
<b>ICO</b>	initial coin offering
<b>ICRC</b>	International Committee of the Red Cross
<b>IIF</b>	InsuResilience Investment Fund
<b>KfW</b>	German Development Bank
<b>LDDS</b>	livret de développement durable et solidaire
<b>MFI</b>	microfinance institutions
<b>MIGA</b>	Multilateral Investment Guarantee Agency
<b>MTR</b>	Mass Transit Railway
<b>NGO</b>	non-governmental organizations
<b>ODA</b>	official development assistance
<b>O&amp;M</b>	operation and maintenance
<b>P2P</b>	peer-to-peer
<b>PPP</b>	public-private partnership
<b>SDG</b>	Sustainable Development Goals
<b>SER</b>	staff efficiency ratio
<b>SME</b>	small and medium-sized enterprises
<b>TIF</b>	tax increment financing

## Part 1: Introduction

This report examines innovative approaches to financing the cleanup and regeneration of contaminated soil. As public budgets tighten, governments around the world are looking at opportunities to attract private capital participation in both land remediation and its productive use and redevelopment thereafter. **The business case is intrinsically the value capture in the increase in retail price of land and related business opportunities once the remediation is complete.**

The need for soil remediation is also very real. In Europe, for example, the European Environment Agency (EEA) reports that soil remediation costs around EUR 6.5 billion per annum and that there may be EUR 2.5 million potentially contaminated sites that merit investigation. The EEA also forecasts that 14 per cent of these sites are likely to require remediation (EEA, 2016). Reuters (2016) reports that China's Ministry of Environment Protection estimates that 16 per cent of China's soil exceeded state pollution limits. In 2016, under the Comprehensive Environmental Response, Compensation and Liability Act, often referred to as Superfund, the U.S. Environmental Protection Agency (EPA) reports to have received USD 1 billion in commitments from potentially responsible parties to clean up Superfund sites and levied USD 91.8 million in oversight costs associated with cleanup. The latter is reported to be the third highest amount of oversight ever billed in the program's history (U.S. EPA, 2016).

Soil remediation has challenged governments for decades. It is a highly complex issue encompassing a wide array of variables and uncertainties. Remediation also takes several years to complete. Given the extent of land degradation around the world, governments and stakeholders accept that it is not technically or economically feasible to remediate all contaminated sites. Public funds for soil remediation have therefore been aimed at long-term strategies designed on a "risk-based" approach to land management. The core of this approach is based on two aspects:

- (a) Enforcing the "polluter pays principle," identifying public and private entities that are responsible for the degradation, determining the characteristic and extent of clean up required and ensuring the "polluters" meet the costs of the cleanup.
- (b) The characteristics of the remediation are determined to render the soil "fit for use"—fitness being determined based on site-specific characteristics including location and future use.

**This objective of rendering land "fit for use" lies at the core of soil remediation financing strategies. Moreover, it is the baseline on which the feasibility to attract private capital can be realistically assessed.**

Private investors look for opportunities to take risks and reap financial rewards commensurate with the level of risk they are prepared to take. In this vein, soil remediation markets are based on the availability of reliable information on land contamination registers, costs and characteristics of remediation, the track record and perceived risks associated with the cleanup technologies and, most importantly, forecasts on land value increases and revenues from commercial activities that can be expected after the soil is remediated.

When there is reasonable certainty that land value will increase and related business activities with stable revenue streams can be developed post remediation, there is a strong case for wooing private investors. The private counterparties may well be willing to meet the costs and the risks of remediating the land to a level that is "fit for use," provided that they can develop the site for residential, industrial or commercial use thereafter. The best examples of this are urban brownfield sites where public and private counterparties have worked together to remediate and redevelop these sites into commercial and residential assets.

In the case that land value capture is lower and related revenue streams remain uncertain, the case for private capital participation is much less compelling. Governments, in this case, have to fund the remediation through public budgets, and thereafter seek opportunities to partner with private counterparties to use the land as "fit for purpose."

In light of the long periods required for remediation, coupled with the complexities and uncertainties associated with determining the sources and nature of contamination and the effectiveness of remediation technologies, governments have only met with limited success in attracting private capital participation to this sector. Most industrialized countries established public agencies and funds to remediate land—the U.S. Comprehensive Environmental Response, Compensation and Liability Act, better known as Superfund, is perhaps the best-documented example.

There has, however, been substantial innovation in the development of soil remediation technologies. They have led to the reduction of costs and risks and are leaving behind a much more successful track record of sites that are “fit for use.” It is therefore timely for governments to seek new ways of attracting private capital. To that end, it is worthwhile to examine innovative financing strategies that have evolved across the financial services sector and the infrastructure finance domain.

With the advent of deregulation, information technologies and, now, financial service technologies (fintech), there is also continuous innovation on financial products that aim to make a positive impact on people and the planet. Buzzwords such as impact finance, social finance, green finance and conservation finance refer to these opportunities, and start-up ventures around them seem to burgeon every day.

Some of these strategies and products hold valuable lessons for financing soil remediation, and this report will discuss and debate some of them.

In the pages that follow, we present 17 case studies on a variety of financing instruments that blend public and private capital. Each case study includes a short discussion on the extent to which each instrument could be used to finance the remediation of contaminated soil. The authors have undertaken both primary and secondary research in developing the case studies and have attempted to make them as complete as possible. We are not able to comment on the impacts of these financing instruments at this point in time because related information remains anecdotal and undocumented. Moreover, because some of these instruments were relatively new, the response of capital markets and follow up on innovation is yet to play out.

Readers should also note that these case studies are by no means an exhaustive compilation of innovative and blended financing approaches. They provide a very preliminary insight into the types of approaches that may be envisaged to channel more capital, both public and private, to remediate contaminated soil in the years to come.

## Part 2: The Case Studies

In Part 2 of this report, we present 17 case studies. An overview is provided in Table 1.

The case studies have been selected to present a variety of financing strategies that can be considered for remediating contaminated land.

**Table 1. Overview of 17 case studies**

Type of Instrument	Case Studies
<p><b>Bonds</b></p>	<p><b>Case Study 1:</b> Mass Transit Railway Corporation’s Green Bond, Hong Kong Instrument: Green project bond</p>
	<p><b>Case Study 2:</b> Expansion of the Physical Rehabilitation Programme of the International Committee of the Red Cross Instrument: Humanitarian impact bond</p>
	<p><b>Case Study 3:</b> Sanitation Bond India Instrument: Social impact bond</p>
	<p><b>Case Study 4:</b> The Hong Kong and Shanghai Banking Corporation Limited (HSBC) Sustainable Development Goals (SDG) Bond Instrument: Green project bond</p>
	<p><b>Case Study 5:</b> World Bank SDG-linked Bonds Instrument: Index-linked bond</p>

Type of Instrument	Case Studies
<p><b>Crowdfunding</b></p>	<p><b>Case Study 6:</b> RateSetter Green Loan Marketplace Instrument: Peer-to-peer lending platform with seed capital from the public sector</p>
	<p><b>Case Study 7:</b> The TRINE Crowd Investment Platform Instrument: Crowdfunding</p>
<p><b>Funds</b></p>	<p><b>Case Study 8:</b> The U.S. Department of Housing and Urban Development’s Brownfields Economic Development Initiative (BEDI) Instrument: Viability gap fund</p>
	<p><b>Case Study 9:</b> The BOFAS npo, the Reserve Fund for Soil Remediation in Petrol Stations (Belgium) Instrument: Reserve fund</p>
<p><b>Fiscal instruments</b></p>	<p><b>Case Study 10:</b> The Atlantic Station (Atlantic Steel Site Redevelopment Project), Atlanta, United States Instrument: Tax increment financing &amp; tax incremental bonds</p>
<p><b>Public-Private Partnerships</b></p>	<p><b>Case Study 11:</b> Biomass Cogeneration Plant, Mayenne, France Instrument: Public-private partnerships</p>
<p><b>Debt-for-nature swap</b></p>	<p><b>Case Study 12:</b> The United States-Guatemala Forest Conservation Debt-for-Nature Swap Instrument: Debt-for-nature swap</p>

Type of Instrument	Case Studies
<p><b>Insurance products</b></p>	<p><b>Case Study 13:</b> InsuResilience Investment Fund Instrument: Investment fund and climate insurance products</p>
<p><b>Social Credits</b></p>	<p><b>Case Study 14:</b> Elazığ Integrated Health Campus Project in Turkey Instrument: Project bond &amp; credit enhancement</p>
	<p><b>Case Study 15:</b> Social credits on blockchain; the pilot initiative between the United Kingdom and South Africa Instrument: Social credits</p>
<p><b>Initial Coin Offering</b></p>	<p><b>Case Study 16:</b> WePower Green Energy Trading Platform Instrument: Initial Coin Offering (ICO)</p>
<p><b>Savings account</b></p>	<p><b>Case Study 17:</b> Le livret de développement durable et solidaire (LDDS), France or The Sustainable and Inclusive Development Savings Account, France Instrument: Savings account</p>

## Case Study 1: The Green Bond issued by the Mass Transit Railway Corporation, Hong Kong

**Sources of financing:** Investors from capital markets

**Actors:** Commercial enterprises, in this case the Mass Transit Railway Corporation, Hong Kong

**Instrument:** Green project bond

**Motivation:** Raising financing from capital markets for a range of environmental improvements

### Definition of the Financing Instrument

Project bonds are issued to finance a particular project and are paid back exclusively by the revenues generated by the same project. Bondholders hence have no recourse to other revenues generated by the project initiator or bond issuer. Project bonds pay a predetermined coupon (interest) during a defined time period, while the principal (the borrowed amount) is paid back when the bond reaches maturity.

Green bonds are issued to fund projects that have quantifiable environmental benefits and help mitigate and adapt to climate change. Most green bonds are “green” in their use of proceeds, which are assigned to “green” projects and are backed by the entire balance sheet of the bond issuer.

### About the Project

Mass Transit Railway (MTR) Corporation LTD owns and manages the Hong Kong Mass Transit Railway, which serves more than 5.5 million passengers a day. MTR is also invested in operating rapid transit systems in London, Stockholm, Beijing, Shenzhen and Hangzhou. The company has also expanded into real estate development and telecommunications. MTR was listed on the Hong Kong Stock Exchange in 2000.

MTR issued their first green bond in October 2016 as a part of the corporation’s green investment strategy and environmental performance goals. The bond was arranged as a part of the MTR USD 4 billion debt issuance program and was entirely guaranteed by the corporation’s balance sheet.

Prior to the issuance of this green bond, MTR published a green bond framework to define how the proceeds would be invested. The eligible areas include:

- **Low-carbon transportation:** development, construction and operation of low-carbon transportation systems.
- **Energy efficiency:** Design, manufacture and installation of systems, products and technologies to reduce energy consumption, improve efficiency or mitigate greenhouse gas emissions.
- **Sustainable transit stations and real estate properties:** New and refurbished buildings that will be certified under international sustainability standards including BREEAM and LEED.
- **Adaptation to climate change:** Design, construction and maintenance of climate-resilient buildings.
- **Biodiversity and conservation:** Reforestation of forests and wetlands and the remediation of contaminated soil.
- **Water management:** Solutions for rainwater collection, water efficiency and water treatment.
- **Waste management:** Solutions for improved waste management on MTR premises.
- **Pollution prevention:** Technologies that improve air quality or reduce noise.

The MTR green bond framework also indicates the internal procedure for approving projects that are eligible to receive proceeds from the green bond. Departments of finance and corporate responsibility review eligibility

based on technical feasibility, financial performance, comparative assessment with peer and benchmark projects, a life-cycle analysis and a sustainability risk analysis.

### Description of the Project Instrument

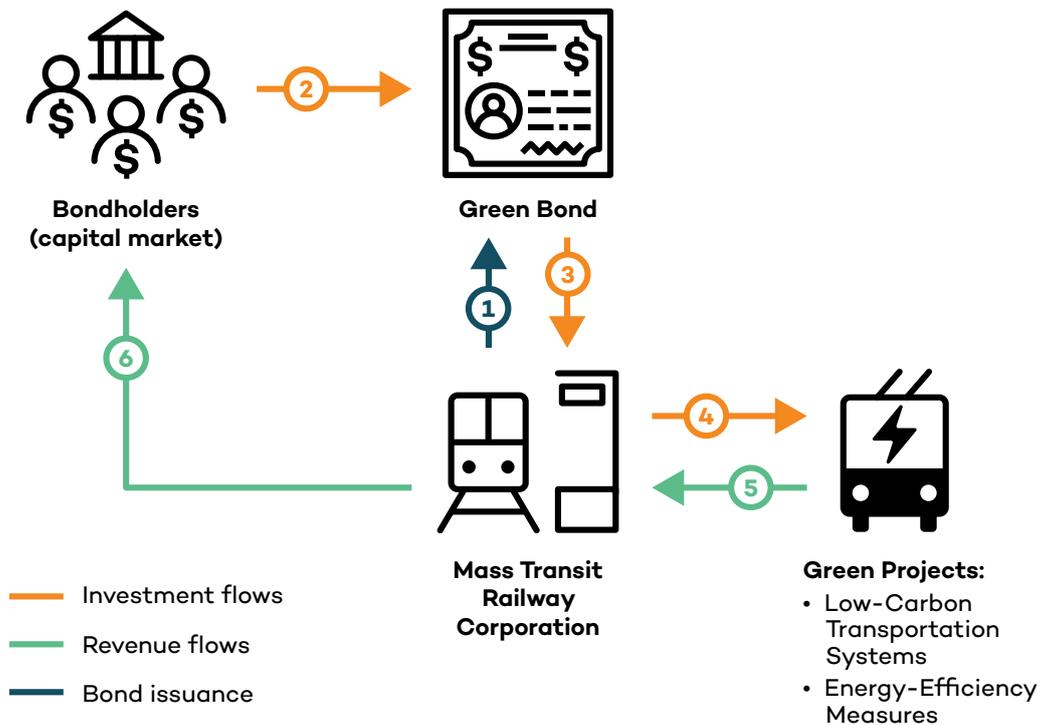
Issued in October 2016 under the MTR USD 4 billion debt issuance program, this bond was designed in accordance with the Green Bond Principles set out by the International Capital Market Association. The bond was launched at USD 500, but in light of strong interest from institutional investors in Asia and Europe, the bond was upsized to USD 600 million. The bond has a maturity period of 10 years, was priced at 99.675 per cent of its face value<sup>1</sup> at the time of issuance and offered a yield<sup>2</sup> of 2.537 per cent (significantly higher than the benchmark 10-year U.S. Treasury bonds with a yield of 1.737 per cent). This coupon is paid semi-annually to bondholders while the bond is fully backed by MTR. The bond was rated AAA by Standard & Poor’s and Aa1 by Moody’s Investors Services, in line with the sovereign credit risk ratings of Hong Kong.

MTR (2017) earmarked the proceeds of the bond for covering the capital expenditures of two major projects:

1. **Kwun Tong Line Extension**
  - Investment area: low-carbon transportation
  - Amount earmarked: USD 167.74 million
2. **South Island Line (east)**
  - Investment areas: low-carbon transportation, energy efficiency
  - Amount earmarked: USD 430.31 million

This bond was awarded the “Best Green Bond” recognition by the Finance Asia Achievement Awards 2016 and has been included in several green bond indices, including: Barclays MSCI Green Bond Index, BofA Merrill Lynch Green Bond Index, Solactive Green Bond Index and S&P Green Bond Index.

**Figure 1. The financial structure of the MTR’s green bond investment**



<sup>1</sup> Face value: value of the bond at the maturity date; in this case USD 600 million.

<sup>2</sup> Yield: the return on an investment.

## INSTRUMENT STEPS

1. Green Bond issuance by MTR
2. Private investments = buying of bonds
3. Proceeds of the bond flow to MTR
4. Investment decision by MTR according to eligibility of projects
5. Revenues generated by projects flow to MTR
6. Payment of principal and coupon to bondholders

## Case Study at a Glance

**Name of the instrument:** MTR Corporation's Green Bond

**Issuer and guarantor:** MTR Corporation (C.I.) Limited

**Advisors and managers:** HSBC, Bank of America Merrill Lynch and Goldman Sachs (Asia) L.L.C

### Instrument details

**Principal amount:** USD 600 million

**Issue price:** 99.675 per cent

**Maturity:** 10 years

**Coupon rate:** 2.5 per cent per annum, payable semi-annually

**Listing:** Hong Kong Stock Exchange

**Expected rating:** AAA by S&P's and Aa1 by Moody's

## Application of this Instrument to Financing Soil Remediation

The cleanup of contaminated soil is eligible under all established green bond frameworks, including the Green Bond Methodology of the Climate Bonds Initiative. As a result, it is an instrument that merits further experimentation. The challenge, however, is that the coupon and principal of the bond needs to be directly backed by the bond issuer's balance sheet or the revenues of the project. The soil remediation project therefore needs to demonstrate that sufficiently stable and predictable revenue streams can be expected post remediation or else bond financing will not be feasible. In addition, bond issuers are legally obligated to obtain guarantees to cover default risks, which increases the costs of debt financing.

## Case Study 2: Expansion of the Physical Rehabilitation Programme of the International Committee of the Red Cross

**Sources of financing:** International donors and investors from capital markets

**Actors:** International non-governmental organizations (NGOs) and international donors

**Instrument:** Humanitarian impact bond

**Motivation:** Raising financing from capital markets for the expansion of the Physical Rehabilitation Programme of the International Committee of the Red Cross

### Definition of the Financing Instrument

This case study looks at the use of humanitarian impact bonds (HIB) to stimulate investment from private and institutional investors in social infrastructure. HIBs can be considered a derivative of social impact bonds. Their purpose is to finance a beneficial social outcome. As such, HIBs and social impact bonds are designed to pay for success. Unlike other bonds, the returns on investment of HIB is linked to the achievement of a predetermined social outcome. If the project has underperformed, bondholders do not receive interest for their bonds and potentially stand to lose a part of their initial investment or principal.

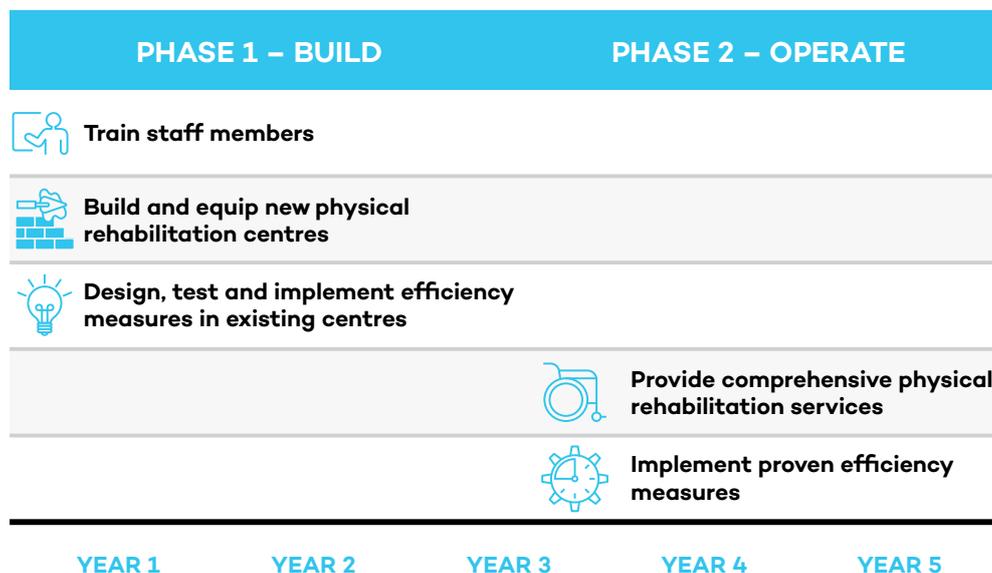
### About the Project

In 2017, the International Committee of the Red Cross (ICRC) issued its HIB to expand the ICRC Physical Rehabilitation Programme. This program establishes rehabilitation centres that provide physical rehabilitation services for people who are in need of mobility devices such as prosthetic limbs or wheelchairs (ICRC, 2017).

When the ICRC designed this bond to finance the expansion of the ICRC Physical Rehabilitation Programme, it was already operating rehabilitation centres in Cambodia, Madagascar, Mali, Myanmar, Pakistan, Niger and Togo. The proceeds of the bond were largely earmarked to expand this program by establishing additional rehabilitation centres in Nigeria, Mali and the Democratic Republic of Congo (DRC) and operating them for five years. The bond issue was worth CHF 26 million. The fact that the ICRC was already successfully operating physical rehabilitation centres in seven countries is of critical importance to the launch of the HIB.

In addition to the construction of three new rehabilitation centres, the HIB will also provide training for staff, develop new management tools and test these tools to increase efficiency across the seven physical rehabilitation centres that are already in operation.

**Figure 2. Timeline for the use of proceeds of the ICRC Humanitarian Impact Bond**



Source: ICRC, 2017

## Description of the Project Instrument

The launch of the HIB marks a new method of financing for the ICRC, enabling the organization to raise financing directly from capital markets while increasing funding from its traditional donors. ICRC usually raises funds from individual contributions and donor governments such as the United Kingdom, Switzerland and Belgium. With the HIB, the ICRC was able to attract additional funding from its donors by providing a performance guarantee on the organization’s ability to achieve the expected social outcome, while providing socially conscious investors a unique opportunity to invest in humanitarian projects.

The HIB is structured as follows (ICRC, 2017):

1. The outcome funders (i.e., the traditional donors to the ICRC) make a conditional *pay-for-success pledge* to the ICRC.
2. Based on the amount pledged by the traditional donors, the ICRC issues the HIB. The tenure of the HIB is five years. HIB bondholders (or social investors) invest in two instalments: one half of the funds at the beginning of the project and the other half at the end of the first year.
3. The ICRC has undertaken to report quarterly to both outcome funders and HIB bondholders. The principal that will be paid to HIB bondholders will however be decided based on the success of the ICRC Physical Rehabilitation project at the end of the five-year period.
4. The success of the Physical Rehabilitation Programme is measured by the staff efficiency ratio (SER), which is calculated as follows:

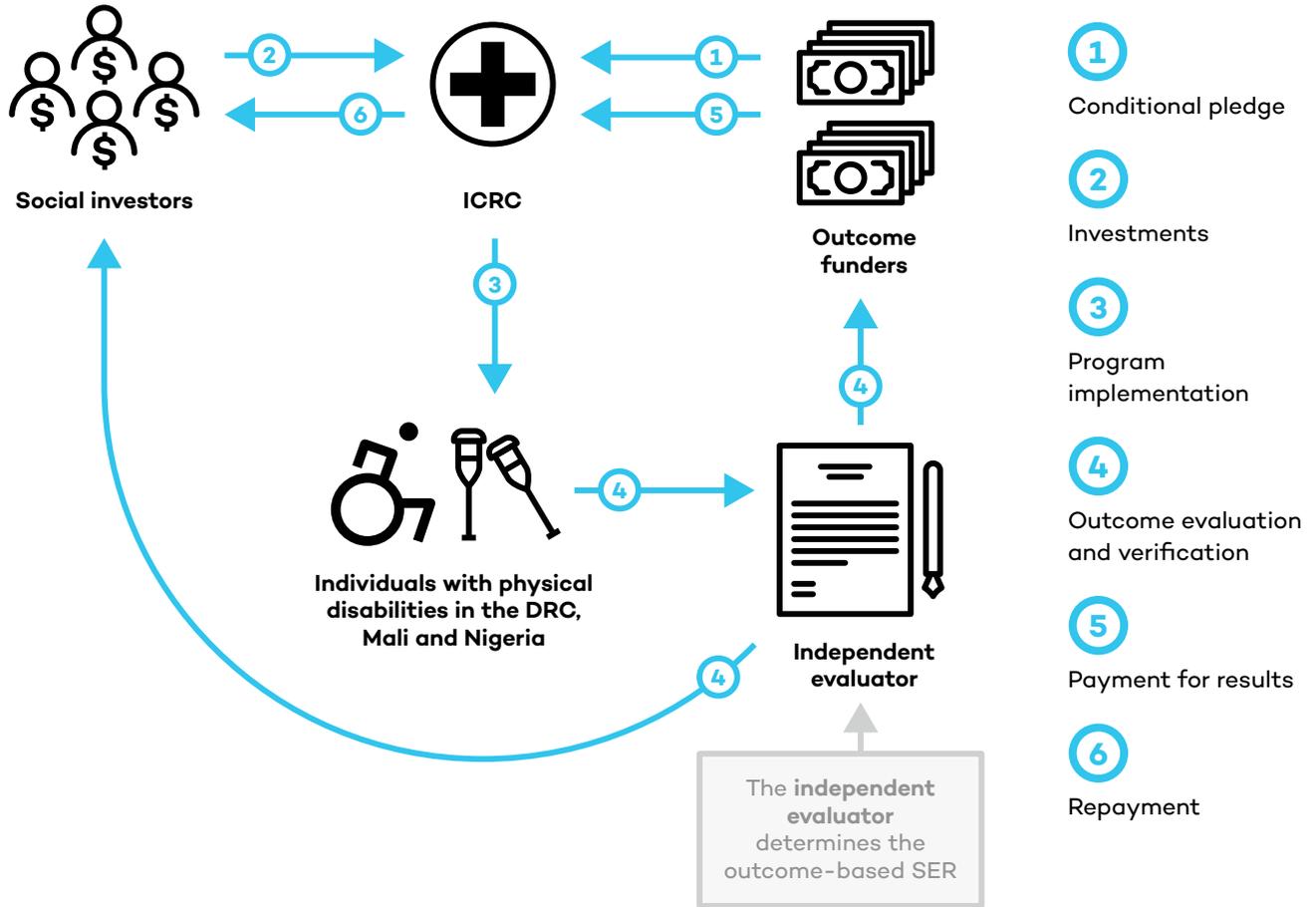
SER = Number of beneficiaries having regained mobility through the use of the mobility device/number of local mobility device professionals.

The ICRC will benchmark the SER ratio of the newly established Physical Rehabilitation Centres in Nigeria, Mali and DRC with the historical average of other the existing centres in Cambodia, Madagascar, Mali, Myanmar, Pakistan, Niger and Togo.

5. The outcome funders will honour their pledges to the ICRC based on the SER performance benchmark, which will be subject to third-party verification.

6. HIB holders will be paid based on the following levels of performance:
  - (a) If the new centres underperform, bondholders lose up to 40 per cent of their capital. If this is the case, 10 per cent of what they receive will be directly provided by the budget of the ICRC.
  - (b) If the SER ratio equals the benchmark, bondholders get their capital back without any interest.
  - (c) If the ICRC centres are 14–80 per cent more efficient than the benchmark, investors will be paid an annual interest of up to 7 per cent.

Figure 3. The financial structure of the HIB



Source: ICRC, 2017

A key feature of the HIB is that the outcome funders (or the traditional donors to the ICRC) no longer take on the performance risk in funding humanitarian projects. Under the traditional circumstances, donors would fund the ICRC to deliver humanitarian services, but do not directly reward efficient delivery and the achievement of the desired impacts. With the HIB, the ICRC takes on the performance risks while raising a larger volume of financing from socially conscious investors.

It is also important to note that the ICRC was able to take on the risk to issue the HIB, as the organization had already been operating the Physical Rehabilitation Programme in seven countries. Hence, the ICRC had robust and reliable performance data on the capital and operating costs of physical rehabilitation centres and the cost savings that could be realized through improved efficiency and its further expansion into three additional countries. (The ICRC was already operating the Physical Rehabilitation Programme in seven countries and the HIB was issued to increase efficiency overall and expand activities to three additional countries). ICRC

could issue the HIB because it had robust performance data and reliable forecasts on costs, savings and the potential performance risks in operating physical rehabilitation centres.

## Case Study at a Glance

**Name of the project:** Expansion of the Physical Rehabilitation Programme of the International Committee of the Red Cross

**Type of instrument:** Humanitarian impact bond (social impact bond)

**Funding sources:** Donors or outcome funders who provide the pledge and socially conscious investors who purchase the bonds

**Project length:** 5 years

**Value of bond issue:** CHF 26 million

## Application of this Instrument to Financing Soil Remediation

Social impact bonds can be used for financing soil remediation due to the intrinsic social and environmental value of remediated land. Moreover, as the ICRC case study illustrates, social impact bonds do not rely on direct revenue streams to make the financing viable; rather, they are designed to take a risk on the performance of the bond issuer. This characteristic is also of value in the soil remediation context, especially when direct land value capture after remediation remains uncertain. Social impact bonds can hence be considered for funding the remediation of contaminated agriculture lands and other rural and peri-urban sites where the revenue streams from post-remediation use might not be very certain.

The social impact bond *pay-for-success* rationale is also replicable in the context of remediating land. The interest paid on the bond could be tied to performance benchmarks in the remediation process. (The bond issuer thus has a direct interest in the success of the project and would have to incur losses if the expected results were not delivered). Such performance incentives can be valuable to make the financing of soil remediation a more attractive proposition for private investors.

One caveat in the use of social impact bonds is that bond issuers need to have robust data on projected costs and risks of the remediation activity. This information is critical to set the “soil remediation performance” benchmark that is specified in the bond. Future bondholders will be looking for above-average performance, and hence bond issuers have to be certain that performance is ambitious but attainable.

## Case Study 3: Sanitation Bond, as designed by YES Global Institute, India<sup>3</sup>

**Sources of financing:** Earmarked public subsidies, private impact investors, commercial banks

**Actors:** Commercial banks (in this case, YES Bank, India); earmarked public funds (in this case, the India Swacch Bharat Abhiyan Mission); private impact investors

**Instrument:** Social impact bond

**Motivation:** Raising co-financing to complement public subsidies for social improvement projects

### Definition of the Financing Instrument

Social impact bonds are primarily designed to raise financing for infrastructure or services that have a strong social purpose. The bond structure often involves a partnership or contract with the public sector, whereby the bond is used to raise capital to pay for better social outcomes in a well-defined context.

An important feature of social impact bonds is that a part of the savings realized through improved social outcomes is passed on to the bondholders. In this light, social impact bonds are different from traditional bonds since repayment and return on investment are directly linked to the realization of the predetermined social purpose. If the social goals are not realized, investors have to forego both the principal and the interest. Investors in social impact bonds are therefore those who seek not just financial return but also greater social impact.

### About the Project

The YES Global Institute, India designed the sanitation impact bond to complement the Government of India Swacch Bharat Abhiyan Mission, which works to improve hygiene and sanitation across the Indian continent. Low-income communities lack access to functioning toilets, and poor sanitation has become a major deterrent to sustainable development. The Mission particularly targets better sanitation for women and girls in both urban and rural areas.

To help close the funding gap for improved sanitation, the India Swacch Bharat Abhiyan Mission provides a government subsidy of INR 10,000 for building and use per toilet unit. The average cost of a toilet for rural and low-income communities is estimated at approximately INR 14,500; the subsidy provides 70 per cent of the required capital. The YES Global Institute designed the sanitation impact bond to help raise the additional capital required to build the toilets and, moreover, to finance the accompanying education and awareness campaigns on the use of toilets across the country. It is important to note that, to receive the subsidy, households have to demonstrate that the toilets have been built and are in regular use.

### Description of the Project Instrument

The sanitation impact bond is operationalized as follows:

The YES Global Institute establishes a dedicated social impact bond structure under which microfinance institutions (MFI) and business correspondents (BCs)<sup>4</sup> are identified, screened and selected for the implementation of the sanitation bond program.

<sup>3</sup> IISD is grateful to Preeti Sinha, Senior President and Global Convenor, YES Global Institute, YES Bank, and Gaurav Kapur, Senior Vice President and Senior Fellow, YES Global Institute, YES Bank, for working with us to compile this case study.

<sup>4</sup> BCs include registered entities or individuals who are authorized to collect small ticket deposits and extend small credit on behalf of the banks.

Yes Bank raises capital from impact investors and uses these funds to provide loans to the MFIs and BCs, who in turn provide loans to individual households for the construction of the toilets. The value of the loans varies based on the households' income and the geographical context.

Individual households work with NGOs accredited under both the Swacch Bharat Abhiyan Mission and YES Global Institute's social impact bond structures. The NGOs supervise the building of the toilets and also provide the very important capacity-building services on the use of toilets and accompanying sanitation measures. These NGOs are therefore the implementing partners and are so identified in the accompanying flow diagram.

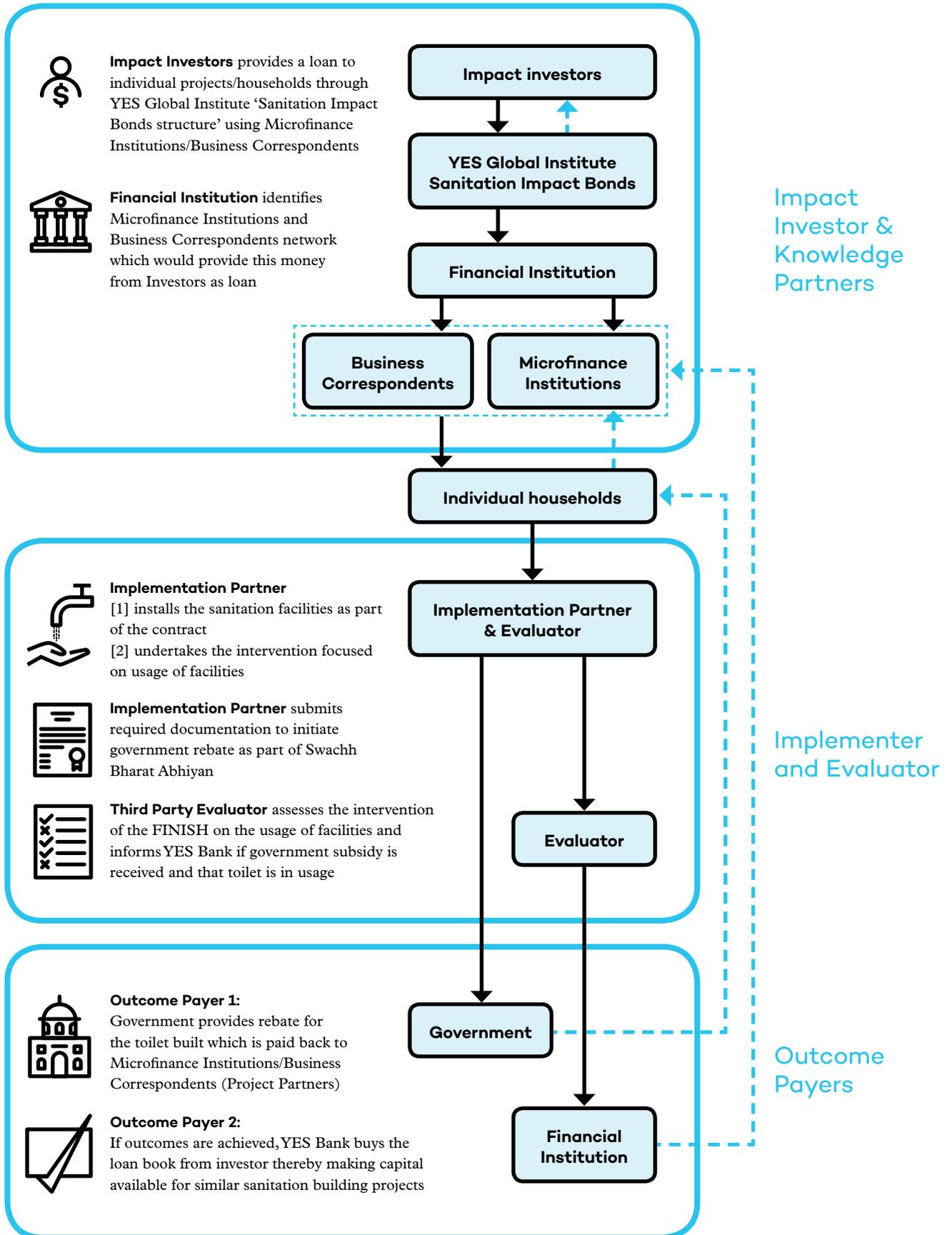
Once the toilets are built and being used, the NGOs submit the required documents to the MFI or BC to receive the government subsidy under the Swacch Bharat Abhiyan Mission. The value of the subsidy is INR 10,000. The subsidy therefore covers around 70 per cent of the cost of the toilets.

The households repay the value of the loan not covered by the subsidy to the MFI or BC. The length of these loans is usually 2–4 years. The MFI and BC in turn repay the loan in its entirety to the Yes Bank.

YES Global Institute contracts a third party to assess the work of the NGOs and confirm that the toilets are built, are in use and the subsidy has been received by the MFI and BCs.

If the assessment is satisfactory and the outcome (i.e., better sanitation) has been achieved, YES Bank buys the loan book from the impact investor. This frees up fresh impact capital for lending to other socially valuable projects.

Figure 4. The financial structure of the sanitation impact bond



## Application of this Instrument to Financing Soil Remediation

Instruments like the sanitation impact bond can well be designed to finance soil remediation. When there is clarity and predictability on costs of cleanup, the public sector can offer an attractive subsidy to kick-start the financing market. Indeed, if the subsidy is sufficiently generous, it would trigger an even greater incentive for remediating land, including areas where there may be no land value capture or attractive revenue streams after the cleanup is complete. Such an instrument would be particularly valuable for financing the cleanup of urban and peri-urban sites that can be subsequently used as playgrounds, urban gardens, schools and clinics—public services that have strong social benefits.

The most valuable lesson demonstrated in this case study is how public subsidies can be used to attract private impact capital. Such blended capital can then be structured in the form of social impact bonds to finance projects with a strong social purpose but low financial returns.

## Case Study 4: The Hong Kong and Shanghai Banking Corporation Limited (HSBC) Sustainable Development Goals (SDG) Bond

**Sources of financing:** Investors from capital markets

**Actors:** Commercial banks, in this case the Hong Kong and Shanghai Banking Corporation Limited (HSBC)

**Instrument:** Green project bond

**Motivation:** Raising financing from capital markets for investing in businesses that derive 90 per cent or more of revenues from activities linked to one or several Sustainable Development Goals.

### Definition of the Financing Instrument

The Sustainable Development Goal (SDG) bonds described in this case study are, in essence, green project bonds. The bond issuer, the HSBC, is using the proceeds to provide loans to businesses or projects that derive 90 per cent or more of revenues from activities linked to one or several SDGs.

Project bonds are issued to finance a particular project and are paid back exclusively by the revenues generated by the same project. Bondholders hence have no recourse to other revenues generated by the project initiator or bond issuer. Project bonds pay a predetermined coupon (interest) during a defined time period while the principal (the borrowed amount) is paid back when the bond reaches maturity.

Green bonds are issued to fund projects that have quantifiable environmental benefits and help mitigate and adapt to climate change. Most green bonds are “green” in their use of proceeds, which are assigned to “green” projects and are backed by the entire balance sheet of the bond issuer.

### About the Project

As a response to the UN SDGs and the Paris Climate Agreement, HSBC issued the world’s first corporate sustainable development bond in November 2017. The bond raised USD 1 billion in proceeds that are assigned to be invested in businesses and projects that contribute to the following SDGs (HSBC, 2017a):

- SDG 3: Good Health and Well-Being
- SDG 4: Quality Education
- SDG 6: Clean Water and Sanitation
- SDG 7: Affordable and Clean Energy
- SDG 9: Industry, Innovation and Infrastructure
- SDG 11: Sustainable Cities and Communities
- SDG 13: Climate Action

The SDG bond was three times oversubscribed and matures in 2023.

### Description of the Project Instrument

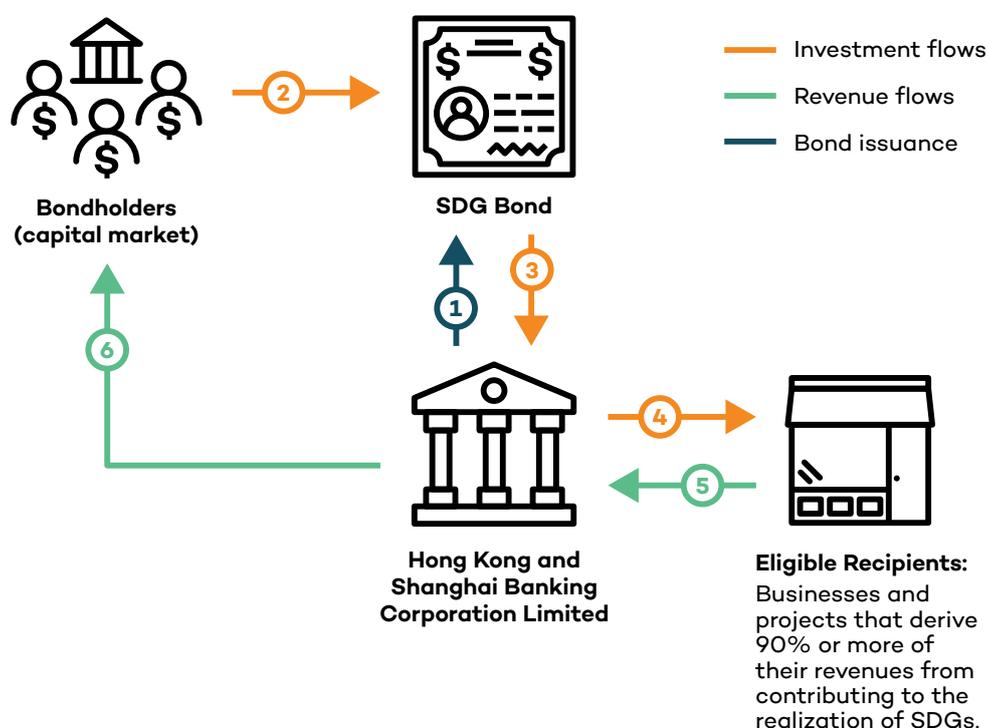
As stated in the HSBC SDG bond framework, the proceeds will be used to finance entirely or partly new businesses and/or refinance existing businesses and projects that derive 90 per cent or more of their revenues from one or several of the seven SDGs that have been selected by HSBC. The selected goals are outlined above.

To provide transparency on how the proceeds will be used, HSBC has included eligibility criteria as well as exclusion criteria into their SDG Bond Framework (HSBC, 2017b, p. 2).

Businesses or projects that receive proceeds from the SDG bonds can use these for general purposes unless resulting operations or projects contribute to activities that are considered non-eligible. HSBC has developed sustainability risk policies to guide decision making when such instances arise. Governance for the HSBC SDG Bond will be provided by the HSBC Green Bond Committee, which was established in 2015. This committee will have oversight on processes and consistency in lending as well as the approval of eligible businesses and projects. The HSBC Group Sustainability Department has the final veto on each eligibility decision.<sup>5</sup>

HSBC also commits to providing an audited annual update on how the proceeds of the SDG bond are being invested and what benefits are being generated by the approved loans.

**Figure 5. The financial structure of the HSBC SDG bond**



**INSTRUMENT STEPS**

1. SDG Bond issuance by HSBC
2. Private investments = buying of bonds
3. Proceeds of the bond flow to HSBC
4. Investment decision by HSBC according to eligibility of interested businesses and projects
5. Revenues generated by businesses/projects flow to HSBC
6. Payment of principal and coupon to bondholders

<sup>5</sup> Please see the SDG Bond Framework (HSBC, 2017b) for more details on the multi-step process for the ratification of eligible businesses and projects.

## Case Study at a Glance

**Name of the project:** Hong Kong and Shanghai Banking Corporation Limited (HSBC) Sustainable Development Goals (SDG) Bond

**Sponsored by:** HSBC

**Type of instrument:** Bond. Proceeds used to provide loans to projects/businesses that are working on realizing seven selected SDGs:

- SDG 3: Good Health and Well-Being
- SDG 4: Quality Education
- SDG 6: Clean Water and Sanitation
- SDG 7: Affordable and Clean Energy
- SDG 9: Industry, Innovation and Infrastructure
- SDG 11: Sustainable Cities and Communities
- SDG 13: Climate Action

**Funding sources:** Bondholders

**Project length:** The bond was issued in 2017 and matures in 2023.

## Application of this Instrument to Financing Soil Remediation

The design of HSBC's SDG bond can be replicated to raise financing for soil remediation projects that can demonstrate stable and predictable revenues after remediation.

Soil remediation projects are also relevant and eligible under the SDG bond criteria established by HSBC, particularly in relation to the goals listed below.

- **SDG 6: Clean Water and Sanitation**

Eligibility criteria: activities that expand public access to safe and affordable drinking water; activities that improve water quality (HSBC, 2017b).

- Soil remediation has a positive impact on groundwater quality (and, depending on location, also a positive impact on other freshwater sources) and hence can contribute to the above activity areas.

- **SDG 11: Sustainable Cities and Communities**

Eligibility criteria: activities that expand or maintain the supply of affordable housing.

- Businesses and projects under this category would enable access for all to adequate, safe and affordable housing, essential services and sustainable transport systems. Remediated soils can be considered a component of ensuring safe housing, for example for the construction of social housing.

## Case Study 5: The World Bank's Sustainable Development Goal-linked Bonds

**Sources of financing:** Investors from capital markets

**Actors:** World Bank and BNP Paribas

**Instrument:** Index-linked bond

**Motivation:** Raising financing from capital markets for investing in projects that will help the realization of the United Nations Sustainable Development Goals (SDGs)

### Definition of the Financing Instrument

This case study describes the World Bank's SDG-linked bond issuance, index-linked bonds wherein the interest rate paid to investors is based on the stock performance of the Solactive SDG World Index.

A bond is a fixed income investment. The investor's loan is provided to a private enterprise or public entity for a defined period at a variable or fixed interest rate (also referred to as the coupon rate). The proceeds are used to finance a range of activities, including maintaining ongoing operations, refinancing debt and launching new business ventures. The issuer of the bond commits to the interest rate that will be paid as well as the time when the bond matures and the loaned funds will be returned. The price at which the bonds are issued are typically set at par (or at face value). The actual market price depends on factors such as the length of time until maturity, credit quality of the issuer and prevailing interest rates.

### About the Project

The World Bank launched the SDG-linked bond as part of the SDGs for Everyone initiative in March 2017. The issue is comprised of two rounds, one with a maturity period of 15 years and another with a maturity period of 20 years. The bond was arranged by BNP Paribas.

The World Bank reports that the SDG bonds raised EUR163 million and included the participation of institutional investors in France and Italy. The proceeds will be used to lend to programs and projects targeted at realizing the UN SDGs.

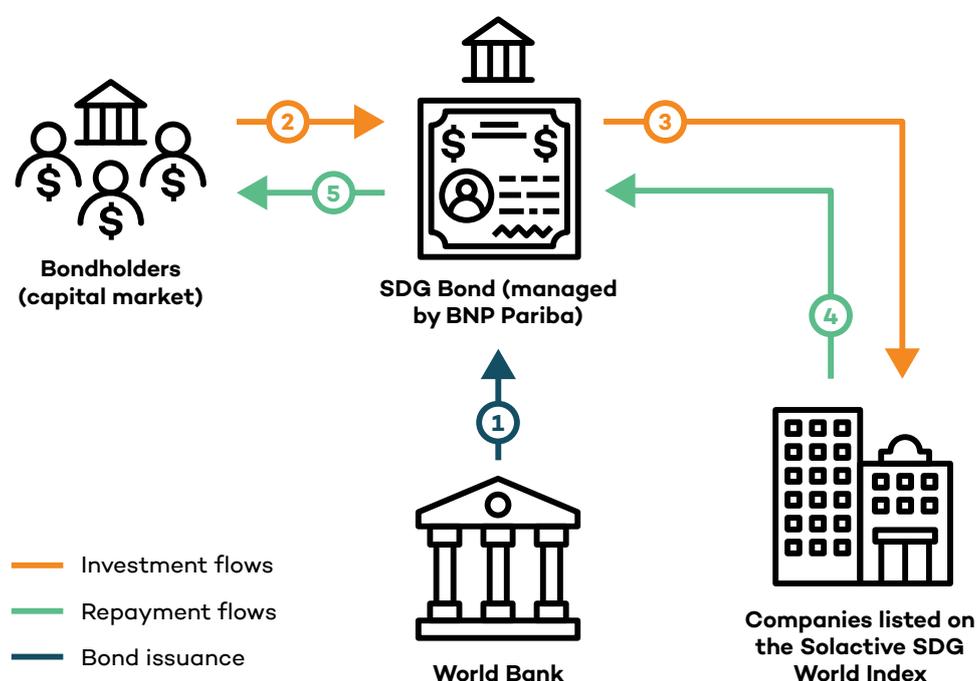
### Description of the Project Instrument

The World Bank SDG bonds are equity index linked, with the interest received directly linked to the stock performance of the Solactive SDG World Index. This index comprises 50 companies that dedicate at least one fifth of their activities to sustainable products, or are recognized leaders in their industries on social and environmental performance. This index builds on the analysis and rating methodology of Vigeo Eiris, a recognized provider of environmental, social and governance research. The bonds were arranged by BNP Paribas, which obtained an exclusive license to the Solactive SDG World Index in 2016. The rating agency Standard & Poor provided the bonds an AAA credit rating.

## Case Study at a Glance

**Name of the project:** World Bank SDG-linked Bonds  
**Type of instrument:** Index-linked bond  
**Issued by:** World Bank in 2017  
**Arranged by:** BNP Paribas  
**Amount raised:** Euro 163 million  
**Maturity:** 15 years and 20 years  
**Index:** Solactive Sustainable Development Goals World Index

Figure 6: The financial structure of the World Bank SDG-linked bonds



### INSTRUMENT STEPS

1. SDG-linked bond issuance by World Bank
2. Private investments = buying of bonds
3. Proceeds of the bond provided to companies
4. Repayments to BNP Paribas
5. Payment of principal and coupon to bondholders

### Application of this Instrument to Financing Soil Remediation

Equity index-linked bonds can be considered to raise funds for soil remediation. But as demonstrated in this example, the credibility of the equity index is intrinsic to the bonds being rated as investment grade.

In addition, index-linked bonds can only be used to finance projects where post-remediation revenue streams are robust and predictable. For example, an index-linked bond can be envisaged for a large urban rehabilitation project, where the remediated land will command higher real estate prices, generate income through the sale, lease and rent of commercial, residential and industrial assets and the like.

## Case Study 6: RateSetter Green Loan Marketplace

**Sources of financing:** Public sector fiscal revenues; investors on virtual peer-to-peer (P2P) investment platforms

**Actors:** Public sector funds, commercial enterprises providing virtual P2P investment services, lenders and borrowers active on virtual P2P platforms

**Instrument:** P2P lending platform with seed capital from the public sector

**Motivation:** Raising financing from capital markets for investing in renewable energy projects and energy-efficiency improvements

### Definition of the Financing Instrument

This case study pertains to the use of a fintech P2P lending platform specifically targeted at green energy projects.

P2P lending provides debt financing by enabling individuals to borrow and lend money without the facilitation of a bank or financial institution acting as an intermediary. As there is no intermediary, the P2P platform provider undertakes the necessary due diligence on the borrowers' credit history and assigns borrowers with a credit risk rating that, in turn, determines the interest rate that the borrower could expect to pay. These interest rates are often lower than what borrowers may expect to receive when taking out loans from formal financing institutions. For P2P lenders, the interest earnings from the loans are often higher than placing funds in saving accounts or fixed deposits.

### About the Project

The RateSetter green loan marketplace is a pioneer initiative in Australia in several regards:

- It is the first P2P lending platform targeted at green energy technologies.
- It is the first time an Australian government body has acted as a seed investor of a P2P lending platform.

The RateSetter green loan marketplace was launched by the U.K.-based RateSetters Group with AUD 20 million in contributions from the Australian Clean Energy Finance Corporation. As reported by St Anne (2017), "this innovative facility offers the potential to improve the marketability of green assets, by bringing purchasers, installers and manufacturers closer together. There have been green loans before, and there has been P2P lending, but combining the two into one platform is an Australian first."

### Description of the Project Instrument

RateSetter's green loan marketplace is targeted at green energy projects. It allows green energy entrepreneurs to bring forward projects that will be credit rated and promoted by the marketplace. Lenders, largely retail investors, also have the opportunity to state the value they seek to invest and the rate of return they expect to receive. The fintech-based marketplace then matches offers with demand. Investors receive rates of return between 3.8 per cent and 8.9 per cent after fees, depending on the investment term, which could be between one month and five years respectively.

Products eligible for financing include:

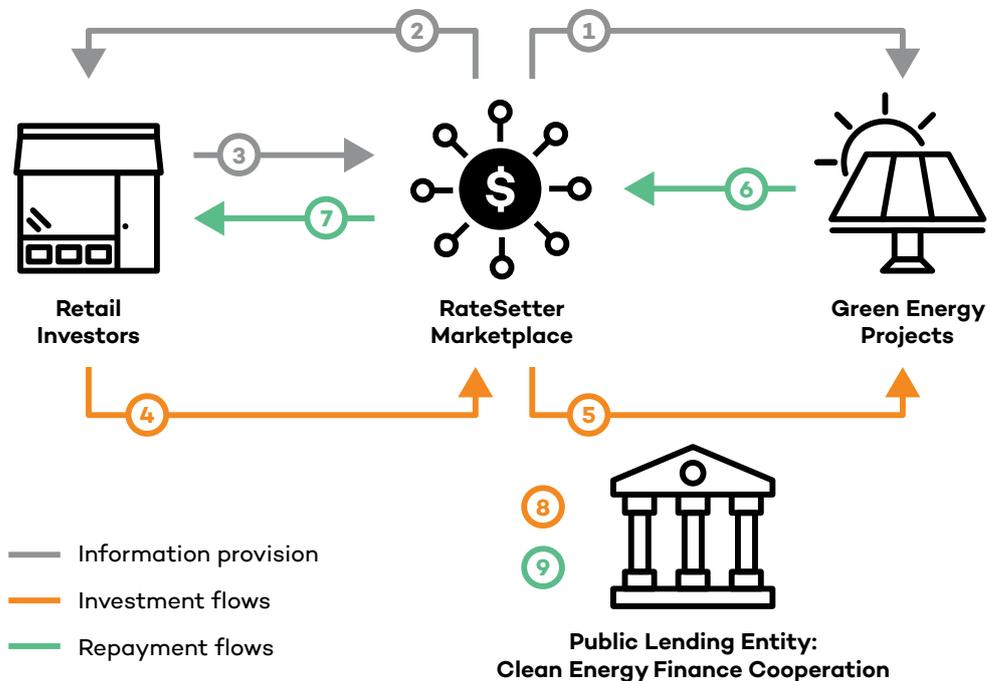
- Solar photovoltaic systems
- Energy-efficient heating and cooling systems
- Batteries and energy storage
- Energy-efficient lighting (such as LED)
- Emissions-reducing industrial applications
- Low-emission/electric vehicles and light trucks

The participation of the Clean Energy Finance Cooperation, a statutory authority established under the Australia Clean Energy Finance Corporation Act 2012, as a seed investor is particularly noteworthy. Such backing from a public lending entity boosts the credibility of the marketplace and increases the confidence of retail investors to risk investing in newer technologies, including those with less robust track records.

The marketplace also demonstrates how financial innovation can thrive when public investors and private fintech providers work together. The Australian green energy market stands to gain as retail investors are offered a unique opportunity to learn about green energy products, invest in them and use them, consequently reducing greenhouse gas emissions in the process.

It is also important to note that RateSetter is Australia’s leading P2P lending platform. Headquartered in the United Kingdom, it was launched in Australia in 2014. Since then, it has facilitated over AUD 100 million in loans from over 6,000 retail investors.

**Figure 7. The financial structure of the RateSetter green loan marketplace**



**INSTRUMENT STEPS:**

1. Project risk assessment and due diligence done by RateSetter
2. Information provision on platform: credit risk rating, financing needs, return on investment
3. Optional: retail investors inform RateSetter about investment priorities to enable match-making with suitable projects
4. Investments by retail investors (dedicated to projects)
5. Capital provision to chosen green energy projects
6. Repayment to RateSetter
7. Payout of principal and return on investment to retail investors
8. Investments by public lending entity
9. Payout of principal and return on investment to public lending entity

## Case Study at a Glance

**Name of the project:** RateSetter's green loan marketplace

**Type of instrument:** Fintech P2P lending platform with cornerstone investment from a public financing organization

**Preliminary budget:** USD 14.8 million

**Rates of return:** Between 3.8 per cent and 8.9 per cent after fees, for investment terms ranging between one month and five years respectively

## Application of this Instrument to Financing Soil Remediation

While P2P lending platforms have been generally used to channel capital into small-scale projects, they can also be used to finance larger-scale soil remediation projects. A pre-condition for attracting private capital is that remediation projects lead to revenue-generating activities to pay back the loan and interest once the soil is remediated. To date, financing soil remediation has typically taken place through public budgets; private lenders hesitate to be involved as they lack the technical expertise to evaluate the risks associated with the nature and sources of pollution, effectiveness of the technologies to be deployed and if the remediated land will bring predictable revenues. P2P platforms can provide confidence to retail investors on these matters. P2P lending platforms can undertake due diligence, provide credit risks assessments on listed borrowers, identify realistic revenue streams and return on investment, and publish this project-specific information on their platform. This enables retail investors to crowd in as they have more information on the project and its inherent risks.

Transaction costs could also be lowered through P2P lending. The high minimum investment sizes often associated with soil remediation projects is due to the high transaction costs involved in financing a large number of small projects. P2P lending platforms overcome this barrier by automatizing and streamlining the otherwise cumbersome investment process and enable micro and small investments to be channelled profitably into soil remediation projects. P2P platforms might also enable less mature remediation technologies to find investors, which, in turn, will help deepen and diversify markets for soil remediation.

As demonstrated in this case study, it is valuable for P2P platforms to be backed by public funds or guarantees. This sends an important signal to the market and retail investors become more comfortable lending to projects, including those that involve new technologies with less robust track records.

P2P lending platforms enable local stakeholders to participate in the remediation of the soil in and around their neighbourhoods. Community-financed infrastructure has been successfully implemented in several emerging and developed economies. Community ownership increases the likelihood of project success and eliminates project risks that can arise due to the lack of sufficient public understanding and acceptance of the project. People living in affected areas would have the additional incentive of investing, as they would also be the direct beneficiaries of the remediation project.

Finally, P2P lending platforms can potentially increase the participation of domestic capital providers. This can lead to lower exchange rate exposure or foreign exchange hedging costs for the soil remediation project.

## Case Study 7: The TRINE Crowdfunding Platform

**Sources of financing:** Public sector fiscal revenues; impact investors on virtual crowdfunding platforms

**Actors:** Public sector funds, social enterprises providing crowdfunding platforms financing for poverty alleviation projects in developing countries, impact investors, borrowers in developing countries

**Instrument:** Crowd investing

**Motivation:** Raising financing from capital markets for investing in renewable energy projects and energy-efficiency improvements

### Definition of the Financing Instrument

This case study presents the application of crowdfunding for projects that generate positive environmental and social benefits. It also demonstrates how public funds and international donors can participate in these platforms to boost and match the efforts of private investors.

Crowdfunding platforms connect private investors with projects and entrepreneurs that need capital to start or scale their impact-driven venture. The value of such platforms lies in their function to aggregate capital from multiple investors and channel it into multiple projects and businesses seeking investment. The value added of crowdfunding platforms for borrowers include the acquisition of affordable capital, the promotion of business plans, assistance with risk analysis, the aggregation of projects and the reduction of transaction costs. The value added for investors includes access to financially viable ventures, reliable due diligence on the business case and, again, the reduction of transaction costs.

### About the Project

In 2016, Swedish company TRINE launched a crowdfunding platform to channel investments from large and small private impact investors to solar energy entrepreneurs in East Africa. The objective was to reduce energy poverty and introduce solar technology to rural and off-grid areas.

### Description of the Project Instrument

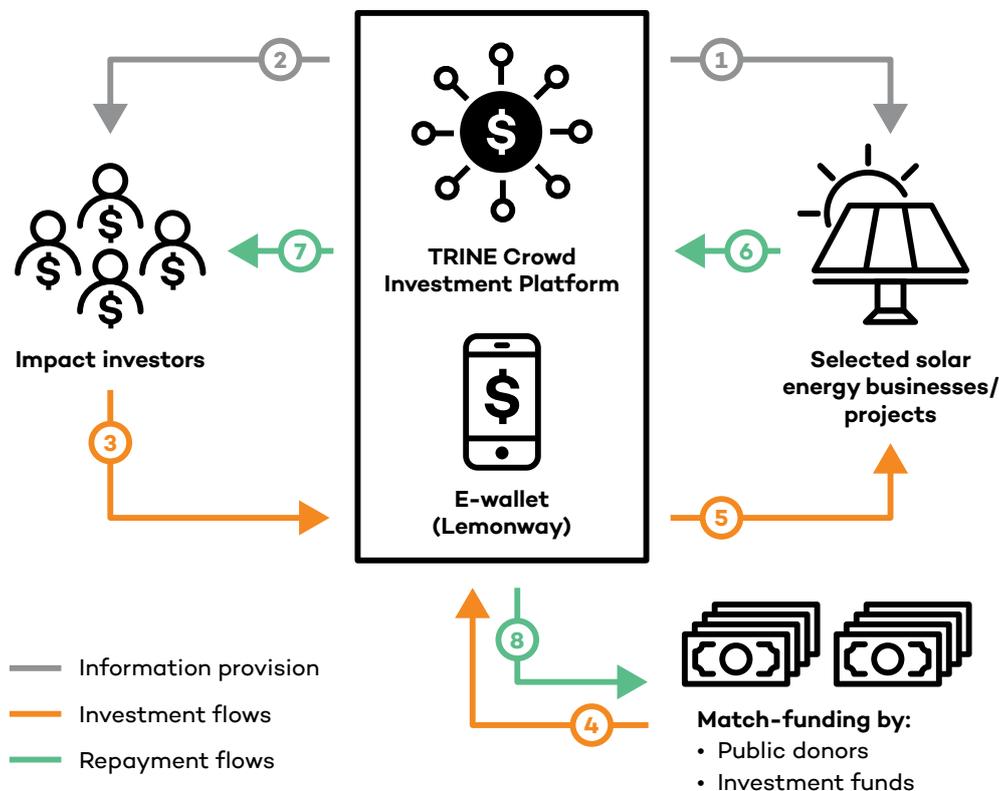
The TRINE platform offers investors a portfolio of investment opportunities and transparency on project risks, revenues and rates of return.

The platform operates as follows:

- Funds provided by private investors are channelled into an e-wallet under the investor's name. The e-wallet is managed by Lemonway, TRINE's strategic partner.
- Funds are maintained in the e-wallet until the total amount required for a specific project is raised.
- TRINE enters into a loan agreement under commercial terms with the selected borrower.
- The borrower is required to pay a 5 per cent administration fee for setting up the funding scheme and an interest payment between 10 and 16 per cent on the declining balance of their loan.

An important feature of TRINE is that it combines match-funding from international donors and larger investment funds. For example, Gullspang Invest (one of the founders of TRINE) and UK Aid have provided match-funding for given portfolios. Similarly, solar technology provider Omnivoltaic partnered with TRINE to provide 25 per cent first-loss protection for loans provided to a solar lighting venture in Tanzania.

**Figure 8. The financial structure of the TRINE crowdfunding platform**



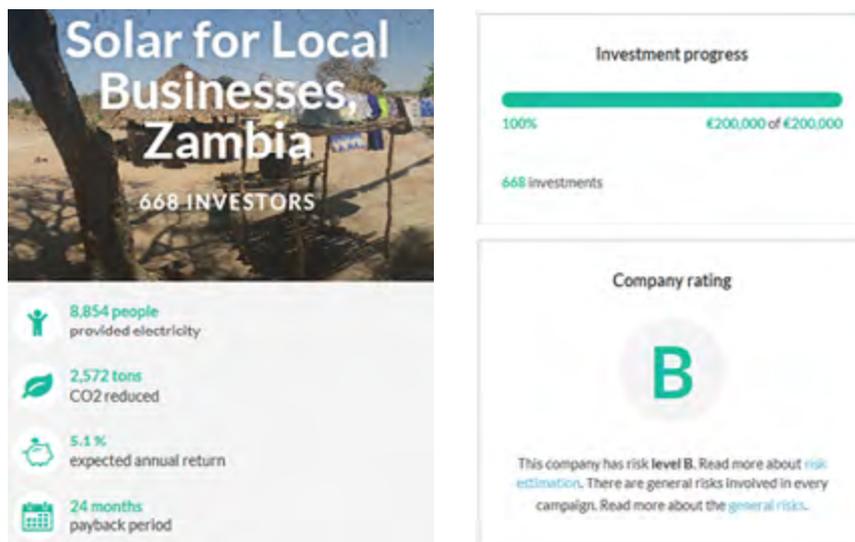
**INSTRUMENT STEPS:**

1. Project risk assessment and due diligence done by TRINE
2. Information provision on platform: credit risk rating, financing needs, return on investment, positive impacts (e.g., CO<sub>2</sub> savings, people provided with solar energy)
3. Investments provided by impact investors for a chosen project (funds maintained in e-wallet until funding requirements reached)
4. Match-funding provided for certain projects
5. Capital provision to chosen solar energy entrepreneurs/ projects
6. Repayment (loan and interest rate) to TRINE, plus administration fees
7. Payout of principal and return on investment to impact investors
8. Payout of principal and return on investment to match-funding parties

**VITALITE: An Example of the TRINE Platform at Work**

One of the portfolio companies of TRINE is VITALITE, a Zambia-based solar energy system provider founded in 2003 that serves low-income households in rural Zambia. Their solar home systems include two lamps, a phone charger, a radio, a battery and a solar panel, while some advanced systems include a TV and extra lighting. All devices are covered by a three-year warranty. VITALITE offers an integrated pay-as-you-go model for all of their solar home systems—the first company in Zambia offering such a payment solution. As such, VITALITE enables customers to have access to solar energy while not paying the upfront costs to purchase the system. Customers can save USD 75 on energy costs per year due to using the VITALITE solar systems. An amortization period of two years for the system is the result (TRINE, n.d.). Further details are provided in Figure 9.

Figure 9. VITALITE’s Zambia-based solar energy system



## Case Study at a Glance

**Name of the project:** TRINE’s Solar for Local Businesses, Zambia project

**Participants:** TRINE (fund for impact investment), VITALITE (borrower)

**Total investment:** EUR 200,000

**Total investors:** 668

**Type of instrument:** Crowdfunding and impact investment

**Funding sources:** Individual investors through TRINE’s crowdfunding platform

**Level of impact:** 8,854 people with access to electricity

**Carbon dioxide reductions:** 2,572 tonnes

**Investor’s expected annual return:** 5.1 per cent

**Expected payback period:** 24 months

## Application of this Instrument to Financing Soil Remediation

The use of crowdfunding platforms for impact-driven projects such as soil remediation is very attractive, especially when projects have stable revenue streams after remediation. The value added of crowd-investment platforms is the improved transparency on risks and returns and the substantial reduction of transaction costs associated with raising funds from a multitude of investors. In addition, impact investors may be willing to accept lower returns for higher social and environmental impacts and hence take on the risks of soil remediation ventures where post-remediation revenues are not so robust.

Crowdfunding platforms can also crowd in small-scale investors (retail investors) and enable them to invest in soil remediation projects in their neighbourhoods. Moreover, platforms can enable small investors to combine their capital with that of public donors and larger impact investors to give rise to “community financing” for projects that are strong priorities for local communities. Decontaminating soil is certainly one such priority.

## Case Study 8: The U.S. Department of Housing and Urban Development's Brownfields Economic Development Initiative (BEDI)

**Sources of financing:** Dedicated public sector funds that operate in a symbiotic manner

**Actors:** Public sector agencies, in this case the U.S. Department of Housing and Urban Development (HUD)

**Instrument:** Viability gap fund

**Motivation:** Providing the basis for crowding in private capital to finance the remediation of contaminated urban cities

### Definition of the Financing Instrument

This case study looks at the use of public grants designed to serve as viability gap funds. A viability gap fund is a one-time grant or loan provided to support public projects that are economically and socially valuable but are not financially robust due to the long development, remediation or incubation periods that these projects require. During such a period, these projects do not generate revenue streams; rather, the period is characterized by high uncertainty during which expenditures and cash flows have to be managed carefully. Viability gap grants can bridge shortfalls between spending and revenue streams and make the cash flows during the development or remediation phase more robust. The entire project then becomes more financially feasible and creditworthy.

### About the Project

The Brownfields Economic Development Initiative (BEDI) is a competitive grant program offered by the U.S. Department of Housing and Urban Development (HUD). It is specifically designed to offer cities additional funding for the redevelopment of abandoned, idled, and underused industrial and commercial facilities where further development is impeded due to pollution and contamination.

The BEDI grants are also tied to the HUD Community Development Block Grant (CDBG) loan guarantee program. Project proponents—cities and municipalities—are only eligible to apply for BEDI grants if they have proved themselves eligible for the CDBG loan guarantee program beforehand. The rationale for this design is discussed below.

### Description of the Project Instrument

The innovative elements of the BEDI grant program are:

1. **The grant eligibility criteria:** To be eligible for BEDI grants, the redevelopment project needs to meet one of the three objectives of HUD's CDBG loan guarantee program:
  - Benefit low-income persons
  - Prevent the expansion of slums and informal urban settlements
  - Address urgent community needs

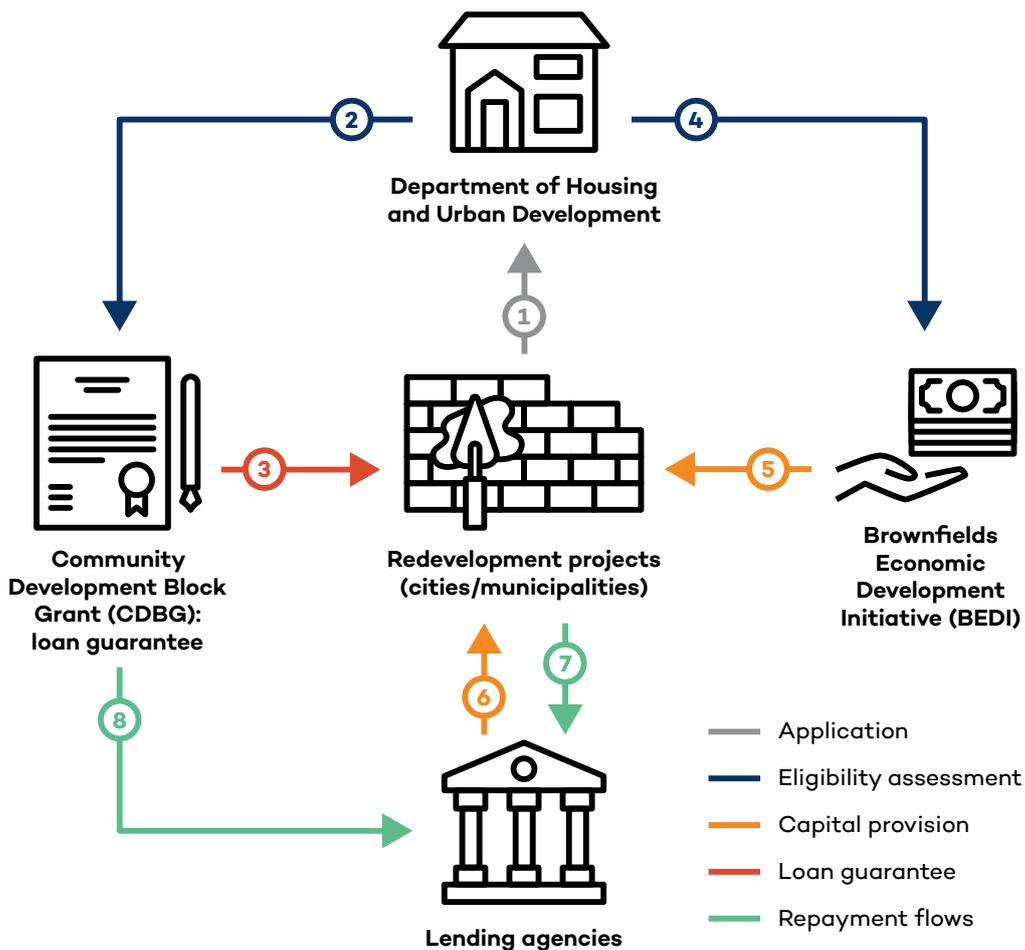
To optimize value-for-money in awarding BEDI, HUD also stipulates how the grant funds may be used. Eligible activities include site remediation, land write-downs, serving as collateral/security for loan guarantees provided by the CDBG program and provision of financing for businesses at below-market interest rates.

2. **The competitive nature of the grant:** Cities and municipalities have to bid competitively for the grant. Projects are selected based on the above criteria, the commercial viability of the project after remediation and the value-for-money derived from the public funds invested in them.
3. **The link to the CDBG loan guarantee program:** Projects first need to be eligible for receiving a loan guarantee under the CDBG loan guarantee program before they can be considered for the BEDI grant.

The BEDI grant therefore acts as a viability gap instrument especially targeted at environmentally and socially valuable projects that do not have sufficiently strong financial profiles to be commercially attractive to mainstream lenders. The grant enables such projects to become more financially attractive and thereby enable its proponents to seek concessional lending from financing institutions.

Moreover, the BEDI grant works in synergy and complements the CDBG loan guarantee program. Loan guarantees enhance the credit quality of a project by providing investors recourse if a project cannot meet its debt-servicing obligations. However, loan guarantees are also expensive. Guarantee facilities often need to ensure that projects are sufficiently robust and will only use the guarantee if cash flows are poor due to unforeseen risks and extreme events. This is where the BEDI grant becomes valuable, as it provides viability gap funding, the capital top-up that is needed to make the project financially strong. Armed with both instruments (the CDBG loan guarantee program and the BEDI grant), cities and municipalities (the project proponents) are able to present projects that are financially more attractive and stand a better chance of obtaining low-cost loans from lending agencies.

**Figure 10. The financial structure of the HUB vitality gap fund**



### INSTRUMENT STEPS:

1. Cities/municipalities apply for BEDI and/or CDBG
2. Eligibility assessment of projects for CDBG
3. Loan guarantee provided to eligible projects
4. Eligibility assessment of projects for the BEDI programme (pre-condition: eligible for CDBG)
5. BEDI grant provision to eligible projects
6. Provision of concessional loans from lending agencies to financially secured redevelopment projects (in case projects handed in a request for a loan)
7. Repayment of loan and interest
8. Guarantee payments by CDBG to lending agency in case of project's loan default

### Case Study at a Glance

**Name of the project:** U.S. HUD Brownfields Economic Development Initiative (BEDI)

**Sponsored by:** The United States government, Department of Housing and Urban Development

**Type of instrument:** Viability gap fund

**Funding sources:** Federal budget allocation

**Project length:** Project specific

### Application of this Instrument to Financing Soil Remediation

Viability gap funds are of significant value to soil remediation projects, especially in light of the long lead times required for the remediation activities and the redevelopment plans that will follow thereafter. Moreover, during remediation and redevelopment phases, projects need to meet the cleanup-related expenses but are not generating any revenues. Cash flows have hence to be managed carefully, and viability gap funds can be very valuable in managing potential shortfalls. This additional capital injection will resolve liquidity issues of remediation and redevelopment projects, making them less risky, more creditworthy and, therefore, more appealing for public and private investors.

Viability gap funds are also useful for improving the financial profile of socially and environmentally valuable projects, which are meant to be implemented after the remediation/redevelopment has been completed, but which might have lower revenue projections compared to primarily commercially oriented projects (e.g., real estate). Governments can consider targeting viability gap funds at projects that address contaminated soil in peri-urban and agricultural areas, where post-remediation activities may not generate attractive revenue streams.

It is also important to note that viability gap funds can be:

- Designed as grants, subordinated loans or even as a subsidy for interest payments.
- Used to support both the soil remediation phase (capital phase) and the post-remediation activities (operations and management phase).
- Disbursed contingent upon performance milestones and hence contribute to the efficient allocation of risks and rewards between landowners and remediation/redevelopment experts.

## Case Study 9: BOFAS npo, the Reserve Fund for Soil Remediation in Petrol Stations (Belgium)

**Sources of financing:** Polluters, in this case the users of gasoline and diesel.

**Actors:** Retailers and users of gasoline and diesel, regional governments.

**Instrument:** Reserve fund

**Motivation:** Providing a subsidy for the remediation of land in and around petrol stations.

### Definition of the Financing Instrument

This case study examines the BOFAS npo, a reserve fund for meeting the costs of soil remediation in and around petrol stations in Belgium. Governments maintain reserve funds as liquid assets to meet future maintenance, refurbishment and retrofitting costs. These funds are designed to have a steady stream of deposits and payouts and are managed to ensure that the seed capital accrues interest and increases in value over time.

### About the Project

The Belgian BOFAS fund was set up as a statutory interregional cooperation agreement between the three regions (Flanders, Wallonia and Brussels) and the Federal Government of Belgium. These types of agreements are often used for interregional collaboration on matters that are material to several regions. To date, interregional cooperation agreements have been established for waste treatment, regional transportation infrastructure and soil remediation—all sectors for which operational knowledge and financing can be optimized when it is shared across regional territories.

The cooperation agreement for the setup of the BOFAS fund was signed in 2002 and came into force in 2004 when the fund was established. The initial term of operations was 10 years and, in 2014, it was extended by another five years.

### Description of the Project Instrument

The BOFAS is founded on the “polluter pays principle.” It was seeded by the Belgium Federal Department of Energy and is replenished by levies based on the polluter pays principle:

- A cleanup duty levied on petrol stations and the petroleum industry.
- An excise duty: for every litre of gasoline, EUR 0.0030 is levied, and for every litre of diesel, EUR 0.0020 is levied. In other words, drivers travelling around 15,000 kilometres per year using a diesel-fuelled vehicle would contribute around EUR 30 to the BOFAS Fund.

The annual budget of the fund in 2016 was EUR 36 million.

The BOFAS fund’s mandate is to advise on the remediation required and reimburse a portion of the remediation costs in and around petrol stations. It has thus a financing and technical advisory mandate.

Applications for reimbursement of remediation costs are accepted for:

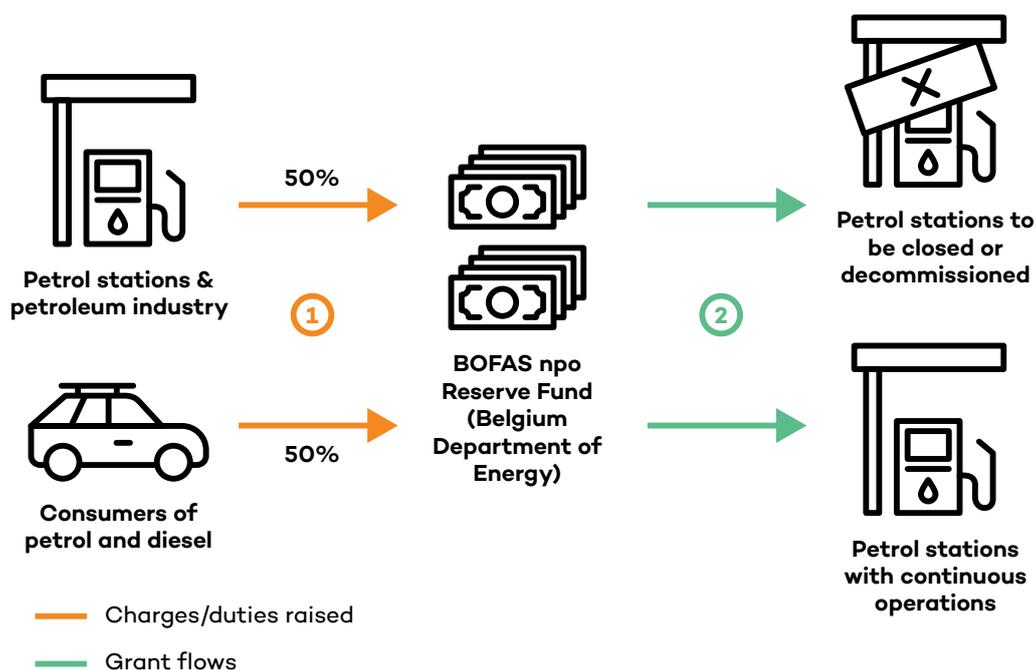
- Soil remediation activities of petrol stations that are being closed and decommissioned.
- Soil remediation activities of petrol stations that have applied for their licences to continue operations but need to take care of polluted soils.

Remediation costs are reimbursed as follows:

- In the case of closure, the fund advises on the required remediation and reimburses part of the related costs.
- In the case of continued petrol station operations, the fund only reimburses the costs that are evaluated as “necessary and in direct relation” to the operational activity of the petrol station up to a maximum amount of EUR 62,000.

Between 2004 and 2014, the fund received 1,850 requests for reimbursement from operating petrol stations and 1,964 applications from closures. The fund has a pipeline of 800 projects that are due for completion by 2019. At the time of writing, BOFAS is not accepting new applications.

**Figure 11. The financial structure of the BUFUS npo reserve fund**



**INSTRUMENT STEPS:**

1. Charges collected from petrol stations/industry and consumers
2. Approved payments to cover part of soil remediation costs

**Case Study at a Glance**

**Name of the project:** BOFAS npo, the Reserve Fund for Soil Remediation in Petrol Stations (Belgium)  
**Sponsored by:** The Public Agency for Energy, Belgium  
**Type of instrument:** Reserve fund  
**Founding sources:** Seed funds from the federal Department of Energy: 50 per cent from the petroleum industry, 50 per cent from petrol and diesel users.  
**Fund working period:** 10 years, extendable  
**Annual funding budget:** EUR 36 million

## Application of this Instrument to Financing Soil Remediation

As demonstrated in this case study, blended reserve funds, with seed capital from the public sector and replenishment or working capital from private polluters, can well be considered for financing soil remediation. Challenges may arise in terms of establishing direct liability on the source for the pollution, but once this is established, blended funds can be designed with working capital from sectors such as agrochemicals, petrochemicals, mining and shipping. Indeed, best practice requires that plans for the remediation of the site are included in extractive industry contracts and extractive industry community development agreements.

Reserve funds, backed by other appropriate public guarantees, can also be structured to provide concessional loans. In this case, the fund acts as a first-loss protection mechanism and thus enables other socially conscious capital providers to co-invest. First-loss protection mechanisms are used to insure the tranche of capital that is first exposed should financing risks arise during the lifetime of the project.

## Case Study 10: The Atlantic Station (Atlantic Steel Site Redevelopment Project), Atlanta, United States

**Sources of Financing:** Public fiscal revenues and investors across capital markets  
**Actors:** Public sector agencies, in this case the State of Georgia and the City of Atlanta  
**Instrument:** Tax increment financing and tax incremental bonds  
**Motivation:** Providing earmarked public capital for the remediation of contaminated urban land and the upgrading of derelict urban sites

### Definition of the Financing Instrument

This case study looks at the use of tax increment financing (TIF) and tax incremental bonds. Both instruments rely on the appreciation of land value after remediation is complete.

TIF is sourced from the increase in tax revenues to local governments resulting from remediation and redevelopment projects that generate additional taxable income flows. For example, remediated land can be used for commercially viable ventures that can generate additional tax revenues in the form of higher corporate taxes or higher property taxes. The additional proceeds from the “increment in taxes” (and hence “tax increment financing”) can be earmarked and directed into a dedicated fund to service bonds or directly finance new projects. Some local governments also allow local sales tax and income tax revenues to fund TIF systems.

TIF bonds are most often revenue bonds that are secured by incremental tax revenues in the relevant TIF district (revenue bonds in general are secured by the revenues generated by a particular source or project). TIF bonds can also be issued as general obligation bonds, but in this case, the bond needs to be credit enhanced by the full faith and credit of the issuing local government.

### About the Project

Atlantic Station is a USD 2 billion development project involving the cleanup and redevelopment of a 138-acre brownfield site, the former site of the Atlantic Steel facility. The project involved the remediation of a former steel facility, the separation of sanitary and storm sewer systems, and the construction of a highway bridge to connect the site to both public transit and the closest highway.

The latter is of particular relevance, as the project needed to demonstrate at the outset that the bridge would reduce transport-related greenhouse gas emissions because commuter distances could be lowered and better access to public transport could be provided. As Atlanta had not met mandatory Clean Air Act standards, the bridge would normally not have been approved under the standard interpretation of building regulations of the U.S. Environmental Protection Agency (EPA). A study was commissioned by the U.S. EPA’s Development, Community, and Environment Division to assess how the redevelopment would lower emissions and how this evidence could enable the project to be approved under the US EPA’s eXcellence and Leadership (XL) program. The XL program was designed to promote low-carbon infrastructure.

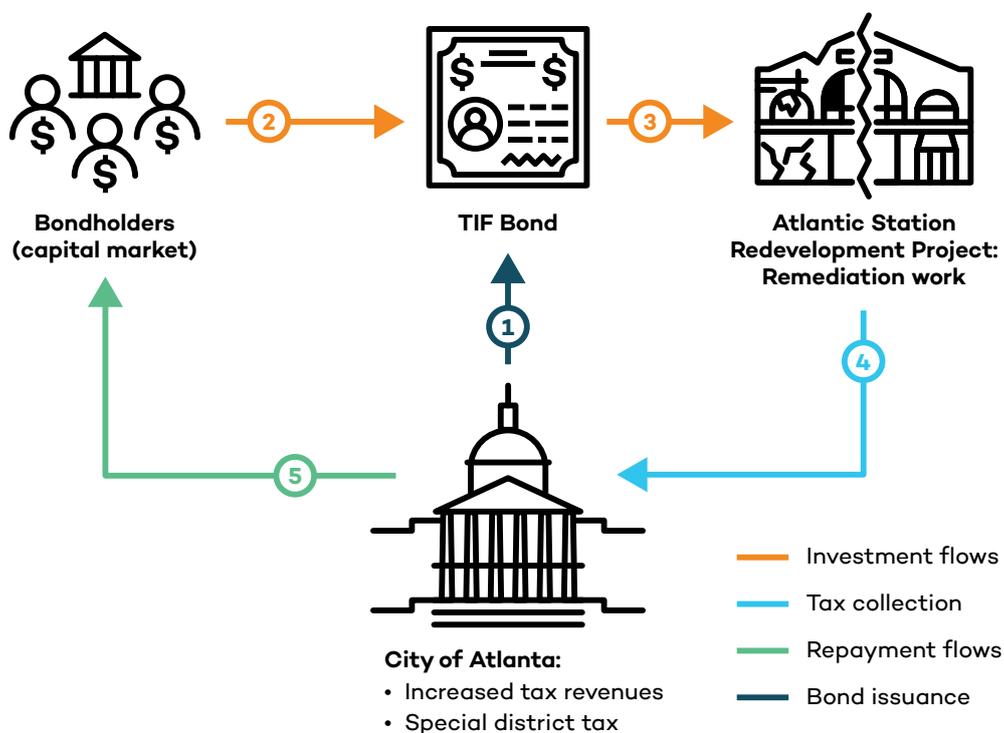
### Description of the Project Instrument

The Atlantic station was financed by a combination of TIF proceeds, TFI bonds, water bonds and federal general obligation bonds. The project was deployed through a public–private partnership (PPP) structure. The remediation process and the construction of roads and utilities were financed by the public sector using TIF bonds, while the private sector was responsible for acquiring finance and executing the construction of housing and commercial facilities.

As mentioned above, the remediation work, along with roads and utility construction, were financed using TIF bonds. These bonds were issued by the municipality and were structured to be repaid from the increased tax revenues resulting from new commercial activities on the redeveloped district. To enable the issuance of TIF bonds, the municipality had to amend the Provisions State Act that disallowed the issuance of municipal bonds with maturity dates longer than 18 months. Given that the incremental tax revenues could not be realized in 18 months, as remediation and redevelopment take time, the act was amended to allow the time frame to be extended by 42 months. Over USD 200 million was raised by this instrument.

To protect the City of Atlanta against the risk that future tax revenues would not be sufficient to service the bonds, a special district tax was designed to provide credit enhancement to the TIF bonds. The tax was aimed at new inhabitants of the remediated and rehabilitated district.

**Figure 12. The financial structure of the Atlantic Station project**



**INSTRUMENT STEPS:**

1. TIF Bond issuance by City of Atlanta
2. Private investments = buying of bonds
3. Proceeds of the bond are used as public investments into the Atlantic Station Redevelopment Project: TIF bonds dedicated for the remediation work
4. Tax revenues based on:
  - (a) Additional taxable income flows from enhanced commercial activities at the remediated site
  - (b) Special district tax charged from new inhabitants of the remediated site
5. Payment of principal and coupon to bondholders

## Case Study at a Glance

**Name of the project:** Atlantic Station (Atlantic Steel Site Redevelopment Project)

**Type of instrument:** Tax increment finance (TIF) and tax increment bond

**Sponsored by:** State of Georgia and the City of Atlanta,

**Remediated area:** 138 acres

**Project estimated cost:** USD 2 billion

**Funding sources:** TIF financing, TIF bonds issued by the City of Atlanta and the State Government of Georgia, other project bonds.

**Bond maturity:** Up to 42 months

## Application of this Instrument to Financing Soil Remediation

The appeal of TIF for soil remediation is that such instruments are directly linked to land value capture after the remediation is complete. As the incremental tax revenues are generated within the remediated area or the TFI district, the systems can be ring-fenced and administered with relative ease. TFI systems can also be backed up by complementary taxes that are again levied on those that directly benefit from the remediated area. Hence, when there is a clear case of value addition in remediating a given area and the people being taxed recognized the benefits, TIF can be used to provide a part of the required financing.

If issued TFI bonds are designed as revenue bonds backed by the additional tax revenues generated by the remediated land, the TFI systems would provide off-balance-sheet financing for the local governments and avoid an increase in their budget deficits.

On the downside, credit risks arise as future incremental tax revenues and the pace of remediation and redevelopment cannot entirely be controlled by the municipality issuing the bond. Moreover, the success of TIF systems relies heavily on the accurate forecasting of remediation and redevelopment costs and the related taxable income increases. In some geographies, this can be difficult to predict. Moreover, TIF is feasible only in countries where capital markets are deep and municipalities are able to issue bonds. Hence, TIF will be not be practical in most emerging and developing countries.

## Case Study 11: Agrimaine Biogas Cogeneration Project, Mayenne, France

**Sources of financing:** Private equity investors

**Actors:** Commercial enterprises, including farmers' cooperatives; public enterprises, including energy services regulator and energy utility

**Instrument:** Public–private partnership

**Motivation:** Raising financing, as well as design, management and operations expertise for private enterprises

### Definition of the Financing Instrument

The World Bank PPP Knowledge Lab defines public–private partnerships (PPPs) as “long-term contracts between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance” (World Bank Group, n.d.). PPPs do not include turnkey contracts<sup>6</sup> or service contracts, as they are defined as public procurement vehicles.

### About the Project

This case study describes a PPP arrangement on a waste-to-energy biogas cogeneration plant in Mayenne, Pays de la Loire in northwestern France. Mayenne is a rural area. Around 80 per cent of its land is used for agriculture, predominantly livestock farming (bee-keeping and cattle, horse and pig breeding). The region is renowned for meat (specifically cattle breeds that include Blonde d’Aquitaine, Charolais, Limousin and the Rouge des Prés) and related gastronomy. As such, the industry follows high sustainable agriculture standards and implements a range of programs on social inclusion and environmental stewardship; for example, the free-range eco labels IGP and Label Rouge originate from Mayenne.

Around 2011, 110 farming entrepreneurs in Mayenne began to explore the feasibility of a biogas cogeneration plant to dispose of agricultural waste, generate renewable energy and diversify revenues for the farming community. They established a limited liability cooperative, AB2M (Agri Bio Energie Methanisation Du Maine), to develop the business plan, seek investment and implement the project. From the onset, AB2M was in a strong position, as the founding 110 farmers produced 20 per cent of the region’s agriculture waste, which amounts to around 126,800 tonnes a year.

The design of the biogas cogeneration plant requires that waste from AB2M’s member farms be fed into a digester and then into a controlled-process cogenerator to produce biogas or methane. This gas will then be used to power a turbine to generate electricity and heat. The electricity will be sold to the national grid and will receive a preferential feed-in tariff (FIT) that was negotiated during a public tender issued by the Commission de Regulation l’Energie (the federal energy regulator). The heat generated as a by-product of the methane will be sold to an agri-industrial facility nearby and the residues (following the production of methane) will be sold back to AB2M shareholders at a preferential rate for use as fertilizers.

Another important feature is that the biogas cogeneration plant is located within 25 km of most of the AB2M shareholders. The feasibility of transporting the agriculture waste is hence greatly increased due to reduced transportation costs.

The project entered its financial close in 2017. Construction is currently ongoing. The plant is due to start operations at the end of 2019.

<sup>6</sup> Turnkey contracts involve contacting a single entity to design and build an asset that can be sold to a public buyer as a complete product.

## Description of the Instrument

This project was executed through a PPP for which a dedicated call for proposals was issued by the Commission de Régulation de l'Énergie in 2017. Fundamental to the design was France's biogas energy goal of 625 MW by 2020.

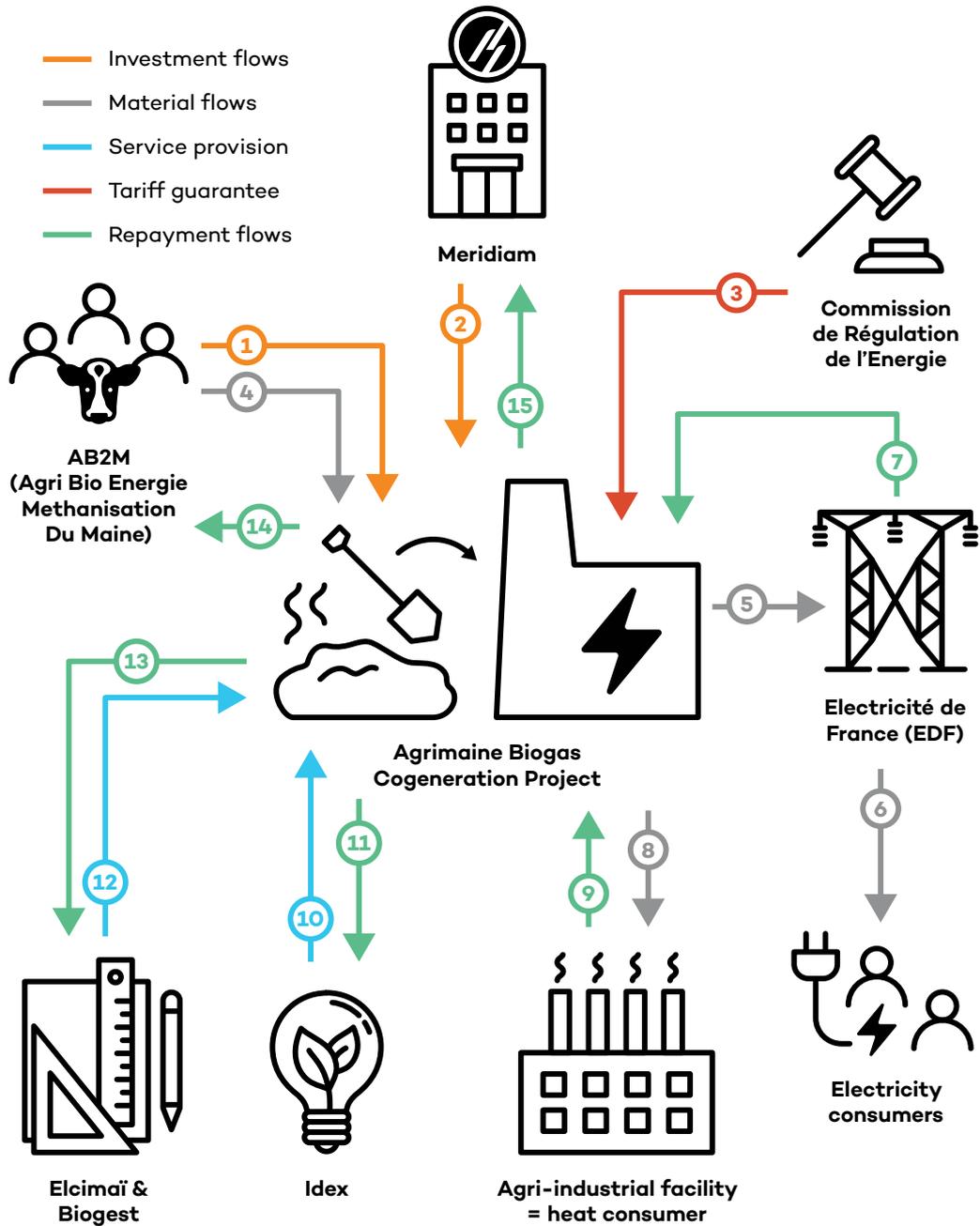
The call for proposals included a concession agreement for a *design, finance, build, operate and maintain* arrangement for a 3.65 MW biogas cogeneration plant. Under this arrangement, the winning bidder or concessionaire would raise the capital, design, build, operate and maintain the biogas cogeneration plant and feed the electricity generated into the national grid. The concessionaire would receive a preferential FIT for the electricity sold to the grid. The tariff was set on base rates but would be negotiated with the concession holder based on the capital and operating costs of the plant.

The winning consortium consisted of the following enterprises:

- Project sponsors: AB2M and Meridium, a world leader in developing, financing and managing infrastructure projects around the world
- EPC contracts: Elcimaï, an engineering and design company, and Biogest, a specialist in methane technologies
- Operation and maintenance (O&M) provider: Idex (energy), a specialist firm on energy and energy efficiency
- Feedstock supplier: AB2M

The FIT base rates published by the French Ministry of Environment and Energy Transition are between EUR 0.064 and 0.095 per kWh, with an additional premium of EUR 0.02 to 0.03 per kWh, given that the feedstock was predominantly agricultural waste (Ministère de la Transition écologique et solidaire, 2017). The bankability of the project was further enhanced given that the heat produced as a by-product of the electricity could be sold to an agro-industrial plant nearby. The project reached its financial close in early 2017 with a capital cost of EUR 25 million.

**Figure 13. The financial structure of the Agrimaine Biogas Cogeneration Project**



**INSTRUMENT STEPS:**

1. Equity provision by AB2M
2. Equity provision by Meridiam
3. Preferential long-term FIT guaranteed by the French Commission de Régulation de l'Énergie
4. Provision of farm effluents for biogas production
5. Electricity provision to the grid
6. Electricity distribution to end-consumers by Electricite de France (EDF), the French National Energy Utility

7. Power Purchase Agreement between the Agrimaine Project and EDF, based on the preferential long-term tariff (= revenue flow for the Agrimaine Project)
8. Heat provision to industrial facility
9. Payment by industrial facility for provided heat
10. O&M services
11. Payment for O&M services
12. EPC services
13. Payment for engineering, procurement and construction services
14. Payment for farm effluents and distribution of dividends to AB2M
15. Distribution of dividends to Meridium

## Case Study at a Glance

**Name of the project:** Agrimaine Biogas Cogeneration Project, Mayenne, France

**Name of the instrument:** Public–private partnership

**Project sponsors (private equity providers):** AB2M and Meridium

**Power purchase agreement:** Electircite de France

**Guarantors of preferential feed in tariff:** Commission de Régulation de l'Energie, France

**Principal amount:** EUR 25 million

## The Application of this Instrument to Soil Remediation

PPP contracts can be used to attract the private sector to finance, remediate and restore contaminated land. Such contracts can be negotiated on two models:

- The user fees model, which, in the case of soil remediation, translates directly to an increase in retail, agricultural, or other industrial value of the land after it is remediated.
- The availability payment model, under which the public sector pays the concessionaire an agreed amount for the “availability and use” of the decontaminated site.

For PPP contracts to bring value-for-money, it is very important that all stakeholders have reliable information on the costs and the technological and environmental risks associated with the cleanup. As demonstrated in this case study, if technological risks and costs are clear, risks can be allocated between the public and private counterparties in an efficient manner. Moreover, PPP can then combine the interests of local economic actors, national government policies and private financing, technology and management expertise in an optimal manner.

## Case Study 12: The USA Guatemala Forest Conservation Debt-for-Nature Swap

**Sources of financing:** Public debt and public debt obligations

**Actors:** Public sector agencies working on fiscal policy, public sector agencies working on environmental protection and conservation, international NGOs

**Instrument:** Debt-for-nature swap

**Motivation:** Raising funds for nature conservation through the forgiveness of outstanding sovereign debt

### Definition of the Financing Instrument

Debt-for-nature swaps (DNS) involve the cancellation of debt obligations of a developing country on the agreement that the funds used for debt servicing will instead be invested in the protection of biodiversity. This arrangement is valuable for developing countries that face pressing conservation challenges.

DNSs can be structured in two ways:

- The creditor government waives all or a part their credit rights, and the debtor government invests the equivalent value in biodiversity conservation.
- The creditor government sells all or a part of the debt outstanding to an organization with the expertise to carry out biodiversity conservation work in the debtor country.

The proceeds from DNSs are best invested in environment trust funds in the debtor country. These funds can then be used to provide grants and loans for biodiversity conservation and the upkeep of protected areas. Proceeds from DNSs can also be invested in endowment funds, which ensure long-term annual budgets for earmarked projects. In either case, the establishment of a fund is important to secure the long-term commitment for conservation from the debtor government and adequate follow up from the creditor government.

### About the Project

The United States and Canada have been the leading creditor countries in the structuring of DNS. Impetus and legal security for these initiatives were also provided by the United States Tropical Forest Conservation Act, 1988, which provided for the allocation of public and private capital towards forest conservation.

In 2006, the United States government agreed to waive USD 24 million in debt for the Government of Guatemala—20 per cent of the debt owed by Guatemala—in a DNS arrangement that was facilitated by The Nature Conservancy and Conservation International. Four earmarked conservation projects were chosen to benefit from the DNS arrangement:

- The Maya Biosphere Reserve, which makes up 10 per cent of Guatemala's total land area
- The Sierra del Lacandon National Park and Tikal National Park that lie within the Maya Biosphere Reserve
- The Motagua/Polochic System, which is home to 80 per cent of Guatemala's biodiversity
- The Sierra Madre Volcanic Chain including Lake Atitlan

### Description of the Project Instrument

Under the DNS arrangement, the U.S. government agreed to waive USD 24 million in debt for the Government of Guatemala, which would instead be used to finance the above-mentioned four conservation projects over 15 years. The proceeds from the swap were placed in a permanent conservation trust fund expressly designed to

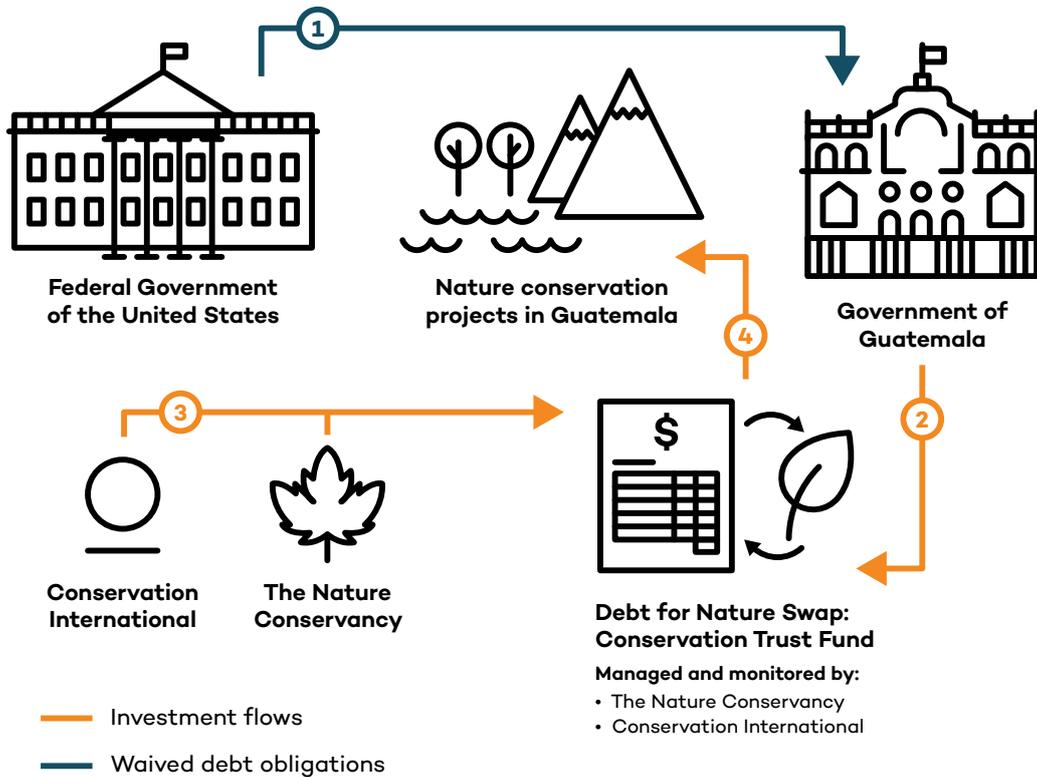
manage the fund, disburse the grants and monitor project impacts. USD 19.5 million is being used to finance grants for the earmarked projects and USD 4.9 million is invested to generate revenues from interest for further grants. This DNS also requires that for every USD 1 contributed by United States government, The Nature Conservancy and Conservation International bring USD 1.4 worth of conservation on the ground in Guatemala.

The DNS was structured under the Tropical Forest Conservation Act of 1988, which enables eligible countries to use their debt payments to finance tropical forest conservation in their countries. Panama, Jamaica, Colombia and Peru have also entered into a DNS under this act.

To provide for the structuring and facilitation of the swap arrangement (or to establish the swap preparation fund):

- The Nature Conservancy contributed USD 1 million, USD 500,000 of which was donated by American Electric Power Inc.
- Conservation International contributed USD 700,000 from its Global Conservation Fund.
- White & Case served as pro bono legal counsel.

Figure 14. The financial structure of Guatemala’s DNS



**INSTRUMENT STEPS:**

1. The Government of the USA waives part of remaining debt obligations with the condition to invest this sum into DNS.
2. A conservation trust fund is established to aggregate and disburse the conservation investments. This fund is managed by two international NGOs: The Nature Conservancy, Conservation International.
3. Both NGOs invest own capital into the Conservation Trust Fund.
4. Funds are disbursed to earmarked conservation projects while the funds and project impacts are monitored by the NGOs.

## The Case Study at a Glance

**Name of the project:** Guatemala's Debt-for-Nature Swap

**Sponsored by:** United States government, The Nature Conservancy, Conservation International

**Remediated area:** More than 10 per cent of Guatemala's territory

**Project estimated cost:** USD 24 million

**Type of instrument:** Debt-for-nature swap

**Funding sources:** Debt forgiveness by the United States to Guatemala; additional grants for project structuring.

**Agreement length:** 15 years

## Application of this Instrument to Financing Soil Remediation

Lower-income countries are particularly challenged to finance soil remediation. Debt relief for soil remediation may be an attractive option. In addition, DNS can be used to finance the remediation of rural and agricultural lands where the land value capture is not so lucrative and, hence, cannot be co-financed by private investors.

DNSs are also instruments that can attract philanthropic capital from charitable foundations and high-net-worth individuals. These funds can be combined with the proceeds from debt forgiveness or indeed used to set up a debt for remediation swap preparation fund.

Challenges could, however, arise in the arrangement of the DNS. This needs to be undertaken by an agency specializing in soil remediation along with public sector financiers and appropriate experts on investment law. In addition, for the swap to generate the desired outputs, there needs to be baseline expertise on soil remediation in the recipient country, otherwise the conditions of the swap will not be fulfilled.

The arrangement of the DNS is also expensive. As demonstrated in this case study, the organizations involved contributed over USD 1.7 million to structure the swap. Governments interested in pursuing DNS for remediating soils may therefore need to establish a dedicated fund to meet the upfront costs of DNS structuring.

## Case Study 13: InsuResilience Investment Fund

**Sources of financing:** Earmarked public fiscal revenues

**Actors:** International donors, development banks, reinsurance providers, private impact investment funds

**Instrument:** Investment fund and climate insurance products

**Motivation:** Providing insurance services for communities and businesses that face natural catastrophe risks

### Definition of the Financing Instrument

The blended resilience investment fund presented in this case study is targeted at providing insurance products and services for vulnerable communities and businesses that face natural catastrophe risks. The fund is seeded by a public donor and combines private debt and private equity investment opportunities as well as first-loss protection for these private investors.

### About the Project

On behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), the German Development Bank (KfW) set up the Climate Insurance Fund in 2013 and launched it in 2017. This fund was restructured in 2017 to align with the G7 initiative on climate risk insurance, renamed the InsuResilience Investment Fund (IIF) and opened to private investors.

The purpose of the IIF is to improve access to insurance solutions in natural-catastrophe-prone official development assistance (ODA) recipient countries. In this light, the IIF combines the provision of financial investments and technical assistance to participants across the insurance value chain, including insurance service providers, brokers, aggregators and other businesses that can offer natural catastrophe cover. The technical assistance is oriented at increasing local risk management capacities, developing new insurance products and, consequently, reducing the overall risks of exposure to extreme weather events.

The IIF also aims to reduce ODA countries' dependency on conventional public emergency assistance and international donors. Beyond that, premium systems of insurance companies incentivize insured parties to adapt to extreme weather events and other potential natural catastrophes by implementing effective measures to reduce their vulnerability and hence their premium payments.

The IIF is managed by:

- BlueOrchard Finance, an impact investment firm focusing on emerging markets. They are responsible for the management of the two IIF sub-funds (see below).
- CelsiusPro, a weather and climate insurance specialist responsible for providing technical assistance to ODA country-based insurance companies on the design and development of insurance solutions. CelsiusPro also disburses subsidies to reduce premiums for low-income homes and businesses.
- Swiss Re, Munich Re and Hannover Re, reinsurers, provide advice and guidance on risk capacity and risk tolerance.

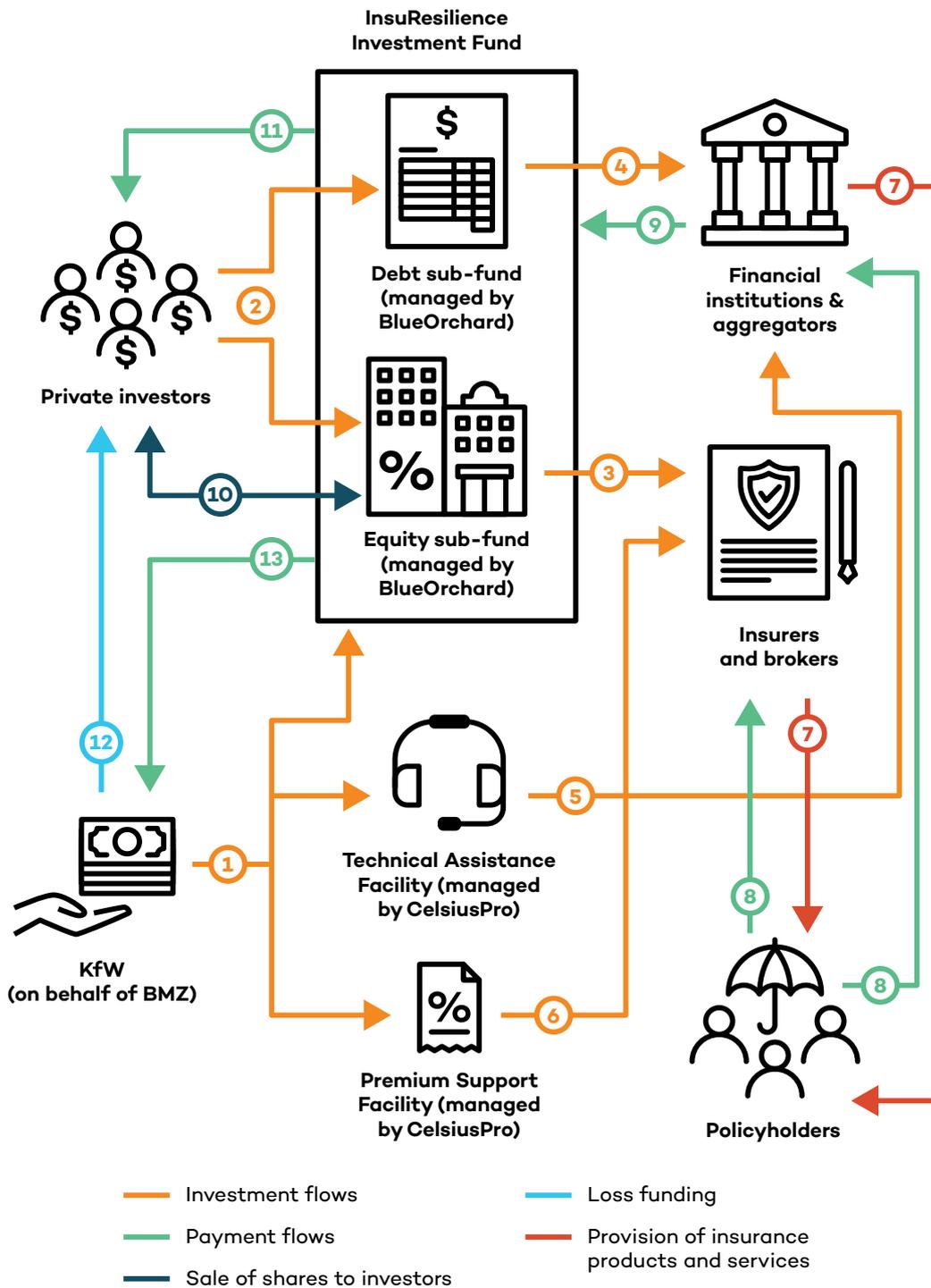
### Description of the Project Instrument

The IIF is structured as follows:

- Debt Sub-Fund: Lending to financial institutions and aggregators for the development and distribution of climate insurance solutions for vulnerable communities and small and medium-sized enterprises (SMEs).

- Equity Sub-Fund: Investing in insurers and brokers that are actively building the market for climate insurance solutions and directly offer these to vulnerable communities and SMES.
- Technical Assistance Facility: Supporting the development launch of climate insurance solutions.
- Premium Support Facility: Subsidizing the premiums of climate insurance products targeted at low-income groups.

Figure 15. The financial structure of the IIF



## INSTRUMENT STEPS:

1. On behalf of the BMZ, KfW provides funding to the different funds of the IIF:
  - (a) Partial contribution to the target sizes of the debt sub-fund (USD 200 million) and the equity sub-fund (USD 100 million)
  - (b) Full coverage funding for the technical assistance facility ( $\approx$  USD 13.6 million) and the premium support facility ( $\approx$  USD 7.4 million)
  - (c) Provision of first-loss protection for private investors: USD 35 million per sub-fund
2. Private investors invest into the two sub-funds.
3. BlueOrchard provides equity capital to insurance companies and brokers.
4. BlueOrchard provides debt financing to financial institutions and aggregators.
5. CelsiusPro provides technical assistance to selected IIF recipients.
6. CelsiusPro provides subsidies to selected insurance companies and brokers in order to reduce premiums.
7. Once developed and launched by insurance companies, brokers or aggregators, their climate insurance products and services are sold to low-income and vulnerable stakeholders (communities, farmers, micro enterprises and SMEs, etc.). They become policyholders.
8. Insurance premiums are paid by policyholders.
9. Recipients of IIF loans pay back principal and interest rate to BlueOrchard (IIF manager).
10. Exit strategy for BlueOrchard's equity investments: sale of shares to strategic investors or buy-back of shares by initial equity recipients (insurers, brokers, aggregators).
11. Payout of principals and return of investments to private investors.
12. First loss protection: provision of funds by KfW to private investors (class A investors) in case of investees' default.
13. KfW as a junior lender and equity provider is paid back after senior lenders.

## Project Example: PlaNet Guarantee

PlaNet Guarantee is a micro-insurance broker that provides climate insurance products for entrepreneurs and smallholder farmers in emerging and developing economies, especially in Africa.

PlaNet Guarantee already launched an index-based micro-insurance scheme in 2011 that is based on climate and harvest indicators to predict harvest losses for various crops. Threshold levels for the indicators and a crop timeline are set to determine when insurance payouts are provided to policyholders. The micro-insurance scheme is based on continuous monitoring and sophisticated data collection including satellite information over 30 years to design rainfall maps, a rainfall deficit index, etc. (Eurisy, 2015).

PlaNet Guarantee has strong ties to banks, micro-finance institutions, cooperatives and other insurers. They also serve as an intermediary for the development and diffusion of new climate insurance solutions.

As PlaNet Guarantee operates on the micro level with direct relations to insurance policyholders, banks, cooperatives and micro finance institutions, PlaNet Guarantee represents one of the core target groups for investments and technical assistance of the IIF. Using BlueOrchard as an investment vehicle, the equity sub-fund of IIF allocated EUR 1 million to PlaNet Guarantee while, in return, receiving a 30 per cent equity stake in the company. BlueOrchard can hence assist the PlaNet Guarantee to enhance its product offering, including mobile insurance services. PlaNet Guarantee is expected to reach a client base of 900,000 people by 2020.

## Case Study at a Glance

**Name of the instrument:** InsuResilience Investment Fund (IIF)

**Issuer:** BMZ and KfW

**Final objective:** Improved access to insurance solutions for stakeholder groups in ODA recipient countries

**Intermediate Objective:** Scaling and/or developing and launching of climate insurance products and services = market development

**Sub-Components of IIF:**

Component Name	Investors/ funders	Volume	Manager	Target Group/ Beneficiaries
Debt Sub-Fund	BMZ & private investors	USD 200 million	BlueOrchard	Financial Institutions & Aggregators
Equity Sub-Fund	BMZ & private investors	USD 100 million	BlueOrchard	Insurers & Brokers
Technical Assistance Facility	BMZ	USD 13.6 million	CelsiusPro	Financial Institutions, Aggregators, Insurers & Brokers
Premium Support Facility	BMZ	USD 7.4 million	CelsiusPro	Insurers & Brokers
First Loss Protection	BMZ	USD 70 million	–	Private Investors

**Final beneficiaries:** Low-income communities, farmers, and micro enterprises and SMEs vulnerable to the impacts of climate change (especially extreme weather events)

## Application of this Instrument to Financing Soil Remediation

With the advent of climate change, proponents of soil remediation projects are facing increased risks for natural catastrophic events and weather-related uncertainties. This, in turn, makes the costs of soil remediation very difficult to predict.

Climate insurance products can be useful for soil remediation project proponents to mitigate and hedge against risks associated with freak weather events and their adverse impacts related to the long-term payback capability of soil remediation investments. To enable soil remediation to become a more widespread and bankable endeavour, international donors could consider establishing a fund similar to the IIF example. Donor funds could serve as seed capital (for establishing insurance products for soil remediation projects), first-loss provision and a subsidy to reduce the insurance premiums for soil remediation project proponents. Private funders could then crowd in to provide complementary capital and technical assistance.

Climate insurance products applicable for soil remediation can be categorized into two types:

- **Indemnity insurance:** insurance payouts in case extreme events materialize in actual damage to the policyholders (e.g., remediation costs higher due to extreme weather events, remediated soil provides less agricultural outputs than expected due to extreme weather events).
- **Parametric insurance:** insurance payouts are issued if defined threshold levels are exceeded (e.g., air temperature, precipitation volume, magnitude of an earthquake) irrespective of the actual damage.

## Case Study 14: Elazığ Integrated Health Campus Project in Turkey

**Sources of financing:** Public donor funds, private investors

**Actors:** Development banks, private investors from capital markets, infrastructure investment funds

**Instrument:** Credit enhancement and project bonds

**Motivation:** Positioning public financing as guarantees to improve the creditworthiness of the project; thereafter, raise capital from private investors

### Definition of the Financing Instrument

This case study looks at how the combination of project bond financing and credit enhancement can enable the deployment of social infrastructure projects in emerging markets.

Project bonds are fixed income instruments issued to finance a particular project and are paid back exclusively by the revenues generated by the project. As a result, bondholders do not have recourse to other revenues generated by the project initiator or bond issuer. Bonds pay a predetermined coupon (interest) during a defined time period (e.g., 5 to 20 years). When the bond reaches maturity, the borrower pays back the principal (the borrowed amount).

In addition to project bonds, this case study also covers two types of credit enhancement instruments: political risk insurance and liquidity facilities. Credit enhancement instruments improve the credit rating of a project by mitigating key project risks:

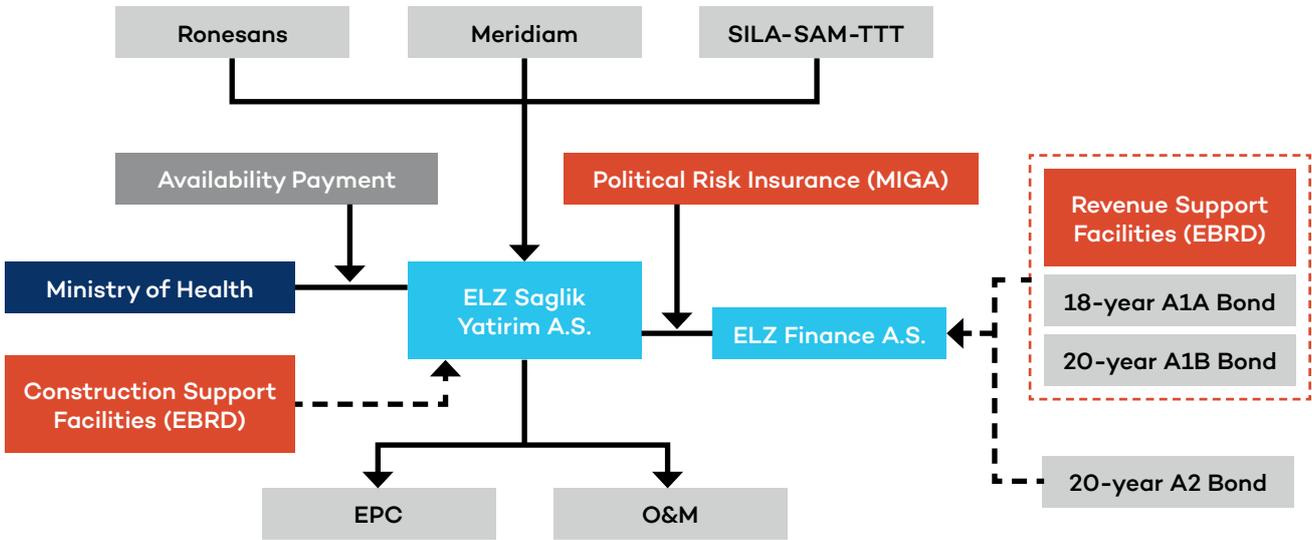
- Political risk insurance protects investors against the risks of transfer restriction, expropriation, war and civil disturbance, breach of contract and non-honouring of financial obligations.
- Liquidity facilities provide funding when there is a temporary disruption or delay in the flow of capital. Such facilities are valuable to help project companies meet payment and debt servicing obligations on schedule during both the construction and operation phases of a project.

### About the Project

The Elazığ Integrated Health Campus Project was a EUR 350 million greenfield PPP project commissioned by the Ministry of Health in Turkey. The campus has an area of 347,500 m<sup>2</sup> and 1,038 total bed capacity. It consists of a maternity and children's hospital, general hospital, psychiatric hospital, high-security psychiatric hospital, and oral health and dental clinic. All hospitals have inpatient services, outpatient clinics, diagnostic treatment departments, support facilities and technical unit buildings. The seismic isolation technology used would prevent any disruption in operation in case of earthquakes (Rönesans Sağlık Yatırım, n.d.).

ELZ Sağlık Yatırım, project company and concessionaire, was responsible for the design, construction, equipping, financing and maintenance, while the Ministry of Health was in charge of the provision of medical services for the 28-year project period.

**Figure 15. The financial structure of the Elazığ Integrated Health Campus Project**



Source: Global Infrastructure Hub, 2017

The project company, ELZ Saglik Yatirim, was set up by Ronesans Holding, Ronesans Saglik Yatirim and Meridiam Eastern Europe, among other investors (Sila Danismanlik Bilisim Egitim Insaat Taahhut Ticaret ve Saglik Hizmetleri, TTT Saglik Hizmetleri Egitim Insaat Sanayi Ticaret, and S.A.M. Yapi Sanayi ve Ticaret). The role of the project company is to supply and maintain the hospital facilities. As per the PPP concession agreement, it receives availability payments from the Ministry of Health. These payments are not subject to volume and price risk, but are subject to penalties in case of poor performance.

### Description of the Project Instrument

A special purpose vehicle, ELZ Finance, was set up to arrange the financing of the Elazığ Integrated Health Campus Project. The financing structure included the issuance of projects bonds that were backed by credit enhancement instruments provided by multilateral development banks. There was also additional capital participation by the International Finance Corporation. The details are as follows:

- The total value of the bonds issued was EUR 288 million.
- The bonds were issued in three tranches.
- Tranche A1A was priced at 4.192 per cent for 18 years and tranche A1B was priced at 4.46 per cent for 20 years. Both these tranches were backed by two credit enhancement facilities:
  - Political risk insurance provided by the World Bank’s Multilateral Investment Guarantee Agency (MIGA)
  - A liquidity facility provided by the European Bank of Reconstruction and Development (EBRD)
- The A2 20-year tranche was unenhanced, unrated and purchased by the International Finance Corporation.

Due to the political risk guarantee provided by the World Bank’s MIGA and the liquidity facility provided by the EBRD, the credit rating of the Elazığ Integrated Health Campus’ EUR 288 million bond issue was improved to two notches above that of Turkey, its host country.

The structure is innovative as it is a first in many aspects:

- It is the first time that a project bond issued in Turkey was rated higher than the country’s credit rating.

- It was the first time that the World Bank's MIGA and the EBRD worked collaboratively to credit enhance an infrastructure project in a country where the sovereign credit rating was below investment grade.
- It was the first time in Turkey that a greenfield infrastructure project was financed through project bonds, which itself is a testament to the importance of guarantees provided by the multilateral development banks above.

Turkey has a below-investment-grade credit rating of BB, as rated by Standard & Poor's. (A bond is considered investment grade if the credit rating by Standard & Poor's is BBB or higher.) If the World Bank's MIGA and the EBRD had not credit enhanced the bond issue, private investors would have not been comfortable to invest at the given prices. They would have indeed required additional risk premiums to take on the country risk, and this could have made the entire project financially unviable.

Investors are also often hesitant to invest in greenfield projects due to the underlying construction and cash flow risks involved. This adds additional importance to the combined credit enhancement provided by MIGA and the EBRD, for it increased the confidence of investors to take on greenfield-project-related risks. The participation of the International Finance Corporation in purchasing the unenhanced and unrated tranches of the project bonds could have lent additional confidence to investors that the project was a robust investment.

Due to the enhanced credit profile of the project, the project bonds were euro denominated. This made the bond issue more attractive to international investors, as it eliminated the currency risk of investing in Turkish lira. The project also benefited from the euro's lower base interest rate compared to that of the Turkish lira.

## Case Study at a Glance

**Name of the project:** Elazig Integrated Health Campus Project

**Type of instrument:** Political risk guarantee provided by the World Bank's MIGA; liquidity facility provided by the EBRD; credit-enhanced project bonds purchased by institutional investors in Turkey and Europe; unrated and unenhanced bonds purchased by the International Finance Corporation.

**Funding sources:** Institutional investors through the purchase of the project bonds.

**Project length:** 28 years

**Value of the bond issue:** EUR 288 million

## Application of this Instrument to Financing Soil Remediation

The Elazig Integrated Health Campus Project demonstrates how projects with limited revenue streams can be financed by private investors when the conditions for their participation are conducive. It also demonstrates how the right combination of credit enhancement instruments can create value and decrease project risks to enable private capital participation. Due to the complexity and scale of soil remediation projects, successful structures might not be able to rely on a single instrument, but may need to explore how different financial instruments can complement each other:

- Political risk insurance can address some of the perceived risks associated with investing in emerging markets, such as currency inconvertibility, non-transferability and expropriation.
- Liquidity facilities can ease the cash flow and cost overrun challenges during the remediation and post-remediation construction. Such facilities can also decrease the cost of capital.
- Backed by the combination of both of these instruments, even higher-risk projects can raise financing directly from capital markets.

## Case Study 15: Social credits on blockchain; the pilot initiative between the United Kingdom and South Africa

**Sources of financing:** Fiscal revenues, private capital

**Actors:** Private investors, public tax authorities

**Instrument:** Social credits

**Motivation:** Raising capital from private impact investors for social infrastructure and for improving social cohesion; increasing liquidity across private impact investment markets.

### Definition of the Financing Instrument

Social credits are an initiative of the Forum of Young Global Leaders at the World Economic Forum. It is an incentive mechanism and digital ecosystem aimed at attracting foreign direct investment into infrastructure, sustainable development and climate-related projects. Potential sectors for social credits include agriculture, water, housing, health, education, finance and energy.

Social credits are redeemable certificates that are generated based on the multiple social benefits of given development projects. These benefits need to be identified and valued in financial terms before the project is launched. Investors are awarded credits as they invest in the earmarked project; they can redeem their credits when the social impacts are realized and so confirmed by third party verifiers. The social impact of the project determines the number of social credits that can be issued. Once a critical mass of investors and projects begins to use social credits, they can be traded on a blockchain-based platforms and act as a crypto currency.

The additional value added of the social credits is that they can be used to decrease the investor's tax liabilities in participating countries.<sup>7</sup> The eligible tax deductions will be determined by each participating country and are likely to include deductions in both income and corporate taxes. In order to ensure that these tax offsets do not have a disproportionate impact on public budgets, countries can limit the amount of social credits they redeem from each country and sector. These limits can be set based on the international development budget allocated to that country. For example, the United Kingdom could specify that tax deductions from social credits from South African projects cannot exceed 15 per cent of the United Kingdom's development budget pre-allocated for South Africa.

It is important to note that social credits are based on a blockchain ecosystem. Blockchain is a distributed ledger that can record transactions between multiple parties in a verifiable and permanent manner (Iansiti & Lakhani, 2017). This technology offers trust, transparency and security as well as a way to facilitate social credit transactions across multiple countries and stakeholders.

### About the Project

Social credits are currently being piloted in the United Kingdom and South Africa. Discussions are ongoing to identify investors in the United Kingdom as well as social projects such as hospitals and schools in South Africa. The Forum of Young Global Leaders is also holding discussions with the governments and tax authorities in both countries to establish the necessary governance frameworks and double taxation agreements before the social credit scheme can be formally launched.

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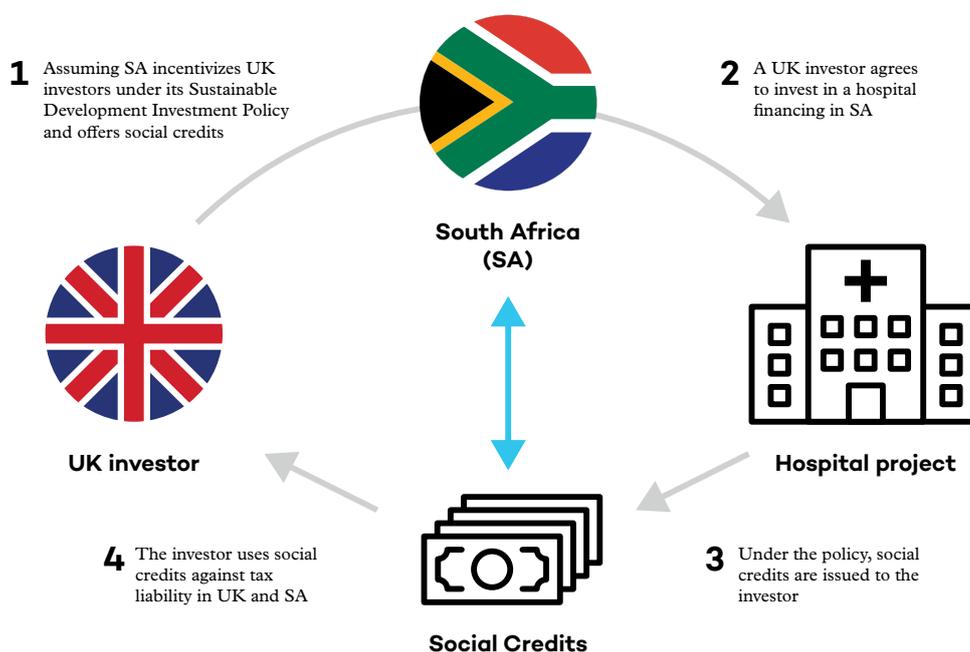
<sup>7</sup> Further information on social credits can be obtained at <http://www.social-credits.org/>

## Description of the Project Instrument

Social credits are built on Hyperledger blockchain technology. Hyperledger is an open source blockchain project of the Linux Foundation. Social credits have three core functions:

1. A digital ecosystem that facilitates development finance, impact investing, multilateral aid and blended finance transactions in an efficient, low-cost manner.
2. In this ecosystem, social credits serve as a digital currency for sustainable development that is freely transferable and tradable. Participating countries determine the value of social credits.
3. As an incentive mechanism to stimulate private financing into sustainable projects, it enables investors to redeem social credits and accordingly decrease their income tax obligations in their home state.

**Figure 16. The social credits process<sup>8</sup>**



At the time of writing, the social credit pilot initiative in the United Kingdom and South Africa is being planned as follows:

1. As part of the pre-certification phase, the eligibility of the host country, South Africa, is established. Eligibility is being evaluated based on three key criteria: transaction costs, social impact and value of the positive externalities of the project. The number of credits that the project will generate is determined at this stage.
2. The hospital projects to which the social credits will be linked are being identified.
3. The investors based in the United Kingdom will provide financing for the earmarked hospital projects.
4. Implementation of the activities funded by social credits will commence and formal third-party verification of the expected socioeconomic impacts will be commissioned.
5. Once the socioeconomic impact of the project is verified, the investor in the United Kingdom receives the predetermined number of social credits.

<sup>8</sup> <https://www.weforum.org/agenda/2017/10/fintech-for-sustainable-development-via-blockchain/>

6. The investor can redeem the social credits and as per the social credit agreement, decreasing corporate or income tax obligations in the United Kingdom or in South Africa.
7. Eventually, with more projects and market participants, social credits can be exchanged on the blockchain in the form of a crypto currency.

## Case Study at a Glance

**Name of the project:** South African social projects

**Type of instrument:** Social credits using blockchain technology, which can be used to offset investors' tax liability in participating countries

**Funding sources:** Institutional investors/impact investors/social investors

**Project length:** Varies

## Application of this Instrument to Financing Soil Remediation

Soil remediation projects could be eligible for social credits due to their high social component. These credits could mobilize not only domestic capital but also international private capital into soil remediation projects. Investors with an impact mandate should be identified as the premier target group.

Another attractive feature of social credits is that the overall cost of financing could be limited to the value of the social credits. In other words, the soil remediation project receiving the credit would not offer any interest but only the repayment of the loan; the tax deduction the investor receives would compensate for the absence of an interest payment. Investors would recuperate their return on investment by redeeming the social credit.

It is also important to note that successful soil remediation projects are likely to increase economic activity in the region. Therefore the resulting increase in tax revenues could eventually offset the cost of social credits in the host country.

While the piloting of social credits is being planned between the United Kingdom and South Africa, it is important to note that it might be easier to implement them in a single country. Investors will then have more certainty in the tax regime, and double taxation agreements between different tax authorities (for example, federal, provincial and municipal tax authorities) can be more easily aligned.

There are, of course, a number of challenges linked to the launch of social credits; the most obvious is the number of credits that each project should be allowed to generate. Further problems will arise if the credits are redeemed largely in the home country of the investors, as the corresponding loss of tax revenues can strain public budgets. This could be mitigated by imposing limits on the number of credits that can be issued at the country level and/or at the level of a project. Finally, social credits do not replace the need for stable revenue streams. The project still needs to be financially viable or be credit enhanced before credits can be issued.

## Case Study 16: WePower Green Energy Trading Platform

**Sources of financing:** Private investors

**Actors:** Energy utilities, renewable electricity generators, blockchain-based energy trading platforms, private investors, consumers of electricity

**Instrument:** Initial coin offering (ICO)

**Motivation:** Providing for the cost-effective trading of renewable energy through blockchain and smart contracts; expanding markets for renewable energy

### Definition of the Financing Instrument

This case study presents the use of an ICO, which is a virtual blockchain-based mechanism to raise financing for business ventures. An ICO will issue crypto currencies in the form of coins or tokens.<sup>9</sup> For the purpose of comparison, coins or tokens are similar to shares issued by a company during an initial public offering.

An ICO is generally preceded by a white paper developed by the pioneers (proponents) of the project. It describes the project, presents the business plan, states the target value of the ICO, indicates the number of virtual tokens the pioneers plan to keep for themselves, establishes what type of money is accepted and the indicates the time frame for the ICO.

During the ICO, early enthusiasts (investors or buyers) purchase the crypto tokens using a fiat or a virtual currency. If the money raised through the ICO does not reach the minimum capital target, the money is returned to enthusiasts and the ICO is deemed unsuccessful. If, on the other hand, the ICO reaches the funding target within the specified time frame, the ICO is a success. The pioneers can then proceed to use the funds to initiate the project or undertake the activities outlined in the white paper.

Early enthusiasts are motivated to buy the tokens with the expectation that, if the project is successful, the coins or tokens will translate into a higher value than the price at which it was bought.

An example of a successful ICO that was profitable for enthusiasts is the smart contract platform Ethereum that issued Ethers as its tokens. In 2014 the Ethereum project ICO raised USD 18 million in Bitcoins, or USD 0.40 per Ether. The Ethereum platform was built on schedule and was launched in 2015. A year later, in 2016, an Ether was valued at USD 14. The project reached a market capitalization of over USD 1 billion.

ICOs are poised to be a disruptive, innovative financing strategy, and this expectation is likely to increase exponentially in the years to come. Many stakeholders, however, remain skeptical, as ICOs are not yet regulated by financial authorities. Early enthusiasts have therefore no recourse to funds lost in fraudulent ICO campaigns.

### About the Project

WePower is a renewable-energy-trading platform that operates on blockchain technology. The platform offers two main features:

- It enables producers of renewable energy to sell directly to end consumers—both households and large energy users.

<sup>9</sup> Crypto coins are stand-alone crypto currencies that do not need other platforms to operate. Examples of crypt coins are Bitcoin, Bitcoin cash and Ethereum. Crypto tokens are built on other platforms and therefore require these platforms to exist and operate—for example, auge and EOS.

- It enables renewable energy producers to raise capital to expand or complete their plants/projects by tokenizing future energy generation capacity. WePower provides renewable energy producers with direct access to enthusiasts and eliminates the additional fees and margins that are claimed by intermediaries that are present in traditional investment transactions.

## Description of the Project Instrument

The fundamentals of an ICO are similar to that of an initial public offering. The price of a token is determined by a number of factors, including the reputation of the startup, the expected demand for the services to be financed by the ICO, the fundraising target and the number of tokens that the pioneers plan to reserve for themselves to cover operating costs and earn a profit. The ICO community should therefore be informed of the number of tokens that are available for sale.

The WePower platform launched its ICO on February 1, 2018. The offer was fully subscribed the same day; the details are included in the box below:

Overview of the WePower ICO
<b>Ticker:</b> WPR
<b>Token type:</b> ERC20 ICO
<b>Token Price:</b> 1 WPR = USD 0.13
<b>Fundraising Goal:</b> USD 40 million
<b>Total Tokens:</b> 289 million
<b>Sold on pre-sale:</b> USD 30,000,000 (25% BONUS)
<b>Available for Token Sale:</b> 45%

To prepare for this successful ICO, WePower issued a token pre-sale in October 2017, published a white paper with a statement of support by the Lithuanian Ministry of Energy<sup>10</sup> and launched a pilot project in January 2018 with Elering, the Estonian transmission system operator. The pilot focused on building a proof-of-concept for recording real-time energy production and consumption data at the national scale on an Ethereum blockchain.

The proceeds of the ICO will be used to complete the development of the WePower trading platform and open it for operation in Spain and Australia. WePower will then operate as an independent energy supplier, with its platform connected to the electricity grid, energy exchanges and end users. As such, the platform will continuously receive and processes real-time data on fluctuations in electricity production, consumption, costs, prices and more.

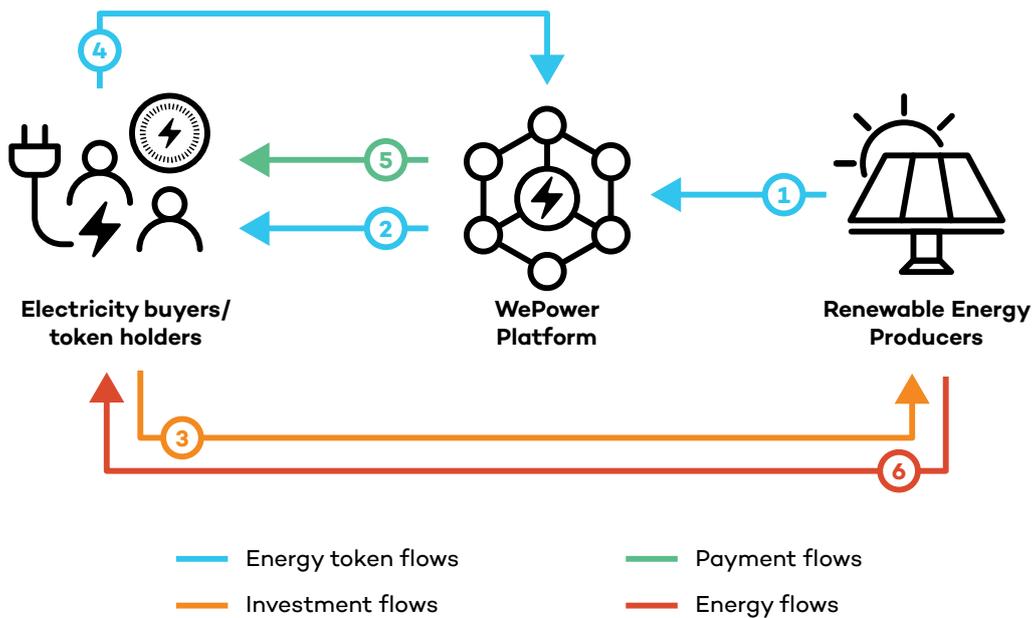
The characteristics of the platform are being designed as follows:

- When renewable energy producers join the WePower Platform, their future energy production will be tokenized.
- One token will be equivalent to 1 KWh of electricity that will be produced at a given point in the future.
- Renewable energy producers can auction their tokenized electricity to enthusiasts registered on the WePower platform. These enthusiasts can be consumers of electricity or investors who seek to trade the tokens.

<sup>10</sup> WePower is registered as corporation in Lithuania.

- The buyers of the token (or token holders) can use their tokens to:
  - (a) Cover the costs of their own electricity consumption
  - (b) Sell to other electricity consumers or investors registered on the WePower platform before the electricity is produced
  - (c) Trade on the wholesale market after the electricity is produced
- Registered renewable energy producers are required to donate 0.9 per cent of their tokenized energy to token holders. Token holders can retrieve this allocation in proportion to the number of tokens they hold. They also have the option to either consume this donated electricity or auction it to other buyers on the platform.
- Token holders will have 48-hour advance access to the auctions of the renewable energy produces. Buyers that do not hold tokens will not be offered this advantage.
- The sale of tokens will be backed by power purchase agreements, which will be executed in the form of smart contracts. Smart contracts are built on blockchain technologies. They are automated digital contracts that are stored and replicated on the blockchain system and are supervised by the network of computers that run the blockchain.

**Figure 17. The structure of the WePower Platform**



**SCHEMATIC DIAGRAM OF THE WEPower PLATFORM**

1. Renewable energy producers tokenize their future energy supply.
2. Buying of tokens by enthusiasts (energy users and investors).
3. Payments for energy tokens flow to renewable energy producers in cryptocurrency.
4. Selling of energy tokens on the WePower trading platform.
5. Token holders receive revenues by selling their tokens to other buyers.
6. Token holders can also use the tokens to pay for their own electricity consumption. Provision of electricity to token holders who choose to use their token to meet the cost of their own electricity consumption.

## Application of this Instrument to Financing Soil Remediation

ICOs can be used to raise financing for the remediation of soil when the remediated site can generate financially attractive revenues after the remediation is complete. Tokens can be based on the unit of remediated land and the price of the token can be based on the projected price of the land post remediation. The ICO will be designed on the premise that the remediated land will fetch a significantly higher price than it would before the decontamination activities are complete.

ICOs also offer an innovative way to raise capital from both institutional and retail investors. The underlying blockchain technology provides trust, transparency, security and a cost-efficient way to exchange tokens between market participants. Some stakeholders remain concerned, as ICOs are largely unregulated and can therefore be a conduit for financial fraud and other misdemeanors. Jurisdictions such as Switzerland now require that ICOs be registered on financial securities exchanges to ensure that formal regularity supervision is provided. Many other countries are likely to follow suit. This is certainly a mechanism to watch in the years to come.

## Case Study 17: Le livret de développement durable et solidaire (LDDS), France [The Sustainable and Inclusive Development Savings Account, France]

**Sources of financing:** Public financing, savings from private citizens

**Actors:** Public agencies, tax payers

**Instrument:** Savings account

**Motivation:** Raising capital through the savings of taxpayers for businesses that contribute to sustainable development

### Definition of the Financing Instrument

The case study pertains to the launch of a dedicated savings account targeted at sustainable and inclusive development. A savings account is an interest-providing deposit account that can be held at a retail bank or similar financial services provider. Savings accounts are very low-risk products and, as a result, offer relatively modest interest rates. Account holders are usually required to maintain a minimum deposit and limit withdrawals or else incur additional fees.

### About the Project

In November 2016, the Government of France enacted *La loi sur la transparence, la lutte contre la corruption et la modernisation de la vie économique*.<sup>11</sup> The law is often referred to as “*la Loi Sapin 2*” or the *Law Sapin 2* (after its proponent, the Hon. Michel Sapin, Minister of Finance, 1992 to 1993 and 2014 to 2017). The law provides for a range of economic and fiscal incentives including the *livret de développement durable et solidaire* (LDDS) (savings account for sustainable and inclusive development).

When it was launched in 2016, LDDS was a timely answer to historically low interest rates (with inflation at 1 per cent). French citizens faced political uncertainty in light of the French elections, which were to take place in 2017. Middle-income French citizens did not have many choices in terms of low-risk, low-platform investment products that offered interest rates that mirrored inflation. LDDS was hence a popular choice. Moreover, the LDDS investment in sustainable development and social inclusion was also welcomed by French citizens who continue to be preoccupied with climate risks and geopolitical uncertainties facing the European Union at this point in time.

### Description of the Project Instrument

In terms of design, the LDDS is a traditional savings account. The relevant innovative financing aspects are:

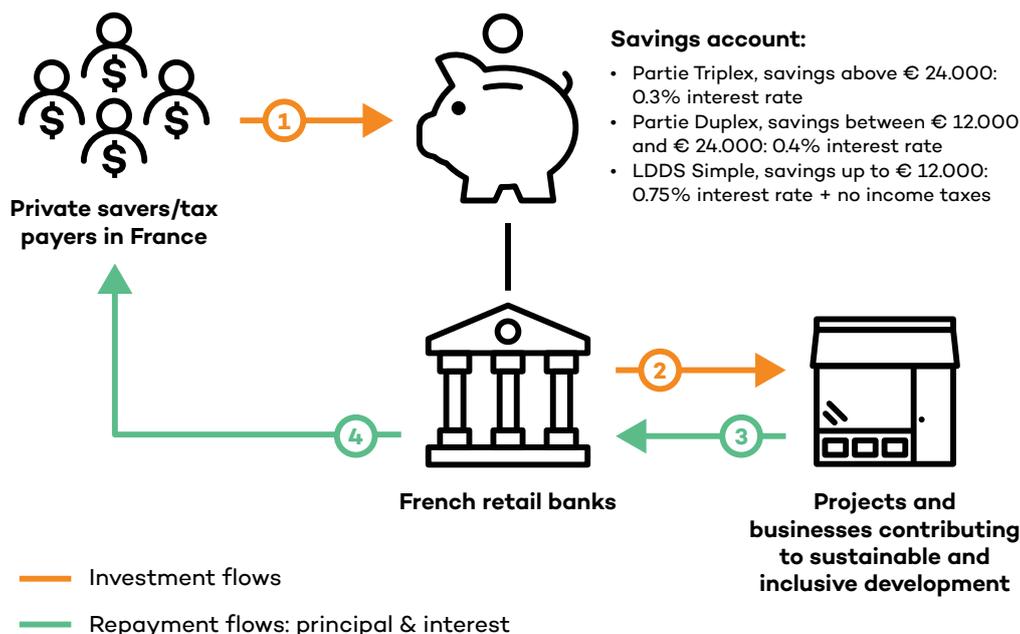
1. Funds placed in the LDDS are not subject to income taxes up to the ceiling of EUR 12,000.
2. LSSD holders are offered more attractive interest rates than comparable savings products (at the time of writing, in light of the ongoing quantitative easing policies of the European Central Bank, many Eurozone countries are facing negative interest rates).
  - The LDDS baseline savings account with a ceiling of EUR 12,000 offers a net interest rate of 0.75 per cent.
  - The LDDS Duplex offers account holders the option to place an additional EUR 12,000 and receive 0.40 per cent interest on this additional tranche.
  - The LDDS Triplex enables account holders to invest more than EUR 24,000 and earn an interest rate of 0.30 per cent on this additional tranche.

<sup>11</sup> Translation: Law on Transparency, Anticorruption, and Economic Modernization

3. The proceeds from the LDDS are invested in projects and businesses that contribute to sustainable development and social inclusion.

LDDS has become one of the most popular savings products in France. It is low cost, involves no extra fees and is offered by all retail banks and financing institutions across the country. In 2017, placements in LDDS totalled EUR 740 million (Radio France, 2018).

**Figure 18. Structure of the LDDS**



**INSTRUMENT STEPS:**

1. Private savers put money into an LDDS savings account offered by French retail banks.
2. Retail banks invest in/provide loans to projects and businesses contributing to sustainable and inclusive development.
3. Borrowers pay back principal and defined interest within determined time frames.
4. Retail banks pay interest rates to savings account holders according to the financial volumes in their account.

**Case Study at a Glance**

**Name of the project:** Le Livret de Développement Durable et Solidaire (LDDS), France

[The Sustainable and Inclusive Development Savings Account, France]

**Type of instrument:** Savings accounts with the proceeds being invested in projects related to sustainable development and social inclusion

**Funding sources:** French tax payers and savers

**Interest rate:** 0.75 per cent for the baseline up to EUR 12,000, 0.40 per cent for the duplex tranche to EUR 24,000; 0.30 per cent for the triplex tranche with no ceiling

**Fiscal benefits:** The baseline tranche is tax deductible.

**Flexibility:** No restrictions on deposits and withdrawal

## Application of this Instrument to Financing Soil Remediation

Savings accounts with the proceeds targeted at environmentally and socially beneficial projects are indeed an option for raising capital for remediating contaminated soil. They are not very costly to establish and are a feasible strategy to implement in lower-income countries, where capital markets may still be in their infancy.

Savings accounts are also popular products among lower- and middle-income groups. Countries can therefore raise substantial capital for environmentally beneficial ventures and increase “citizen financing” for soil remediation.

## Part 3: Conclusions

### Lessons Learned from the Case Studies

The case studies in this report demonstrate a variety of financing strategies, from index-linked bonds to savings accounts and from peer-to-peer lending platforms to debt-for-nature swaps. As stated in the introduction, we selected these case studies to demonstrate diversity, but they are by no means exhaustive.

Several lessons emerge from these case studies in the context of financing the remediation of contaminated land:

1. As with all financial arrangements, the risk appetite of different investors has to match the risk profile of the investment. It is difficult to crowd in private and institutional investors when projects remain below investment grade.
2. Money follows a good deal. When legal, technological, revenue and other risks are understood and are transparent, feasible ways to reduce these uncertainties can be planned and financing strategies can be worked upon. Moreover, when stakeholders have reliable due diligence on the costs of remediation and how the site can be used post-remediation, appropriate financing strategies can be developed.
3. When there is reasonable certainty that the value of the land will increase after remediation and will subsequently generate stable and predictable revenues, there is a strong case for blending public and private financing. In most cases, these sites tend to be located in and around urban areas where post remediation value capture from commercial and residential developments can be expected.
4. When, on the other hand, projects have less attractive revenue potential, governments have to step in to finance the remediation, or at least a larger part of it. This said, it can be possible to use public capital in an innovative manner to de-risk projects and make them attractive to socially conscious private capital holders who may be willing to accept lower returns for higher environmental and social impacts.
5. Many countries and donors have and will continue to establish public funds to finance the remediation of contaminated land. These funds could generate greater value-for-money if they were used to increase the credit worthiness of projects and enable other public and private capital holders to crowd in. An example is provided in Case Study 8, the U.S. Department of Housing and Urban Development's Brownfields Economic Development Initiative. Public funds were used to provide a viability gap fund and a loan guarantee for the eligible urban redevelopment projects. Armed with these instruments, which improved the credit quality of the project, cities and municipalities were provided with a much stronger business plan to seek concessional financing from both private and public financing organizations.
6. When working on financing strategies, the challenge is not just to choose one strategy but the right combination of strategies that complement each other, reduce the risk profile of the project and thereby allow public funds to crowd in complementary financing from private capital holders. This is exemplified in Case Study 15 on the Elazig Integrated Health Campus Project in Turkey. Public hospitals are socially valuable projects, but the revenue streams from these assets are sometimes not sufficiently attractive for private investors. Hence the project was structured to use donor funds to credit enhance the project—political risk insurance provided by the World Bank's MIGA and a liquidity facility provided by the EBRD. As a result, the credit rating of the project increased by two levels above that of Turkey. This enabled institutional investors in Europe to purchase the project bonds and bring in blended capital to finance the project.

In addition, in the TRINE Crowd Investment Platform (Case Study 6) and the RateSetter Green Loan Marketplace (Case Study 7), we have insight into how seed capital from the public sector was used to crowd in private and retail investors to finance environmentally and socially valuable projects. In addition to the comfort provided by the public capital, the due diligence and transparency provided by the platforms are also critically important to increasing the confidence of retail investors.

7. We also see the emergence of financing strategies that are based on successful performance rather than on commercially attractive revenue streams. Social impact bonds are one such strategy described in Case

Study 2 on the expansion of the Physical Rehabilitation Programme of the International Committee of the ICRC. The ICRC issued the first-ever Humanitarian Impact Bond. The bond rewards investors based on the ICRC's ability to improve efficiency and expand their physical rehabilitation program. Such social impact bonds can be particularly valuable for financing soil remediation, especially when the site has low commercial value after remediation. A note of caution however: arranging social impact bonds requires reliable and long-term performance data on which performance risk can be based. In the case of soil remediation, this includes reliable long-term records on the performance and cost of the remediation technologies when applied in a similar geographical and remediation context.

8. Fintech solutions to address a wide range of problems are set to grow exponentially in the years to come, despite the fact that, at the time of writing, cryptocurrencies are being met with volatile market valuations and backlash from financial securities regulators in many countries. Case Study 15 on social credits on blockchain and Case Study 16 on the WePower Green Energy Trading Platform provide useful examples of how fintech may be used to address social and environmental challenges. Fintech offers unprecedented transparency and multiple-point valuation across the value chain. It democratizes access to financial transactions and investment opportunities and brings citizens an alternative means to trade and invest outside of formal capital markets. In this light, the use of cryptocurrencies to raise capital for soil remediation projects merits further investigation.

## Emerging Trends in Blended Financing for Remediating Contaminated Soil

Blended public and private financing for remediating soil is important, as governments will not have the budgets to meet these expenditures by themselves. In the EU, the launch of the fund **Ginko 2**,<sup>12</sup> which targets the remediation of brownfield sites in France and Belgium, is a case in point.

**Ginko 2** blends EUR 30 million in investments from the European Investment Bank and with capital from Caisse des Dépôts, the Edmond de Rothschild Group and the Société Fédérale de Participations et d'Investissement. The fund aims to raise EUR 120 million and is supported by the European Fund for Strategic Investments. **Ginko 2** builds on the success of **Ginko 1**, which ended in 2016 as **Ginko 2** was launched. The noteworthy feature of both **Ginko 1** and **Ginko 2** is that the funds operate as both a land remediation specialist and a capital provider. **Ginko 2** conducts its own due diligence on the state of contamination and the financial potential of the site once redevelopment is complete. This arrangement internalizes both the due diligence risks and the technology and performance risks. It also increases transparency and efficiency, as the decisions on remediation and financing are housed under the same legal entity.

In 2017 we also saw the launch of the blended capital **Land Degradation Neutrality Fund**<sup>13</sup> (LDN), which was inaugurated at the 13th session of the Conference of the Parties of the United Nations Convention to Combat Desertification. The **LDN** target is USD 300 million and includes participation from Mirova, Global Environment Facility, the European Investment Bank, the French Development Agency, Grand-Duchy of Luxembourg, the Inter-American Development Bank, Caisse des Dépôts, BNP Paribas Cardiff, Fondation (the workers pension fund, Quebec) and many others. In 2018, the French president provided the **LDN** with an additional boost by identifying it as one of the projects that the French government would support over the coming years. The **LDN** has set up a dedicated technical assistance facility in partnership with the IDH Sustainable Trade Initiative to ensure comprehensive due diligence in the selection of projects.

As concerns over water, climate and desertification intensify, we are likely to see increasing innovation in blended financing for remediating land. These ventures will also include sites where public health and livelihoods are prioritized over commercially attractive revenues. Sustainable development and sustainable finance stakeholders should continue to monitor these strategies for future remediation projects.

<sup>12</sup> Further information on **Ginko 2** can be obtained from <http://www.eib.org/infocentre/press/releases/all/2016/2016-112-nouveau-financement-dans-le-cadre-du-plan-dinvestissement-pour-leurope-ginkgo-2.htm> and <http://www.ginkgo-advisor.com/>

<sup>13</sup> Further information on the **LDN** can be obtained from [http://www.mirova.com/Content/Documents/Mirova/CP/171212\\_LDNF%20OPS\\_Press%20package%20-%20EN%20-%20Final.pdf](http://www.mirova.com/Content/Documents/Mirova/CP/171212_LDNF%20OPS_Press%20package%20-%20EN%20-%20Final.pdf)

## References

- Eurisy. (2015). PlaNet Guarantee: Supporting agriculture thanks to a satellite-based insurance scheme. Retrieved from [https://www.eurisy.org/good-practice-planet-guarantee-supporting-agriculture-thanks-to-a-satellitebased-insurance-scheme\\_173](https://www.eurisy.org/good-practice-planet-guarantee-supporting-agriculture-thanks-to-a-satellitebased-insurance-scheme_173)
- European Environmental Agency. (2016, June 21). Soil contamination widespread in Europe. Retrieved from <https://www.eea.europa.eu/highlights/soil-contamination-widespread-in-europe>
- Global Infrastructure Hub. (2017). *Turkey: Elazig Hospital PPP. A G20 Initiative Showcase project*. Retrieved from <https://gihub-webtools.s3.amazonaws.com/umbraco/media/1603/gih-showcase-project-elazig-hospital.pdf>
- Hong Kong and Shanghai Banking Corporation Limited. (2017a, November 23). HSBC issues world's first sustainable development bond. Retrieved from <http://www.hsbc.com/news-and-insight/media-resources/media-releases/2017/hsbc-issues-worlds-first-corporate-sustainable-development>
- Hong Kong and Shanghai Banking Corporation Limited. (2017b, November). *HSBC Sustainable Development Goals (SDG) Bond Framework*. Retrieved from <http://www.hsbc.com/-/media/hsbc-com/investorrelationsassets/fixedincomesecurities/green-bond-reports/pdfs/171115-hsbc-sdg-bond-framework.pdf>
- International Committee of the Red Cross. (2017, September 6). World's first "Humanitarian Impact Bond" launched to transform financing of aid in conflict-hit countries. Retrieved from <https://www.icrc.org/en/document/worlds-first-humanitarian-impact-bond-launched-transform-financing-aid-conflict-hit>
- Iansiti, M. & Lakhani, K. R. (2017). The truth about blockchain. *Harvard Business Review* (January-February). Retrieved from <https://hbr.org/2017/01/the-truth-about-blockchain>
- Ministère de la Transition écologique et solidaire. (2017, February 1). Biogaz. Retrieved from <https://www.ecologique-solidaire.gouv.fr/biogaz>
- MTR Corporation. (2017). *MTR Green Bond Report 2016*. Retrieved from [https://www.mtr.com.hk/archive/en/community/MTR\\_GreenBondRpt2016\\_Eng.pdf](https://www.mtr.com.hk/archive/en/community/MTR_GreenBondRpt2016_Eng.pdf)
- Project Finance International. (2017). New green lending platform. Retrieved from [www.pfie.com/new-green-lending-platform/21293777.fullarticle](http://www.pfie.com/new-green-lending-platform/21293777.fullarticle)
- Radio France. (2018, January). *Le décryptage éco. Le livret A, le placement préféré des Français*. Retrieved from [https://www.francetvinfo.fr/replay-radio/le-decryptage-eco/le-decryptage-eco-le-livret-a-le-placement-prefere-des-francais\\_2553619.html](https://www.francetvinfo.fr/replay-radio/le-decryptage-eco/le-decryptage-eco-le-livret-a-le-placement-prefere-des-francais_2553619.html)
- Reuters. (2016, May). China releases new action plan to tackle soil pollution. Retrieved from <https://www.reuters.com/article/us-china-environment-soil/china-releases-new-action-plan-to-tackle-soil-pollution-idUSKCN0YM0YO>
- Rönesans Saglik Yatirim. (n.d.). Elazığ City Hospital. Retrieved from <http://rsy.com.tr/en/projects/elazig-integrated-health-campus>
- St Anne, C. (2017, May 25). Government, RateSetter to kickstart green loans. Retrieved from <https://www.rfigroup.com/rfi-group/news/government-ratesetter-kickstart-green-loans>
- TRINE. (n.d.). Solar for local businesses, Zambia. Retrieved from [www.jointrine.com/campaign/solar%20for%20local%20businesses](http://www.jointrine.com/campaign/solar%20for%20local%20businesses)
- U.S. Environmental Protection Agency (2018). Superfund remedial annual accomplishments, fiscal year 2016. Retrieved from <https://www.epa.gov/superfund/superfund-remedial-annual-accomplishments>
- World Bank Group. (n.d.). What are Public Private Partnerships? PPPIRC. Retrieved from <https://ppp.worldbank.org/public-private-partnership/overview/what-are-public-private-partnerships>

## Further Reading

- Allianz Risk Transfer. (2013). *The weather business: How companies can protect against increasing weather volatility*. Retrieved from [www.agcs.allianz.com/assets/PDFs/Reports/2484%20Allianz%20Weather%20Risk%20LR.pdf](http://www.agcs.allianz.com/assets/PDFs/Reports/2484%20Allianz%20Weather%20Risk%20LR.pdf)
- Berk, J., & DeMarzo, P. (2014). Bond cash flows, prices, and yields. In *Corporate Finance*. Pearson.
- BOFAS. (.n.d.). Le Fonds d'assainissement des sols des stations-service. Retrieved from [www.bofas.be/index.php?page=home&section=&lang=fr](http://www.bofas.be/index.php?page=home&section=&lang=fr)
- Bravo, S. (n.d.). Esquemas de financiamiento de las Asociaciones Público Privadas en el Perú. Retrieved from <http://revistas.pucp.edu.pe/index.php/derechoadministrativo/article/viewFile/13503/14129>
- Bravo, S. (2013, August). *Carretera Interoceánica Sur del Perú. Retos e Innovación*. Banco de Desarrollo de América Latina CAF. Retrieved from [http://publicaciones.caf.com/media/34441/carretera\\_interoceanica.pdf](http://publicaciones.caf.com/media/34441/carretera_interoceanica.pdf)
- Brussels Environment. (n.d.). Financing of works for the remediation and management of contaminated soils. Retrieved from <https://www.environment.brussels/state-environment/summary-report-2011-2012/soil/financing-works-remediation-and-management>
- Capital Power. (2017, March 16). Capital Power's Bloom Wind Project receives recognition as North American Wind Deal of the Year. Retrieved from [www.capitalpower.com/MediaRoom/newsreleases/2017/Pages/CapitalPower%E2%80%99s Bloom Wind Project Receives Recognition as North American Wind Deal of the Year.aspx](http://www.capitalpower.com/MediaRoom/newsreleases/2017/Pages/CapitalPower%E2%80%99s%20Bloom%20Wind%20Project%20Receives%20Recognition%20as%20North%20American%20Wind%20Deal%20of%20the%20Year.aspx)
- City of Atlanta. (n.d.). *Atlantic Steel Brownfield Redevelopment plan & Tax Allocation Bond District*. Retrieved from <http://investatlanta.com/wp-content/uploads/Atlantic-Steel-Redevelopment-Plan.pdf>
- Clean Energy Financial Corporation (CEFC). (n.d.). About us. Retrieved from [www.cefc.com.au/about-us.aspx](http://www.cefc.com.au/about-us.aspx)
- Comitato Scientifico del Comune di Milano. (2014, December 1-2). *Debrief - European Conference. Renaturing cities: Systemic urban governance for social cohesion*. Retrieved from [https://ec.europa.eu/research/environment/pdf/renaturing/debrief\\_european\\_conference\\_renaturing\\_cities\\_milan\\_it\\_presidency.pdf](https://ec.europa.eu/research/environment/pdf/renaturing/debrief_european_conference_renaturing_cities_milan_it_presidency.pdf)
- Dagher, J., Dell'Ariccia, G., Ratnovski, L., & Tong, H. (2016, September). Capital buffers. Retrieved from [www.imf.org/external/pubs/ft/fandd/2016/09/dagher.htm](http://www.imf.org/external/pubs/ft/fandd/2016/09/dagher.htm)
- DLA Piper. (2016, June 22). Corporate power purchase agreements (PPAs): What are they? Retrieved from <https://www.dlapiper.com/en/uk/insights/publications/2016/06/renewable-energy-global-paper/what-are-corporate-power-purchase-agreements-ppa/>
- Economic Commission for Latin America and the Caribbean (ECLAC). (2016, April 12). *Proposal on debt for climate adaptation swaps: A strategy for growth and economic transformation of Caribbean economies*. Retrieved from [http://repositorio.cepal.org/bitstream/handle/11362/40253/LCCARL492\\_en1d11.pdf?sequence=1&isAllowed=y](http://repositorio.cepal.org/bitstream/handle/11362/40253/LCCARL492_en1d11.pdf?sequence=1&isAllowed=y)
- Ehlers. (2011, March 25). *What is tax increment financing (TIF)?* Retrieved from [www.ehlers-inc.com/blog/tag/hra/](http://www.ehlers-inc.com/blog/tag/hra/)
- European Innovation Partnership on Smart Cities and Communities (EIP-SCC). (n.d.). EIP-SCC. Retrieved from <https://eu-smartcities.eu/sites/all/files/Blue%20district%20C%20how%20can%20we%20improve.pdf>
- Evans, P. (n.d.). *Using tax increment financing for brownfields redevelopment*. Retrieved from [www.nemw.org/wp-content/uploads/2015/07/2008-Brownfields-Using-Tax-Increment-Financing-for-Brownfields-Redevelopment.pdf](http://www.nemw.org/wp-content/uploads/2015/07/2008-Brownfields-Using-Tax-Increment-Financing-for-Brownfields-Redevelopment.pdf)
- Gani, A. (2015, October 28). Government to cut tax relief for community green energy schemes. *The Guardian*. Retrieved from [www.theguardian.com/environment/2015/oct/28/government-subsidy-cuts-put-green-energy-companies-at-risk](http://www.theguardian.com/environment/2015/oct/28/government-subsidy-cuts-put-green-energy-companies-at-risk)

GCube Insurance Services Inc. (n.d.). Weather Risk Transfer. Retrieved from [www.gcube-insurance.com/en/coverage/weather-risk-transfer/](http://www.gcube-insurance.com/en/coverage/weather-risk-transfer/)

Global Impact Investment Network. (n.d.). What you need to know about impact investing. Retrieved from <https://thegiin.org/impact-investing/need-to-know/>

Grants.gov. (n.d.). A short summary of federal grants. Retrieved from [www.grants.gov/web/grants/learn-grants/grants-101.html](http://www.grants.gov/web/grants/learn-grants/grants-101.html)

Grants.gov. (n.d.). Grant lifecycle timeline. Retrieved from [www.grants.gov/web/grants/learn-grants/grants-101/grant-lifecycle.html](http://www.grants.gov/web/grants/learn-grants/grants-101/grant-lifecycle.html)

Investopedia Terms. (n.d.). Loan. Retrieved from [www.investopedia.com/terms](http://www.investopedia.com/terms)

Leonardo DiCaprio Foundation. (2017). LDF supports first ever debt-for-nature swap in Seychelles. Retrieved from [www.leonardodicaprio.org/ldf-supports-first-ever-debt-for-nature-swap-in-seychelles/](http://www.leonardodicaprio.org/ldf-supports-first-ever-debt-for-nature-swap-in-seychelles/)

Marija, D. (2017, May 26). Australia gets first P2P green loan marketplace. Retrieved from [www.pv-magazine.com/2017/05/26/australia-gets-first-p2p-green-loan-marketplace/](http://www.pv-magazine.com/2017/05/26/australia-gets-first-p2p-green-loan-marketplace/)

MTR Corporation. (2016). *MTR Green Bond Framework*. Retrieved from: [https://www.mtr.com.hk/archive/corporate/en/mtr\\_green\\_bond\\_framework2016.pdf](https://www.mtr.com.hk/archive/corporate/en/mtr_green_bond_framework2016.pdf)

MTR Corporation. (2016). *Metro Transit Railway Corporation*. Retrieved from [https://www.mtr.com.hk/archive/corporate/en/press\\_release/PR-16-096-E.pdf](https://www.mtr.com.hk/archive/corporate/en/press_release/PR-16-096-E.pdf)

MTR Corporation. (2017). *MTR Green Bond Report 2016*. Retrieved from [https://www.mtr.com.hk/archive/en/community/MTR\\_GreenBondRpt2016\\_Eng.pdf](https://www.mtr.com.hk/archive/en/community/MTR_GreenBondRpt2016_Eng.pdf)

Murray, J. (2016, November 10). Tax credits and deductions for your “going green” business. Retrieved from [www.thebalance.com/tax-credits-and-deductions-for-your-going-green-business-4052679](http://www.thebalance.com/tax-credits-and-deductions-for-your-going-green-business-4052679)

Nature Conservancy. (n.d.). Guatemala: \$24 million in debt now slated for conservation. Retrieved from [www.nature.org/ourinitiatives/regions/latinamerica/guatemala/guatemala-debt-for-nature-swap-is-a-win-for-tropical-forest-conservation.xml](http://www.nature.org/ourinitiatives/regions/latinamerica/guatemala/guatemala-debt-for-nature-swap-is-a-win-for-tropical-forest-conservation.xml)

New Jersey Economic Development Authority EDA. (n.d.b). Brownfields and Contaminated Site Remediation Program. Retrieved from [www.njeda.com/large\\_business/brownfields](http://www.njeda.com/large_business/brownfields)

Northwest Product Stewardship Council. (n.d.). What is product stewardship? Retrieved from <http://productstewardship.net/about/what-product-stewardship>

Organisation for Economic Co-operation and Development (OECD). (2015). *Infrastructure financing: Instruments and incentives*. Retrieved from [www.oecd.org/finance/private-pensions/Infrastructure-Financing-Instruments-and-Incentives.pdf](http://www.oecd.org/finance/private-pensions/Infrastructure-Financing-Instruments-and-Incentives.pdf)

Petroleum & Biofuels Association - Finland. (n.d.). Soil remediation. Retrieved from [www.oil.fi/en/federation/soil-remediation-programme-soili](http://www.oil.fi/en/federation/soil-remediation-programme-soili)

Prive, T. (2012, November 27). What is crowdfunding and how does it benefit the economy? Retrieved from [www.forbes.com/sites/tanyaprive/2012/11/27/what-is-crowdfunding-and-how-does-it-benefit-the-economy/#36b0e2e3be63](http://www.forbes.com/sites/tanyaprive/2012/11/27/what-is-crowdfunding-and-how-does-it-benefit-the-economy/#36b0e2e3be63)

Project Finance International. (2012, April 18). Boosting the Peruvian infrastructure market. *Project Finance International*, 479. Retrieved from [www.pfie.com/boosting-the-peruvian-infrastructure-market/21011942.fullarticle](http://www.pfie.com/boosting-the-peruvian-infrastructure-market/21011942.fullarticle)

Project Finance International. (2013, November 20). Solar City completes solar securitization. *Project Finance International*, 517. Retrieved from [www.pfie.com/solar-city-completes-solar-securitization/21120439.fullarticle](http://www.pfie.com/solar-city-completes-solar-securitization/21120439.fullarticle)

- Project Finance International. (2015a). Credit Suisse closes SolarCity financing. *Project Finance International*, 545. Retrieved from [www.pfie.com/credit-suisse-closes-solarcity-financing/21182309.fullarticle](http://www.pfie.com/credit-suisse-closes-solarcity-financing/21182309.fullarticle)
- Project Finance International. (2015b). Peru and the project bond revolution. *Project Finance International*, 552. Retrieved from [www.pfie.com/peru-and-the-project-bond-revolution/21195280.fullarticle](http://www.pfie.com/peru-and-the-project-bond-revolution/21195280.fullarticle)
- Project Finance International. (2016, May 5). DEME eyes close on Antwerp PPP. *Project Finance International*, 552. Retrieved from [www.pfie.com/deme-eyes-close-on-antwerp-ppp/21245839.fullarticle](http://www.pfie.com/deme-eyes-close-on-antwerp-ppp/21245839.fullarticle)
- Project Finance International. (2017a). French interconnector reaches FC. *Project Finance International*, 611. Retrieved from [www.pfie.com/french-interconnector-reaches-fc/21312984.fullarticle](http://www.pfie.com/french-interconnector-reaches-fc/21312984.fullarticle)
- Project Finance International. (2017c). RateSetter sets up green lending platform. *Project Finance International*. Retrieved from [www.pfie.com/ap-australia-ratesetter-sets-up-green-lending-platform/21293342.fullarticle](http://www.pfie.com/ap-australia-ratesetter-sets-up-green-lending-platform/21293342.fullarticle)
- Rate Seller. (n.d.). About us. Retrieved from [www.ratesetter.com.au/about-us](http://www.ratesetter.com.au/about-us)
- Shumkov, I. (2016, May 6). Capital Power to use new tool to manage revenue risks at US wind project. Retrieved from <https://renewablesnow.com/news/update-capital-power-to-use-new-tool-to-manage-revenue-risks-at-us-wind-project-523908/>
- Social finance. (n.d.). Social impact bonds. Retrieved from <http://www.socialfinance.org.uk/what-we-do/social-impact-bonds>
- SolarCity. (n.d.). Solar power projects. Retrieved from [www.solarcity.com/commercial/case-studies](http://www.solarcity.com/commercial/case-studies)
- Sustainalytics. (2016). *MTR Green Bond Framework*. Retrieved from [https://www.mtr.com.hk/archive/corporate/en/mtr\\_green\\_bond\\_framework2016.pdf](https://www.mtr.com.hk/archive/corporate/en/mtr_green_bond_framework2016.pdf)
- TERNA S.p.A. (n.d.). “Italy–France” electrical interconnection (Piemonte-Savoia project). Retrieved from [www.terna.it/en-gb/sistemaelettrico/pianodisviluppodellarete/progettidiinteressecomune/interconnessione\\_italia-francia\\_progetto\\_piemonte\\_savoia.aspx](http://www.terna.it/en-gb/sistemaelettrico/pianodisviluppodellarete/progettidiinteressecomune/interconnessione_italia-francia_progetto_piemonte_savoia.aspx)
- TERNA S.p.A. (2017, July). Terna and Interconnector Italia sign the Italy–France interconnector agreements. Retrieved from [www.terna.it/Default.aspx?TabId=1095&docid=93803&docType=TCAT-CS&popUp=true](http://www.terna.it/Default.aspx?TabId=1095&docid=93803&docType=TCAT-CS&popUp=true)
- TRINE. (n.d.a). Frequently asked questions. Retrieved from [www.jointrine.com/faq](http://www.jointrine.com/faq)
- TRINE. (n.d.b). How it works. Retrieved from [www.jointrine.com/about/how](http://www.jointrine.com/about/how)
- U.S. Department of Housing and Urban Development. (2010, June 4). *Notice of HUD’s Fiscal Year (FY) 2010 Notice of Funding Availability (NOFA) Policy Requirements and General Section to HUD’s FY2010 NOFAs for Discretionary Programs*. Retrieved from <https://archives.hud.gov/funding/2010/gensec.pdf>
- United Nations Development Programme. (2017). Financing solutions for sustainable development. Retrieved from [www.undp.org/content/sdfinance/en/home/solutions/debt-for-nature-swaps.html](http://www.undp.org/content/sdfinance/en/home/solutions/debt-for-nature-swaps.html)
- United States Department of Housing and Urban Development. (n.d.). Brownfields Economic Development Initiative (BEDI). Retrieved from [www.hud.gov/hudprograms/bedi](http://www.hud.gov/hudprograms/bedi)
- United States Department of the Treasury. (2011, May 17). *SSBCI Program Profile: Collateral Support Program*. Retrieved from [www.treasury.gov/resource-center/sb-programs/Documents/SSBCI\\_Program\\_Profile\\_Collateral\\_Support\\_FINAL\\_May\\_17.pdf](http://www.treasury.gov/resource-center/sb-programs/Documents/SSBCI_Program_Profile_Collateral_Support_FINAL_May_17.pdf)
- United States Environmental Protection Agency. (n.d.). *Atlantic Station (Atlantic Steel Site Redevelopment Project)*. Retrieved from [www.epa.gov/smartgrowth/atlantic-station-atlantic-steel-site-redevelopment-project](http://www.epa.gov/smartgrowth/atlantic-station-atlantic-steel-site-redevelopment-project)

US Bank. (n.d.). The basics: Tax credit syndications. Retrieved from [www.usbank.com/commercial-business/tax-credit-financing/tax-credit-syndication.html](http://www.usbank.com/commercial-business/tax-credit-financing/tax-credit-syndication.html)

Welsh School of Architecture. (n.d.). Soil remediation programme (The Finnish Petroleum Industry's Programme SOILI to remediate oil polluted decommissioned service station sites). Retrieved from [www.cardiff.ac.uk/archi/research/cost8/case/waste/soil.html](http://www.cardiff.ac.uk/archi/research/cost8/case/waste/soil.html)

World Bank Group. (2014, October). *Financing mechanisms for addressing remediation of site contamination*. Retrieved from <http://documents.worldbank.org/curated/en/660921468272039771/pdf/929550WP0P14940edia tion0FinalReport.pdf>

World Bank Group. (2016, July 13). Leases and affermage contracts. Retrieved from <https://ppp.worldbank.org/public-private-partnership/agreements/leases-and-ffermage-contracts>

Yildiz, Ö. (2014). Financing renewable energy infrastructures via financial citizen participation: The case of Germany. *Renewable Energy*, 68(C), 677–685.

