

SUSTAINABLE DEVELOPMENT AND INTELLECTUAL PROPERTY

Financing solutions to promote technology transfers to emerging countries

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Disclaimer

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Overview

This study follows on from our previous study, “Sustainable development & intellectual property: Access to technologies in emerging countries”, which was presented at the COP21 summit in 2015.

The goal is to provide an overview of and offer guidance on the financing of technology transfers for green projects in emerging countries. In particular, we examine the role of intellectual property and to what extent it can and does play an important role.

We provide a series of recommendations with a view to creating a more stable political and economic environment for green projects. Some of the ideas mentioned are based on suggestions contained in previous works on this subject, while others are the result of original research carried out in order to complete this study.

The study is divided into two parts:

Part 1 focuses on the **existing financing mechanisms for green technology projects and transfers**, and in particular the three main mechanisms available: investments funds, concessional loans and green bonds.

Our method consists of providing a detailed description of each mechanism before examining the pros and cons with regard to its use for green technology transfers. One of the key issues we found is the fact that investments in sustainable economy projects are often considered to carry a higher level of risk than other investments.

This study posits that, despite the current obstacles, green projects can be a worthwhile investment, provided specific action is taken both in the public sector (to mitigate this risk) and in the private sector. Current economic and general political trends would appear to support this belief.

Part 2 of the study is dedicated to the **Green Climate Fund** which has been granted a direct mandate to accelerate the transfer of green technologies to emerging countries and to support research and development projects in this field.

We take a look at how the Green Climate Fund can link its actions with the various public financing mechanisms for green technology transfers.

The study also addresses the crucial issue of whether the Green Climate Fund can use patents as a tool for technology transfer. Although, from a legal standpoint, nothing would appear to prevent it from owning patents (either through acquisition or direct filing), in practice this would only be useful in certain situations, for example when the Fund invests in research and development projects. The complex issue of whether the Green Climate Fund should be entitled to request compulsory licences is also addressed.

Key words: Technology Transfer; Innovation; COP22; Green technology; Green finance; Intellectual property rights; Emerging markets

GLOSSARY

Adaptation: Efforts (such as technology) that aim to limit the impact of climate change on human activities.

Mitigation: Efforts (such as technology) that aim to facilitate the transition towards a sustainable economy by decreasing the anthropogenic impact on the environment.

Venture capital: financing provided by investors to start-up companies.

Investment fund: A fund that uses capital from a number of investors to invest in companies selected using pre-defined criteria.

Hedge fund: A high-risk investment fund that often use leverage, i.e. minimal investment, to invest much higher amounts, thereby increasing the risk factor.

Foreign direct investment (FDI):

Long-term investment (acquisition of a lasting interest) in the economy of another country, for example by investing in an existing entity or by creating an entity in that country.

Bond: Debt instrument that represents a debt owned by the issuer.

Collective investment schemes (CIS): Financial vehicles based on collective management. Collective investment schemes (known as organismes de placement collectif en valeurs mobilières or OPCVM in France) are financial intermediaries that give their subscribers the possibility of investing on financial markets to which it would be otherwise difficult for them to have direct access (foreign financial and money markets, unlisted shares, etc.). They collect funds by issuing financial securities to various agents (private individuals, companies, etc.) with a view to acquiring financial assets. Collective investment schemes include open-end investment companies (Sociétés d'Investissement à Capital Variable – SICAVs), and common investment funds (Fonds Commun de Placement – FCPs), both widespread in France and Luxembourg.

Concessional loans: Loans extended on terms (rate, reimbursement, etc.) that are substantially more generous than loans granted by traditional private banks.

Credit enhancement: Financial process designed to improve a borrower's credit worthiness (and therefore borrowing conditions) thanks to the issuance of guarantees by financial institutions known as monolines.

Securitisation: Financial process which consists in selling financial assets (usually in the form of contractual debt, such as outstanding loans) to investors by transforming these assets into securities issued on a capital market.

INTRODUCTION

1. GREEN PROJECTS: A UNIQUE OPPORTUNITY

A silent revolution is gradually taking place on the global energy and green technology markets, as we stand on the verge of a boom that is likely to radically reshape the global energy economy¹.

In 2015, investments in green energy reached a record level of \$286 billion after several years of fast-paced growth². This figure includes \$76 billion in foreign direct investment (FDI) in 'greenfield' investments, with Renewable energy projects recording the fastest rate of growth among crossborder investments³.

The increase in investments in green projects is being witnessed worldwide. Even though the pace of growth is higher in emerging countries, such as India and Chile, the United States is currently experiencing its own solar boom, while the United Kingdom continues to generate significant investment in wind energy.

According to experts, there are many reasons for this trend, but the most important is the development of green technologies, which has helped drive down the cost of green projects⁴. This can be seen across all sectors of the sustainable development industry and has led to a sharp drop in consumer prices. The cost of solar panels has also declined by roughly 80% since 2009 and as solar panel production continues to increase, manufacturing costs continue to fall. Similarly, onshore wind power technology has become one of the most competitive sources of electricity in a number of countries⁵. The cost of wind power technology has dropped by 43% since 2009 and, if the current trend continues, in 2018 the cost of building and exploiting wind power facilities will be lower than that of building and exploiting new coal-fired facilities, nuclear energy facilities and certain types of facilities fuelled by natural gas⁶.

Together, these factors have brought these new energy sources within the reach of middle-class consumers in developed countries and have also opened up investment opportunities in emerging markets.

This study focuses on emerging countries where the cost savings compared to traditional energy systems should be even more significant. Indeed, the traditional energy sector, which consists of centralised and state-controlled energy facilities, must meet profitability requirements outside of macroeconomic considerations, and are therefore confronted with regulatory and governance risks.

The reduction in costs is just one of the main reasons behind the boom in green projects. Two other factors have also played a decisive role in this respect.

First of all, the progress made in terms of climate change negotiations over the past few years has proven to be an additional catalyst, particularly regarding the introduction of green technologies on emerging markets.

In addition, the increase in the range of financing options available has made it possible to sustain this boom, particularly in emerging economies.

However, despite this progress, market growth continues to be restricted by a number of factors. Many of these factors relate to institutional and regulatory stability, the effectiveness of economic actors in the local ecosystem, the financial risks in terms of foreign currency, as well as to other more general risks related to the various classes of assets used to finance projects.

Moreover, the issue of intellectual property rights (IPR) continues to be a sensitive point when it comes to attracting more investment and disseminating green technologies on new markets.

The aim of this study is to analyse both the positive trends and risk factors, and to assess the manner in which the combination of IPR and financing functions on emerging markets. Our main finding is that IPR have relatively little impact on investment projects, particularly when positive measures are taken to continue to allay

¹ Allen 2014

² Wuester et al. 2016

³ Romei 2016: 'Greenfield' FDI refers to "crossborder investments in physical projects excluding M&A".

⁴ Romei 2016

⁵ Romei 2016

⁶ Allen 2014

investors' concerns with respect to the three main risk factors: regulation, local economic ecosystems and all financial assets.

In order to take into account the foregoing, this study first examines the various categories of assets, as well as the existing relations with economic actors and the existing projects in emerging countries. It then focuses on the Green Climate Fund (GCF), i.e. a specific stakeholder capable of mobilising various financing mechanisms. It should be noted that for each of these mechanisms, the possible impact of adjustments of IPR has been assessed.

This debate has extremely important implications for the growth potential of the green energy market, as the latter plays a key role in determining whether political leaders are able to meet emission reduction targets in the fight against climate change. By closely examining this issue, we can show and provide extremely solid evidence that the current growth being experienced by green technologies is not likely to come to a halt in the near future. In order to achieve the objectives set by the international community, significant and rapid investment is needed to modernise renewable energy infrastructure.

Investments in this sector will need to increase by more than three times current levels in the 2020s⁷. This is to meet growing energy demand that has yet to be satisfied.

This issue takes on even more importance when we look at the areas where investment needs and strategic policy objectives converge: emerging markets and developing countries. China, which is at a more advanced stage of the transition process, but is also responsible for one third of the world's greenhouse gas emissions, recently became the world's largest investor in renewable energies. In 2015, the country invested a staggering \$103 billion in the sector, or 36% of the world total⁸. In countries with less developed economies, the fact that a very high number of people still do not have access to electricity presents opportunities of another nature. In half of the states in India – the country which set the record for the largest energy blackout in history in 2012 – solar energy is cheaper than electricity from the national grid⁹. In Africa, the potential in terms of renewable energy is equally high and is expected to jump to 22% by 2030, compared to today's level of just 5%¹⁰. Although currently responsible for less than 4% of global CO₂ emissions, Africa is expected to become the most densely populated continent on Earth and therefore represents a huge challenge.

It is easy to take comfort in the optimistic trend of these statistics, but it is important to note that these trends will only continue if concrete political measures are taken to remove the barriers that still remain. In particular, an economy focused on adaptation – which has yet to emerge – is unlikely to be developed within a centralised system. On the contrary, the development of such an economy is likely to be based on and around elements whose assembly and disassembly will be depend on local circumstances and skills. Moreover, even though investment in renewable energy is increasing by record levels, many investors continue to steer clear of the sector due to a lack of optimal yields. Likewise, recent policy measures show positive developments, but the lack of guarantees in international agreements continues to limit efforts to attract the necessary financing¹¹. The motives of the various stakeholders (governments, investors) continue to diverge, and can even be contradictory.

2. THE ROLE OF TECHNOLOGY TRANSFERS

Technology transfers represent an issue that, despite having attracted little attention in terms of doctrine, is going to play an increasing role in the development of green technologies and energy markets.

It is important to understand the definition of this concept before carrying out further analysis. Hall (2005) gives a broad definition of technology transfers: according to her, they consist of “practices and

⁷ Wuester et al. 2016

⁸ Rumney 2016

⁹ Shah 2014

¹⁰ Gilpin 2015

¹¹ Lin and Streck 2009

processes/procedures comprising soft technologies (i.e. intangible technology/software) such as capacity-building/skill development technologies, information network technologies, training and research technologies, as well as hard technologies like equipment and material, which make it possible to control, reduce and prevent anthropogenic greenhouse gas emissions in the energy, transport, forestry and agriculture sectors, as well as other industry sectors, in order to improve removals by sinks and facilitate adaptation”.

From an intellectual property point of view or even an institutional economics point of view, both technology and know-how are concerned, regardless of the nature of the rights actually transferred: right of use, ownership and resale right, modification and redevelopment rights, etc. The author stresses that technology transfers can occur in a number of different interactions between stakeholders: direct purchases/acquisitions, granting of licences, granting of franchises, foreign direct investment, subcontracting, exchange of scientific and technical personnel, scientific and technological conferences, training and education of nationals and foreigners, etc.¹².

The very concept of technology transfer is of significant importance for two main reasons.

The first is that, even though it is not yet present in the majority of the green projects today, technology transfer is present in a sizeable minority of these projects. For example, some experts have demonstrated that approximately one third of the projects belonging to the Clean Development Mechanism (CDM) involve technology transfer¹³. Others have suggested that, on average, technology transfers are more effective in the area of green projects than in other industry sectors¹⁴.

The second reason for which technology transfers represent such a key issue at present is that public policy, at both national and international level, is in the process of creating an environment in which technology transfers are not only encouraged, but also demanded. This trend dates back to the United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992. The UNFCCC recognised the different capacities of developed and emerging countries with regard to fulfilling and respecting their emission reduction obligations. It encouraged the adoption of various solutions in terms of cooperation, financial mechanisms and technology transfers¹⁵. However, these principles operate on a strictly voluntary basis, which is why they have been largely ignored by many countries.

However, the situation changed significantly with the COP21 summit in 2015, which can be considered a decisive turning point. During the Paris summit, the parties agreed to focus on ensuring developed countries’ commitment to scaling up technology transfers to emerging countries. The emphasis up to that point had, for the most part, been put on mitigation, requiring all stakeholders to reduce emissions almost without taking into consideration their capacity to do so. The recent shift towards adaptation reflects a desire to take this lack of capacity into account.

The logic behind this change is simple. Developed countries are the least vulnerable to climate change and also have the highest capacity to adapt. They are also responsible for the vast share of current emission levels. Emerging countries, on the other hand, are the most vulnerable to climate change and have the lowest capacity to adapt¹⁶. This vulnerability stems from the lack of homogeneity in the climate: an average increase of two degrees worldwide can result in double that in sub-Saharan Africa, for example.

Nevertheless, despite the fact that emerging countries have the least significant financial resources, this study seeks to highlight the fact that they have the highest adaptive potential.

The current restrictions in terms of financing and technology represent two of the major obstacles facing efforts to overcome this problem. Various global initiatives have emerged that explicitly refer to the concept of adaptation. These include, in particular, the Green Climate Fund, the Global Environment Facility Trust Fund, the Special Climate Change Fund and the Adaptation Fund.

¹² Hall 2005

¹³ Serres 2008

¹⁴ Wuester et al. 2016

¹⁵ Hall 2005

¹⁶ It is important to note, however, that there are wide variations within both camps. This is particularly true of emerging countries and depends largely on their level of development. China, for example, which has a relatively high level of economic development for an emerging country, is more interested in adaptation than mitigation. At the same time, the Alliance of Small Island States, which have low levels of development and are the most vulnerable, is in favour of a strong and committed approach, involving both mitigation and adaptation.

There is therefore a clear trend in favour of the use of technology transfers as a tool to fulfil international obligations on the fight against climate change. The next Conference of the Parties (COP) summits are therefore expected to primarily focus on how to use funding and technology transfers to achieve the objectives set in terms of adaptation.

3. ANALYSIS OUTLINED IN THIS STUDY

The objective of this study is to provide the link that is missing in existing texts on green technologies, green financing and green energy. We have mainly focused on funding and intellectual property rights in the field of green projects, both of which are key factors in ensuring the continued growth of such projects. This study stands out from all existing research on the subject in that it puts the emphasis on the role of technology transfers. The reason for this is simple: current trends with regard to the market and general policy suggest that technology transfers will play a critical role in the progress of green projects.

We attempt to establish a link between the issues of financing and intellectual property rights, and try to make recommendations to overcome the obstacles at these two levels. We argue that developing countries do not necessarily lack know-how and that technology and financing can be used as a means of harnessing this know-how.

The analysis presented in this study is the result of an in-depth review of existing work on the subject, as well as a series of interviews with stakeholders. Given that the relevant data on these issues are relatively recent and hard to come by, we have not defined a clear quantitative strategy. On the contrary, we used a qualitative analysis to identify the issues at hand and to present them in a positive and normative manner.

The main conclusion we reached is that, in spite of the many obstacles currently facing green projects – including concerns relating to financing and intellectual property rights – solutions do exist which are likely to facilitate their continued growth in order to meet emission reduction objectives.

4. DATA AND METHODOLOGY

It is difficult to obtain quantitative data on the success of green projects. This is even more true where the research focuses on green projects involving technology transfers. Had we chosen to use only the data currently available for the purposes of this study, it would have proven inconclusive and prevented us from producing quantifiable results. Our objective is to provide as comprehensive a guide as possible, aimed at both experts in the field and non-specialists. This means that the main topics are broached and covered in a sweeping manner and that the issue at the core of our research remains general at this stage. Where hard data were available, they have been used to support our analysis.

We proceeded by first reviewing existing texts on the subject. We organised the articles we found into different categories, including "Investment Funds", "Grants and Concessional Loans", "Green Bonds", "Intellectual Property Rights" and "General Articles". We then created a map of these articles in order to pinpoint the main findings, as well as the main recommendations. Lastly, we carried out a series of interviews in order to supplement these works and to provide a general stance.

PART 1: FINANCING MECHANISMS

This study covers the three main financing mechanisms: **investment funds** (1.1), **grants and concessional loans** (1.2) and **green bonds** (1.3).

These financing mechanisms were selected based on their prevalence and their importance on the green energy and green technology markets.

1.1 INVESTMENT FUNDS

▶ 1.1.1 Definition and current position

An investment fund constitutes a source of capital held by a group of individual investors. Each investor therefore owns and controls a certain percentage of shares in the fund. These funds are used because of the inherent benefits that result from their collective ownership, in particular a wider choice of investments, greater expertise in terms of management, and lower costs and/or investment/commission fees.

It is important to note that the investors do not control the manner in which their money is invested nor where it is invested. This responsibility is entrusted to a fund manager. However, they do choose the fund in which they invest based on a certain number of objectives: costs/fees, the level of risk associated with the investment concerned, as well as a number of other factors. The most common investment funds are mutual funds, money market CIS and hedge funds.

▶ 1.1.2 Advantages

It is quite clear that, in order to meet funding gaps, a large portion of the sums that need to be invested in green energy will have to come from private investment. This is why it is important to analyse the current situation of investment funds and their positioning with regards to projects using green technologies.

There are various positive factors which suggest that investment funds will continue to play an important role in this area.

- The first of these factors is that with the market having reached maturity, green projects have become much more "realistic" and viable from a financial point of view¹⁷. This results in an increase in opportunities and a lower risk than in the past for private investors.
- Secondly, the rise in Socially Responsible Investors (SRI) has laid the groundwork for changes that will take place in the future with regard to investment practices and which will boost investment in green projects. This movement has shown that green projects can represent higher yields than the market and has established a code of conduct with the potential to be used as a form of market governance¹⁸. For example, we are starting to see investment by some of the most important hedge funds in green technologies. Some experts believe that the market for the exchange of carbon emission rights is particularly attractive for investment funds. With a value of \$48 billion, this market offers a considerable opportunity with a low risk of loss.

Nevertheless, the trend in favour of investment funds has not always been so clear. Indeed, the financial crisis of 2008 resulted in a drop of 48% in venture-capital investments in green projects in the U.S¹⁹. However, many

¹⁷ Stosser et al. 2007

¹⁸ Richardson 2009

¹⁹ Hager 2008

experts consider venture capital as essential to finance projects using green technologies. This fall also proves that barriers continue to limit private investment in renewable energy projects. Aside from quantitative trends, we also need to identify warning signs that may appear on the markets and actions that need to be put in place in developing economies.

The interviews that we conducted show that there are two groups of investors.

The first of these groups is of the opinion that developing countries, which are coming from a position with very low levels of emissions, are capable of skipping several stages and making a leap forward in terms of environmental performance. They also believe that a significant proportion of energy should be subject to decentralisation, that is to say production should be carried out in a multitude of facilities.

The second group focuses on fast, urgent and “cheap” needs, pushing “cleanliness” (in the sense “lacking pollutants”) into the background.

These two points of view represent a set of convictions rather than actual analyses. In this context, the existence of an innovative regulatory framework offering incentives could prove to be an advantage.

► 1.1.3 Risk factors

The risk factors that green projects carry for investment funds can be divided into internal and external barriers. In order to understand the way these barriers are taken into account in decision-making mechanisms, it is necessary to determine the objective pursued by investors.

A study, prepared by the Triple E consulting firm in 2013, divides investors into three categories²⁰:

1) “Business-as-usual (BAU)” investors, i.e. investors whose behaviour is not at all influenced by climate change:

- a. Market share: 95%.
- b. Risk assessment: exposure in terms of long-term risk is mainly based on historical data and the structure of the index.
- c. Potential in terms of “climate-friendly” investments: investment needs to keep its promises with regard to financial criteria and must be easy to analyse under current frameworks/provisions.
- d. Recommendation: increase/strengthen investments in this sector.

2) “Long-Term, Risk-Aware (LTRA)” investors:

- a. Market share: approximately 5%.
- b. Risk assessment: analysis adopting a forward-looking approach.
- c. Potential in terms of “climate-friendly” investment: new tools and assessment frameworks required in order to integrate them into decisions.
- d. Recommendation: mobilisation and increase in the percentage of the global investor market.

3) “Climate-Friendly Investors (CFI)”:

- a. Market share: <1%.
- b. Risk assessment: return on investment commensurate with the risks incurred represents a concern, but alignment with climate goals constitutes an additional constraint.
- c. Potential in terms of “climate-friendly” investment: the investment strategy integrates climate objectives into the analysis.
- d. Recommendation: mobilisation and increase in the percentage of the global investor market.

Other studies have explored this question and have found that investor categories can be refined further.

For example, Righolt (2016) divides investors in the area of renewable energy projects into five major categories: funds, family offices (i.e. private wealth management advisory firms), public services, institutional investors (which include pension funds and insurance companies) and brokers.

The author places family offices and institutional investors in the category of “direct” investors. A distinction is

²⁰ The standard/benchmark market used for the classification of these types of investors is the developed countries market, although certain principles apply equally to all types of countries.

then made based on the investment phase. Family offices are characterised by a bias in favour of tax optimisation. They are interested in projects with a maximum level of financial leverage (investment through the use of debt). They usually invest from the "ready to build" phase.

Public services investors include strategic considerations in their decision-making process; they are interested in projects with a high level of financial leverage and invest at all stages of the project.

Lastly, institutional investors are interested in long-term investments but not using financial leverage.

The author also notes that among "indirect" investors (funds and brokers), they are all focused on the final phase of the project²¹.

Kaminker and Stewart (2012) focus primarily on institutional investors and highlight the many qualities of green projects, which result in them attracting this category of investors in particular. Considering the current economic slowdown, the authors argue that a good number of institutional investors are looking for "physical/real estate" assets capable of ensuring a steady flow of income. Green projects can therefore prove to be extremely attractive as they offer stable and predictable liquidity²² (in the sense that they are backed by long-term contracts involving counterparties with an investment-grade rating) and often feature a protection mechanism against inflation. The long-term nature of these projects also corresponds to the desire for long-term investment of these investors.

The main lesson to be learned from this preliminary analysis is that demand in terms of green projects exists but that financial requirements must be met, as these requirements are the most important element for all investors. Understanding these financial requirements is the key to effectively analysing the risk factors that currently exist on the market.

Our interviews confirmed this situation and more particularly, the following points:

- The industry requires an adapted regulatory regime (considering that many of the "G77" countries – 134 countries in total – are not densely populated and represent small markets) and argues that certain regulatory provisions should prevail (supranational, regional or international).
- Debate among experts highlights the fact that, in countries in the southern hemisphere, some aid should be granted based on the financial viability ("bankability") of the project. The risk profile of the various segments of the project should be assessed and clarified.
- Some innovative operators, which combine a fund and a debt structure, are confident enough to make their entry on the market with a local partner as they can combine infrastructure in the energy or social sector with a commercial side project. These types of operators do not always require a sovereign guarantee.

At this stage, it should be noted that, in any case, intellectual property is not cited as presenting a major obstacle to investment in particular. On the contrary, project promoters are often tasked with handling and settling this issue.

What are the internal and external risks facing investors in the field of green technologies?

a. The external risks facing investors in green projects can be divided into three major categories:

- The first is the result of the low number and volume of green projects. Even if the current market trends are in the process of changing in this respect, this remains a significant concern. It is clear that there are simply not enough "first-class" green investment opportunities currently available on the market. In addition, constraints in terms of liquidity have forced investors to opt for certain types of assets that are more easily negotiable (Triple E Consulting 2013).

- The second risk category concerns the risk-return ratio. Most investors still seem to view green projects as higher-risk investments with lower returns. Whether this proves or remains to be true or not, the sector is

²¹ Koh et al. (2014) supplement these works by classifying investment products according to the following investment criteria: complexity and risk. They argue that various categories of investors are likely to match and be interested in projects based on their positioning in the light of the abovementioned criteria.

²² Bouille and Kidney 2014

relatively new and has therefore not yet been tested. In the past, failure and the lack of effectiveness of some projects led investors to avoid them. Investments in projects located in emerging countries carry an even higher level of risk due to exchange rates, exposure to financial markets considered to be immature, as well as economic and political instability (Baily 2015).

- The last source of external risk for investors in green projects lies in the high transaction costs associated with these projects. This is due in particular to the nature of these projects, which tend to be smaller and therefore imply higher transaction costs. Although securitisation is often proposed as a solution in this respect, the lack of standardisation makes this solution flawed at best. This process generally involves the packaging/grouping by banks of various types of loans based on risk and maturity, among other criteria, which are then made available to investors. Once the design stage of the project has been completed, securitisation enables institutional investors to take lower risks, which usually reflect their preference (low risk but long-term), and allows banks to grant loans likely to improve their balance sheet (short-term but high risk). This is particularly important for green projects in emerging countries, which are usually fragmented and small in size, as securitisation would allow them to respond (through their packaging/grouping) to investors' requirements in terms of size and liquidity. Lastly, given the lack of comparable data, investors often have difficulty fully understanding these risk factors and integrating them into their models (Triple E Consulting 2013).

b. Three main internal risks have been identified as part of this study:

- The first concerns the time horizon available to funds in terms of decision making. Most investment/fund managers have a time horizon of approximately three years or less, mainly due to regulations that require them to have a certain amount of liquidity (however, certain categories of investors such as institutional investors have longer time horizons). These obligations restrict their capacity to integrate longer-term risks (such as climate change) into their investment strategy²³. Some solutions have been proposed. Indeed, some of the funds we interviewed have developed different brands for Europe and Africa, for example, in order to take into account the different regulatory mechanisms.

- The second internal risk factor lies in the fact that most funds simply do not include climate concerns in their definition of fiduciary duty.

- Lastly, there are few broad-use methodologies or methodologies that have proven effective in taking into account climate risks and adapting to investment tools and practices.

► 1.1.4 Examples of successful implementation

This study examines in particular the case of waste management and recovery in Thailand and the Philippines, both projects which have been studied by Forsyth²⁴.

Forsyth begins by studying the factors likely to guarantee the success of technology transfers. According to the author, these factors reflect the fact that technology transfers do not constitute an isolated act, but a combination of acts occurring over a long period. The critical success factors in the area include:

- | |
|--|
| <ol style="list-style-type: none">1) The appropriate nature of the technology for the local market.2) Financial management in order to cover costs in the long term.3) Hardware/IT equipment and software: programmes/IT ensure that the technology is adopted by the local community in the long term.4) Partnerships with local communities in order to ensure the correct/appropriate use and the adjustment of the project details in the light of the prevailing local conditions. |
|--|

Considering that most environmental technologies are the property of companies belonging to the private sector, it is essential that appropriate incentives be put in place in order to promote technology transfers. Unfortunately, the UNFCCC's attention has been mainly focused on public initiatives and supply-driven initiatives.

²³ Triple E Consulting 2013

²⁴ Forsyth, 2005.

An example of a model that will possibly be used within the framework of future interactions is the waste management model in Thailand and the Philippines. The issue is of crucial importance for developing countries as not only is waste a source of disease and pollution, it also contributes to climate change through methane emissions²⁵. When waste is used to produce electricity, the benefits are even more significant, as the process involves the production of energy.

Thailand and the Philippines are both good examples given their recent experience in the area of waste management. The Philippines adopted two important laws at the start of the 21st century which laid the groundwork for the efforts required in this area: the Clean Air Act of 2000 which made it illegal to burn waste and the Solid Waste Act of 2001 which made it mandatory for households to separate organic and non-organic waste. Even though Thailand has not yet adopted similar laws, the Thai government has put in place programmes encouraging waste management.

Three main success factors relating to technology transfers in the field of waste management have been identified by Forsyth:

1) Minimisation of transaction costs: this is possible thanks to the creation of small, feasible projects

²⁶

- a. In 2000 and 2001, Enron Corporation invested \$96 million in order to build a 40MW power generation plant in Bulacan in the Philippines, which uses rice hulls to generate power. To achieve this, Enron entered into contracts with 150 different rice producers. At a certain point, these producers realised that Enron did not have any other source of supply and that they were therefore free to increase their price. When the investors became aware of this, they withdrew their funding and the project was abandoned.
- b. AT Biopower undertook a similar project in Thailand which proved to be a success. One of the reasons for this success is that the scope of the project was much narrower than that of Enron's project in the Philippines (six different power plants representing 16MW each, rather than a single 40MW plant). In addition, the investor strove to keep the supply of rice hulls constant and thus minimise transaction costs. The project featured contracts with just 20 to 30 rice producers instead of 150, and only 10-15% of the total production of rice hulls was used instead of 100%.

2) Maximisation of insurance/guarantee mechanisms

- a. Investors in biomethanisation in the Philippines managed to enter into agreements with the local community which proved beneficial for both parties. Citizens benefited from the reduction in waste and were provided the opportunity to earn an income through recycling, while the company gained access to organic waste that could be used to generate energy.
- b. In Thailand, AT Biopower put in place effective incentives for the benefit of the rice producers in order to ensure their participation in the project, by drawing up contracts which included a guaranteed minimum quantity clause. The producers were liable to pay compensation in the event that they did not reach the set objectives, but were in contrast rewarded in the event that such objectives were achieved.

3) Maximisation of trust and responsibility

In the case of both Thailand and the Philippines, citizens were initially opposed to the projects. For example, in Thailand, citizens wrongly associated a power plant project with local political conflicts. In the Philippines, activists accused biomethanisation of being just another form of incineration. The companies were able to continue these projects and ensure their success by carrying out information and education campaigns within the communities concerned, as well as by working with local government bodies in order to forge links and to obtain the trust of citizens.

²⁵ Methane has about 23 times the global warming potential of carbon dioxide.

²⁶ Although, as we previously pointed out, it is difficult to find financing for small projects without resorting to securitisation.

► 1.1.5 Recommendations

While it is worrying to note that, as a result of the combination of risk factors, public action is essential in order to guarantee that private investment funds continue to consider green projects a viable opportunity, it is however reassuring to note that various policy tools already exist or could easily be put in place in order to cope with the risks set out. Our recommendations in this regard fall into two categories: the first includes actions that target the risk itself, whereas the second focuses on actions designed to contribute to growth and strengthen investment.

Risk perception plays a key role in determining the cost of capital, which means that risk management is crucial when it comes to strengthening investor confidence in the area of green projects.

The following initiatives could be taken in order to limit the risk factors:

- 1) Use of improvement mechanisms in terms of credit enhancement** in order to improve the risk-return ratio of green projects, which would mainly involve issuing eligibility criteria for green projects.
- 2) Use of guarantee instruments to protect against the various risks**
 - a. Guarantee instruments offer "insurance" regarding the various sources of risk, which may include insurance with regard to strategic risk, credit policy or even foreign exchange/currency rates.
 - b. A limited contribution in terms of public capital is required as it can have a huge impact when it comes to attracting private investment.
- 3) Support for green securitisation²⁷**
 - a. The first step is to develop standardised regulations with regard to loan agreements relating to green assets.
 - b. Structures will also be necessary in order to allow the pooling of assets between the various issuers ("originators").
- 4) Development of longer time horizons in respect of investors**

This is a longer-term measure which would require government support in terms of research on risk models and best practices in order to encourage companies in this direction²⁸.

It is also important that policymakers provide for mechanisms that encourage investment growth in green projects, and in particular:

- 1) Raise awareness of green projects through mechanisms involving educational content²⁹.**

Public institutions can prove useful in this regard by increasing the volume of their own investments in green projects and highlighting successful initiatives. The use of workshops and conferences in order to present case studies of successful investments in green projects may also prove beneficial in this regard.
- 2) Provision of tax incentives with regards to green investments³⁰.** Better practices should be established to ensure that investments increase in a sustainable and effective manner.
- 3) Improvement of transparency in terms of green projects through the standardisation of projects and the adoption of climate performance indicators.**

One of the main obstacles with regard to the increase in investment in green projects lies in the relatively new nature of such projects and the lack of standardisation that goes hand in hand. The provision of climate performance indicators would make the climate impact more transparent both for investors and for the public.

²⁷ Triple E Consulting 2013

²⁸ Bouzidi et al. 201

²⁹ Triple E Consulting 2013

³⁰ Idem

4) Improvement of the governance structure of investors³¹. The improvement of standards and best practices as regards investors would play a large part in supporting the development of this sector of activity.

1.2 GRANTS AND CONCESSIONAL LOANS

► 1.2.1 Definition and current situation

Grants and concessional loans are two forms of financing usually supplied by national governments and international institutions. That is one of the major differences with investment funds. According to the OECD definition, grants are “transfers made in cash, goods or services for which no repayment is required”³².

The absence of a repayment requirement is what differentiates grants from loans. The OECD defines loans as “transfers for which repayment is required”³³. Concessional loans fall into the second category but they feature certain specific characteristics: they are subject to terms that are substantially more advantageous than “market loans”, either because they provide lower interest rates than those on the market, because they include grace periods or even because they involve a combination of the two³⁴.

Before attempting to identify the market conditions in respect of grants and concessional loans, it is important to mention the ongoing debate among policymakers as regards the relative effectiveness of each of these mechanisms. The debate has become essential since 2000, when the Meltzer Commission in the United States came to the conclusion that assistance in terms of development should take the form of performance-based grants rather than concessional loans. The main argument of this report is that the cancellation of debt is essential with regard to assisting developing countries on the path to growth³⁵.

Some previous arguments within the same mindset have suggested that it is better to let the private sector decide when it comes to commercial funding and to let the public sector focus on grants³⁶. However, the various works published on this issue show a lack of consensus. Those who are opposed to Meltzer’s argument claim that it presupposes the existence of perfect financial markets, which is certainly not the case in developing countries³⁷.

Another distinction must also be made between grants and loans and that is the distinction between bilateral and multilateral aid. Bilateral aid comes directly from an official government source and is provided directly to the beneficiary country, whereas multilateral aid passes through a multilateral agency. There is a debate as to which is the most effective form of aid.

Many experts suggest that the networks/channels used to distribute multilateral aid benefit from their ability to “organise, pool and promote common causes in a collective manner” whereas bilateral aid promotes “the exercise of control by the donor agency, visibility and preferences”³⁸. The two forms of aid can play an important role in the financing of green projects: multilateral aid can help mobilise mass investment, whereas bilateral aid can help to alleviate the fears of donors and investors with regard to green projects.

³¹ *Idem*

³² OCDE 2016

³³ OCDE 2016

³⁴ OCDE 2003

³⁵ Cohen et al. 2007

³⁶ (Meltzer et al. 2000)

³⁷ Panizza et al. 2009. *On pourrait aussi avancer un argument en ce qui concerne les mesures d'incitation qui se développent à la faveur des subventions et des prêts concessionnels. Malheureusement, on ne semble pas non plus pouvoir tirer de conclusion définitive en ce qui concerne cette question (Panizza 2015). Djankov et al. (2004) démontrent que les subventions ont pour résultat une augmentation de la consommation globale dans les pays en voie de développement, mais Morrisey et al. (2006), dans leurs recherches sur la même question, ne constatent pas un tel effet. Cordella et Ulku (2007) quant à eux ont une vue plus nuancée des choses et suggèrent que les subventions devraient être spécifiquement ciblées à l'attention de pays récipiendaires/bénéficiaires se trouvant dans l'incapacité d'absorber des flux d'aides importants (ce qui se traduit par l'existence d'une faible qualité institutionnelle), possédant des perspectives de croissance faibles et étant hautement susceptibles de se trouver dans la situation de ne pouvoir gérer leur dette de manière durable (problème de viabilité de la dette).*

³⁸ Gulrajani 2016

In addition, there is an increasing tendency to challenge the Bretton Woods system with its multiple multilateral agencies, a structure that has not changed since it was put in place after the Second World War (and including organisations such as the IMF and the World Bank which have traditionally played an important role in the financing of green projects). The best example of this phenomenon is the creation of the Asian Bank of Investment for Infrastructure (AIIB), which is similar to the institutions belonging to the Bretton Woods system, but which forbids its members from having any influence in political matters³⁹. The effect on the financing of green projects has not yet been fully determined but all signs indicate that this bank will play a major role when it comes to filling the current financing gaps with regard to infrastructure, including in the field of green projects, in developing countries⁴⁰.

► 1.2.2 Advantages

Even if most of the theoretical discussions on the subject are focused on development aid in general, the principles can also be applied to green projects. There are many positive trends that suggest that the importance of this market will continue to grow.

First of all, as has already been indicated, developing countries have very substantial needs in terms of renewable energy and these needs are on the rise. This is an opportunity for the private sector. However, several risk factors have the effect of restricting investment. It is therefore important that the public sector plays a role in the promotion of green projects in order to encourage private investors to continue to finance their growth. This is particularly true in developing countries which suffer from increased risk factors. The main portion of initial investments in these countries must come from the governments of developed countries and international institutions in the form of aid. This is likely to play a role in "unblocking" and opening the market to private investors.

Secondly, governments and international institutions have already invested substantial amounts in clean energy and green technologies. This gives them tremendous influence with regard to the energy networks of the future and can help promote green projects in addition to exerting influence on stability in terms of emerging markets' strategic policies. This also shows that many institutions have already acquired expertise and experience in this field and have integrated it as a priority.

Thirdly, technological, political and economic changes and improvements have all increased the potential when it comes to the market for green projects. Before 1990, most banks were reluctant to grant loans to projects in the renewable energy sector. However, changes in national and international guidelines have paved the way and laid the foundations for initial investments in this field, and have made it possible for this sector to develop and reach its maturity⁴¹. This constitutes a positive development in terms of encouraging funding to come.

It's true that the volume of funding from grants and concessional loans is still far from the amount needed to achieve the emission reduction objectives, but the trend is encouraging.

► 1.2.3 Risk factors

Many of the risk factors described with regard to investment funds are valid for green projects in general and concessional loans in particular. But grants and concessional loans also present specific risk factors.

Firstly, it should be noted that the role of the public sector differs from that of private investors. Governments and international institutions have a number of objectives in addition to profitability. For example, they are likely to be interested in taking part in some projects in order to promote a strategic objective or even to establish or improve trade relations with a new diplomatic partner. In a sense, this makes them less sensitive to risk than private investors. They can therefore take more risks than private investors.

³⁹Liao 2015

⁴⁰Bessler 2016

⁴¹(Özkol 2011)

Of course, this does not change the fact that renewable energy projects tend to lead governments and international institutions to take on a relatively high level of risk. Many of these projects require a lot of capital, feature a high level of debt and are complex. In addition, a large proportion of the risk inherent in the projects in question is concentrated in the initial phases of the projects, a time when grants and concessional loans often play a vital role, as most private investors avoid investing money at this stage.

The most important risk with regard to grants and concessional loans lies in the "policy and regulatory" risk. The reason for this is simple: Political support is considered essential in order for projects in the green energy sector to be considered "viable"⁴². But this also means that changes in the area of public policies are likely to have serious repercussions on the success rate of projects. For example, Standard & Poor's argues that grants in respect of solar energy projects in Europe could represent up to 85% of their initial income⁴³. Most experts argue that this risk increases further in emerging markets where political and regulatory stability is significantly lower than in developed countries.

Moreover, the fact that indebted countries are required to implement austerity measures also exerts added pressure on grants in the area of green technologies. Governments and international institutions are now more than ever subject to monitoring when it comes to making investments. The financing of renewable energy projects is constantly subject to funding reductions. In Europe, for example, many countries have carried out significant reductions in feed-in tariffs for electricity produced using solar power: Germany has cut tariffs by 15% while tariffs in the United Kingdom have been cut by 70%⁴⁴.

One of the specific factors limiting investment both in the public and private sector lies, as already indicated, in the lack of standardisation regarding green projects. The problem is magnified by the fact that there is generally a lack of experience in the field of renewable energy projects within governments and international institutions (even if this is now changing)⁴⁵. This creates what the World Bank refers to as a "low-level equilibrium trap", i.e. a situation in which a lack of skills and experience results in a lack of development of viable projects/projects likely to be funded, even where opportunities exist. This problem is particularly prominent in the emerging markets. Although it cannot only be dealt with through financial aid from governments and financial institutions, this aid can help overcome this obstacle.

It is also important to distinguish risk factors specifically related to grants from those related to concessional loans.

Grants carry their own risks. To cite just one, most grants do not set binding conditions in terms of performance/results, which means that they offer very little incentive in terms of achieving objectives. Such grants can also have the effect of pushing out private investment or result in State control of the projects, which often leads to less effective results⁴⁶. In addition, it has been proven that public-sector projects in developing countries often perform poorly due to countries' weak institutional capacity. Lastly, grants do not provide the return on investment in capital that governments and international institutions could use in order to finance other projects.

Loans, on the contrary, generate income in the form of the repayment of interest, which can be used within the framework of subsequent investments. They involve the same risks as grants with regards to the eviction of investors, but they also include other risks such as the fact they burden the projects and emerging countries with debt that can prove harmful in terms of growth prospects and the fact that they make it necessary to carry out due diligence to ensure that the loan conditions are met⁴⁷.

⁴² (Economist Intelligence Unit - Cellule de Renseignements de l'Economist - 2011)

⁴³ Economist Intelligence Unit 2011

⁴⁴ Economist Intelligence Unit 2011

⁴⁵ World Bank - Banque Mondiale 2013

⁴⁶ Ibid. Eviction is defined as a situation in which the increase in investments by the public sector in an industry sector or a specific area leads to a decrease or even the complete disappearance (referred to as the "drying up") of investment by the private sector in the same area. This can happen when the private sector no longer sees investment opportunities due to the saturation of the market resulting from public expenditure.

⁴⁷ Ibid.

► 1.2.4 Examples of successful implementation

In order to illustrate how public-sector financing can support green projects, contribute to their success and thus encourage and trigger private investment, we have selected a case study on a hydropower plant in Uganda⁴⁸. The selected project specifically concerns the 250MW Bujagali Hydropower Plant project that managed to raise close to \$300 million in commercial loans and private equity. At the time, the project represented an unprecedented amount of private finance in a low-income country⁴⁹. This project is particularly interesting to study because it is one of the rare examples of a large project to use simultaneously different risk mitigation instruments. The World Bank Group (WBG) was closely involved in the development of the project, which was a key factor in its success, according to Frisari and Micale. The main factors that helped support the project include the WBG's close relations with governments, its successful history in supporting and backing such projects and its preferred creditor status. These elements all contributed to lowering the cost of capital and increasing private investment.

It is important to understand the context in which this project was completed before taking a closer look at the details. The contract for the project was entrusted to a private consortium in 2005 after a failed attempt to develop the project in the 1990s. Construction began in 2006 and ended in 2012 when the project entered the operational phase. The finalisation of the project immediately led electricity production to double in Uganda⁵⁰. The dual objective was, on the one hand, to provide a stable source of power at a lower cost than that paid by the country for power generated by fossil fuels and, on the other hand, to reduce CO2 emissions.

Even though Uganda enjoyed high economic growth during the entire development phase of the project (6.4%), it was still one of the poorest countries in the world (UNCTAD 2013). It is important to note that only 9% of the population had access to the electricity before the hydroelectric project was commissioned, which was one of the main limiting factors in terms of investment in all sectors of the economy. Before, financing in the energy sector had been subject to strict limitations resulting in a handful of small-scale projects, because investors were concerned by the low recoverability of investments as well as the presence of the UETCL (Uganda Electricity Transmission Company Limited), the electricity company owned by the State and the sole purchaser of all of the electrical energy supplied to the Ugandan network.

The investment climate was so bad at the time that the Bujagali project represented the only source of private investment and the most significant investment ever to occur in Uganda⁵¹.

The initial failure of the project highlighted and stressed the need for financing and solid sponsorship. In 2005, a private consortium was selected to develop the project in cooperation with the Ugandan government as minority owner. This group included Industrial Promotion Services (IPS Kenya), the Aga Khan Fund for Economic Development and Sithe Global (owned by the American company Blackstone). Bujagali Energy Ltd. (BEL) was established through the partnership between the consortium and the Government of Uganda and was responsible for financing, building and operating the plant. It was to sell electricity to UETCL under a 30-year Power Purchase Agreement, at the end of which it will transfer the plant to the government.

The bulk of financing and risk management support was provided by bilateral and multilateral organisations including, among others, the International Financial Corporation (IFC), the World Bank Group, the African Development Bank (AFDB), the European Investment Bank (EIB) and the French Development Agency (Agence Française de Développement – AFD). This was necessary due to the low level of capital available in the country, as well as the reluctance of private investors.

It is for this reason that Foreign Direct Investment (FDI) played a key role in the financing of the project. This was due both to the long-term loans that they offered as well as to the various risk reduction/minimisation measures that contributed to obtaining private funding from equity sponsors and commercial banks. Two key mechanisms were used to achieve the latter: partial risk guarantees and political risk insurance. This resulted in a total exposure for the group of \$360 million. The result was that commercial lenders found themselves in a

⁴⁸ Frisari and Micale 2015

⁴⁹ *Ibid.*

⁵⁰ *Ibid.*

⁵¹ *Ibid.*

position to offer loans for the same duration but at lower rates than FDI⁵². These efforts also reduced the estimated cost of the electricity produced by the plant to \$107/MWh, i.e. approximately half of the average cost of electricity production in Uganda at the time⁵³.

The risk mitigation methods used in the Bujagali project are summarised by Frisari and Micale as follows:

1) Access to capital and financing risk

Multilateral and bilateral lending institutions provided long-term loans, which constituted a source of initial funding and encouraged private investors to offer capital at a much lower cost than they would have otherwise agreed to.

2) Hydrology risk (Risk linked to variations in the volume of the water)

In the Power Purchase Agreement (PPA), payments were linked to the capacity made available and not to the electricity produced. This has had the effect of transferring the risk of low volumes of water to UETCL, the power transmission company owned by the Ugandan government.

3) Political risk

Three mechanisms were used in order to protect against this risk and to dispel concerns with regard to the risk of payment default: the Ugandan government's guarantee, political risk insurance and the partial risk guarantee.

4) Credit risk

The vast portion of this risk was mitigated through the same mechanisms as those used to protect against political risk.

5) Currency depreciation risk

Currency depreciation risk was not an additional factor in this instance, given that the project simply replaced imported fossil fuels.

The use of risk mitigation mechanisms made it possible to obtain financing from private investors at rates and for durations comparable to those offered by development banks. The question is whether this model can be reproduced. Frisari and Micale point out that, up until 2015, the World Bank Group had only used a similar structure five times, and only within the framework of large-scale projects. This is because of high transaction costs due, in particular, to the complexity of such agreements. However, the ongoing modernisation within these institutions should provide an opportunity to improve the replicability of this model and increase its scope to eventually include smaller-scale projects. The Bujagali project is an excellent example of the way in which institutions can use a combination of loans and risk mitigation measures to mobilise financing for green projects.

► 1.2.5 Recommendations

Our recommendations can be grouped into three broad categories: improvement of the transparency and training (1), changes to the terms and conditions of grants and loans in order to mitigate risk (2) and risk mitigation instruments (3)

1. The financial links between the World Bank Group and the host country alone can significantly reduce the risks with regard to green projects set to take place in a country⁵⁴. This is proof of the role transparency plays in determining risk. Countries and international institutions can play a formative role with regard to the manner in which risks can be reduced⁵⁵. In this respect, standardisation, especially with regard to the contractual and installation conditions, can significantly reduce investors' fears in the private sector as in the public sector⁵⁶.

⁵² The rule is generally the opposite. In principle, commercial banks offer loans for shorter periods of time and at rates higher than those provided through FDI. This highlights the importance of combining loans with risk mitigation measures provided by international institutions.

⁵³ Frisari and Micale 2015

⁵⁴ Frisari and Micale 2015

⁵⁵ Economist Intelligence Unit 2011

⁵⁶ IRENA 2016

2. As regards grants, one of the proposals put forward by the International Renewable Energy Agency (IRENA) is to increase the use of convertible grants. In the initial phases, this mechanism is almost identical to a normal grant. However, if the project looks set to succeed, the grant is then "converted" into a loan with 80% of the initial financing subject to reimbursement. Should the project fail, no repayment is required. This mechanism has been used effectively in high-risk industry sectors such as, for example, drilling activities in the field of geothermal energy⁵⁷.

3. Our final recommendation relates to risk mitigation instruments. Experts suggest that such instruments could represent the most effective use of public financing given that they do not require the immediate disbursement of capital⁵⁸. Risk mitigation instruments have been used with success in improving public sector agents' "risk taking ability" and making them contracting parties on the same basis as private investors⁵⁹. Partial risk guarantees as well as political risk guarantees are the most common forms of risk mitigation instruments. Various factors contribute to the effectiveness of these guarantees. The fact that the lending institutions providing the guarantees often have control over a large volume of finance flows to developing countries deters the governments of these countries from defaulting on their obligations in terms of debt repayment. In addition, multilateral organisations acting as lenders often have experience and have established diplomatic relations with the government of the developing country in question, which limits the likelihood of events occurring that would represent a political risk. Lastly, the fact that most institutional lenders benefit from preferred creditor status gives them preferential access to the beneficiary country's foreign currency reserves and priority order with regard to the repayment of loans⁶⁰.

1.3 GREEN BONDS

► 1.3.1 Definition and current situation

Green bonds are standard bonds, but for which the issuer undertakes to use the money obtained for the benefit of investments related to the environment or to fight against climate change. Like a conventional bond, it is a financial instrument under which the buyer (investor) loans a certain amount to the borrower (issuer of the bond) for a given duration in return for a fixed rate of interest. Upon maturity (defined in advance), the issuer repays the initial amount of the loan to the buyer. From a financial perspective, green bonds function in the same manner.

The issuer does not necessarily have to have only "green" activities, but the transaction or project to which the bond is attached must be of a sustainable or environmental nature. When the bond is issued by a bank, it must involve redistribution (usually in the form of loans) to clients planning to carry out operations that meet environmental criteria. At present, green bonds are mainly used for investment in the development of renewable energies. Nevertheless, they are increasingly being used to finance projects involving energy efficient buildings, water supply, waste management and low-carbon transport⁶¹. Nothing would therefore appear to prevent their use in projects related to climate change adaptation.

Any conventional bond issuer can, in principle, issue a green bond. The green bond market therefore includes different types of issuers: companies, development and commercial banks, governments, municipalities, etc.⁶² Green bonds come in several forms⁶³:

Corporate bonds: bonds issued by companies that use their proceeds to invest in green projects. It is therefore the issuing entity that is responsible in the case of default on interest payments or on return of principal.

Project bonds: bonds issued directly in relation with a single or multiple green projects for which the investor has direct exposure to the risk of the project(s).

⁵⁷ IRENA 2016

⁵⁸ Frisari and Micale 2015

⁵⁹ Frisari and Micale 2015

⁶⁰ Frisari and Micale 2015

⁶¹ Kidney, Sonerud 2015

⁶² IRENA, 2016

⁶³ OECD, 2015 & Lam, 2015

Asset-backed securities (ABS): bonds guaranteed and collateralised by a set of loans or income-generating assets⁶⁴. They are therefore securities backed by other assets or a portfolio of assets.

Supranational, sub-sovereign and agency (SSA) bonds: issued by international financial institutions (IFIs) such as the World Bank and the European Investment Bank for example, but also by national development banks. They operate in the same manner as corporate bonds.

Municipal bonds: bonds issued by a municipal government, region or city. In September 2016, a national government announced its plan to issue a “green sovereign bond” for the first time. The government in question was the French government. The launch will take place next year, and although the exact amount of this bond has not yet been announced, the operation will involve several billion euros. The French Minister of the Environment, Ségolène Royal, and the Minister of Finance, Michel Sapin, have announced that this green sovereign bond issue will be used in particular to finance green investments under the 3rd PIA (*Programme d’investissements d’avenir – Investments for the Future Programme*)⁶⁵.

Each type of bond is associated with different risks, and therefore attracts different investors, based on their objectives and means. Project bonds expose the investor directly to the risks of the project whereas corporate bonds are protected by the rest of company’s assets and treasury flow⁶⁶.

In general, green bonds are better adapted to the refinancing phase than to the design or construction phases of the project. Investors generally require an operational history spanning a few years of the assets concerned. Up until now, green bonds have therefore been an effective option for refinancing assets or groups of assets that are already operational in the field of renewable energies, for example. Nevertheless, efforts are being made, especially by public financial institutions, to ensure that more and more green projects can be financed by bonds as early as the construction phase⁶⁷.

The construction of the Topaz solar farm in California, for example, was financed as early as 2013 by the issuance of a green project bond for an amount of \$850 million by MidAmerican Energy. However, this project was largely guaranteed by the balance sheets of the companies involved, by sponsors and by contractual counterparties which helped improve its rating by specialised agencies. The appeal and security for investors were more a result of these elements than of the project itself⁶⁸. A joint effort between the finance sector, rating agencies, companies and international institutions is therefore still needed to find solutions, in full cooperation, that make it possible to foster the use of green bonds in the early stages of a project.

State of the market

The green bond market has undergone exponential growth over the past few years, not just in terms of monetary volume, but also in terms of the currencies used and its geographic scope. It is a very young market that is expanding at an extremely fast pace. The first green bond was issued by the World Bank in 2008 and it has since issued more than \$7 billion worth of green bonds⁶⁹. The Climate Bonds Initiative⁷⁰ now publishes a report on the state of the market every year and has been doing so since 2012. In 2015, it estimated that the global market of what are “considered” to be green bonds represented \$597.7 billion, or 2,769 bonds coming from 407 issuers. Within this total, a distinction is made between officially labelled green bonds (\$65.9 billion) and non-labelled bonds associated with green bonds to the extent that they fund “green” assets (\$531.8 billion). It is a growing market, not just in size but also in the diversity of issuers, the types of bonds and the sectors concerned⁷¹.

The graph below shows the exponential growth of the market in recent years. It concerns only officially labelled green bonds and shows that the market tripled between 2013 and 2014, and continued to increase in 2015. It also highlights the predominance of the renewable energy sector. The appeal of the green bond market can be largely explained by its potential to unlock large-scale investment in renewable energy, a sector that is particularly buoyant today and at the heart of strategies to fight against climate change, in particular mitigation.

⁶⁴ For example, a business already in operation such as an active solar farm.

⁶⁵ Press release (in French): http://www.developpement-durable.gouv.fr/IMG/pdf/2016-09-02_-_SR_-_MS_-_Greenbonds-2.pdf

⁶⁶ Ozkol, 2011

⁶⁷ IRENA, 2016

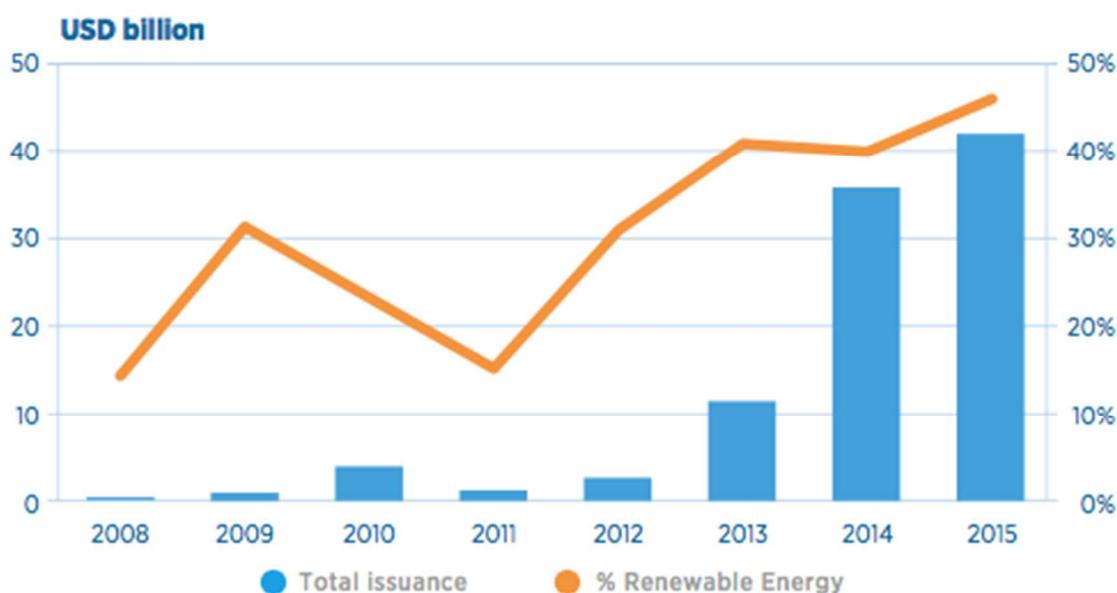
⁶⁸ Reuters, 2012

⁶⁹ Baily, 2015

⁷⁰ International non-profit organisation based in London, which focuses on the assessment, analysis, promotion and mobilisation of the green bond market <https://www.climatebonds.net/>

⁷¹ Refer to the “BONDS AND CLIMATE CHANGE: THE STATE OF THE MARKET IN 2015” report by the Climate Bonds Initiative.

Figure 19. Growth in the global green bond market²⁴



Source: Based on Climate Bonds Initiative (2016c)

Although the market was dominated by the public sector at the start, private companies have today taken the lead in terms of emissions, and are increasingly interested in the opportunity that green bonds offer to diversify their investor base⁷². By observing the currencies used in the issuance of green bonds, we can also see the geographical spread of their use. In 2015, green bonds were issued in 37 different currencies, with the Chinese Yuan in the first position (197.7 billion), followed by the US dollar (124.8 billion) and the euro (11.3 billion). The growth in the use of green bonds in emerging countries is both probable and necessary, insofar as these countries are the most in need of large-scale, low-carbon infrastructure over the coming decades. Moreover, most of these countries want to grow their domestic capital markets and cease to depend on international loans and financing. Green bonds are one way of achieving this objective for emerging countries, and the year 2015 shows that the latter have given a real boost to their respective green bond markets. Alongside the giant figure of China, Brazil, Mexico, Russia and South Africa are gradually becoming major players in terms of green bond issues. As for India, it may soon catch up with the Chinese leader thanks to green bond issuances by banks such as the Yes Bank and the Export Import Bank of India for amounts of approximately \$500 million to finance renewable energy and clean transport projects (Climate Bonds initiative & HSBC, 2016). Beyond the domestic bond markets, supranational bonds (issued by transnational institutions) represent a non-negligible proportion of total issuances, accounting for \$31.7 billion in 2015 (ibid.).

► 1.3.2 Advantages

The development of green bonds is part of a global trend of recognition by all players that it is essential to make a radical change towards low-carbon investments, which will be resilient in the face of climate change. This urgent change in investment paradigm has been recognised for several years by the Conferences of the Parties (COP). Today it involves finding the right tools that will act as large-scale growth levers in climate finance, to meet the massive need for low-carbon investment. Green bonds are an attractive tool for several reasons:

Green bonds represent a means of obtaining **large-scale non-bank funding in the long term**. Most green bond issue are for a period of more than 10 years⁷³. It is a long-term financial debt instrument, at a fixed price,

⁷² Baily, 2015

⁷³ Green Bond Initiative, 2015

and is therefore particularly suitable for large-scale projects, in particular in the renewable energy sector. Furthermore, the grouping and securitisation of smaller renewable energy projects is also possible (through the use of asset-backed securities [ABS], therefore by linking bonds to other assets) and makes it possible to reduce costs. This financial mechanism makes it possible to increase the overall volume of investment, and thus reduce the costs related to each project. In the long term, this decrease in costs helps attract bigger investors⁷⁴. Overall, it is an opportunity to broadly “stimulate green investments by reducing the cost of capital for green projects⁷⁵.”

For bond issuers, opting for green bonds allows them to **diversify and expand their portfolio of investors**, a phenomenon that is beneficial in the long term for all of their activities.

For investors, it represents a guaranteed return on investment **and therefore a stable and attractive alternative to the stock market**, which is much more volatile⁷⁶. This argument is particularly reassuring for investors in all markets related to climate change, which do not follow a conventional financial pattern, in terms of risks and time horizon, as they lack the historical and therefore statistical depth necessary to model the behaviour of assets. This almost insurance-like aspect is interesting in this case. In a way, we could make a parallel with the role of bonds at the start of industrialisation, or the development of railways and other infrastructure. In addition, the regulatory risk linked to new sectors means that bonds make it possible to internalise this constraint, especially when the issuer is parapublic or public.

Although more difficult to quantify than the above aspects, the use of green bonds is ultimately clearly **beneficial in terms of image**, for both issuers and investors. They make it possible to meet the growing demand for "sustainable" investment by institutional investors⁷⁷. If the labelling process is carried out correctly (see greenwashing risk), these investors can thus show their involvement in the fight against climate change. The same argument can be extended to companies for example, to demonstrate that they honour their ethical or legal obligations in terms of CSR⁷⁸. At the same time, companies are joining the effort to implement climate policies at national level. For governments, promoting the use of green bonds through various players helps show their commitment to environmental issues and to respecting their commitments with regard to the redirection of capital flows. Indeed, we believe that the issuance of sovereign green bonds by countries themselves, based on the example of France (the first country to announce the issuance of a sovereign green bond), is a trend that is set to develop. This adds another tool to the range already at the disposal of governments to respect their Intended Nationally Determined Contributions (INDCs)⁷⁹ to reduce their greenhouse gas emissions under the United Nations Framework Convention on Climate Change.

► 1.3.3 Risk factors

Despite its growing appeal, the green bonds market continues to face risks and challenges that prevent investors from resorting to it on a more systematic basis.

First of all, there is a **lack of definition and standardisation of criteria** in relation to labelling bonds as "green", which reflects an **overall lack of regulation and transparency on the market**. Some bonds are labelled green by the issuers themselves, while others undergo an audit by an external institution before being labelled. Others are simply "considered" green as they are generally seen to be respectful of the environment⁸⁰. The labelling criteria also differ from one external auditor to the next. In addition, projects are not always subject to a transparency and reporting obligation to ensure their "green" label. Given that labelling has an impact on predicting the level risk and the return on investment, it represents an important factor in the investment decision.

⁷⁴ IRENA, 2016

⁷⁵ Institute for Climate Economics (IACE), 2016

⁷⁶ Baily, 2015

⁷⁷ OECD, 2015

⁷⁸ Corporate Social Responsibility: concept whereby companies integrate social, environmental and economic concerns into their activities and their interactions with stakeholders on a voluntary basis (ISO 26000)

⁷⁹ http://unfccc.int/focus/indc_portal/items/8766.php

⁸⁰ Baily 2015

Progress has been made, however, since the emergence of the market to regulate and increase its transparency and standardisation. At the start of 2014, a group of 13 banks⁸¹, which have since been joined by other players, launched the Green Bond Principles⁸² in order to standardise labelling practices for green bond issuers, improve the evaluation of projects and reporting on the use of income, and thus promote the transparency of the market as a whole. These principles are governed by a secretariat consisting of green bond issuers, investors and intermediaries. Nevertheless, it is still a self-regulated initiative that promotes transparency and reporting, but relies on volunteering. Other principles and guidelines regarding green bonds have been issued: for example, China has developed its own "Green Bond Guidelines" to guide the market and the European Commission continues to monitor and assess the market through the Union of Capital Markets (UMC)⁸³. The initiatives are therefore increasing, but they do not always converge and **there is no binding international framework**.

Moreover, aside from its impact on investment decisions, the lack of market transparency raises the issue of the **risk of greenwashing**. If there are no official standards and reporting obligations, there is a tangible risk of projects or companies falsely claiming to be "green". The spontaneous bottom-up development of this market, which is scarcely controlled and does not offer solid guarantees, therefore poses real problems with regard to the environmental integrity of green bonds⁸⁴.

Furthermore, green bonds face **specific risks in developing countries**, although these risks would appear to impact the majority of investments. These countries are more likely to suffer from political and financial instability, a lack of public policies, a lack of protection of intellectual property, and have less efficient systems regarding the creation of contracts and the resolution of disputes. All of these elements are likely to curb investment. In the case of green bonds, the decision to invest is particularly linked to national and institutional stability, as 80% of them are backed by government guarantees⁸⁵.

Regarding this last point, we could argue the opposite: the fact that green projects and bonds are being envisaged in these countries surely proves the existence of the social and human capital and regulatory environment required to mitigate these risks.

► 1.3.4 Examples of successful operations

Green bonds for off-grid solar solutions in Kenya and Rwanda

As mentioned in the previous sections, green bonds are particularly relevant and appropriate for financing the renewable energy sector. As one of the sources of renewable energy with the highest potential, solar power is therefore likely to be increasingly financed using climate finance tools, such as green bonds. The latter are already used to finance the development of solar power in several forms⁸⁶: bonds issued by companies specialised in solar power, linked to other projects through securitisation (solar asset-backed securities), and broader green bonds including a share of solar power⁸⁷.

The possibilities for issuing green bonds for solar power are therefore vast, and, more importantly, are not reserved for the sectors' pure-players in that they can be included in broader financial mechanisms.

The following case study shows that the green bonds are also a means of financing the development of off-grid solar power, a solution that is particularly adapted to supplying clean energy in Africa, where many isolated and rural areas are not connected to the national grid. The potential in Africa is huge, as it is in Asia. It is estimated that 1.2 billion people worldwide, living in rural or isolated areas, do not have access to an electrical grid⁸⁸.

⁸¹ Bank of America Merrill Lynch, Citi, Crédit Agricole Corporate and Investment Banking, JPMorgan Chase, BNP Paribas, Daiwa, Deutsche Bank, Goldman Sachs, HSBC, Mizuho Securities, Morgan Stanley, Rabobank and SEB.

⁸² Press release: <https://www.climatebonds.net/2014/05/12-thirteen-major-banks-issue-%E2%80%9Cgreen-bond-principles%E2%80%9D-guide-development-green-bonds>

⁸³ OECD, 2016

⁸⁴ I4CE, 2016

⁸⁵ Baily, 2015

⁸⁶ <http://www.pv-tech.org/features/green-bonds-and-solar-investment-whats-the-future>

⁸⁷ The U.S. tech giant Apple issued a green bond in this format for the first time in 2016. The \$1.5 billion issue was dedicated to financing green buildings, energy efficiency, recycling, the reduction of pollution, but also to developing the share of renewable energy, with a portion being used to finance solar and wind energy projects.

⁸⁸ Data from the International Energy Agency

Conscious of this, BBOXX, a British company specialised in solar energy, has created 65,000 solar-powered battery boxes for domestic use in 14 developing countries. These boxes are powered by solar panels placed on the roofs of houses. At the time of its creation (2010), the company loaned pre-charged solar batteries to its customers against a fee. It then implemented a monthly payment system allowing its customers to buy kits and solar panels. However, this payment system took a considerable amount of time, as the beneficiaries had very limited income.

That is when the company came up with the idea of using green bonds in the form of securitisation, i.e. the grouping (or pooling) of contractual loans to resell the related cash flows (corresponding to the amount of the future customers' loans) in the form of bonds to investors. Dutch investor Oikocredit⁸⁹, which specialises in social and environmental projects in developing countries, bought these bonds giving BBOXX faster access to capital than through payment by its customers, enabling the company to continue to invest and to develop its solar solutions⁹⁰.

The transaction was carried out under the control of commercial bank Persistent Energy Capital LLC and began in Kenya and Rwanda, with the objective of being extended to other countries in Africa.

The inaugural bond issue in Kenya raised \$500,000 (2,500 contracts, with an average maturity of 2.5 years and an interest rate of 21%⁹¹). The target for 2016 is to raise \$16 million through a bond issuance every 90 days.

The use of green bonds in this instance has proven to be a particularly adapted means of financing "green" projects in the context of the developing countries, creating affordable asset classes that make it possible to expand and grow projects in the long term. More generally, this case study shows that green bonds, as an innovative financial tool, can make it possible to address limitations in terms of risks intrinsic to the financing of "green" projects and resilient to climate change. Similarly, it shows the possibility for the private sector to use this financial vehicle and therefore to become involved in the development of the green finance, despite its requirements and obligations in terms of return on investment and risk assessment.

It would appear that this financial instrument is capable, depending on the context, of overcoming the barriers to green investment and to the use of new technologies in the developing world. It could prove to be a means of overcoming the huge energy challenge in these regions, of transforming and massively increasing the off-grid solar sector in Africa, while minimising the risk for investors.

China Railway Corporation

The following case study demonstrates the extremely rapid development of a national green bond market, in this case the Chinese market. In 2015, according to a report published by the Climate Bond Initiative and the International Institute of Sustainable Development, China has become the largest green bond market in the world. At the same time, the Research Centre for Climate and Energy Finance (RCCEF)⁹² estimates that by 2020, \$45.6 billion of green bonds will be issued annually in China⁹⁴.

Green bonds could be one of the most effective financial tools for financing the transition to a low-carbon economy in the country. This transition requires heavy investment, far greater than current amounts, in particular due to the slowdown of the Chinese economy. The People's Bank of China has announced that the majority (between 85% and 90%) of this investment will come from the private sector⁹⁵.

Green bond issuers in China are divided mainly into three sectors: clean transport, renewable energies and construction/buildings. Among the green bonds issued in the clean transport sector, 81.31% are used for construction, commissioning and the maintenance of railways. The China Railway Corporation (CRC) is the state institution that issues the most green bonds. In 2015, it issued a total of 210 billion yuan as part of a movement

⁸⁹ <http://www.oikocredit.coop/>

⁹⁰ <https://www.theguardian.com/oikocredit-investing-for-development-zone/2016/may/03/stepping-into-the-light-financing-solar-power-in-developing-countries> ⁹¹ http://www.pv-magazine.com/news/details/beitrag/bboxx-and-oikocredit-bring-securitization-to-off-grid-african-solar_100022736/#axzz4K83CWNKy

⁹² Research Centre for Climate and Energy Finance (RCCEF). The RCCEF is a member of the Green Finance Committee. <http://mpacc.cufe.edu.cn/>

⁹⁴ Roadmap for China: green bond guidelines for the next stage of market growth

⁹⁵ China Green Bond Report, 2015

to replace the institution's bank loans with bond funds. Figures show that the shift to green bonds by the CRC has helped reduce financial costs and improve profitability, while providing the necessary support to the sustainable development of China's railways⁹⁶.

In September 2016, the Chinese government approved a new issuance by the CRC amounting to 300 billion yuan¹, following the country's decision to invest heavily in its railways as part of a project to expand the network to 150,000km by 2020. Two thirds of the funds would be used for construction while the rest would serve to restructure debt. Most of China's rail lines, and in particular the high-speed lines, are operating at a loss. In order to encourage investment, in particular in the form of green bonds, the government has announced that it will extend a tax break on bonds issued by the CRC for a further two years⁹⁷, demonstrating its willingness to support the development of green bonds.

In line with this, in December 2015, the People's Bank of China released the Green Financial Bond Directive, intended to outline standards on how to use green bonds. It is the first regulation on the green bonds in the country, and it could help to significantly expand their use. China therefore takes the lead on the international scene, in clearly demonstrating its willingness to develop the financing of low-carbon projects using green bonds. As early as May 2015, the People's Bank of China also created the Green Finance Committee, a sign of the government's willingness to implement a sustainable green financial system. State incentive policies are essential for the development of the green bond market, as we demonstrate in the section 3.5.5.

► 1.3.5 Recommendations

As a financial instrument featuring many benefits and whose risks appear to be relatively easily overcome, green bonds are definitely set to be a part of the future of green finance and clearly appear to be one of the most effective financing solutions for the implementation of low-carbon projects and the transfer of technologies. This financial tool is definitively part of the post-COP21 agenda, the COP22 agenda which will focus on financing and, in particular, the key to the increased role of the private sector. Nevertheless, investors often remain timid, and the issuance of green bonds remains very low compared to the huge green investment needs for mitigation and adaptation purposes over the next few decades. The market is experiencing very strong growth but is still poorly regulated. Green bonds therefore still face a number of challenges, that the public authorities and the private sector must work together to solve. The overall recommendation is that of a better dialogue between market players and national and international public authorities.

- The first challenge is that of environmental integrity, which is essential in order to gain the confidence of investors and thereby lower transaction costs and encourage the use of green bonds. The lack of a single standardisation framework for procedures and criteria and the resulting risk of greenwashing are major issues. We believe that **the intervention of the public authorities is essential to support the standardisation and regulation of the market**. Despite the creation of the Green Bond Principles, they often prove insufficient when it comes to defining whether an initiative is green or not. Governments must push for the implementation of monitoring and assessment procedures and ensure the reliability of data, in close cooperation with market players. Should the market fail to regulate itself, governments must be able to intervene to implement top-down regulations⁹⁸. Some countries, such as China and India, have already put in place guidelines for the issuance of green bonds, and should be taken as an example by other governments. The central banks of each country definitely have a role to play, in cooperation with governments, in establishing criteria for labelling requirements⁹⁹. In addition, a **process to establish standards and global criteria for green bonds could be implemented by global rating agencies**. This would provide a guarantee and a more solid form of insurance for investors, particularly in unstable areas (Baily, 2015). International institutions also have their role to play in the establishment of guidelines and the regulation of the green bond market. The Green Climate Fund's Private Sector Facility could play this role (Baily, 2015).

⁹⁶ www.chinabond.cn

⁹⁷ <http://www.reuters.com/article/china-railway-bonds-idUSL3N1BP1P8>

⁹⁸ I4CE, 2016

⁹⁹ IRENA, 2016

- The other major challenge is the **growth of the market**, by increasing the pipeline of projects and reducing the cost of capital for green projects. Today, green bonds are essentially used to repackage projects, or are the result of labelling bonds that could have been issued as conventional bonds. New forms of securitisation, supported by the financial sector, are essential to promote access to the market for smaller or riskier projects (such as the off-grid solar solutions in Africa). In this sense, **the public authorities still have a role to play in the form of incentives. By providing targeted support measures to reduce the costs associated with green bonds** (tax breaks, grants, etc.), they can encourage green investment and, in the long term, fulfil their own climate objectives¹⁰⁰.
- The use of **credit enhancement**¹⁰¹ can also be recommended for green bonds. This type of programme is already used to help small and medium-sized companies for example, but remains all too rare in the climate sector despite the fact that it could easily be applied to low-carbon investment projects to reassure and encourage investors. In this vein, the European Union's Project Bond Initiative allows the European Investment Bank to use credit enhancement for green bonds issued by companies for infrastructure projects, and its role could be widely developed¹⁰².
- Among the various forms of green bonds, **the development of green asset-backed securities is a priority in order to expand the use of green bonds for smaller green projects**. These securities allow the aggregation/grouping of assets, and therefore access to institutional investors for small-scale projects. They also allow banks to move loans for green projects off their balance sheet, by restructuring and reselling them to investors in the form of financial securities, thus encouraging their involvement in green investment. Despite a drop in popularity after the financial crisis of 2008, today asset-backed securities are encouraged by the European Central Bank in a simpler and more regulated format¹⁰³.

In parallel with these recommendations, intended to instigate an increasingly bigger and stable green bond market, it is important to reflect on the merits of the **creation of innovative forms of bonds that may be considered "green"** due to the fact that they meet objectives in the areas of sustainable development, the mitigation of greenhouse gas emissions and adaptation to climate change. Abdeldjellil Bouzidi, economist, director of Emena Advisory and member of the steering committee of the Bridge Tank, and Michael Mainelli, chairman of Z/Yen, have thus come up with a new form of bond, which does not meet the standard definition of green bonds, but is fully in line with the climate goals set at the COP21: the environmental policy performance bond¹⁰⁴. This type of bond may take two forms: bonds issued by States in the form of sovereign carbon bonds, or bonds issued by companies.

1. We can see that green "conventional" bonds at fixed interest and in the private sector are experiencing significant growth, but that the COP negotiators should also consider the opportunity to capitalise on the public debt of countries to meet CO2 emission reduction objectives. **By using "Sovereign carbon bonds", they can correlate public debt with environmental performance:** the variable interest rates are indexed to countries' performance in terms of the emission reductions. The interest rate paid by these governments is much lower when the environmental objectives are met. Conversely, if the commitments are not respected, the interest rate increases. Governments are not obliged to invest the money from these bonds in green projects, and can invest it in any form of public expenditure. However, they are obliged to reduce their emissions and thus contribute to a global environmental effort which is sometimes more necessary than direct investment in a particular project.

¹⁰⁰ I4CE, 2016

¹⁰¹ Specialised financial institutions provide guarantees to public or private bodies that issue loans. The latter therefore enjoy a better rating and can thus borrow more easily and ensure better returns for investors.

¹⁰² Kidney, Sonerud, 2015

¹⁰³ Kidney, Sonerud, 2015

¹⁰⁴ <http://www.strategie.gouv.fr/actualites/environmental-policy-performance-bonds>

2. Bonds that are indexed to environmental performance can also be issued by companies. Abdeldjellil Bouzidi and Michael Mainelli suggested this mechanism at the time of the Volkswagen emissions scandal which revealed that the company had tampered with nitrogen oxide testing, addressing it more broadly at the automotive giants that regularly transgress objectives in terms of harmful emissions¹⁰⁵. These firms could be forced to issue this type of bond (NOx bonds for example) in order to enter the national markets. The bond interest rate would be linked to an objective to reduce NOx emissions. Failure to meet this objective would entail the payment of higher interest to investors. The advantage is twofold as they encourage efforts to limit pollution, while allowing the car industry to regain the confidence of investors and customers.

These last two examples show that, ultimately, green finance is not a static issue. In addition to existing and effective tools, new innovative tools will surely emerge in order to meet the objectives established by the international community under the United Nations Framework Convention on Climate Change. **Financial innovation across all sectors will undoubtedly be one of the key factors in ensuring the commitment of all players to these ambitious and pressing objectives**, but it will also be key in aligning the interests of the North countries with those of the South, polluting countries and victim countries, countries with the necessary means of financing and countries in need of financing solutions.

► 1.4 Intellectual Property: a means of reducing the level of risk perceived by investors

As already indicated, the increase in investment in green technologies, irrespective of the financing mechanism used (bonds, investment funds, etc.), is often hampered by the fact that, for different reasons, investors view this form of investment as being riskier than other more conventional investments. And any risk (whether real or not) or uncertainty is likely to deter investors.

In the area of technology transfers, investors often identify additional risks related to political, economic and also legal instability (possibility of enforcing a contract, etc.). Among these specific risks, it is widely acknowledged that the lack of intellectual property infrastructure, or its partial implementation (if any), can be very discouraging for technology holders who are considering a transfer to emerging or developing countries. As a result, there is an increased risk that the investment made to carry out the technology transfer will not be recovered due, for example, to counterfeiting¹⁰⁶.

This has also been observed in the field of clean energy infrastructure¹⁰⁷. According to a report by the OECD, a quarter of survey respondents indicated that the protection of intellectual property rights was a decisive factor in their decision to sign licence agreements and other collaborative intellectual property agreements with developing countries.

The creation of a protection system for intellectual property rights is therefore one way for developing countries and emerging economies to reduce the level of risk perceived by investors and to promote investment aimed at transferring green technologies¹⁰⁸.

¹⁰⁵ <https://www.environmental-finance.com/content/analysis/cracking-the-vw-case-with-nox-bonds.html>

¹⁰⁶ T. Santarius, J. Scheffran, A. Tricario, *North South Transitions to Green Economies. Making expert support, technology transfer, and foreign direct investments work for climate protection*, 2012, p. 19

¹⁰⁷ OECD Report: *Policy Guidance for Investment in Clean Energy Infrastructure. Expanding Access to Clean Energy for Green Growth and Development*, 2016, p 32 to 35.

¹⁰⁸ B. BIALY, *An institutional Truth: increasing institutional investor involvement in climate change* (27 *Geo. Int'l. L. Rev.* 447 2014-2015), p. 460, 461, 467, 468.

PART 2: THE GREEN CLIMATE FUND – A PROMISING FUNDING INSTRUMENT

The Green Climate Fund (GCF) is currently the focus of international negotiations as a tool designed to give emerging countries better access to green technologies.

Firstly, it should be noted that the GCF is not an investment fund. It is a legal entity that was created as part of the United Nations Framework Convention on Climate Change (UNFCCC) with the goal of helping emerging and developing countries finance their transition towards a sustainable economy.

The history and operating principles of the GCF are unique compared to other public finance mechanisms in the technology transfer field (see section 2.1).

However, the Fund is now at a crossroads: it must decide whether it becomes yet another funding instrument or whether it helps create a paradigm shift (see section 2.2).

If the GCF manages to carve out a place for itself among other technology transfer mechanisms, it could play an essential role in supporting transfers of technology and know-how. This raises the important questions of whether the Fund is legally able to act in the intellectual property field in particular by acquiring or applying for patents and, if so, whether there is any practical benefit in it doing so (see section 2.3).

2.1 THE GCF'S HISTORY AND OPERATING PRINCIPLES

► 2.1.1 Seven years in the making

After the Copenhagen Conference in 2009, developed countries pledged to jointly mobilise US\$100 billion per year by 2020 to support the fight against climate change in developing countries.

The following year, the GCF was created to collect and channel a large share of this climate funding (see image below), half of which should be put towards adaptation efforts.

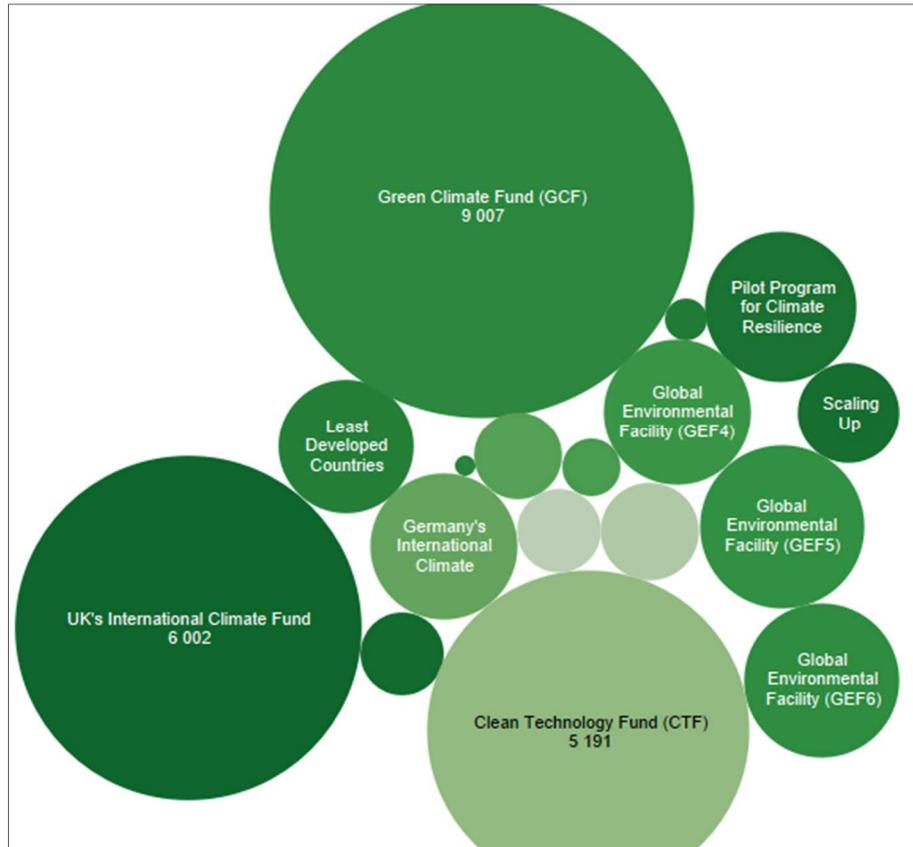


Figure 1: Size of the major climate funds based on pledges, in millions of US dollars, since 2003 (Source: <http://www.climatefundsupdate.org>)

The GCF only really commenced operations in 2015, after a long setup period. Its Secretariat is based in Songdo (South Korea). In September 2016, initial contributions had allowed it to raise US\$10.3 billion in pledged amounts for the 2015-2018 period. It has therefore been able to begin operations.

The Fund is governed by UNFCCC principles and provisions and answers to the Convention's 195 Parties. The linkages between the GCF and the UNFCCC are progressively being determined. In practice, this will mean annual meetings between the UNFCCC Secretariat, the Convention's thematic bodies, and the GCF Board.

► 2.1.2 Innovative fundamental principles

Several fundamental principles set the GCF apart from other international climate finance mechanisms (such as the World Bank, the Global Environment Facility, multilateral development banks, etc.). These principles are contained in its Governing Instrument, adopted in 2011, the terms of which are vague enough to require interpretation¹⁰⁹.

Nationally appropriate actions: This core principle involves supporting and enhancing commitments made by institutions and stakeholders on the national level, to ensure that the programmes financed are relevant and effective. The idea is that the countries concerned should define their own action priorities, as they have the best knowledge of their populations and needs.

In this respect, nationally determined contributions (NDCs¹¹⁰) are a necessary (but non-exclusive) instrument when it comes to defining mitigation and adaptation priorities.

In this area, the GCF relies on national designated authorities (NDAs), whose role is to:

- Identify priority sectors or projects in the country, especially by relying on NDCs. However, to gain direct access (see definition below), national or regional bodies must be designated by NDAs and undergo an accreditation process.
- Issue No-objection letters when intermediaries seek to submit projects.

However, as the situation stands today, decisions (to approve financing) are not made on the national level.

Direct access: In 2011, several countries raised the issue of “universal access” to the GCF. By this they meant that recipient countries should not be selected by donors (countries contributing funds), as is currently the case for other climate funds (in particular, the World Bank climate funds). Instead, recipient countries should be able to request funds directly from the GCF.

There has never really been any question of giving all of the actors involved (NGOs, the private sector, regional authorities, etc.) the ability to directly request funding from the GCF.

At present, the private sector has direct access, but local authorities/governments and NGOs do not.

Direct access by national governments is intended to support the development of nationally appropriate actions, ensure that funds go to the most vulnerable groups, and somewhat decentralise the governance of funds.

However, several obstacles exist:

- There are concerns about the mixed results obtained by the Adaptation Fund. This Fund was set up to finance projects and programmes helping populations to adapt to the effects of climate change. It was implemented in Cancun in 2010. Its main innovation was to abolish intermediaries: countries could request funds directly from the Board of the Adaptation Fund. But this process was too complex and continued to exclude the poorest countries. Direct access was not a success.
- De facto, GCF procedures rely heavily on the usual intermediaries (because, in practice, they can be accredited more quickly). These intermediaries have more interest in defending their position in the GCF than in developing direct access, which can also make it difficult to develop nationally appropriate actions.

It should be noted that direct access is also possible through regional entities¹¹¹

Since the call for accreditation applications opened in November 2014, 111 entities have requested accreditation. Forty-one have been accredited, but only 15 are direct access entities (five of these are regional entities). The other 26 are private sector or international entities. Support has been provided to help speed up the accreditation process for national direct access entities (Benin, Brazil, Cambodia, Colombia, Honduras, Kenya, Mexico, Micronesia, Niue, Pakistan, Palau and the Seychelles).

¹⁰⁹ Annexed to decision 3/CP.17.

¹¹⁰ Nationally determined contributions are the commitments made by each party to the UNFCCC as part of the global response to climate change (Article 3 of the Paris Agreement).

¹¹¹ <http://www.greenclimate.fund/partners/accredited-entities/ae-directory>

Balanced governance: At the GCF, decisions are made by a 24-member Board. The GCF Board has an equal number of representatives from developed and developing countries. It makes decisions on funding, accreditations, strategic rules and orientations, recruitment requirements for operational teams and the appointment of the Executive Director. It meets three times per year. Decisions are made by consensus, which may explain the Board's tendency to avoid risk when granting funds to date. Observers attend GCF Board meetings: two members of civil society and two private sector representatives. Observers may speak and ask questions but do not have the right to vote.

Paradigm shift: The most promising but least clear GCF principle is the "paradigm shift": The Fund will "promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their GHG emissions and to adapt to the impacts of climate change". This "paradigm shift" may be interpreted in many different ways. A number of project leaders have indicated that they still do not clearly understand the concept, or that they have difficulty in determining whether a project will bring about an appropriate "paradigm shift". Regardless of the concept's definition, the GCF's Operational Modalities will determine whether the Fund is effectively able to more efficiently combat climate change.

Three points can be mentioned here:

- First, this leads us to question the nature of the Fund: is it a "typical" development bank, a blending facility for financial instruments or a technical assistance facility? While the resources currently mobilised by the GCF amount to US\$10 billion, no contributions have been guaranteed after 2018. Developed countries will need to make further funding pledges. In any case, the amounts dealt with by the Fund will remain relatively low (at US\$2 to 3 billion per year), far below the sums handled by existing multilateral development banks. In late 2016, the GCF only had around 100 staff members¹¹², meaning it would be incapable of managing more funds¹¹³. Taking into account these constraints, the Fund's role is to finance innovative and pilot initiatives and create real added value while ensuring the best possible linkage with existing schemes. In practice, linkage with existing schemes is made possible in part by the presence of a large number of international financing institutions among the GCF's accredited entities. However, this also curbs the financial instruments mobilised and operations undertaken, as these institutions consider the Fund an "additional funding window" for projects that would have existed anyway. This is far from constituting a paradigm shift.
- Secondly, for developed countries, the issue is about better coordinating and harmonising funding to improve efficiency and increase the leverage of available funding by attracting more private investments.
- Lastly, as regards the paradigm shift, the GCF has a wide range of financial instruments at its disposal: grants, concessional loans, equity investments and guarantees. All of these instruments can be blended within a single project. This list of instruments is not exhaustive: the Fund's Governing Instrument states that financing can be provided in the form of "grants and concessional lending, and through other modalities, instruments or facilities as may be approved by the Board."

► 2.1.3 Strategic priorities: low-carbon and climate-resilient development trajectories

The GCF Board has established several priorities, using wording that is vague enough to ensure that it has considerable flexibility when identifying and implementing projects:

- ⇒ Supporting the transition towards low-carbon sustainable development trajectories through:
 - Low-emission energy access and electricity generation,
 - Low-carbon transport,
 - Energy-efficient buildings, cities and industries,
 - Sustainably managed land and forests.

¹¹² Action item GCF/B.14/14, "Report on the staffing of the Secretariat"

¹¹³ By comparison, the World Bank has been operational for over 65 years and currently has 10,000 employees and 20,000 consultants, who manage an average of US\$30 billion per year.

- ⇒ Improving the climate resilience of development models through:
 - Enhanced livelihoods for vulnerable people, communities and regions,
 - Improved health, well-being, food and water security,
 - More resilient infrastructure that addresses threats posed by climate change,
 - More resilient ecosystems.

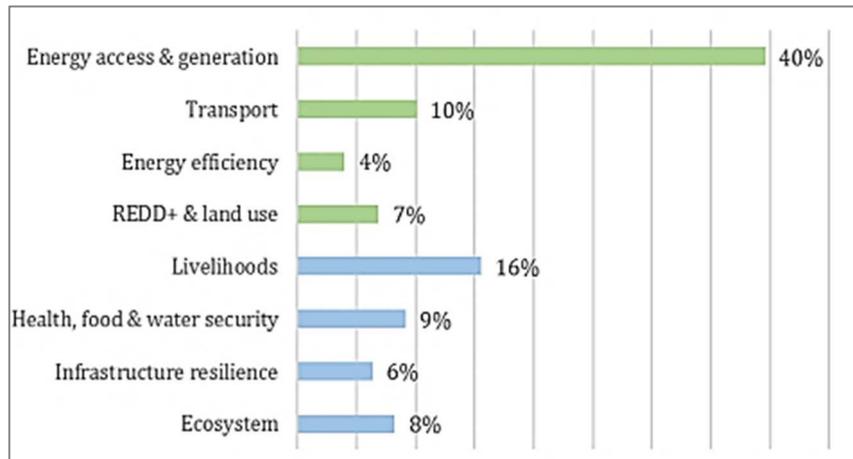


Figure 2: Total requested GCF funding by strategic priority at 10 October 2016 (source: GCF/B.14/Inf.05/Rev.01, Status of the Fund's portfolio: pipeline and approved projects)

Currently, more funding requests deal with *mitigation* (approximately two-thirds of total requested funding), with many focusing on energy access and the generation of clean electricity. Following the fourteenth GCF Board meeting, the total amount of funding allocated was relatively well balanced between mitigation and adaptation (40%/60%).

► 2.1.4 Access to funding

There are currently three ways to access funding:

- ⇒ **Direct access:** This allows developing countries to directly request funding from the GCF. Senegal used this approach when seeking to restore the productive bases of salinised lands, submitting a funding proposal through its national accredited entity, the Centre de Suivi Ecologique (CSE). Morocco adopted a similar strategy when seeking to develop argan orchards in degraded environments, submitting a funding proposal through its national accredited entity, the Agency for the Agricultural Development (ADA). Given the difficulties mentioned above, direct access is only used in 10% of all selected projects.

Specific support to accelerate direct access has been provided concerning a dozen countries; the aim is to identify capacity-building requirements. Several accredited national entities are also receiving support to develop project proposals. This support is provided by international consultants.

- ⇒ **Access through international accredited entities:** This is the most common modality used to award GCF financing, given the many international organisations in the list of accredited entities¹¹⁴. Indeed, 23 of the 25 projects to be presented to the GCF Board in the next 12 months use the international entity access approach.

This type of access enables international entities to act as intermediaries for project leaders applying for funds from the GCF, or to put forward proposals for programmes that they will co-finance.

- ⇒ **Access through specific facilities:** To accelerate operations and encourage actors to put forward proposals, the GCF is progressively implementing several mechanisms (facilities).

¹¹⁴ Five private entities have been accredited to date: three commercial banks (HSBC, Deutsche Bank and Crédit Agricole) and two NGOs (Acumen Fund and Conservation International).

In particular, the Board decided to create two facilities targeting the private sector (decision B.09/09):

- A facility designed to attract “large investors” through a pilot programme which has yet to be defined, but which could include a foreign exchange facility to cover investor risks or allow the GCF to participate in investment funds for renewable energy and energy efficiency. Up to US\$500 million will be dedicated to this initiative.
- A “private sector” facility to support very small enterprises as well as small and medium-sized enterprises (SMEs) in developing countries. Up to US\$200 million will be dedicated to this initiative, which will operate by calls for proposals.

In addition, several initiatives to support project preparation in developing countries have been grouped as part of a “readiness” facility, which can be accessed upon request by the countries concerned. Given the GCF’s requirements, assistance with activities such as financial modelling, socio-economic evaluations, technical pre-feasibility studies and mobilisation is often required. The Fund has therefore set aside US\$53 million to support project preparation by providing international technical assistance.

► 2.1.5 Linkages between the GCF and other financing mechanisms

In the climate financing field, several multilateral windows are currently providing huge amounts of funding to support technology and/or know-how transfer, but not all needs have been met¹¹⁵.

Some examples are presented in the table below:

<p>Clean Technology Fund (CTF)</p>	<p>This is one of the World Bank’s three climate investment fund windows. It focuses on financing private and public sector investment in clean technologies by providing additional capital to projects financed by multilateral development banks in around 15 countries and one region¹¹⁶. However, these funds, which generally target countries with high mitigation potential, have mostly been granted to emerging or middle-income countries. Five beneficiaries have received 54% of the US\$4.6 billion disbursed since 2008 (in order: Morocco, India, Mexico, South Africa and Turkey).</p> <p>Most funding has focused on large-scale infrastructure for the generation and distribution of renewable energy electricity (geothermal, solar and wind energy), or projects supporting industrial energy efficiency (especially in urban public transport). The nature of the fund has resulted in limited investment in small-scale projects.</p> <p>The CTF’s resources have now been exhausted, but discussions are underway for a “CTF 2.0”. This has raised questions as to the Fund’s action priorities and financing modalities¹¹⁷.</p>
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¹¹⁵ There are many different initiatives and the landscape is very fragmented. See *Sustainable Development and Intellectual Property, Access to Technologies in Developing Countries* by Guillaume Henry, Joël Ruet and Matthieu Wemaere (p. 121 onwards). In this paper, we have only focused on the largest initiatives in terms of total funding. See also: www.climatefundupdate.org and the websites of multilateral institutions.

¹¹⁶ Colombia, Egypt, Indonesia, Kazakhstan, Mexico, Morocco, South Africa, Thailand, Turkey, Ukraine, Vietnam, the Philippines, Nigeria, India, Chile and the MENA region (including Algeria, Egypt, Jordan, Morocco and Tunisia).

¹¹⁷ The CTF Trust Fund Committee put forward a strategic direction document which suggested adopting an enhanced programmatic approach to better focus efforts in geographical and sectorial terms. It also proposed two new financing modalities: CTF Green Markets and a Risk Mitigation Facility. CTF Green Markets would issue green bonds in international capital markets to finance new CTF projects. The Risk Mitigation Facility would be implemented to “scale up mobilisation of local and international private capital for clean technology projects through provision of risk mitigation guarantees”.

Source: Bretton Woods Project, *CFs Monitor 13*, June 2016

<p>Special Climate Change Fund (SCCF)</p>	<p>The Special Climate Change Fund (SCCF) was created in 2001 by the Global Environment Facility (GEF) to address the specific needs of developing countries, especially the least developed countries (LDCs). It is supposed to cover incremental costs related to climate change and includes two funding windows: i) adaptation and ii) technology transfer. At the end of 2015, US\$350 million had been disbursed; it has granted financing to 75 projects in widely varying fields: natural resource management, agriculture, health, coastal zone management, etc. The SCCF focuses on strengthening the capacity of beneficiaries to adopt and use new technologies for adaptation and disaster-risk reduction.</p>
<p>Sustainable Energy for All (SE4ALL) Technical Assistance Facility</p>	<p>The goal of this technical assistance facility, which has a €22 million budget mobilised by the European Union, is to help partner countries develop public policies and regulatory frameworks that boost investment in the energy sector. It offers assistance in several fields:</p> <ul style="list-style-type: none"> Policy reform by helping countries to develop national action plans, legislation and regulations, Capacity building in the field of renewable energy technologies, Investment planning, Fund mobilisation and partnerships to maximise leverage, Industrial and technological cooperation by helping countries to establish regional networks. <p>The Facility is therefore primarily intended to complete investment preparatory studies, but also to support know-how transfer on the institutional and technical levels.</p>
<p>Global Energy Efficiency and Renewable Energy Fund (GEEREF)</p>	<p>GEEREF is a public-private partnership designed to maximise private sector financing by leveraging public sector funds mobilised by the European Commission and managed by the European Investment Bank. It invests in private equity funds that specialise in financing small and medium-scale projects run by SMEs in the fields of energy efficiency and renewable energy in developing and emerging countries.</p> <p>It places special emphasis on small hydro, biomass, cogeneration, on-shore wind, photovoltaics, etc.</p> <p>GEEREF seeks to establish a diversified portfolio that meets the following targets:</p> <ul style="list-style-type: none"> 30% high-risk investments (in LDCs and/or small-scale projects), 50% medium-risk investments: large or medium-scale projects in the renewable energy or energy efficiency fields in medium-income countries, 20% low-risk investments: medium or large-scale projects in the renewable energy or energy efficiency fields in emerging countries. <p>The Fund's priority is investing in small-scale projects, as these are often overlooked, and in countries seeking to effectively mobilise the private sector.</p> <p>It is capitalised with US\$160 million for the 2008-2023 period. Its resources are therefore relatively limited.</p>

Partnership for Market Readiness (PMR)	<p>Founded in 2011, the PMR is a partnership between developed and emerging countries, managed by the World Bank. It provides grants and technical assistance to help implement market instruments supporting mitigation efforts. Its initial focus was to establish a favourable environment for carbon markets. With funds of US\$110 million, it also aimed to support South-South and North–South exchanges and collective knowledge creation, thus fostering innovation in relevant market instruments. Fifteen countries have been selected: Brazil, Chile, China, Colombia, Costa Rica, India, Indonesia, Jordan, Mexico, Morocco, South Africa, Thailand, Turkey, Ukraine and Vietnam.</p>
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While existing funds address several challenges, they provide little or no support to certain geographic areas and some aspects of technology or know-how transfer. For example, this is the case of the transfer and acquisition of effective renewable energy technologies in LDCs. It should also be noted that, once again, the focus is on mitigation rather than adaptation, even though the latter also requires technology and know-how transfer. To make financing policies more consistent and understandable, some existing funds could (and should) be absorbed by the GCF. In the long term, this could help the GCF define its role in terms of technology transfer.

► 2.2 The current challenge: business as usual or a paradigm shift?

Today, the GCF is at a crossroads. Seven years after it was officially created, it is under pressure due to the different expectations it gave rise to.

This situation has arisen because each party to the Convention had their own, often divergent, hopes for the newly created fund. These hopes centred on the establishment of new governance modalities with respect to existing funds or development banks; the implementation of innovative approaches, especially in the field of adaptation; and the Fund’s ability to provide guidance concerning the consultation of stakeholders, communities and indigenous populations.

Several factors have curbed the GCF’s ability to innovate and bring about a “paradigm shift”:

- First, the GCF Board must make all decisions by consensus. While this ensures that all members are in favour, it also means that decisions often only support the lowest common denominator.
- Secondly, most multilateral development banks (and accredited commercial banks) are averse to risk, given their need to maintain good credit ratings on the markets¹¹⁸. By accrediting mostly international entities, which are often able to submit funding proposals faster than national entities, the GCF risks only financing low-risk projects: large-scale investments with lower transaction costs than small-scale projects, and which to a large extent use existing operating methods and focus on lower risk countries¹¹⁹. According to a report published by IIED and HIVOS in June 2016, only 3% of international climate funding is used for projects supporting decentralised electricity access. Meanwhile, 40% of funding goes towards the energy sector, with most of it being spent on large-scale electricity grid extensions in medium-income countries¹²⁰. It is therefore unsurprising that, at the fourteenth GCF Board meeting in October 2016, three of the ten projects selected focused on energy infrastructure and electricity generation, and were granted nearly 75% of all financing.
- Lastly, by turning to the private sector to leverage investments, the GCF creates favourable market conditions for climate-compatible investments. While this approach is highly useful in reducing risks for the local private sector, it also provides possibly unnecessary support to multinational enterprises. These companies are given – at little cost – “green bonuses” on investments that they probably would have made anyway, given global market trends (and the goals of the Paris Agreement).

¹¹⁸ See Neha Rai’s blog, IIED: <http://www.iied.org/green-climate-fund-will-vulnerable-be-overlooked-rush-spend>.

¹¹⁹ See above. The GCF Secretariat anticipates that approximately 90% (in monetary terms) of the activities considered for financing in 2016 will be proposed and managed by international entities.

¹²⁰ IIED is the International Institute for Environment and Development. Rai, N., Best, S. and Soanes, M. 2016, [Unlocking climate finance for decentralised energy access](#). IIED, London.

Furthermore, in terms of transparency and environmental and social safeguards, the GCF has not brought about a paradigm shift, despite making progress in several fields. In this respect, two points must be raised:

- The National Designated Authority (NDA) must issue a No-objection letter for any project to be implemented in the country before this project is submitted to the GCF Board. However, the GCF has not established minimum standards for NDA practices. Recommendations do exist, but there are no obligations in terms of stakeholder consultation, especially regarding affected communities and indigenous populations.
- Information on funding proposals must be made publicly available on the GCF website at least 120 days before the project is examined by the Board. However, the haste created by the need to quickly disburse funds has led to this innovative rule being broken. In addition, the information published by the GCF is not detailed, meaning that civil society cannot accurately evaluate each proposal. Furthermore, project descriptions published by the GCF do not mention the ways in which know-how and technologies will be transferred.

“Business as usual” is therefore a real possibility, especially given that the international community is pressing the GCF to work faster. At 15 October 2016, seven years after the Fund was created, only 17 projects and programmes had been approved, representing a total of US\$1.2 billion.

2.3 TECHNOLOGY AND KNOW-HOW TRANSFER

► 2.3.1 The GCF’s role in technology transfer

The GCF’s Governing Instrument states that the Fund will finance full and incremental costs for activities enabling and supporting action on adaptation, mitigation, technology development and transfer, capacity-building and the preparation of national reports by developing countries¹²¹. The Board shall also “ensure adequate resources for capacity-building and technology development and transfer”, and “resources for innovative and replicable approaches”¹²².

One of the GCF’s main roles is therefore to facilitate access to technology, especially during the first stages of the technology development cycle. This is conditional on the technology being characterised by the highest levels of ambition, and being replicable or instrumental in bringing about fundamental changes in individual behaviour and/or investment patterns.

So far the GCF has suggested enhancing its activities by:¹²³

- Helping countries identify technology options, building on Technology Needs Assessments (TNAs, technology needs expressed by countries where countries choose to do so),
- Supporting the development of “technology” components in project proposals through the Project Preparation Facility (PPF).
- Encouraging technology transfer by financing projects and programmes,
- Dedicating resources to collaborative R&D initiatives for developing countries,
- Strengthening existing connections to thematic bodies, including the Technology Mechanism, through enhanced cooperation,
- Enhancing collaboration with other climate finance delivery channels on technology-related matters.

However, these goals must be further defined and must be operationalised, as discussed during the fourteenth GCF Board meeting¹²⁴.

¹²¹ Paragraph 35 of the Governing Instrument.

¹²² Paragraph 38 of the Governing Instrument.

¹²³ GCF/B.14/02/Par. 14, 30 September 2016.

¹²⁴ GCF/B.14/02, “Support for facilitating access to environmentally sound technologies and for collaborative research and development”

- The GCF also aims to support collaborative R&D in developing countries, acknowledging that “the benefits of research and development can help countries to address their climate and sustainable development in the longer term.”¹²⁵ R&D funding proposals are therefore encouraged. The Board suggested a non-exhaustive list of possible activities, which included:

- (a) GCF innovation funding to stimulate local/regional interest and investment through requests for proposals,
- (b) Promoting micro-finance for research and development projects in developing countries,
- (c) Working with governments to strengthen national innovation systems,
- (d) Facilitating the establishment of research centre networks on environmentally sound technologies,
- (e) Catalysing research partnerships with relevant stakeholders, including collaboration with the private sector.

To achieve these goals, the GCF put forward several possibilities, including business incubation, financial support for the deployment of viable new technologies in developing countries, and capacity-building programmes to improve local know-how¹²⁶.

- A key issue is ensuring linkages and consistency with the UNFCCC’s two technology transfer bodies, the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN).

The origin of the TEC and CTCN can be traced back to the Bali Action Plan in 2007. This plan sought to structure negotiations on a climate agreement for after 2012. It suggested developing “Effective mechanisms and enhanced means for the removal of obstacles to, and provision of financial and other incentives for, scaling up of the development and transfer of technology to developing country Parties in order to promote access to affordable environmentally sound technologies.”¹²⁷

In December 2009, at the Copenhagen Conference, the Parties agreed to create a new “Technology Mechanism” which would formally be established under the UNFCCC through the Cancun Agreements adopted in 2010.

The role of this mechanism, which reports to the Conference of the Parties (COP)¹²⁸, is to “accelerate technology development and transfer in support of action on adaptation and mitigation”¹²⁹. The mechanism consists of a Technology Executive Committee (TEC) and a Climate Technology Centre and Network (CTCN). The organisation, structure and procedures of these bodies were progressively determined by the COPs.

The goal of the TEC is to establish policy guidelines and recommendations for technology development and transfer to make the Technology Mechanism more operational. These policies are then submitted to the COP. The CTCN’s goal is to encourage technological collaboration and provide technical assistance at the request of developing countries. This assistance is tailored to these countries’ capacities, situations and priorities, so that they are better able to identify their technological needs and develop and implement technological projects and strategies.

¹²⁵ GCF/B.14/02/Par. 2

¹²⁶ GCF/B.14/02/Par. 26

¹²⁷ Dec. 1/CP.13 Bali Action Plan.

¹²⁸ The TEC and the CTCN must regularly report to the Conference of the Parties, “through the subsidiary bodies, on their respective activities and the performance of their respective functions” (Decision 1/CP.16, par. 126).

¹²⁹ Dec. 2/CP.15

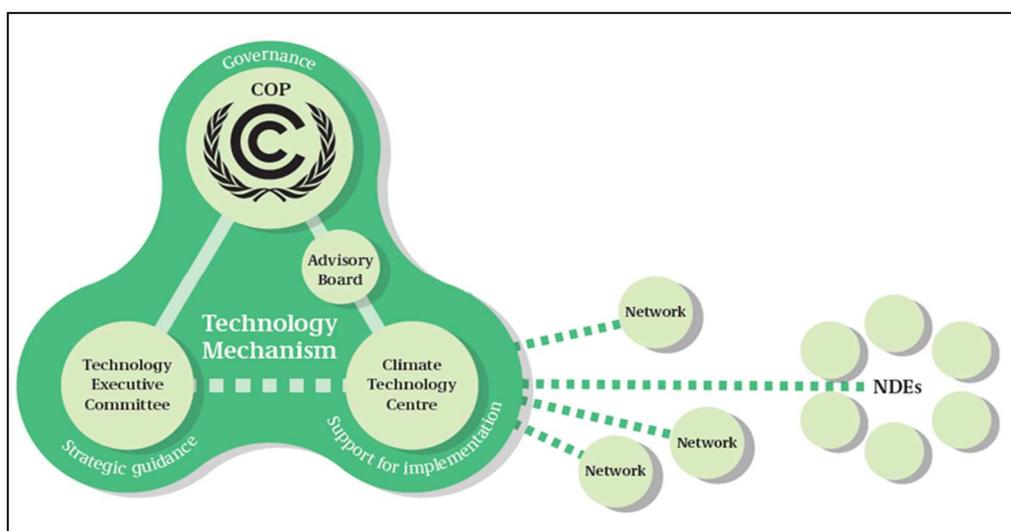


Figure 3: Technology Mechanism (UNFCCC) – Source: Climate Convention website

- Following the fourteenth GCF Board meeting, the Secretariat was asked to produce, for the seventeenth Board meeting in June 2017, recommendations for achieving better cooperation and coherence with the TEC and CTCN. These recommendations will necessarily take existing technology and know-how transfer financing mechanisms into account. This is probably a real opportunity to highlight the GCF’s potential to bring about a paradigm shift by putting forward innovative approaches to financing technology transfer.

- Instead of waiting for these principles to be defined, the GCF has already begun financing concrete actions. However, clear guidelines will probably make it easier to fill funding gaps for promising and innovative initiatives, which have often been overlooked by other climate finance and technology transfer actors. Linkage with the CTCN is also beneficial, allowing the CTCN to focus on transferring existing know-how and technology and the GCF to focus on better financing R&D in developing countries and deploying technology (from developing or developed countries). These issues will probably play a key role in whether or not the GCF is able to bring about a “paradigm shift”. The GCF Board should therefore adopt an ambitious approach.

- Interestingly, intellectual property is never mentioned as a potential barrier to technology transfer – intellectual property does not even appear in strategic documents on technology transfer. At the fourteenth meeting of the GCF Board, when technology transfer appeared high on the agenda, only Kamal Uddin Ahmed from Bangladesh underlined the importance of intellectual property, arguing in favour of the GCF supporting the acquisition of intellectual property rights.

► 2.3.2 Examples of GCF actions supporting technology and know-how transfer

Firstly, it should be recalled that the GCF only really began operating in late 2015. Examples of projects financed by the Fund and its methods are therefore limited. However, a brief overview of existing initiatives enables us to draw a few conclusions as to its action strategy. It should also be remembered that the information published on projects financed is not detailed. As a result, it can be difficult to understand the operating methods for different activities.

The GCF has selected a number of projects that support the transfer of know-how and equipment, mentioning the importance of adapting technologies and practices to needs in the field. Several of these projects focus on providing incubation support to businesses developing and diffusing low-carbon technologies, and on creating favourable conditions for investing in and diffusing clean, climate resilient technologies (this includes strengthening the capacity of distribution and maintenance networks). The duration of these projects, which is relatively long (five years minimum), means it is possible to provide medium-term support to businesses.

However, technology transfer is only discussed in vague terms in the project documents that have been made public. This seems to indicate that these projects are mostly vectors for importing technologies from developed countries.

The notion of intellectual property never arises.

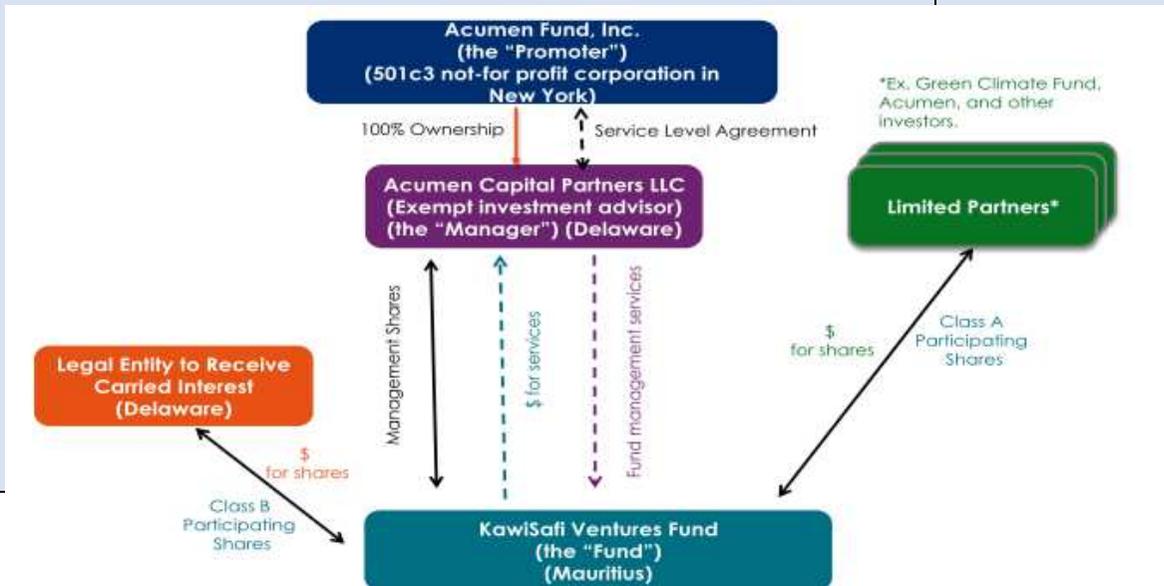
The table below shows all of the projects that have been approved by the GCF. It also lists technology transfer activities and approaches when these are mentioned in project documents. Relatively innovative projects that are relevant for this study are highlighted in blue.

Project name	Brief description	Budget (including GCF financing)	Technology transfer activities
<p>FPO01 - Building the Resilience of Wetlands in the Province of Datem del Marañón, Peru¹³⁰</p>	<p>This project, submitted by the Peruvian Trust Fund for National Parks and Protected Areas (PROFONANPE), aims to enhance the adaptation capacities of wetlands indigenous communities living in Peru’s Datem del Marañón province. This ecosystem is a substantial carbon reservoir.</p> <p>The project seeks to (a) facilitate the participatory preparation of land-use plans; (b) entrust local communities with the management of natural resources and empower women in the decision-making process; and (c) strengthen and expand viable and sustainable commercial use of natural resources.</p>	<p>US\$9 million (US\$6.2 million from the GCF)</p> <p>Duration: 5 years</p>	<p>This project aims to promote innovation by identifying and developing sustainable “bio-businesses” (<i>aguaje</i> oil and pulp production, meat and fish production and transformation, latex production, production of medicinal treatments, etc.) One of the goals is to use renewable energy in production and transformation processes: lighting, cold storage and freeze-drying. Bio-businesses will receive technical assistance and support from scientists to improve and assure the quality of their final products.</p> <p>Some support will be provided by the Republic of Korea, especially in terms of solar photovoltaic and cold storage technology. It will carry out technical studies, install equipment, perform maintenance, and provide training to local engineers so they can use and maintain this equipment.</p> <p>However, there is no mention of intellectual property rights issues that may arise in connection with products developed by these “bio-businesses”.</p> <p>Roughly US\$1.8 million will be allocated to this support component.</p>

<p>FP002 - Scaling Up the Use of Modernized Climate Information and Early Warning Systems in Malawi¹³¹</p>	<p>This project, submitted by the UNDP (access via an international entity), aims to enhance Malawi's hydro-meteorological capacity in order to improve its early warning and forecasting systems, in particular for smallholder farmers and fishermen.</p> <p>It aims to improve data acquisition by installing high-performance collection systems and to build the capacities of government engineers and technicians so they are able to better process data and produce relevant and useful information for local actors. The project also aims to enhance local disaster risk-reduction capacities.</p>	<p>US\$16 million (US\$12 million from the GCF) Duration: 6 years</p>	<p>Most technology transfer activities focus on expanding the coverage of high-performance meteorological and hydrological infrastructure throughout the country. However, operating methods are not particularly innovative, given that this equipment will be supplied, installed and maintained by companies selected on the basis of international requests for proposals (open to local companies), according to the project document. Technicians will be trained on operating and maintaining equipment.</p> <p>The project also focuses on know-how transfer, by building capacity in the data modelling and forecasting fields. However, no information on operating methods is available: it is likely that private sector international experts will be called on.</p>
<p>FP003 - Increasing the resilience of ecosystems and communities through the restoration of the productive bases of salinized lands¹³²</p>	<p>This project, submitted by the Centre de Suivi Écologique for the Senegalese Government, seeks to minimise salinisation and to restore salinised lands using appropriate agricultural techniques and affordable technologies that can be easily replicated and maintained by local actors themselves.</p>	<p>US\$8.2 million (US\$7.6 million from the GCF) Duration: 4 years</p>	<p>This project involves transferring simple, low-cost techniques (planting halophilic trees, etc.) and equipment (anti-salt dikes, embankments, etc.). Equipment may be implemented directly by communities or local businesses.</p> <p>The planned techniques and equipment are based on work completed by several research institutes (including Senegalese institutes) and build on previous projects.</p>

<p>FP004 - Climate Resilient Infrastructure Mainstreaming (CRIM)¹³³</p>	<p>This project, submitted by the Kreditanstalt für Wiederaufbau (KfW), aims to systematically integrate climate issues into decision-making regarding infrastructure planning and operations by the Local Government Engineering Department (LGED) of three coastal districts in Bangladesh. The LGED is responsible for a significant share of public investment in infrastructure (roads, public buildings, canals, etc.). The project aims to strengthen the capacities of local stakeholders and to undertake pilot climate-resilient infrastructure projects (such as cyclone shelters and roads).</p>	<p>US\$80 million (US\$40 million from the GCF) Duration: 6 years</p>	<p>No technology transfer is envisaged as such. Instead the focus is on providing strong support in terms of methodology and the development of national climate-compatible standards, especially for public procurement.</p>
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<p>FP005 - KawiSafi Ventures Fund in East Africa¹³⁴</p>	<p>This is the first project submitted by a private stakeholder to be approved by the GCF Board. It was submitted by the Acumen Fund, a non-profit impact investment fund. Founded in 2001, it mainly invests in SMEs in developing and emerging countries.</p> <p>The project plans to create a new investment fund, KawiSafi, to boost the diffusion of decentralised solar power generation units in East Africa. The Fund, with a targeted US\$100 million total size, will invest in 10 to 15 companies (between US\$2 to 10 million per company), starting in Rwanda and Kenya. Two thirds will be dedicated to companies that already develop large-scale energy access solutions, such as solar lanterns, solar home systems and solar mini-grids. The remaining third will be used to help develop the markets. A technical assistance facility will be set up to support businesses funded by KawiSafi in order to gradually improve their viability.</p>	<p>US\$110 million (US\$25 million from the GCF) Duration: 12 years</p>	<p>Although not formally specified in the project document, the technology supported appears to be developed and produced locally. However, that’s not to say that the local subsidiaries of foreign companies (of emerging or developing countries, for example) won’t be added to the Fund’s portfolio. Technology transfer, where there is any, will be South-South oriented.</p> <p>However, the project document makes no mention of intellectual property rights issues that may arise in connection with products developed by the businesses supported.</p>
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FP006 - Energy Efficiency Green Bonds in Latin America and the Caribbean ¹³⁵	This programme, submitted by the Inter-American Development Bank (IDB), aims to mobilise the private capital necessary to roll out energy efficiency projects in four countries in Latin America and the Caribbean (Colombia, Dominican Republic, Jamaica and Mexico). It seeks to do so through the issuance of partially guaranteed green bonds. It plans to raise private funds in the amount of US\$780 million.	US\$328 million (US\$22 million from the GCF) Duration: 10 years	Rather than providing for the transfer of energy-efficient technologies, this programme seeks to create a favourable environment for mass investment in existing technologies, already in use in the countries of intervention.
FP007 - Supporting vulnerable communities in Maldives to manage climate change-induced water shortages ¹³⁶	This programme, submitted by the UNDP, aims to reduce drinking water shortages in the Maldives by improving and securing the drinking water supply system for the most vulnerable households, creating water supply systems for the dry season, and improving the quality of groundwater in order to secure climate-resilient reserves in the long term.	US\$28 million (US\$23 million from the GCF) Duration: 5 years	The technologies and techniques planned under this project are not described in detail; they are merely listed as examples. It is therefore difficult to determine the nature of the technology transfers that may be carried out. They will more than likely be carried out in a commercial context with specialised companies. No specific cooperation framework is indicated. However, certified training courses, aimed at companies and specialists in water supply engineering, are expected to be set up at the Maldivian Polytechnic Training Institute.
FP008 - Fiji Urban Water Supply and Wastewater Management Project ¹³⁷	This project, submitted by the Asian Development Bank, aims to improve access to drinking water and waste water treatment. It plans to build infrastructure to increase water production by 20% (by creating a new water intake station on the River Rewa) and waste water treatment by 200% (through more modern and efficient equipment).	US\$220 million (US\$31 million from the GCF) Duration: 7 years	This is a fairly standard development project. In theory, it does not require technology transfer. Know-how transfer for the use and maintenance of the new equipment installed is nevertheless planned in the form of capacity-building sessions.
FP009 - Energy Savings Insurance (ESI) for private energy efficiency investments by Small and Medium-	This project, submitted by the Inter-American Development Bank (IDB), seeks to improve access to financing for SMEs in El Salvador. By doing so, it hopes to speed up the replacement of the energy-intensive motors and equipment (air-conditioning, refrigerators) that they are using, and to develop a new energy services market.	US\$42 million (US\$22 million from the GCF) Duration: 5 years	By providing access to financing for SMEs, this project targets existing technologies that are readily available on the El Salvador market. As a result, technology transfer is not dealt with.

Sized Enterprises (SMEs) ¹³⁸			
FP010 - De-Risking and Scaling-up Investment in Energy Efficient Building Retrofits in Armenia ¹³⁹	This project, submitted by the UNDP, aims to gradually improve the energy efficiency of residential and public buildings. This will help reduce energy insecurity among many vulnerable households and restrict the use of imported fossil fuels, which represent a huge burden on Armenia's import budget. The project will involve financial incentives for some types of owners, but also seeks to create favourable conditions for public policies and regulations to encourage the improvement of buildings and reduce the associated risk.	US\$30 million (US\$20 million from the GCF) Duration: 20 years	Energy efficiency (EE) and thermal insulation techniques are already well known and present in Armenia. As a result, this project does not involve technology transfer. Instead it relies on the mass dissemination of techniques through the creation of favourable market conditions.
FP011 - Large-scale Ecosystem-based Adaptation in The Gambia River basin: developing a climate-resilient, natural resource-based economy.	This project, submitted by the UNEP, aims to restore the degraded forests and agricultural landscapes in Gambia with climate-resilient trees and shrub species (over at least 10,000 hectares), to develop businesses linked to the sustainable use of resources, and to strengthen capacity and public policies to implement ecosystem-based adaptation practices.	US\$25 million (US\$20 million from the GCF) Duration: 6 years	The nature of this project does not involve technology transfer. Instead it involves the transfer of know-how and methodologies, across all of the planned activities. This will mainly be achieved through studies and by organising capacity building on several levels: (i) strengthening the capacity of a group of multidisciplinary national experts who will oversee the implementation of the project activities; (ii) strengthening the capacity of the local authorities for the implementation of Ecosystem-based Adaptation (EbA) protocols and of the local communities, in particular with respect to climate-resilient agricultural practices, as well as activities related to the transformation of natural resources; etc. The bulk of this know-how transfer will be carried out by the project team and through the ad hoc hiring of international and national consultants.

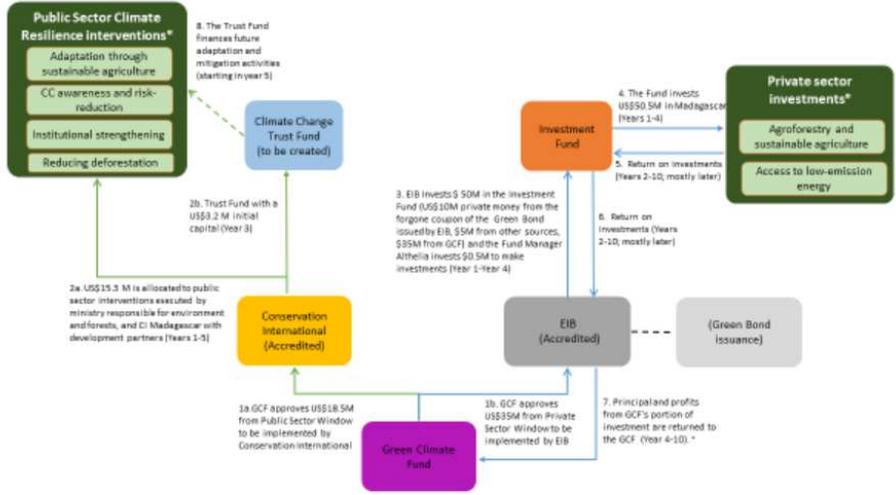
<p>FPO12 - Africa Hydromet Program – Strengthening Climate Resilience in Sub-Saharan Africa: Mali Country Project¹⁴⁰</p>	<p>This project, submitted by the World Bank, is implemented by Mali’s General Directorate for Civil Protection. It focuses on training and capacity building, and expanding and upgrading the existing hydro-meteorological observation networks. A national network of climate services will be established and flood and drought warning initiatives will be implemented at the local level.</p>	<p>US\$27 million (US\$23 million from the GCF)</p>	<p>The type and amount of equipment to be implemented will be defined during the start-up phase of the project. However, given the poor coverage of the country’s hydro-meteorological stations, the entire system will need to be upgraded with imported equipment. Despite this, there are currently no plans for a specific cooperation with one or several developed countries.</p> <p>A considerable capacity-building programme is planned, however, for the use and maintenance of the equipment, the collection and use of data, and the production of relevant and adapted climate services.</p> <p>The project will draw on the lessons learned from a number of similar programmes in Mali and elsewhere.</p>
<p>FPO13 - Improving the resilience of vulnerable coastal communities to climate change related impacts in Viet Nam¹⁴¹</p>	<p>This project, submitted by the UNDP, aims to enhance storm and flood protection for coastal communities in Vietnam through the construction of resilient housing, the planting and rehabilitation of mangrove forests, and systematised climate risk assessments for the public and private sectors.</p>	<p>US\$40 million (US\$29 million from the GCF) Duration: 5 years</p>	<p>This programme does not involve technology transfer, as most of the low-cost, resilient construction techniques are already tested locally on pilot projects. It will essentially involve the mass dissemination of these techniques by providing financial and technical support to the poorest households.</p>
<p>FPO14 – Project to support the World Bank’s Climate Adaptation and Mitigation Program for the Aral Sea Basin (CAMP4ASB),</p>	<p>This project, submitted by the World Bank, is an extension of a pilot project aimed at improving regional cooperation on climate change issues in Central Asia. It provides for the creation of an institutional platform granting access to knowledge services for climate change decision-making and increased technical assistance for climate change investments.</p>	<p>US\$69 million (US\$19 million from the GCF) Duration: 6 years</p>	<p>The transfer of know-how is planned on a regional basis in this instance, with the provision of technical assistance from one country of intervention to another.</p>

in Tajikistan and Uzbekistan ¹⁴²			
FP015 - Tuvalu Coastal Adaptation Project (TCAP) ¹⁴³	This programme, submitted by the UNDP, aims to increase the protection of so-called “high-value” coastline by improving and supplementing existing infrastructure. Besides building infrastructure, the project aims to strengthen the capacities of technicians, engineers and architects to ensure the long-term viability and sustainability of coastal protection infrastructure.	US\$39 million (US\$36 million from the GCF) Duration: 40 years	The coastal protection technology in question is already well known and documented. The question of technology transfer therefore does not arise. However, the programme does provide for know-how transfer as it will be required in order to ensure the local capacity to undertake these large-scale works and to ensure the long-term maintenance of the infrastructure. As stated in the project document, the construction of coastal protection infrastructure will be carried out by a public works company selected on the basis of an international request for proposals, which will also be open to local companies.
FP016 - Strengthening the resilience of smallholder farmers in the Dry Zone to climate variability and extreme events through an integrated approach to water management ¹⁴⁴	This programme, submitted by the UNDP, aims to restore and enhance irrigation and drinking water supply systems in the Northern and Eastern provinces of Sri Lanka. The project also aims to develop climate information to provide better and more relevant forecasting solutions for local farmers.	US\$52 million (US\$38 million from the GCF) Duration: 7 years	This programme uses technologies that are already well known and documented. The challenge remains, however, to create local market niches for these climate-resilient technologies (including adapted seeds), using the local economic fabric.

<p>FP017 - Climate Action and Solar Energy Development Programme in the Tarapacá Region in Chile¹⁴⁵</p>	<p>This project, submitted by the Development Bank of Latin America (CAF), aims to help finance the Atacama solar park (1 43MW) through the provision of loans. Indeed, the current regulations in Chile make it difficult for Chilean commercial banks to finance large-scale renewable energy projects. In addition to building the infrastructure itself, this project seeks to demonstrate the relevance and effectiveness of such infrastructure in order to facilitate future investments.</p>	<p>US\$265 million (US\$49 million from the GCF) Duration: 20 years</p>	<p>This project does not involve technology transfer given the considerable maturity of the photovoltaic market in Chile.</p>
<p>FP018 - Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan¹⁴⁶</p>	<p>This project, submitted by the UNDP, aims to improve the monitoring of 33 glacial lakes that pose a significant threat of outburst floods. It involves disseminating early warning pilot initiatives (automatic weather stations, rain gauges) and building small infrastructure intended to protect downstream communities.</p>	<p>US\$37 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting) Duration: 5 years</p>	<p>This project does not involve the mobilisation of specific technology or techniques. It focuses on improving adaptive capacity through: (i) planning and disaster risk prevention and ii) the generation and dissemination of information to guide communities in decision-making.</p>
<p>FP019 - Priming Financial and Land-Use Planning Instruments to Reduce Emissions from Deforestation¹⁴⁷</p>	<p>This project, submitted by the UNDP, aims to support the REDD+ action plan established by Ecuador in 2015. Its objectives include investing in activities designed to control agricultural expansion into forest areas, strengthening restoration and sustainable production in vulnerable watersheds and promoting tax incentives to support REDD+ activities, etc. The national objective is to achieve zero net deforestation by 2020.</p>	<p>US\$84 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting) Duration: 5 years</p>	<p>This project does not involve the mobilisation of specific technology or techniques.</p>
<p>FP020 - Sustainable Energy Facility for the Eastern Caribbean¹⁴⁸</p>	<p>This programme, submitted by the Inter-American Development Bank (IDB), aims to create a financing facility for electricity generation projects using geothermal energy in five Caribbean countries (Dominica, Grenada, Saint Kitts & Nevis, Saint Lucia and Saint Vincent & Grenadines – SVG). Geothermal energy is the largest available renewable energy resource in these five countries, which currently rely heavily on fossil fuels for electricity generation. However, it faces significant financial and technical barriers. This project aims to support several plant construction projects, on a step by step basis, by blending financial tools based on their progress. Furthermore, by</p>	<p>US\$190 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting) Duration: 8 years</p>	<p>There are currently no geothermal electricity generation units in operation in the five countries in question. The technical and technological barriers are substantial and require know-how that exists in very few countries worldwide. In the five Caribbean countries concerned, the projects will take the form of public-private partnerships (PPPs) which will be</p>

	<p>providing support to several projects at the same time, it will be able to generate economies of scale. The project also aims to strengthen the capacity of national governments so as to create a favourable environment for this type of energy.</p>		<p>majority-owned by the private companies providing the technical and management expertise required for geothermal energy. The terms and conditions will be different for each country. For example, in SVG, the PPP will take the form of a special-purpose company 25%-owned by the government and 75%-owned by the private sector (in this instance, two companies are involved: Light and Power Holdings, a regional company owned by Canadian company Emera, and Reykjavik Geothermal, a geothermal development company based in Iceland). The purchase terms and conditions for the electricity produced are not yet known.</p> <p>The North-South technology transfer under these projects is only envisaged in a business context, which does not involve favourable conditions for the developing countries concerned. This is underlined by the fact that the project does not specifically provide for capacity-building actions for local engineers and technicians. We can, however, imagine that with the emergence of a regional geothermal market, specialised training courses will need to be set up to improve these skills.</p>
<p>FP021 - Senegal Integrated Urban Flood Management Project¹⁴⁹</p>	<p>This project, submitted by the Agence française du développement (French Development Agency), aims to help the Senegalese government with its integrated flood management project in Greater Dakar. Despite a number of previous projects, which treated flooding risks in a partial or localised manner, the damage caused by flooding has becoming increasingly significant. The first objective of this project is therefore to understand the nature of the risk (using a geographical information system developed by the Ministry of Urban Renewal, Housing and Living Environment). It then plans to reduce the risk by systematically integrating the risk-reduction issue into urban planning, in addition to carrying out drainage and developing</p>	<p>EUR 71 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting)</p> <p>Duration: 5 years</p>	<p>The executing entities are all public institutions and are tasked with implementing one or several activities. They will be assisted by international expertise on an ad hoc basis.</p> <p>Technology transfer is not a key priority in this instance.</p>

	sanitation infrastructure in one of the most vulnerable areas (Pikine Irrégulier Sud). Lastly, a risk prevention component will improve the response capacity where the risk of flooding is confirmed, while a "governance" component will help improve the coordination of institutions involved in flooding issues.		
FP022 – Development of Argan orchards in Degraded Environment ¹⁵⁰	This programme, submitted by the Moroccan government through the Agency for Agricultural Development of Morocco, aims to plant 10,000 hectares of argan tree orchards for semi-intensive to intensive cultivation in order to improve the livelihoods of rural communities and increase carbon sequestration.	EUR 49 million (amount from the GCF pending the publication of decisions following the 14 th GCF Board meeting) Duration: 5 years	This project does not involve the mobilisation of specific technology and mainly relies on local expertise.
FP023 - Climate Resilient Agriculture in three of the Vulnerable Extreme northern crop-growing regions of Namibia ¹⁵¹	This project, submitted by the Namibian government, focuses on three particularly vulnerable regions in the North-East of Namibia. It aims to promote climate-resilient agriculture and encourage the use of off-grid solar energy technologies to reduce dependency on costly imported fuels.	US\$10 million (amount from the GCF pending the publication of decisions following the 14 th GCF Board meeting) Duration: 5 years	This programme provides for the creation of a climate-resilient agriculture centre of excellence to carry out R&D and build on initiatives tested in the field. The type of technology due to be tested has yet to be specified and there is no mention of partnerships with other research structures, either in the North or South.
FP024 - Empower to Adapt: Creating Climate Change Resilient Livelihoods through Community-Based Natural Resource Management in Namibia ¹⁵²	This project, also submitted by the Namibian government, aims to empower rural communities to implement actions to combat climate change. It includes two components: (a) a capacity-building and support component to develop action and investment plans at local level and (b) a component aimed at providing rural communities with direct access to financing for climate-resilient agricultural actions, climate-compatible infrastructure and ecosystem-based adaptation (average amount of grants: US\$240,000).	US\$10 million (US\$10 million from the GCF) Duration: 5 years	This project does not involve the mobilisation of specific technology and mainly relies on local expertise.

<p>FP025 - Scaling up private sector climate finance through local financial institutions¹⁵³</p>	<p>Submitted by the European Bank for Reconstruction and Development (EBRD), this programme concerns 13 countries: Kyrgyzstan, Tajikistan, Mongolia, Albania, Moldova, Montenegro, Serbia, Egypt, Jordan, Morocco, Tunisia, Armenia and Georgia. It aims to create a sustainable energy, energy efficiency and climate-resilience financing facility for the local private sector.</p>	<p>US\$1.5 billion (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting) Duration: 15 years</p>	<p>The project documents refer to technology transfer and provide an indicative list of the type of technology concerned. However, they do not specify the basic situation with regard to the acquisition of technology for each of the countries concerned nor do they explain the operating mode envisaged for technology transfer.</p>
<p>FP026 - Sustainable Landscapes in Eastern Madagascar¹⁵⁴</p>	<p>This project was submitted by Conservation International and the European Investment Bank. Its overall aim is to implement measures that enhance the resilience of smallholder farmers, reduce GHG emissions from land use and deforestation, and channel private finance into climate-smart investments in agriculture and renewable energy. It provides for the issuance of green bonds, the profits of which will be reinvested into a Climate Change Trust Fund for Madagascar.</p>	<p>US\$70 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting) Duration: 10 years</p>	 <p>The flowchart illustrates the project structure and funding flow. At the top left, a box labeled 'Public Sector Climate Resilience interventions*' lists 'Adaptation through sustainable agriculture', 'CC awareness and risk-reduction', 'Institutional strengthening', and 'Reducing deforestation'. This is linked to a 'Climate Change Trust Fund (to be created)'. Below this, 'Conservation International (Accredited)' is shown, with a note: '2a. US\$15.3 M is allocated to public sector interventions executed by ministry responsible for environment and forests, and CI Madagascar with development partners (Years 1-5)'. 'Conservation International' also receives funding from the 'Green Climate Fund' (note: '2b. Trust Fund with a US\$3.2 M initial capital (Year 3)'). The 'Green Climate Fund' is funded by 'GCF' (note: '3a. GCF approves US\$18.5M from Public Sector Window to be implemented by Conservation International'). The 'Climate Change Trust Fund' is linked to an 'Investment Fund'. The 'Investment Fund' is funded by 'EIB (Accredited)' (note: '3. EIB invests \$50M in the Investment Fund (US\$10M private money from the forgone coupon of the Green Bond issued by EIB, \$5M from other sources, \$35M from GCF) and the Fund Manager Altheia invests \$0.5M to make investments (Year 1-Year 4)'). The 'Investment Fund' is linked to 'Private sector investments*', which includes 'Agroforestry and sustainable agriculture' and 'Access to low-emission energy'. The 'Investment Fund' also receives funding from '(Green Bond Issuance)'. The 'Investment Fund' is linked to 'EIB (Accredited)'. The 'EIB (Accredited)' is linked to '(Green Bond Issuance)'. The 'EIB (Accredited)' is linked to 'GCF' (note: '7. Principal and profits from GCF's portion of investment are returned to the GCF (Year 4-10)'). The 'EIB (Accredited)' is linked to 'Investment Fund' (note: '4. The Fund invests US\$50.5M in Madagascar (Years 1-4)'). The 'Investment Fund' is linked to 'Private sector investments*' (note: '5. Return on investments (Years 2-10; mostly later)'). The 'Private sector investments*' is linked to 'EIB (Accredited)' (note: '6. Return on investments (Years 2-10; mostly later)').</p>

<p>FP027 - Universal Green Energy Access Program¹⁵⁵</p>	<p>This project, submitted by Deutsche Bank, covers five Sub-Saharan countries (Benin, Kenya, Namibia, Nigeria and Tanzania). Its objective is to create an investment fund for off-grid renewable electricity systems (solar home systems), mini-grid renewable electricity systems, and medium-capacity electricity installations for industrial use. Various means of financing are envisaged, such as microcredit (activated via mobile payment) for solar home systems.</p>	<p>US\$500 million (amount from the GCF pending the publication of decisions following the 14th GCF Board meeting)</p> <p>Duration: 15 years</p>	<p>This project does not involve the transfer of renewable energy technologies. Instead, it aims to grow demand and to create a favourable environment for mass investment in existing (and often imported) technology that is already used in the countries of intervention. However, the project contributes to know-how deployment on these technologies through the creation of a services market for clean energy facilities.</p>
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¹³⁰ Source: <http://www.greenclimate.fund/-/building-the-resilience-of-wetlands-in-the-province-of-datem-del-maranon-peru?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³¹ Source: <http://www.greenclimate.fund/-/scaling-up-of-modernized-climate-information-and-early-warning-systems-in-malawi?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³² Source: [http://www.greenclimate.fund/-/resilience-increase-of-ecosystems-and-communities-through-restoration-of-the-productive-bases-of-salinized-](http://www.greenclimate.fund/-/resilience-increase-of-ecosystems-and-communities-through-restoration-of-the-productive-bases-of-salinized-lands?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

[lands?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects](http://www.greenclimate.fund/-/resilience-increase-of-ecosystems-and-communities-through-restoration-of-the-productive-bases-of-salinized-lands?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

¹³³ Source: <http://www.greenclimate.fund/-/climate-resilient-infrastructure-mainstreaming-in-bangladesh?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³⁴ Source: <http://www.greenclimate.fund/-/kawisawi-ventures-fund-in-east-africa?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³⁵ Source: <http://www.greenclimate.fund/-/energy-efficiency-green-bonds-in-latin-america-and-the-caribbean?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³⁶ Source: <http://www.greenclimate.fund/-/support-of-vulnerable-communities-in-maldives-to-manage-climate-change-induced-water-shortages?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³⁷ Source: <http://www.greenclimate.fund/-/fiji-urban-water-supply-and-wastewater-management-project?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹³⁸ Source: [http://www.greenclimate.fund/-/energy-savings-insurance-for-private-energy-efficiency-investments-by-small-and-medium-sized-](http://www.greenclimate.fund/-/energy-savings-insurance-for-private-energy-efficiency-investments-by-small-and-medium-sized-enterprises?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

[enterprises?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects](http://www.greenclimate.fund/-/energy-savings-insurance-for-private-energy-efficiency-investments-by-small-and-medium-sized-enterprises?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

¹³⁹ Source: <http://www.greenclimate.fund/-/de-risking-and-scaling-up-investment-in-energy-efficient-building-retrofits-in-armenia?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹⁴⁰ Source: <http://www.greenclimate.fund/-/africa-hydromet-program-strengthening-climate-resilience-in-sub-saharan-africa-mali-country-project?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹⁴¹ Source: [http://www.greenclimate.fund/-/improving-the-resilience-of-vulnerable-coastal-communities-to-climate-change-related-impacts-in-viet-](http://www.greenclimate.fund/-/improving-the-resilience-of-vulnerable-coastal-communities-to-climate-change-related-impacts-in-vietnam?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

[nam?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects](http://www.greenclimate.fund/-/improving-the-resilience-of-vulnerable-coastal-communities-to-climate-change-related-impacts-in-vietnam?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

¹⁴² Source: <http://www.greenclimate.fund/-/climate-adaptation-and-mitigation-program-for-the-aral-sea-basin-camp4asb-?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹⁴³ Source: <http://www.greenclimate.fund/-/tuvalu-coastal-adaptation-project?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹⁴⁴ Source: [http://www.greenclimate.fund/-/strengthening-the-resilience-of-smallholder-farmers-in-the-dry-zone-to-climate-variability-and-extreme-events-through-an-integrated-approach-to-water-](http://www.greenclimate.fund/-/strengthening-the-resilience-of-smallholder-farmers-in-the-dry-zone-to-climate-variability-and-extreme-events-through-an-integrated-approach-to-water?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

[?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects](http://www.greenclimate.fund/-/strengthening-the-resilience-of-smallholder-farmers-in-the-dry-zone-to-climate-variability-and-extreme-events-through-an-integrated-approach-to-water?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects)

¹⁴⁵ Source: <http://www.greenclimate.fund/-/climate-action-and-solar-energy-development-programme-in-the-tarapaca-region-in-chile?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects>

¹⁴⁶ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.01_-_Funding_proposal_package_for_FP018.pdf/27ae9a87-ab98-4375-bf3c-5fb32128cf01

¹⁴⁷ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.02_-_Funding_proposal_package_for_FP019.pdf/891deb19-2417-48d7-982a-da3c93470209

¹⁴⁸ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.03_-_Funding_proposal_package_for_FP020.pdf/bfb4f1a1-b719-4219-9661-93f0c71c4cc5

¹⁴⁹ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.04_-_Funding_proposal_package_for_FP021.pdf/7bfb04c5-0bfc-4306-a5a5-35e721761846

¹⁵⁰ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.05_-_Funding_proposal_package_for_FP022.pdf/1c9b8361-ad8b-4bfc-a210-cf933201aa58

¹⁵¹ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.06_-_Funding_proposal_package_for_FP023.pdf/4650680b-2f87-45f8-b89d-84eb66450410

¹⁵² Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.07_-_Funding_proposal_package_for_FP024.pdf/d7b317b2-4064-4b7d-a89b-7009352fb19d

¹⁵³ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.08_Rev.01_-_Funding_proposal_package_for_FP025.pdf/7a6b8071-3a2e-4431-8505-514fd6bb4a49

¹⁵⁴ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.09_-_Funding_proposal_package_for_FP026.pdf/934c3625-8958-41c1-a296-148915a1070e

¹⁵⁵ Source: http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.10_-_Funding_proposal_package_for_FP027.pdf/d9f23b32-a202-40d2-8e41-2b77d83bd7a5

► 2.3.3 Intervention by the GCF in the field of intellectual property?

The question arises as to whether the GCF's mandate authorises it to use intellectual property to achieve the objectives it has been set by the Conference of the Parties, and if so, in what way.

Admittedly, none of the initial projects financed by the GCF has consisted in acquiring intellectual property rights nor does any project even mention intellectual property rights.

However, the question needs to be asked as, since the creation of the GCF, a number of countries argue that its actions should focus on the purchase of technologies and, more specifically, industrial property rights (patents). This position is underpinned by the belief that patents pose a barrier to clean technologies for developing countries¹⁵⁶.

The use of funds from the GCF to acquire and use intellectual property rights raises two key questions: the first concerns the legal feasibility in view of the GCF's legal status (2.3.4.1), whereas the second focuses on the possible effectiveness of such operations given the GCF's objectives (2.3.4.2).

► 2.3.3.1 The legal feasibility of the acquisition of intellectual property rights by the GCF

In order to examine the legal feasibility of the use of intellectual property to achieve the GCF's objectives, we must first briefly consider the circumstances under which the GCF could possibly use intellectual property rights (IPR).

IPR can be acquired in various ways. In practice, the acquisition of an intellectual property right (such as a patent) can be achieved in several ways:

- Through the acquisition of an existing intellectual property right from a third party;
- Through the direct filing of a patent application following the creation of an invention. The legal basis of such a filing can take two forms: the direct creation of an invention by the GCF in a laboratory owned by it (which, in principle, is effectively excluded), or the creation of an invention based on research financed by the GCF and giving rise to the right (contractually negotiated by the GCF) for it to file one or more intellectual property rights in its name.
- Through the acquisition, from a third party, of a patent licence.
- Finally, one last option must be considered: the GCF may seek to obtain a compulsory licence, i.e. a licence granted against the will of the owner of the patent.

In order to explore these possibilities, we must first answer two key questions: (a) does the GCF have the legal capacity to own IPR? (b) does the acquisition of such rights fall within the GCF's mandate?

a. Does the GCF have the legal capacity to own IPR?

To determine whether an international organisation has the capacity to take practical action as a legal actor, that is to say as a legal person, we must first determine whether they have "juridical personality" and identify the scope of their potential "legal capacity".

In international public law, an organisation with juridical personality is an entity that can legally possess certain rights and obligations and that can take legal action to protect its rights at international level. In concrete terms, an international organisation with juridical personality, may (i) negotiate and conclude international treaties and agreements, (ii) initiate legal action on an international level and bring proceedings before an international court, and (iii) maintain bilateral diplomatic relations with States or with other international organisations.

In international public law, legal capacity is different from juridical personality. It makes it possible to determine more accurately the scope of intervention of an international organisation with juridical personality. It indicates the actions that such an organisation may, in practice, perform. This legal capacity most often includes (i) the capacity to conclude contracts, (ii) the capacity to acquire and dispose of movable or immovable property, and (iii) the capacity to institute specific proceedings.

¹⁵⁶ Source : http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.08_Rev.01_-_Funding_proposal_package_for_FP025.pdf/7a6b8071-3a2e-4431-8505-514fd6bb4a49

The GCF not only has *juridical personality*, it also has the *legal capacity* to perform the acts necessary for the exercise of its functions and the protection of its interests. In effect, paragraph 7 of the Governing Instrument (adopted by decision 3/CP.17 during the COP17 in Durban) indicates that in order to be able to operate effectively on an international scale, the GCF shall possess juridical personality and have legal capacity¹⁵⁷. The question therefore arises as to whether the acquisition of industrial property rights can be seen to be part of the GCF's mission.

b. Does the acquisition of IPR fall within the GCF's mandate?

The issue is to determine whether the acquisition of industrial property rights (patents) falls within the GCF's mandate. More specifically, it involves assessing whether the financing of industrial property rights (through acquisition or direct filing) is likely to fall within the mission assigned to the GCF by the Conference of the Parties.

As industrial property is a tool likely to be used by the GCF to carry out its mandate, it is normal that it is not directly mentioned in the description of its mission set out in the Governing Instrument.

It is therefore only by analysing the mandate entrusted to the GCF by the Conference of the Parties (1) and the GCF's own plan of action (2) that we can determine whether it can use the tool of industrial property.

1. The GCF's mandate focuses on encouraging technology transfers and cooperation in terms of research and development

In accordance with the Paris Agreement of 2015, the GCF's mandate has two main objectives:

- to encourage technology transfers; and
- to promote cooperation in terms of research and development¹⁵⁸.

Article 10 of the Paris Agreement is devoted to the "deployment" and "dissemination" of existing technology, as well as to "innovation and research and development"¹⁵⁷. The "Technology Mechanism" and the "Financial Mechanism" (of which the GCF is an operating entity) must support innovation in two areas:

- collaborative approaches to research and development,
- access to technology, in particular for the "early stages of the technology cycle" for developing countries.

Lastly, paragraph 6 of Article 10 provides that developing countries must receive support, including financial support, to strengthen cooperation in the development and transfer of technology.

During the COP21, the Parties also adopted decision 7/CP.21, which provides the GCF with certain guidelines for its future action¹⁶⁰. The Conference of the Parties invited the GCF to examine the measures that would facilitate access to green technologies for developing countries. It was also invited to undertake collaborative research and development work in order to enable developing countries to enhance their mitigation and adaptation measures¹⁶¹.

¹⁵⁷ Source : http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.09_-_Funding_proposal_package_for_FP026.pdf/934c3625-8958-41c1-a296-148915a1070e

¹⁵⁸ Source : http://www.greenclimate.fund/documents/20182/409835/GCF_B.14_07_Add.10_-_Funding_proposal_package_for_FP027.pdf/d9f23b32-a202-40d2-8e41-2b77d83bd7a5

¹⁵⁹ Article 10 of the Paris Agreement: "1. Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions.

2. Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognizing existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer.

3. The Technology Mechanism established under the Convention shall serve this Agreement.

4. A technology framework is hereby established to provide overarching guidance to the work of the Technology Mechanism in promoting and facilitating enhanced action on technology development and transfer in order to support the implementation of this Agreement, in pursuit of the long-term vision referred to in paragraph 1 of this Article.

5. Accelerating, encouraging and enabling innovation is critical for an effective, long-term global response to climate change and promoting economic growth and sustainable development. Such effort shall be, as appropriate, supported, including by the Technology Mechanism and, through financial means, by the Financial Mechanism of the Convention, for collaborative approaches to research and development, and facilitating access to technology, in particular for early stages of the technology cycle, to developing country Parties.

6. Support, including financial support, shall be provided to developing country Parties for the implementation of this Article, including for strengthening cooperative action on technology development and transfer at different stages of the technology cycle, with a view to achieving a balance between support for mitigation and adaptation. The global stocktake referred to in Article 14 shall take into account available information on efforts related to support on technology development and transfer for developing country Parties."

¹⁶⁰ Decision 7/CP.21, paragraph 22: the Conference of the Parties "also invites the Board of the Green Climate Fund, in line with paragraph 38 of the Governing Instrument of the Green Climate Fund, to consider ways to provide support, pursuant to the modalities of the Green Climate Fund, for facilitating access to environmentally sound technologies in developing country Parties, and for undertaking collaborative research and development for enabling developing country Parties to enhance their mitigation and adaptation action".

¹⁶¹ Paragraph 38 of the Governing Instrument for the Fund provides that the Board shall ensure adequate resources for capacity-building and technology development and transfer. The Fund will also provide resources for "innovative" and, more specifically, "replicable" approaches: Governing Instrument for the Green Climate Fund adopted during the COP17 on 11 December 2011 in Durban (South Africa), decision 3/CP.17.

2. The GCF's action plan in terms of technology transfer and research and development

On 30 September 2016, the GCF Board published a document in which it identifies, in a more precise manner, a number of ways in which it can implement the guidelines set by the Parties under the Paris Agreement¹⁶².

Paragraphs 23 to 28 address ways in which collaborative action can be taken in the area of “research and development”.

Paragraph 24 recalls that “research and development can help countries to address their climate and sustainable development in the longer term. Even though research and development as an activity poses many risks, it is only through this process that new technologies are developed and brought to the market¹⁶³” The Fund therefore insists on the need to invest in research and development and says it is ready to devote considerable investment despite the inherent risks.

Paragraph 25 states that the GCF may provide financing for research and development activities to help developing countries overcome the challenges faced in the early stages of the technology development cycle.

In order to achieve this, the Fund identifies a number of possible measures¹⁶⁴:

- promotion of micro-finance as a means of financing projects,
- working with governments to strengthen national innovation systems,
- facilitating the establishment of research centre networks in the field of green technology,
- fostering partnerships, particularly with the private sector.

The GCF examines various concrete options in relation to its intervention:

- Incubation and financial support for new technologies that could be deployed in developing countries. An incubator is designed to assist start-ups with their development and, in particular, to find funding. Incubators are generally used after a first research and development phase has resulted in a successful prototype. The incubator's role is to help support the development of the business. In this context, the private sector is likely to play a very important role by attracting investment funds (venture capital funds and business angels).
- Capacity-building programmes which will focus on knowledge sharing and training.

The GCF therefore clearly plans to fund research and development. Granted, it does not seem to intend funding basic research, but this is not unwise as the road to creating fully operational technology is long and uncertain. Nevertheless, it is often during the production phase that patentable inventions are created. The question of industrial property is therefore sure to rear its head for incubation projects in which the GCF invests¹⁶⁵.

Conclusion:

The GCF has international juridical personality and broad legal capacity as it can perform all of the legal acts required of it to achieve its mission.

Moreover, technology transfer and research and development clearly fall within the GCF's mandate.

Therefore, in principle, in the field of intellectual property there is no legal barrier to prevent the GCF from filing its own patents, jointly owning patents, or acquiring any intellectual property rights that may prove useful in carrying out its mandate.

Were it to become the owner of intellectual property rights (e.g. patents), the GCF would also be entitled to grant licences to economic stakeholders.

¹⁶² Green Climate Fund, GCF/B.14/02, 30 September 2016: “Support for facilitating access to environmentally sound technologies and for collaborative research and development”.

¹⁶³ It also indicates that project financing that helps speed up the deployment of green technologies can in itself promote research and development: “24. The benefits of research and development can help countries to address their climate and sustainable development in the longer term. Even though research and development as an activity poses many risks, it is only through this process that new technologies are developed and brought to the market. Financing of projects and programmes aimed at supporting the deployment of climate technologies can in itself promote research and development activities. Funding proposals may be brought to the Fund which identify activities to be undertaken by the accredited entities that spur research and development”.

¹⁶⁴ “25. GCF could provide financing for research and development activities and help countries tackle the challenges faced in the early stages of the technology development cycle. Some possible activities could include: (a) Competitive GCF innovation funding to stimulate local/regional interest and investment through the tailored request for proposals; (b) Promoting micro-finance for research and development projects in developing countries; (c) Working with governments to strengthen national innovation systems; (d) Facilitating the establishment of research center networks on environmentally sound technologies; and (e) Catalyzing research partnerships with relevant stakeholders, including collaboration with the private sector”. These actions by the Fund will be subject to criteria for the granting of research and development financing, such as criteria relating to the economic sector, the type of technology or the expected results.

¹⁶⁵ Industrial property can also constitute a technology transfer tool, as it is likely to reassure investors who will operate on a market. The patent provides a monopoly over a certain period of time, which can greatly increase the probability of a return on investment.

► 2.3.3.2 Under what circumstances should the GCF invest in industrial property rights?

The potential for the GCF to take action in the field of intellectual property, whether through the acquisition of patent rights or by supporting industrial property infrastructure (national or regional patent offices), covers a number of areas:

- Support of developing countries to speed up technology transfers (a),
- Support of collaborative projects in the area of research and development (b),
- Support with capacity-building activities in terms of innovation (c).

a. Technology transfer: the limited role of patents

1. Patent acquisition: efficacy issues

The acquisition of patent rights by the GCF to facilitate technology transfers could be justified in cases where patents represent a barrier to technology transfer. Indeed, the issue of patents standing in the way of technology transfer has long been debated under the Climate Convention.

As has been shown, intellectual property rights, and more specifically patent rights, do not, in the overwhelming majority of cases, represent an obstacle to the dissemination of technology in emerging countries. This is due to the fact that patents are territorial rights which, in the majority of cases, are not filed in developing countries³. Moreover, in the discussions on whether patents represent a barrier to technology access in emerging countries, to our knowledge no example of green technology has ever been provided where access has been made impossible due to one or more patents.

In light of these circumstances, financing technology transfers through the acquisition of patents does not appear to be a promising path, since the vast majority of technology can be used for free in emerging countries.

Furthermore, as indicated in a previous study, a patent licence which is not accompanied by a transfer of know-how rarely enables the licensee to properly implement the technology concerned. Therefore, should the GCF decide to acquire technology, it would no doubt be crucial for this acquisition to involve technology that can be implemented by the receiving entities in emerging countries¹⁶⁶. If the receiving entity has advanced technological knowledge, a simple patent licence should be sufficient. However, if there is a knowledge gap, no matter how minor, a transfer of know-how is indispensable.

2. Patent acquisition: legal implementation issues

In order to acquire a patent or to be granted a licence, the GCF has two main possibilities: it can negotiate the assignment of the patent or a licence with the patent owner (1) or apply to be granted a compulsory licence against the will of the patent owner (2). However, in practice, several barriers are likely to limit both scenarios.

i) The voluntary contract: a risk of endless negotiations

A voluntary contract involves the free negotiation between the parties of the terms of their agreement. In our field, it would take the form either of a patent assignment, i.e. the sale of a patent, or of a licence.

In the event of an assignment, the GCF would become the owner of the patent and could then **grant licences** to the stakeholders of its choosing, under its own conditions. Several options are possible. The GCF could, for example, allow only certain stakeholders to use the patent in the country covered by the patent, so that it is easier for them to earn a return on investment.

Another policy would be to authorise any person or organisation to use the invention free of charge, on the condition they practice reasonable prices or distribute part of their production at a very low cost. Licensees could also be contractually obliged to disclose any improvements made to the patent. The GCF could therefore adopt a kind of open-source licence approach by exercising its patent rights¹⁶⁷.

The GCF could also create a sort of community involving technology protected by one or more of its own patents. Each member could use the technology for free in a given territory, provided it practices reasonable prices. In addition, each member of the community would be responsible for sharing its know-how and its improvements with

¹⁶⁶ See: INPI study “Sustainable Development and Intellectual Property - access to technologies in developing countries”, G. Henry, J. Ruet, M. Wemaere, 2015.

¹⁶⁷ Contrary to what is often stated, open-source licences involve exercising intellectual property rights in a specific manner and are not in any way a relinquishment of said rights.

the community. This type of system could also possibly operate without the use of patents, except that the absence of a monopoly over the use of the invention (i.e. the absence of a patent) would weaken the position of each member on its market.

The barriers. A voluntary contract is by definition consensual. This means that the parties freely negotiate not just the purpose of the contract, but all of its terms and conditions. The GCF would therefore find itself in the same position as any market player negotiating the terms of a patent assignment or of a patent licence.

The negotiation of the price of the assignment or licence could be difficult, if not extremely complex, in some cases. The price requested by the assignor of the patent will depend on the extent to which it believes the GCF will use the patent. After all, the price of a commodity depends in part on the utility it represents for the purchaser.

There is therefore a non-negligible risk that the negotiation of the assignment or licence terms will get bogged down or drag out.

The economic barrier: the cost of the transaction. There is a second barrier to the GCF's acquisition of patents or patent licences and it involves assessing the actual utility of the patent purchased. This barrier is not specific to transactions carried out by the GCF. High transaction costs are a constant feature of the technology market and are the main reason a fluid and dynamic technology market does not exist. The explanation is simple: in most cases, the assignee of the technology or patent cannot know the exact interest the patent represents. More importantly, they do not know the conditions under which the technology is going to be implemented, nor the scope of the required expertise or additional investments, etc.

As a result, although the purchase of patents by the GCF is legally possible, in practice, it is likely that the negotiations will not be successful.

(ii) Compulsory licences: an ineffective means of attaining the GCF's objectives

A compulsory licence is a licence that grants a third party access to technology covered by a patent, without the consent of the holder. Compulsory licences transform the owner's monopoly into a mere right to receive payment¹⁶⁸. These licences are granted in circumstances which take precedence over the patent owner's interests.

The legal framework. Since patents are national IP rights, compulsory licences can only be provided for under national law, which in turn shall only be applicable to national patents¹⁶⁹.

Nevertheless, several international agreements govern the ability of States to establish compulsory licence regimes: the Paris Convention and the TRIPS Agreement. In other words, States that wish to incorporate compulsory licences into their national legislation must respect both the provisions of the 1883 Paris Convention and the provisions of the TRIPS Agreement.

- Article 5.A of the Paris Convention contains provisions relating to compulsory licences¹⁷⁰. These provisions are optional. Member States are free to choose whether or not they wish to transpose this concept into their national legislation.

Article 5.A.2 of the Paris Convention states that "each country of the Union shall have the right to take legislative measures providing for the grant of compulsory licenses to prevent the abuses which might result from the exercise of the exclusive rights conferred by the patent, for example, failure to work."

These provisions generally aim to prevent abuse by patent holders. There are two reasons for this. First, any right, including a property right, may always result in some form of abuse. Secondly, given that a patent is a monopoly which grants the owner the ability to obstruct the use of a technology, it is wise to guard against such abuse¹⁷¹.

168 Compulsory licences do not render patent rights completely futile as the owner retains the possibility to collect income and to generate a return on their investment. However, they remove the right to exclude competitors and prevent the patentee from developing a licensing strategy. It is therefore only when a vital public interest is at stake that compulsory licences can be justified.

169 Historically, intellectual property has been dealt with in several special international conventions such as the 1883 Paris Convention for the Protection of Industrial Property and the 1886 Berne Convention for the Protection of Literary and Artistic Works. These conventions have been amended on several occasions during diplomatic conferences. The Paris Convention was amended for the last time on 28 September 1979. Its amendment to integrate specific provisions for green technologies is rarely proposed.

170 The Paris Convention is the oldest international convention on industrial property. It has 174 Member States. In his "Guide to the Application of the Paris Convention for the Protection of Industrial Property" (BIRPI, 1969, p. 67-68), Bodenhausen outlines that the use of compulsory licences to sanction patent owners for the abuse of and, in particular, the failure to use their rights, was introduced at the 1925 Revision Conference of the Hague

171 Failure to use a patent can even lead to the forfeiture of the patent if a compulsory licence is not sufficient. Article 5.A.3 provides that: "Forfeiture of the patent shall not be provided for except in cases where the grant of compulsory licenses would not have been sufficient to prevent the said abuses. No proceedings for the forfeiture or revocation of a patent may be instituted before the expiration of two years from the grant of the first compulsory licence."

The example provided in the Convention is the failure to use or insufficient use of the invention; but it is not limiting. Member States are free to define the cases of abuse that may arise from the exercise of the patent rights. The most common examples are insufficient use on the national market and refusal to grant a licence at a reasonable price.

However, as it represents an exception to the patentee's monopoly, the Paris Convention dictates the conditions under which countries can grant compulsory licences under their national legislation. Compulsory licences for failure to use or insufficient use cannot be requested before a period of four years from the date of filing of the patent or three years from the date of its grant. This is to take into account the period required for the development and production of the invention. These licences are inevitably non-exclusive and cannot be transferred, except with the goodwill¹⁷²

- The TRIPS Agreement also contains provisions relating to compulsory licences¹⁷³. But they must be interpreted in the light of the provisions of the Paris Convention¹⁷⁴.

Article 30 authorises Member States to provide limited exceptions to the rights conferred by the patent provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties¹⁷⁵.

Moreover, Article 31 authorises Member States to provide for the possibility of granting compulsory licences with a view to the use of rights by the public authorities or third parties authorised by the latter¹⁷⁶. Such licences can only be granted if the beneficiary has made an unsuccessful attempt to obtain authorisation for the use of the patent from the owner "on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time". A competent (administrative or judicial) authority can then order the owner of a patent to grant a licence to a designated third party in return for a set fee. The conditions in order for a compulsory licence to be granted are therefore strict.

However, "in the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use", the only obligation, in order to grant a compulsory licence, is to inform the patent owner. A key question is whether environmental concerns fall under the category "of national emergency or other circumstances of extreme urgency". There is no clear answer, however, as Article 31 of the TRIPS Agreement provides that compulsory licences must be implemented based on the specific circumstances in each Member State. The difficulty lies in the fact that climate change, unlike health, has a widespread and global impact, meaning that action taken by a single State is clearly not enough and that it is a global rather than a national emergency. To our knowledge, the WTO has not provided any firm ruling on this issue. However, data drawn up by IPCC scientists would appear to indicate that the need to drastically reduce greenhouse gas emissions is likely to fall under the category of "circumstances of extreme urgency" where technology that can significantly reduce greenhouse gas emissions in a given location is insufficiently used.

Lastly, it should be noted that these compulsory licences are provided in return for payment given the "economic value" of the authorisation: the patent owner must receive "adequate remuneration"¹⁷⁷.

¹⁷² Article 5-A-4 of the Paris Convention provides that: "A compulsory license may not be applied for on the ground of failure to work or insufficient working before the expiration of a period of four years from the date of filing of the patent application or three years from the date of the grant of the patent, whichever period expires last; it shall be refused if the patentee justifies his inaction by legitimate reasons. Such a compulsory license shall be non-exclusive and shall not be transferable, even in the form of the grant of a sub-license, except with that part of the enterprise or goodwill which exploits such license."

¹⁷³ For a list of licences granted on the basis of the TRIPS Agreement (and on the basis of national texts) across all continents and in developing and developed countries, refer to: Knowledge Ecology International (KEI), J. Packard Love, "Recent examples of the use of compulsory licenses on patents", KEI Research Note 2007:2. For a list of cases of refusal to grant licences in the area of green technologies, refer to: C. Hutchison, "Does TRIPS facilitate or impede climate change technology transfer into developing countries?", *University of Ottawa Law & Technology Journal*, 2006, p. 517, spec. p. 532.

¹⁷⁴ The TRIPS Agreement does not derogate from the Paris Convention. Article 2.2 of the TRIPS Agreement provides that: "Nothing in Parts I to IV of this Agreement shall derogate from existing obligations that Members may have to each other under the Paris Convention, the Berne Convention, the Rome Convention and the Treaty on Intellectual Property in Respect of Integrated Circuits".

¹⁷⁵ In the case of DS 114, "Canada — Patent Protection of Pharmaceutical Products", the WTO dispute settlement panel defined the interpretation of the three cumulative conditions outlined in Article 30.

¹⁷⁶ It should be noted that the flexibilities provided for in Article 31 of the TRIPS Agreement are not mandatory and can be waived by the parties under so-called "TRIPS-plus" bilateral agreements. P. Arhel, "Propriété intellectuelle. Approche ADPIC-Plus : l'exemple de l'Accord de libre-échange entre les États-Unis et le Maroc", *Propriété industrielle*, January 2008, p. 14. P. Arhel, "Le projet d'accord de libre-échange entre l'Union européenne et l'Inde : une nouvelle illustration de l'approche ADPIC-Plus", *Propriété industrielle*, February 2010, p. 15.

¹⁷⁷ Article 31 of the TRIPS Agreement has a general scope. It is not limited to a particular area.

- **The legal barrier: the inability to grant sub-licences.** The main barrier to the GCF being able to seek compulsory licences is the fact that it is not intended to directly use patents or technology. The GCF would therefore need to make two requests: to obtain a compulsory licence for a patent and the authorisation to grant sub-licences to various users.

The problem is that the option of granting sub-licences is not provided for in international agreements. On the contrary, under the Paris Convention and the TRIPS Agreement, licences are personal rights granted to an industrialist so that they can use the patent themselves. This licence is not transferable.

Article 5-A-4 of the Paris Convention, which is the most important text in the hierarchy of norms, actually specifically prohibits sub-licences:

“A compulsory license may not be applied for on the ground of failure to work or insufficient working before the expiration of a period of four years from the date of filing of the patent application or three years from the date of the grant of the patent, whichever period expires last; it shall be refused if the patentee justifies his inaction by legitimate reasons. Such a compulsory license shall be non-exclusive and shall not be transferable, even in the form of the grant of a sub-license, except with that part of the enterprise or goodwill which exploits such license.”

The provisions of the Paris Convention, which provide that its members cannot allow the compulsory licensee to grant sub-licences, clearly apply to compulsory licences granted due to failure to use or insufficient use. However, this ban on sub-licences is also applicable to other circumstances involving compulsory licences, as the latter are an exception to the monopoly conferred by patents, meaning that they must automatically be interpreted in a restrictive manner.

With regard to the TRIPS Agreement, as seen above, it must be interpreted in light of the provisions of the Paris Convention, since it cannot derogate from it. The ban on granting sub-licences in the case of failure to use or insufficient use must therefore be respected. In addition, the TRIPS Agreement contains specific provisions according to which compulsory licences are “non-exclusive” (Art. 31(d)) and “non-assignable” (Art. 31(e)), which means that they confer a personal right of use that cannot be extended to third parties¹⁷⁸.

Consequently, while national legislation could, in principle, allow the GCF (like any other legal person) to obtain a compulsory licence, it should not allow the GCF to grant sub-licences. Such legislation or authorisation would be in breach of the Paris Convention and the TRIPS Agreement.

The reality is that it would be pointless to grant a compulsory licence to the GCF as it would not be able to authorise anyone to use the patent.

b. Supporting collaborative action in terms of research and development: patents can play a very useful role

The GCF has indicated its desire to invest in green technologies that are not yet available on the market. It is particularly interested in acting through the intermediary of incubators, which aim to support (especially through funding) the development of existing technologies that have not yet passed the prototype stage.

Investing in the adaptation of existing technologies to the specific conditions of emerging countries. We believe that a promising option could be to invest in incubators that aim to adapt existing technologies to specific conditions (climatic, technological, geographical, etc.) in the receiving country or region. Research and development focusing on the adaptation of existing technology is particularly conducive to collaboration, since it requires a combination of both technological expertise and knowledge of the specific conditions of each country or region. In addition, it is often considered that technology owned by Western companies needs to be adapted to the specific conditions of other countries.

Filing patent applications on technology adapted to the conditions of emerging countries. In this context, the question arises as to whether it is of interest for the GCF to oversee the filing of patents on technology benefiting from financial support.

¹⁷⁸ Refer to French law: Article L.613-13 of the Intellectual Property Code (Code de la Propriété Intellectuelle): “Compulsory and ex officio licenses shall be non-exclusive. The rights deriving from such licenses may only be transferred together with the business, the enterprise or part of the enterprise to which they belong.”

In this instance, the filing of a patent can have several purposes:

- First, filing a patent in one or several countries gives the GCF the possibility to use the related technology (it can grant licences to the actors of its preference);
- Secondly, if third parties make improvements to the adapted technology, the filing of a basic patent by the GCF is of fundamental importance. Indeed, if no basic patent has been filed, the improvements made by third parties cannot be integrated in the clean technology funded by the GCF, except by negotiating a licence. By contrast, if a basic patent has been filed by the GCF, any third party who makes improvements cannot use them without the prior agreement of the GCF (i.e. the owner of the basic patent). Indeed, in principle, no improvement can be used without the agreement of the owner of the basic patent. Under these conditions, if the GCF owns a patent, it will be in a position to negotiate a cross-licence, which would make it possible to integrate improvements in the technology it supports.
- Lastly, as demonstrated in a previous study, patents also play other very useful side roles: they constitute a source of information for third parties, reassure investors and occasionally convince them to participate in a project. This last role could prove to be important for the GCF which plans to co-finance projects with private partners.

Therefore, if the GCF intends to contribute to the financing of research and development in the area of green technologies, it would certainly be in its interest to assess the options provided by patents.

In this respect, it should be recalled that patents do not necessarily imply restricted use. While patents do grant their owner a monopoly of use, the latter is free to exercise it as they see fit. For example, a patentee may authorise a third party or a category of third parties to use their invention for free. Patents can also be an effective way of encouraging third parties to grant authorisations for the use of their patents, if they themselves are dependent on other patents.

The terms and conditions of filing patent applications. In this context, the GCF should be able to file patent applications in its own name, since it has juridical personality and the legal capacity to accomplish its mandate. In most countries, a patent application can very well be filed by a person other than the inventor or the company within which the invention was made¹⁷⁹.

The challenge for the GCF will be to develop a contractual framework for the projects it will fund that will be sufficiently robust and efficient to allow it to file patents, while fostering the replication of projects.

The creation of technology user communities. After the challenge of adapting technology to the specific conditions of emerging countries, comes the challenge of replicating projects in other regions or countries. This will require creating and animating a technology user community and spreading information, regarding both the existence of this technology and its terms.

The creation of a technology user community is key to achieving the swift and widespread dissemination of projects. Members should get support from the GCF in various ways: financing, training, technical assistance, etc. The Internet should be an extremely effective tool for sharing knowledge and should especially be used to create online resource sharing programmes related to technology.

c. Contributing to capacity-building in the field of innovation: the potential of investing in industrial property structures

The GCF has indicated that it is considering investing in capacity-building in the field of innovation.

Again, the choice of investment will depend on the existing capacity in each country or region.

For countries that do not yet have mature innovation capacity, we believe that the most effective option would be for them to participate in the adaptation of existing technologies with a view to their distribution in their country, and then on a broader scale.

¹⁷⁹ By way of exception, a U.S. patent application may only be filed by the individual that created the invention. But inventors generally assign their patent application to their company.

However, for countries whose objective is to attract investors with a view to receive know-how transfers, investment by the GCF in industrial property structures (IP Offices, patent attorney communities, etc.) could be an interesting solution, bearing in mind that the main obstacle is that this type of investment can only be made over the long term.

Take the example of the African Intellectual Property Organization (OAPI), created by the Bangui Agreement of 2 March 1977. The organisation, which today has 17 member states¹⁸⁰, established a single office for receiving applications and granting industrial property rights (patents, trademarks, designs). By granting industrial property rights valid in 17 countries, the OAPI makes it possible to limit the cost of infrastructure development. In the context of the fight against climate change, were the GCF to lend its support to these resource-sharing efforts, in keeping with the dedicated regional organisations, it could help encourage local innovation systems.

¹⁸⁰ Benin, Burkina Faso, Cameroon, Central African Republic, Comoros, Congo, Côte d'Ivoire, Gabon, Guinea, Guinea Bissau, Equatorial Guinea, Mali, Mauritania, Niger, Senegal, Chad and Togo.

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