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The rise of the green bond market: how to scale up
climate private finance in the aftermath of the Paris
Agreement.

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COOPERATION AND DEVELOPMENT NETWORK



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**“The rise of the green bond market: how to
scale up climate private finance in the
aftermath of the Paris Agreement”**



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Summary

1. Introduction	1
2. The Paris Agreement.....	5
2.1 Overview	8
2.2 Financing climate actions	11
2.3 Market and mechanisms	14
2.4 The road ahead	18
3. Nationally Determined Contributions	20
3.1 Intended Nationally Determined Contributions and the emission gap.....	20
3.2 Financial needs for INDC implementation.....	21
3.3 Global investment flows and existing financial gap.....	23
3.4 The transparency framework	26
4. Green Bonds.....	29
4.1 Definitions and state of the market.....	29
4.2 The Green Bonds Principles (GBP)	32
4.3 Main actors	35
4.3.1 Institutional investors	36
4.3.2 Cities and municipalities.....	40
4.3.3 International Finance Institutions (IFIs)	43
4.4 Case studies	45
4.4.1 Green Climate Fund (GCF)	45
4.4.2 CDM Refinance Facility and Paris Climate Bond	50
5. Conclusion.....	52
References	55

Abstract

This paper aims at assessing whether the fast-growing pace and specific characteristics of the green bond market will be able to bridge the financial gap needed to cope with the threat that climate change is posing worldwide.

As the Paris Agreement has recently entered into force at COP22, countries from both developed and developing nations have now to live up to their pledges and implement their Nationally Determined Contributions (NDCs) through mitigation and adaptation actions. Considering the relevant amount of financial flows needed to support the transition towards a low-carbon and climate resilient pathway, echoes of the financial crisis together with the high capital risk of financing new technologies remain significant barriers to overcome. While public budgets and bank's lending capabilities are limited, engaging the private sector and taking advantage of the investors' increasing concern about environmental and social issues represent a concrete opportunity to tackle climate change and achieve the zero emissions target by 2100.

In the light of this, offering long-term maturities and steady income returns on capital invested, green bonds have the potential to allow the step-in of the private sector as shown by the growing appetite of both issuers and buyers, who are contributing to the rapid expansion of the market and its diversification in terms of currencies and countries involved in the process. Since most of green bonds are already rated at investment grade and their proceeds are earmarked for projects with environmental benefits, they provide an innovative way to obtain safe financial returns and a positive impact on the planet's climate. In a financial era in which many investors are starting to integrate environmental, social and governance (ESG) concerns into their investment models and to increase the

environmental footprint of their portfolio, green bonds may represent, therefore, a proper financial solution to allow individual, businesses and institutional investors to play an important role in the global climate change scenario.

In collaboration with the UNFCCC Secretariat and its Regional Centre for the Asia-Pacific region based in Bangkok, Thailand, this research is based on a thorough qualitative policy research, a systematic literature review of the most updated and authoritative sources and interviews of international experts.

It aims to shed light on innovative comprehensive approaches used to capitalize previous experiences and existing UNFCCC Financial Mechanisms, exploring potential synergies with the green bonds market, bearing in mind that more studies will need to be done in the following years before having a clear picture of its impact on climate change, being just at the initial phase of its development process.

Keywords: *Climate finance, the Paris Agreement, Green bonds, Private sector, Securitization, Nationally Determined Contribution*

1. Introduction

The 2030 Agenda for Sustainable Development (A/RES/70/1)¹, endorsed as a plan of action for people, planet and prosperity, defines a set of global goals to be achieved within the next 15 years. On top of that, climate change appears to be the single largest threat to development and, thus, the greatest global challenge we face, being diffusely spread across the world while mainly affecting the poorest and most vulnerable countries and populations. Taking urgent action to combat climate change and its impacts is what we are called on if we want to reverse the trend, moving towards a low-carbon and climate resilient development. At this respect, in 2010, aware that implementing these actions would have been required shifting trillions of dollars, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) formalised the collective climate finance goal “of mobilizing jointly USD 100 billion per year by 2020 to address the needs of developing countries... from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources” (UNFCCC, 2010), and recently confirmed this commitment through 2025.

What makes the Paris Agreement an historic turning point for humanity is that it brings together industrialized and developing nations in the common attempt to cope with the increasing impact of global warming, capitalizing a decade of political negotiations. Its ambitious target to stop the planet from warming an additional two degrees Celsius above pre-industrial levels, gathered all the 197 Parties to the UNFCCC which sign on to it, leading them to identify actions each national government intends to take accordingly. To date, 109 Intended Nationally

¹ United Nations (UN) (2015a). Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1

Determined Contributions (INDCs) have been submitted and others will follow as basis of post-2020 global emission reduction commitments included in the Paris Agreement. Nevertheless, since total global greenhouse gas (GHG) emissions in the atmosphere still increase, reaching approximately 52.7 gigatonnes carbon dioxide equivalent (GtCO₂e) in 2014², further strengthening of efforts is crucial.

While the world infrastructure investment need is estimated in the range of USD 57 trillion to USD 93 by 2030, the current infrastructure value stands at USD 50 trillion^{3 4}, indicating that USD 1 to 2 trillion per year in addition to the current level of financial flow in the energy sector alone is required to meet the 2° Celsius climate target⁵. It is, therefore, clear that the total amount of public finance mobilized at global level (USD 151 billion in 2014⁶) is still far from this considerable amount, and the urgency of an immediate response from the private sector arises.

In this context, figuring out a way to mobilize sufficient debt and equity capital to finance the transition to a low-carbon and climate-resilient economy is paramount for the future of our planet, since the private sector alone can deliver 40% of necessary emissions reduction, while lowering the world's fossil fuel bill by more than USD 2 trillion⁷. While it is clear in many cases what has to be done, raising enough financial resources to tackle climate change remains a big challenge as the world has not completely recovered from the 2007 financial crisis.

²UNEP. 2016. "Emissions Gap Report 2016". Available at: http://uneplive.unep.org/media/docs/theme/13/Emissions_Gap_Report_2016.pdf

³ World Bank (WB). 2016. "A trillion dollar opportunity". Available at: <https://www.ifc.org/wps/wcm/connect/0d9f8fbf-2738-4432-843c-05184b9546d8/LAC+1Trillion+6-13-16+web+FINAL.pdf?MOD=AJPERES>

⁴ NewClimateEconomy (NCE). 2016. "The sustainable infrastructure imperative". Available at: <http://newclimateeconomy.report/2016/>

⁵IEA. 2015. "World Energy Outlook". Available at: <http://www.worldenergyoutlook.org/weo2015/>

⁶ CPI, Climate Policy Initiative. 2015. Available at: <http://www.climatefinancelandscape.org>

⁷ European Commission. 2013. "Energy, challenges and policy". Available at: http://ec.europa.eu/europe2020/pdf/energy2_en.pdf

However, one promising trend is that climate investments are seen to augment from a relatively new and increasingly popular asset category, the green bond, which may represent an innovative, potentially attractive financial instrument to overcome the financial barrier and pave the way for the low-carbon transition.

The research, aimed to keep the momentum of the growing consensus on the green bond market, is intended to address the issue of the potential role of green bond market in scaling up climate private finance in the process.

This paper is organized as follows: Chapter 2 provides an overview of the Paris Agreement structure, focusing on major outcomes, market and non-market mechanisms and the role of climate finance. Chapter 3 draws a picture of the Intended Nationally Determined Contributions (INDCs) communicated to date, pointing out their feasibility, financial requirements, the landscape of both public and private climate finance worldwide, describing current trends and challenges, and the importance of enhancing the transparency framework. Chapter 4 introduces the green bond concept, deeply analyzing standards, main actors, envisaging potential synergies with other existing instruments and schemes. Chapter 5 finally discusses key findings, concluding with recommendations and key policy insights.

2. The Paris Agreement

2.1 Overview

The Paris Agreement concluded a decade-long struggle to agree on a universal climate agreement by all countries, resulting in a political success of climate negotiations. In fact, all the 195 Parties to the UNFCCC signed on to it in 2015, at the end of two weeks of intensive debates on issues related to global warming and anthropogenic emissions. The Agreement has officially entered into force in Marrakech since 4th of November 2016, finally ending the historical differentiation between developed and developing countries when it comes to tackle the devastating effect of climate change. The outcomes of the conference are captured in a companion decision and can be summarized as follow: long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels (and strengthening this limitation to 1.5°C); leveraging the best available science to peak significant emissions reduction as soon as possible; extending the current goal of jointly mobilizing USD 100 billion a year through 2025, with a commitment of setting a new and higher goal later on; addressing loss and damage related to the adverse effects of climate change and strengthening cooperation at the international level.

To put this in context, the enactment of Article 2 can be considered as the most positive outcome achieved by the Agreement, stating to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of

climate change” (Article 2.1a). It is true that setting out such an ambitious target could drive more powerful country actions in the future; however, emission reduction policies consistent with it are needed. In fact, although without a specific limit, Parties agreed on the long term objective to “reach global peaking of greenhouse gas emissions as soon as possible....to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century...” (Article 4.1). On the other hand, in terms of adaptation actions for sustainable development, acknowledging the increased frequency of intense climate-related natural disasters, “Parties establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development” (Article 7), aware of the interdependency with emissions of greenhouse gases in the atmosphere. It is worth to note that these fundamental achievements will lead to a paradigm shift towards low-carbon and climate-resilient development only if global financial flows will be wisely and coherently oriented.

Although commitments are voluntary, as the Agreement does not provide legally binding dispositions that oblige countries to adopt domestic legal actions accordingly, innovative mechanisms to submit and implement increasingly ambitious intended nationally determined contributions (INDCs) are embedded. In fact, a 5-years review cycle together with a complementary mechanism to strengthen transparency and track progresses are established. Ideally, countries will submit new NDCs every five years from 2020 onwards, each time updating their low greenhouse gas emission actions and allowing to report on them in a common transparency framework to enable the accurate assessment of their

impact⁸. Moreover, since Article 4.3 stipulates that “each successive step has to be at least as strong as the current one”, this means that each submission must be more aspiring than the last “ratcheting-up”. At this respect, given that currently there is no consensus on the date and the content of this review and that countries have already submitted post-2020 comprehensive national climate action plans but not all require the same level of efforts, a facilitative dialogue will be held no later than 2018, while the COP and CMA will meet jointly at COP 23 in 2017 to review progresses. Linking the short-term five-year cycle review with long-term low greenhouse gas emission development actions using an enhanced transparency framework therefore represents the strategy endorsed by the Paris Agreement in order to preserve the environmental integrity of our planet⁹.

Although the Paris Agreement has made tremendous achievements, criticisms from both scientists and civil society point out that governance is uncertain and some targets are too weak, representing a serious threat to the achievement of all these aims. Indeed, Parties to the Convention have not addressed neither the change in basic policy premises needed to stop supporting fossil fuel production which still drives economic growth (although global carbon dioxide emissions from fossil-fuel and industry in 2015 saw a slowdown and a first stagnation since 1970¹⁰), nor the right to a financial compensation for loss and damage for countries affected by extreme weather events, confirming in this case the lack of concrete commitments for adaptation. In addition, it has to be recognized that no steps forward have been made with the respect to the expected financial support from developed countries, since there are no new explicit numerical targets.

⁸ Cléménçon. 2016. “The Two Sides of the Paris Climate Agreement”. Global Studies Department and Department of Sociology, University of California, Santa Barbara, CA, USA

⁹ IGES. 2016. “Empowering the Ratchet-up mechanism under the Paris agreement. Available at: https://pub.iges.or.jp/system/files/publication_documents/pub/workingpaper/5594/empowering_underPA.pdf

¹⁰ UNEP. 2016. “Emissions Gap Report 2016”. Available at: http://uneplive.unep.org/media/docs/theme/13/Emissions_Gap_Report_2016.pdf

Lastly, the frequent use of an ambiguous language and a weak legal framework are unlikely to produce that crucial transformative change in international climate policy signatories parties have proclaimed.

Aware of the complexity of the Paris Agreement, the elements of climate finance, market mechanisms and INDCs will be analysed in-depth in the following sessions, while maintaining a holistic approach in order to shed light on their interconnection.

2.2 Financing climate actions

What is arisen from the negotiations is the need to systematically green all the investments at the global level, supporting developing countries in the implementation of their policies, strategies, regulations and climate change actions in order to pave the way for a paradigmatic shift from high-carbon approaches to a significant GHG emissions reduction and climate-resilient pathway. As such, it has to be recognized that, when the Paris Agreement is interpreted in its entirety, is strong and able to lead the implementation of countries climate change actions. Nevertheless, both the lack of harmonization between the different parts of the Article 9 as well as the use of a non-committal language, result in a weak approach to climate finance and obstruct the capitalization of its potential. Particularly, with respect to climate finance, the Agreement has not made exciting advancement since Article 9 is merely a collection of existing commitments.

Following the developed countries joint commitment to mobilize \$100 billion by 2020 to help developing nations cut greenhouse-gas emissions and adapt to the effects of climate change, no significant progresses have been done in the run-up

to and at the COP 21. As shown by the Climate Funds Update, the total multilateral funding based on pledges made by developed countries stood at almost USD 22.7 billion in 2015¹¹, very far from the fulfilment of that ambitious commitment made in Copenhagen. In addition, a recent report from the Executive Board of the Green Climate Fund (GCF), which is one of the financial mechanisms of the UNFCCC, shows that developed countries are stuck on the pledges made last year for the initial resource mobilization, with 17 countries, regions and cities that had not signed the contribution agreements for part or all of their pledges yet (GCF/B.13/Inf.06).

The reason why this consistent financial gap persists has to be found in the section of the Paris Agreement dedicated to climate finance. With the respect to the support from developed countries, it is stipulated that they “shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation” (Art. 9.1), continuing to fulfil their existing obligations under the Convention and “to take lead in mobilizing climate finance” (Art. 9.3), ensuring a flow of financial resources consistent with required adaptation and mitigation actions, while other Parties can voluntarily align themselves with this aim (Art. 9.2). In the light of this disposition is, thus, clear why there are no significant advancements in terms of funding pledged, since the encouraged additional climate financing appears to be a relabel of existing development flows and the instruments, sources and channels through which it should be mobilized remain ambiguous. On the other hand, while the expansion of the contributors base could produce a positive impact on the amount of climate flows at global level, many

¹¹ <http://www.climatefundsupdate.org/global-trends/size-spending>

developing countries have strongly criticized the subparagraph 2, considered as an expedient to make the donors assistance less effective¹².

Regarding the long-term role that future climate finance should play, there is inconsistency between the Paris Agreement and its supporting broader COP decision text (FCCC/CP/2015/10/Add.1). If it is evident that the commitment of improving previous efforts is too general without the establishment of a transparent measurement method for relevant financial flows, on the other hand the Paris Decision clearly states the intention of developed countries to extend their collective mobilization goal through 2025 and to “set a new collective quantified goal from a floor of USD 100 billion per year”. For this reason, the workshop on long-term climate finance that will be held in 2017 represents an opportunity not to be missed to create a thorough overview of the totality of actions being taken and needed to meet countries’ obligations.

This in-depth analysis of the Article 9 aims at underlining the weaknesses of the Paris Agreement when it comes to clarify the role of the public sector in the scale up of climate finance, and at calling attention to the importance that the private sector is likely to have over the next years. Since in the history of international cooperation donor countries often do not live up to their financial pledges, agreeing on a durable funding solution is essential to tackle the urgent need of consistent climate actions at global level. The 5-year actions review cycle discussed in the previous section together with the biannual provision of “transparent and consistent information on support for developing country Parties through public interventions” have established (Art. 9.7), are therefore crucial to ensure the consistency financial commitments at international level.

¹² Schalatek, L., et al. 2016. "Climate finance in the Paris Agreement". Available at: <http://www.germanclimatefinance.de/2015/12/21/climate-finance-paris-agreement>

2.3 Markets and Mechanisms

Since the entry into force of the Kyoto Protocol in 2005, carbon markets have been addressing part of global emissions reduction needs, contributing to channeling finance and investment into projects and programmes intended to tackle climate change. Even today, carbon markets are one of the most cost-effective approaches developed countries can use to achieve their emissions reduction targets, generating credits that are tradeable at international, regional and national levels, and represent also an extraordinary opportunity for developing countries to access international finance, technology transfer, and capacity building support.

The strong relationship between climate finance and the carbon market, therefore, shows all its potential as a supporting instrument for the implementation of mitigation actions under the Paris Agreement. At this respect, there are three options for raising funding taking advantage of this relationship:

Option1: issuance and cancellation of carbon credits at the core of climate finance donors strategy to fulfil their financial pledges and deliver result-based climate finance (RBCF). Financial resources received by developing countries will be used to pave the way for a climate-aligned pathways, reducing their emissions and leveraging the strong monitoring, reporting, and verification (MRV) system provided by market mechanisms for the implementation of multi-sectors green projects.

Option 2: to live up to their pledges and achieve their NDCs, carbon markets can be set up at the domestic level and linked/integrated at the regional/global level, but the realized GHG emissions reduction cannot be traded internationally. Each market has the capability to establish its rules (one or more sectors, methodologies, costs, etc..). However, the fragmentation that could be generated by the co-presence of different domestic carbon markets raises concerns about environmental integrity compliance.

Option 3: both buying and selling countries can use ITMOs, which can be traded internationally, significantly contributing to the achievement of their NDCs. In this context, although this particular use of market mechanisms promotes more flexibility and effectiveness, it is necessary that part of realized carbon credits are retired from the market or voluntarily cancelled since the global commitment of an overall emission reduction stated in Article 6.4d.

It is worth to note that the risks associated to each of these three options must be taken into account so as to secure environmental integrity and the most transparent implementation of NDCs. For example, special attention should be paid to the issue of double counting, which means that “a single GHG emission reduction or removal, achieved through a mechanism issuing units, is counted more than once towards attaining mitigation pledges or financial pledges for the purpose of mitigating climate change”¹³. With the respect to the cases aforementioned, double counting can occur either when Parties count, issue and register same emission reductions twice or apply different methodologies. Besides

¹³ SEI. 2014. “Addressing the risk of double counting emission reductions under the UNFCCC”. Available at: <https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2014-02-Double-counting-risks-UNFCCC.pdf>

that, the carbon market fragmentation due to the creation of markets at domestic level as well as the lack of stringent policies to prevent that operations are transferred in a more tolerant country, make the risk of carbon leakage a threat to be immediately tackled.

Guided by the fundamental principles of ensuring environmental integrity, Article 6 of the Paris Agreement centers on three key components: (i) cooperative approaches; (ii) mechanism to contribute to the mitigation of GHG emissions and support sustainable development; (iii) framework for non-market approaches to sustainable development.

To put this in context, Parties are allowed to cooperate among them “for higher ambition in their mitigation and adaptation actions” in order to promote both environmental integrity and sustainable development (Art. 6.1). To fulfil their emissions reduction targets (or nationally determined contributions), they may trade internationally transferred mitigation outcomes (ITMOs), but conditional to the voluntary and authorized Parties participation as well as the promotion of development objectives (Art. 6.2-6.3). While pursuing their targets, countries must follow accounting principles approved by the UNFCCC to avoid the risk of double counting, preventing them from deducting emissions reduction already transferred to another country from its own carbon inventory, directly facing the environmental integrity challenge.

Besides that, Article 6.4 establishes, under a supervisory board, a new mechanism that requires sustainable development as a co-benefit of emissions mitigation. Therefore, it will be shaped as a specific market approach aimed to incentivize the participation of private and public entities to deliver mitigation at global level that is not restricted to project-level activities (Article 6.4). The basic conditions for this new mechanism are similar to the Clean Development Mechanism (CDM)

requirements but with two fundamental differences: while CDM/JI are based on the difference between Annex I and Non-Annex I countries and, basically, is a zero-sum game because every tonne of CO₂ reduced in a developing countries is used to allow for an additional one in a developed country, conversely the new “sustainable development mechanism” (SDM) is meant to be accessible to all, since all parties have to contribute to the global mitigation and it shall aim “to deliver an overall mitigation in global emissions”. It offers universally tradable carbon credits, providing registry facilities and therefore offering the chance to expand the reach of carbon pricing, enabling the full implantation of NDCs while attracting additional investments¹⁴.

Finally, Articles 6.8 and 6.9 establish a framework for non-market mechanisms, although much less detailed than what is proposed for market approaches, considering the relative immaturity of the discussion at the global level. Cooperation among countries without necessarily using market mechanisms is envisaged, together with the possibility of integrating the two different mechanisms. General guidelines for their structuring and scopes are delivered and correspond to promoting adaptation and mitigation ambitions, enhancing public and private participation in the implementation of NDCs and enquiring coordination opportunities across instruments and institutional arrangements (Art. 6.8).

Irremediable consequences of global warming are not far away, disclosing the seriousness and urgency of undertaking climate actions. Global leaders shall, therefore, build on successful elements of market mechanisms, laying a solid foundation for the fulfilment of their national pledges.

¹⁴ IETA. 2016. “A vision for the market provisions of the Paris Agreement”. Available at: http://www.ieta.org/resources/Resources/Position_Papers/2016/IETA_Article_6_Implementation_Paper_May2016.pdf

2.4 The road ahead

The first session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA 1) was recently held at COP22, which took place in Marrakech, added to the programme in less than 30 days since the Paris Agreement surprisingly entered into force at its start. Planned to be a diplomatic conference, parties reaffirm their commitments for the effective implementation of the Agreement and the finalization of a rulebook within two years, accordingly. Key negotiation topics were: mitigation and adaptation in the framework of the NDCs; scale-up and accountability of climate finance; market mechanisms; reporting and transparency; loss and damage. However, the fast-track ratification of the Paris Agreement has meant that no content-related decisions could be taken on those topics, and most of 35 decisions adopted were merely intended to specify a roadmap for December 2018, since CMA1 will run until that date for a resumed session¹⁵.

The one page of the Marrakech Action Proclamation essentially restated last year commitments without any significant advancements, and there were no specifications on market mechanisms under article 6. Nevertheless, it was decided to retain the Adaptation Fund, despite the opposition of developed countries, and both mitigation strategies and NDCs supporting initiatives emerged, with almost 50 countries expressed the intention to decarbonize their economies by 2050. Moreover, the key role played by non-state actors in the transition towards the

¹⁵ EU Parliament. 2016 “Outcome of COP 22 climate change conference”. Available at: [http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/593547/EPRS_ATA\(2016\)593547_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/593547/EPRS_ATA(2016)593547_EN.pdf)

2°C pathway was officially recognized through the establishment of the Marrakech Partnership Platform for Global Climate Action.

3. Nationally Determined Contributions

3.1 Intended Nationally Determined Contributions and the emission gap

Intended Nationally Determined Contributions (INDCs) are national submissions by Parties which identify actions each government intends to take under the Paris Agreement and form the basis of post-2020 global emission reduction commitments (UNFCCC, Decision 1/CP.19). All INDCs contain information on mitigation targets or on strategies and actions towards low GHG emission development within a specified time frame or implementation period. Moreover, INDCs can take different forms, being national in scope, and are meant to tackle most of GHG emissions produced within a country. To be more specific, two different types of INDCs can be envisaged: unconditional INDCs which are proposed without any condition attached by countries to their implementations and conditional INDCs, the implementation of which relates to a range of possible situations such as sound policies, technical support, and access to adequate finance¹⁶.

The entire structure of the Paris Agreement is built around the pillar of keeping global temperature increase below 2°C compared to pre-industrial levels by 2100, with the aspiration of further reducing this warming cap to 1.5°C.

According to the UNEP Emissions Gap Report, which analyses 160 Intended Nationally Determined Contributions submitted, representing 187 out of 195 Parties to the UNFCCC, taking into account a limited action until 2020 and a cost-optimal mitigation afterwards, to be consistent with a pathway limiting warming

¹⁶ UNEP. 2016. "Emissions Gap Report 2016". Available at: http://uneplive.unep.org/media/docs/theme/13/Emissions_Gap_Report_2016.pdf

to below 2°C temperature by 2100 with a likely chance (>66 percent), a 20% reduction of GHG emissions in the next 15 years is required, or reducing from the current level of 52 Gt CO₂e (49 to 53) in 2015 to 42 Gt CO₂e (31 to 44) in 2030. However, the current add-up of INDCs indicates that, during the same period, global emissions will increase by 10%; that is, total emissions in 2030 will amount to 55-60 GtCO₂e, indicating an emissions gap of 12 to 14 GtCO₂e compared with the 2°C scenario, and 3 GtCO₂e larger for 1.5°C. “Even if fully implemented, the unconditional Intended Nationally Determined Contributions are only consistent with staying below an increase in temperature of 3.2°C by 2100 and 3.0°C, if conditional Intended Nationally Determined Contributions are included” (UNEP 2016).¹⁷

Although INDCs show an encouraging increase in the number of countries implementing mitigation actions, resulting in enhanced cooperation and more ambitious targets, larger efforts are, thus, required in the post-2025/2030 to succeed in maintain the temperature rise below 2 °C and achieving the long-term objective of zero emissions by the end of this century (UNFCCC 2016). Since actions must be taken globally, strengthening finance, technology transfer, capacity-building and technical support represent the means Parties have to live up to their pledges.

3.2 Financial needs for INDC implementation

The recent ratification of the Paris Agreement at COP22 has sent a very clear signal to governments and businesses in order to accelerate their efforts and move

¹⁷ UNEP. 2016. “Emissions Gap Report 2016”. Available at: http://uneplive.unep.org/media/docs/theme/13/Emissions_Gap_Report_2016.pdf

from diplomacy to implementation of climate actions. In fact, translating INDCs into systemic investment plans and tangible results will need an unprecedented disbursement of both public and private financial resources, moreover requiring the alignment of domestic and international financial flows.

At this respect, among the 164 countries that have submitted an INDC, quantified financial needs for implementing adaptation and mitigation actions were already expressed by 54 and 61 countries respectively, although sources and methodologies used for this measurement are mostly unclear.

The UNEP Pledge Pipeline study provides a compelling outlook of current financial needs for INDCs implementation, including data on population projected to 2010. Based on 54 country submissions, the total requested financial support for mitigation amounts to USD 422 billion until 2030. For the same time frame, the cumulated financial needs expressed by 61 countries for adaptation equal to USD 615 billion¹⁸. If these data are up-scaled to all non-annex I countries, taking into consideration of population increase in developing countries in the next 15 years, financial needs for the achievement of both mitigation and adaptation targets expressed in INDCs will be equal to USD 2.1 trillion and USD 1.9 trillion, indicating an estimated annual support by 2030 of USD 145 billion for mitigation and USD 128 billion for adaptation (UNEP 2016).

The fact that some countries indicated the total costs of implementing NDCs and other ones included requested support for their NDCs, raises concerns because costs and requested support together result in greater uncertainty of financial calculations¹⁹. Therefore, it would be advisable to agree at the international level

¹⁸ UNEP. 2016. "PledgePipeline". Available at:
<http://www.unep.org/climatechange/pledgepipeline/Default.aspx?tabid=105110>

¹⁹ ESCAP. 2016. "Climate finance in and beyond the Paris Agreement: implementing climate finance commitments in Asia and the Pacific". Available at:
https://www.unescap.org/sites/default/files/14.Climate%20finance_Yuqing%20Yu_0.pdf

on a common format of the INDCs' financial elements part, so that accurate estimations could be done and needs properly assessed.

Finally, it is extremely important to understand that, if temperatures continue to increase beyond the 2 degrees trajectory, implementation costs will rise dramatically. The cumulative nature of the climate problem means investing now is crucial: actionable, innovative, catalytic and transformative financial instruments are therefore needed. As this report will explain more in-depth in the fourth chapter, green bonds could be a potential option to support these funding needs, being increasingly highlighted as part of converting country commitments to climate finance actions.

3.3 Global investment flows and existing financial gap

In 2014, global climate finance increased by 18 % compared to the preceding year, from USD 342 billion to USD 392 billion, (CPI 2015). The total amount of public finance accounted for USD 151 billion thanks to the major contribution of development finance institutions (DFIs) (89%), followed by governments and agencies (9%) and climate funds (1%). Moreover, the role played by finance institutions is essential to drive private investments, often through the establishment of an enabling environment that reduces costs associated to investments and reinforces the legal framework. On the other hand, private investment remained the largest source of global climate finance adding USD 241 billion more, flowed from corporate actors, commercial financial institutions and households. It's worth to note that the private sector is still mostly relying on its

own balance sheet to finance green projects, especially renewable energy projects (73% of the total), probably due to the high cost of capital in the capital market.

Despite the capacity of drawing a comprehensive picture of climate finance is significantly improved at international level, there is a persistent tracking gap that prevent national and regional governments from measuring progresses, arranging investment patterns and planning strategies to overcome barriers and benefit from existing opportunities. Estimations point out almost USD 100 billion not captured in 2015 (CPI, 2015).

Since infrastructures accounted for all the major sources of greenhouse gas emissions worldwide (land use, industry, transport and energy systems, etc.), it's also crucial to evaluate the amount of money they are attracting and the existing financial gap to be filled. Making them as much sustainable as possible has become a priority for both developed and developing countries that want to achieve development objectives of the Paris Agreement and climate resilience.

Current investment trends show that, while in emerging economies the public sector plays a predominant role in financing infrastructures, providing 60% of total contributions, in advanced economies the larger share of financial resources invested comes from the private sector (60%). Although annual infrastructure investment has constantly increased over years, reaching USD 3.4 trillion in 2014, of which USD 2.2 trillion spent in developing countries, bridging the existing financial gap by 2030 will require almost doubling efforts made until now, since USD 6 trillion per year are needed²⁰. With respect to the sectoral distribution of the infrastructure financing, transport and energy sectors are the dominant one, accounting for 70% of total investments. At the moment, the sustainable energy

²⁰ New Climate Economy (NCE), 2016. "The sustainable infrastructure imperative". Available at: http://newclimateeconomy.report/2016/wp-content/uploads/sites/4/2014/08/NCE_2016Report.pdf

demand from developing countries prevails over the demand for new roads, railways, ports and airports that, conversely, is significantly increasing in developed and emerging markets, committed to the rehabilitation and maintenance of existing infrastructures. Projections confirm this trend, highlighting the increasing importance that middle and low-income countries will have over the next 15 years, the period in which their respective economic transitions will be completed, expanding the infrastructure demand to USD 4 trillion (NCE, 2016)

Good news come from the renewable energy sector where the global cost has declined since 2009 (solar 60% and wind 15%) and, consequently, investments have started to increase. In 2015, global investment in renewable energy, excluding large scale hydro-electric projects, was equal to USD 285.9 billion, 5 % more compared to the peak reached in 2011. The documented increase in the amount of finance disbursed globally last year has allowed wind and solar energy to compete with fossil-fuels in several market, and it is considered a turning point for two main reasons: it was the first time financial flows channeled into renewable energies projects were higher in developing economies; the value of government subsidies for fossil-fuel consumption dropped from almost USD 500 billion to USD 325 billion in 2015, in a period in which the documented increase in the amount of finance disbursed globally has allowed wind and solar energy to compete with fossil-fuels in several market²¹.

It is worth to note that global investment in energy efficiency, although less than 14% of the total spending in the energy system (USD 1.6 trillion) targeted the sector in 2015, grew 6% to USD 221 billion. Investments have grown mainly in

²¹ UNEP. 2016. "Global trend in renewable energy investment". Available at: http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf

the buildings sector (9%), with over half of the total investment in efficiency, then in industry (6%) and transport (3%)²².

The IEA estimates that a cumulative USD 44 trillion investment in global energy supply together with an extra USD 23 trillion in energy efficiency is required by 2040, taking into account a 30% rise in global energy demand²³.

To summarize, it has to be recognized that significant progresses in scaling up investment at global level have been made thanks to the increasing commitment of government, financial institutions and the private sector but more work has to be done, as demonstrated by the existing huge financial gaps in each of the major sectors influencing climate change. Fundamental measures such as improving transparency in accounting approaches, enhancing collaboration between investors and countries, creating an enabling environment through clear policy guidelines and implementing more flexible legal frameworks, are needed to help assess risks and scale up investments in climate actions.

3.4 The transparency framework

The picture drawn until now clarifies the need of increasing both the quantity and quality of climate finance for the world to be on track of remaining below the 2°C target. However, what is also clear is that the existing transparency framework in place has to be enhanced and harmonized for the establishment of a concrete roadmap to achieve both the financial commitment recently reiterated and

²² International Energy Agency (IEA). 2016: “Energy efficiency market report 2016”. Available at: https://www.iea.org/eemr16/files/medium-term-energy-efficiency-2016_WEB.PDF

²³ International Energy Agency (IEA). 2016. “World Energy Outlook 2016”. Available at: <http://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExecutiveSummaryEnglish.pdf>

extended at COP 22 and the long-term goal of net zero emissions by the second half of the century.

Two main critical factors undermine the capability to duly report on and track climate finance: over-estimation of the climate-relevance and the counting of the debt capital at its face value rather than its net assistance capacity.

At this respect, although the amount of public finance based on pledges expressed to date is significantly increased compared to 2013 (USD 38 billion) and 2014 (USD 44 billion), accounting for USD 66.8 billion, its relevance for the climate needs assessment seems to be significantly lower. In fact, what is called “net climate-specific assistance” is estimated to be about USD 18 to 34 billion per year in total public climate finance by 2020, and around USD 8 to 16 billion per year for public adaptation finance^{24 25}.

Overestimation could derive also from improper monitoring approaches used by developed countries. They generally document funds for projects that only partially are meant to directly tackle climate change and it's often hard to measure their relevance among multiple development objectives. Looking at major donor countries approaches to shed light on the value of climate activities within this type of projects, the risks that climate change is not currently taken seriously and the USD 100 billion commitment is based on superficial estimations are concrete: Japan and Norway used to apply 100%, Germany 50%, France 40%, while the UK and the USA have their own methods to count only specific climate-related activities.

Another critical point is how loans, equity or guarantees are reported. When just their face value is highlighted, developing countries receive up to two/three times

²⁴ OECD. 2016. “2020 Projections of Climate Finance Towards the USD 100 Billion Goal”. Available at: <https://www.oecd.org/environment/cc/Projecting%20Climate%20Change%202020%20WEB.pdf>

²⁵ Oxfam International. 2016. “CLIMATE FINANCE SHADOW REPORT”. Available at: https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp-climate-finance-shadow-report-031116-en.pdf

less than what is declared in terms of net assistance value (USD 32 billion annual average for 2013-2014). Moreover, these data need must be viewed in the context of the amount of grants provided. Although more suitable to meet the adaptation needs of most vulnerable and marginalized people, they just stand at USD 10 billion during the same period and, in addition, their quantity slightly decreased between the same two reference years.

In light of all these distortions, the enhancement of the transparency framework was a key outcome of COP 21 and, if correctly implemented, it will play an important role in tracking progresses of essential financial contributions, especially from developed countries, and in the achievement of INDCs under the Paris Agreement. The main changes occurred in the transparency provisions are: collective 5-years review cycle; mandatory biennial reporting for developed country Parties, specifically addressing financial resources mobilised through public interventions; suggested common procedures, modalities and guidelines to be established. Altogether, they have, therefore, the potential to decisively adjust global limited funds to real climate needs while tackling the environmental integrity risk.

4. Green Bonds

4.1 Definitions and state of the market

A Bond is basically a debt flow; a loan accommodated to a company, city or government with a promise to be paid back in full, with regular interest payments. Generally, a steady stream of income in the form of a fixed coupon yield is assured, but it doesn't necessarily mean that all bonds are risk-free. In fact, there are three common risks investors are exposed to: the likelihood of how good the bond issuer will make good on its payment, so that the less creditworthy it is, the higher the yield will be; how long the bond is to be held; and the fluctuation of interest rates, because when rates increase, new bonds are issued at a higher rate, making existing bonds less valuable, unless hold until maturity.

A green-labelled bond refers to any type of bond instrument where proceeds are exclusively applied to partially or fully finance or re-finance eligible green projects with demonstrated environmentally sustainable benefits. Green Bonds should not be considered fungible with bonds that are not aligned with the four core components of the Green Bonds Principles (GBP) (Green Bonds Principles, 2016). However, definitions may also vary according to sector and geographical location of projects/regions.

To date, the Climate Bond Initiative (CBI) has identified four different types of Green Bonds: **Green Use of Proceeds Bond**, “a standard recourse-to the-issuer debt obligation for which the proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer’s lending and investment operations for eligible Green Projects”;

Green Use of Proceeds Revenue Bond,” a non-recourse-to the-issuer debt obligation in which the credit exposure in the bond is to the pledged cash flows of the revenue streams, fees, taxes etc., and the use of proceeds of the bond goes to related or unrelated green

project(s). The proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer's lending and investment operations for eligible green projects"; **Green Use of Proceeds Project Bond**, "a project bond for a single or multiple green project for which the investor has direct exposure to the risk of the project with or without potential recourse to the issuer"; **Green Use of Proceeds Securitized Bond**, "a bond collateralized by one or more specific green project(s), including but not limited to covered bonds, ABS, MBS, and other structures. The first source of repayment is generally the cash flows of the assets"²⁶.

This role increased in the last eight years since their first issuance by the European Investment Bank (EIB) in 2007, followed by the World Bank (WB) in 2008. Commonly playground for multilateral banks until 2012, national and private sector banking, from cities and regions to companies have now come into play, laying the foundation for a flourishing mechanism that, nowadays, represents the tangible financial response to transitional challenges associated with the necessary shift in emissions pathways.

The growing interest of the global market is officially confirmed by the twenty-seven signatories of the "Paris Green Bonds Statement". Managing a combined USD 11.2 trillion of assets, they are striving for scaling up investment in Green Bonds to fulfil their risk and return requirements, while financing adaptation and mitigation actions. Well aware of the unprecedented threat that climate change is posing to societies and economies worldwide, accelerating resource mobilization for priority climate-resilient and low-carbon initiatives is what they are encouraging: mechanisms such as policies, regulations, guarantees to facilitate the issuance of Green Bonds; explicit, independent

²⁶Climate Bond Initiative (CBI). 2015. "Explaining green bonds". Available at: <https://www.climatebonds.net/market/explaining-green-bonds>

and ambitious international industry standards; high level of transparency while assessing the use of proceeds and respective impacts.

As annual green bonds issuance continues to increase together with a widening of the type of projects put into effect, they are spreading across the world. The simultaneous involvement of Asset-backed securities (ABS), banks, corporates, multilateral development banks, cities and municipalities reached USD 41.8 billion in 2015, whose proceeds were mainly generated from renewable energy, energy efficiency, low carbon transport and sustainable water management. At the international level, Europe was the region hosting the largest share of Green Bonds, with USD 18.4 billion issued in 2015, recently overcome by the USA that nowadays represent the largest market in the world (USD 29.2 billion predominantly driven by municipal Green Bonds)²⁷. Worthnoting, seven new countries from Europe, Central and South America and South Asia entered the market last year, adding USD 3.2bn Green Bonds more. China, which set the bar with over USD 8bn in the first half of 2016 and another USD 5 billion in Q3, reaching a total value of USD 19.5 billion, has become the largest issuer, although legitimate concerns have been echoed by many about the discrepancy between local and international accepted criteria to define climate-alignment (the China Green Bond Index's criteria also allow fossil-fuel related investment such as clean coal).

Total 2016 issuance has already doubled the total for 2015, and is likely to account for USD 80 billion at the end of 2016. It is, therefore, undeniable that the market is rapidly expanding, making Green Bonds a concrete tool for raising capital and achieve mitigation and adaptation targets²⁸

²⁷ Climate Bonds Initiative (CBI) (2015) "2015 Green Bond Market Roundup". Available at: <http://www.climatebonds.net/files/files/2015%20GB%20Market%20Roundup%2003A>

²⁸ Climate Bonds Initiative. 2016 "Green finance: Green Bonds direction". Available at: https://www.climatebonds.net/files/files/COP22_Directions_WEB.pdf

4.2 The Green Bond Principles

As the attractiveness of green bonds is literally flared up, dubious environmental integrity-oriented projects might originate from greenwashing investments, undermining the future credibility of the market. Moreover, reducing transaction costs for investors and policymakers is paramount as the green bonds market scales up. These are the reasons why, in order to establish project eligibility and the alignment of issuances, a group of criteria guiding domestic and international issuers is effective to date.

The Green Bond Principles (GBP), are voluntary best practice guidelines set up by a consortium of investment banks at international level²⁹, which promote transparency, disclosure, integrity and dissemination of information for better allocation of capital resources to climate-resilient scopes in the development of the green bond market, whereby no single arbiter is in charge. Made of four core components aimed at ensuring the most appropriate utilization of the proceeds and secure the environmental integrity, the GBP leads investors through a complex process that involves guidance for launching eligible green bonds, making necessary information available and (reducing the cost of capital) facilitating transactions. The four areas are the following: **Use of Proceeds**, aimed to ensure the most appropriate utilization of the proceeds, a legal documentation describing the project, assessing and quantifying its supposed environmental benefits is required to the issuer and, when proceeds are used to refinance, clarifying which the project will be refinances. Precisely, a list of categories for green projects eligibility is provided (renewable energy, energy efficiency, pollution prevention and control, clean transportation, etc.); **Process for Project Evaluation and Selection**, to promote a high level of transparency, each project should provide the environmental purposes, indication to determine if the green project is aligned with the categories above

²⁹ Ceres, 2014. "Voluntary Process Guidelines for Issuing Green Bonds". Available at: <https://www.ceres.org/resources/reports/green-bond-principles-2014-voluntary-process-guidelines-for-issuing-green-bonds/view>

mentioned and related eligibility criteria. An external review of both evaluation and selection is crucial; **Management of Proceeds**, internal tracking methods and allocation of funds are crucial and may require the involvement of an auditor or a third party supporting the issuer's management, especially during the period in which Green Bonds are outstanding and the adjustment of the balance of the tracked proceeds is needed; **Reporting**, transparency requires also the use of qualitative performance indicators and, ideally, of quantitative performance measures for the assessment of the potential impacts in the report issuers have to annually update with respect to use, allocation and destination of proceeds³⁰.

The challenge of strengthening the environmental integrity that is currently jeopardized by the heterogeneity of standards and the shortage of reliable information, is now directly tackled thanks to the GBP. The Principles, if internationally accepted, will overcome the greenwashing risk related to both the increased size and sectoral scopes of the market, and the lack of consensus on common approaches through the requirement of a strict definition of the management and objectives of proceeds in order to secure environmental integrity. Besides that, endorsing a robust evaluation, tracking and reporting system, the GBP will potentially bridge the gap of data on the use of proceeds post-issuance, meeting the investors demand for responsible investment while increasing their confidence. In addition, the stringency required for second opinion reviews, the collection of information and the reporting system, are crucial for the market survival resulting in a reduction of additional transaction costs issuers face in the green bonds market. The GBP are precisely meant to address also this issue through the

³⁰ International Capital Market Association (ICMA). 2016. "Green bonds Principles". Available at: [file:///C:/Users/Utente/Downloads/GBP-2016-Final-16-June-2016%20\(1\).pdf](file:///C:/Users/Utente/Downloads/GBP-2016-Final-16-June-2016%20(1).pdf)

standardization of reporting procedures that, consequently, will lower the cost and reduce the risk not to meet the needs of the market³¹.

It is also important to mention the existence of a certification scheme that verify the green credentials of a bond, promoted by an investor-focused not-for-profit organization, the Climate Bond Initiative, helping define whether a project is consistent with its proclaimed green impact. This is the Climate Bond Standard, scientific easy-to-use categorization aimed at assisting the assessment of the environmental integrity of bonds according to different eligibility criteria for several specific sectors, such as solar energy, wind energy, low carbon buildings, low carbon transport, water, and energy efficiency. It incorporates the GBP and adds science-based sector-specific criteria for projects eligibility³².

It also includes a “Certification Scheme”, allowing investors to channel their funds in projects with low-carbon and climate resilient impacts. Moreover, two different phases of issuance are foreseen: *pre-issuance*, required for the certification ahead of issuance and emphasizing the selection of eligible projects and assets, and *post-issuance*, to be delivered within one year after the issuance of the bond, more focus on the use of proceeds and non-allocated funds. Together, these requirements fully integrate the green bond principles³³.

4.3 Main Actors

When it comes to climate finance, the key role green bonds can play at global level is due to a win-win situation for the whole stakeholders category. Issuer benefits are now more evident, resulting in strengthened oversubscription and reputation, enabling geographical

³¹ Institute for Climate Economics (I4CE), 2016. “Beyond transparency: unlocking the full potential of green bonds”. Available at: http://www.i4ce.org/wp-core/wp-content/uploads/2016/06/I4CE_Green_Bonds.pdf

³² Climate Bonds Initiative (CBI) (2016). “Green finance: Green Bonds direction”. Available at: https://www.climatebonds.net/files/files/COP22_Directions_WEB.pdf

³³ Climate Bonds Initiative (CBI) (2016). “Climate Bond Standard”. Available at: [http://www.climatebonds.net/files/files/Climate%20Bonds%20Standard%20v2_0%20-%20Dec2015%20\(1\).pdf](http://www.climatebonds.net/files/files/Climate%20Bonds%20Standard%20v2_0%20-%20Dec2015%20(1).pdf)

and sectorial diversification, investors engagement and alignment of core business when pure play with funding scheme. Besides that, investors also take advantage of the uptake of Green Bonds, representing a profitable opportunity for the market that finally could satisfy their appetite for socially responsible investment opportunities, as projects are well-managed and deeply understood, reducing risk exposure. The climate-aligned bond market equals to USD 694 billion outstanding, of which the labelled green bond stands at USD 118 billion, with an increase of USD 96 billion just on last year (USD 85 billion added by new issuers). To date, there are roughly 3.590 bonds from 780 different issuers, targeting sectors from Energy, Buildings & Industry, to Transport, Waste & Pollution Control, Water and Agriculture & Forestry.

4.3.1 Institutional investors

Offering long-term maturities, green bonds directly address the investment needs of institutional investors with long-term outlook. A category that includes pension funds, insurance companies, foundations, banks, sovereign wealth fund (SWF) and investor managers. It's not by chance that the first issuance was made by the World Bank (WB) in partnership with the Swedish Bank SEB, explicitly called by Scandinavian insurance companies and pension funds to figure out a financial instrument capable to allocate the huge amount of money they were managing³⁴. In fact, what at that time encouraged SEB (and nowadays continues to motivate public pensions to invest in green bonds) was a combination of different reasons: the environmental, social and governance (ESG) factors of a responsible investment that began as a niche area and became a mainstream; the need to diversify their climate investments, ensuring a steady income return; supporting the

³⁴ Stockholm Environment Institute (SEI) (2011). "Private Sector Finance and Climate Change Adaptation:" Available at: <https://www.sei-international.org/mediamanager/documents/Publications/Climate-mitigation-adaptation/policybrief-privatesectorfinance-adaptation.pdf>

environment secure without taking credit risk, investing in the World Bank's AAA-rated bond³⁵.

Often managing huge patient capital, institutional investors have the capacity to potentially bridge the financial gap required by climate change impacts while pursuing the long-term goal of delivering predictable returns to their founding members, and green bonds perfectly match these parameters³⁶. Facilitating long-term investments in green projects is therefore a fundamental precondition for the scale up of private financial flows, since institutional investors primary concern will remain the risk-adjusted financial performance of the asset. In the light of this, green bonds would allow greater financial stability, steady returns, better corporate governance and, eventually, climate-aligned growth³⁷.

As heterogeneous assemblage with different objectives facing different constraints, pension funds and insurance companies, mostly from OECD countries, together with SWFs also in developing economies, represent the new players and are increasingly looking for real asset classes that guarantee a steady income flow, allowing diversification of risks while reducing political pressure. A recent inquire from the World Bank pointed out the huge potential OECD institutional investors already have, managing assets for USD 80 trillion in 2015, although just 10% is currently targeting emerging economies and developing countries' needs³⁸. Public pension funds are frequently the largest investors, considering that just in developed countries they manage a USD 5.1 trillion portfolio of assets, whose largest portion is from bond holdings. The private

³⁵ Flensburg, C. (2009). "The World Bank Green Bond". Available at:

<http://www.europeanpensions.net/netherlands/presentations/SEB/Client%20update%20Green%20bond.pdf>

³⁶ Kaminker, Ch., Stewart, F. (2012), "The Role of Institutional Investors in Financing Clean Energy", OECD Working Papers on Finance, Insurance and Private Pensions, No.23, OECD Publishing.

³⁷ The Organization for Economic Co-operation and Development (OECD) (2014). "Institutional Investors and Long-term investment". Available at: <http://www.oecd.org/finance/OECD-LTI-project.pdf>

³⁸ World Bank Group (WBG) (2015). "Public Private Infrastructure Advisory Facility (PPIAF) annual report 2015". Available at: <http://documents.worldbank.org/curated/en/154271467995083430/pdf/105780-AR-PUBLIC-PPIAF-Annual-Report-2015.pdf>

sector is calling them on to be the leader of smaller funds with less expertise, showing the value of investing in green bonds and the fixed return they can ensure. On the other hand, with the respect to SWFs, the relatively small size of the market is the principal limitation to their entrance. To date, the Norway's sovereign wealth fund represents the largest in the world with a total assets value of USD 882 billion. As of 2014, it started a significant investment process, targeting green bonds under its environmental mandate, delivering a fundamental signaling message to all the other small realities, now that the market is entering its maturity phase and is getting off the ground. Since individual investors and companies pretend to see precedent deals before making an investment to gauge performance of an asset class, it is crucial that someone takes the lead.

Last year, attracted by the potential of green bonds, institutional investors gained more confidence and finally decided to seize the opportunity. USD 11.2 trillion is the total value of assets represented by the twenty-seven undersigned signatories of the "Paris Green Bond Statement" released at the end of the 2015. Their commitment of widening cooperation and working together with governments, industries, development institutions, cities, civil society and commercial banks, reflects both their attempt to reduce the asset risk linked to the future stranding risk of carbon-intensive investments as well as their actual perception that green bonds have the capacity to raise enough money to comply with the additional and more ambitious target of the 1.5° Celsius. Their scope was to call Bond Issuers, governments, stakeholders and industry experts to a common effort for the scaling up of the green bond market through: policies, tax credits and regulations to hold the issuance up while ensuring them the fulfilment of their return requirements; evident

and internationally accepted standards for the assessment of impacts and a streamlined issuance process; transparent use of proceeds³⁹.

Regardless the growing interest shown by institutional investors and recently confirmed by their official commitment, main **barriers** to the implementation of a suitable green bond market and to the subsequent scale up of green institutional investments can be summarized as follow: weak and uncertain policy support and environment (national legal frameworks often restrict the types of asset pension funds and insurance companies can invest into); lack of experience and adequate financial means for the reduction of both investment risk and high upfront capital needed; scarcity of reliable data and information on projects' environmental impact.

In light of this, it is necessary that policy makers will help overcoming these hurdles to unlock the latent capability of green bonds and create an enabling environments. This paper, while trying to suggest right measures according to the context, intends to highlight some possible solutions: active involvement in capacity building and training to reinforce the investors base; distention of government control and regulatory framework, letting investors address resource to alternative assets; providing technical and skilled assistance to limit the risk of the investment along with credit enhancement instruments such as guarantees or co-loans, given the specific profile of the investors, providing a priority list of ready-investment projects and pushing for clear and internationally applied standards.

Although insurance companies and pension funds have been the main player until now, contributing to the scale up of bond issuance both in developed and developing countries, it's still not enough. To prepare the ground for a flourishing growth, public sectors entities and banks must raise domestic capital through provision of liquidity, guidelines

³⁹ Climate Bonds Initiative (CBI) 2015. "The Paris green bond statement". Available at: <http://www.climatebonds.net/files/files/COP21-Paris%20Green%20Bonds%20Statement-PGPS-9th%20Dec%202015.pdf>

and visibility. These are the essential preconditions for the establishment of a solid green bond market and the fulfilment of commitments made under the Paris Agreement.

4.3.2 Cities, Municipalities and Companies

By 2050, over half of the global population will live in cities and, due to increasing urbanization, almost 70% of the global demand for infrastructure is expected to be in town areas over the next 15 years. If it continues to grow at this pace, properly addressing sustainable development issues will depend on how much cities will be inclusive and resilient. Urban dynamics will be soon at the core of every political agenda⁴⁰.

When it comes to the environment, it's always more evident the need of the world's fast-growing cities to produce innovative and reliable practices and infrastructures for sustainable development at municipal level. As demand is subsequently increased, tackling limited access to capital for roads, buildings, water systems and energy supplies should be prioritized and represents the actual challenge in the struggle to cope with climate change, its extreme weather manifestations and warming temperature. Moreover, the long-lasting economic crisis and the widespread political instability are the main causes behind the unprecedented flux of migrants who flee their countries of origin to find a decent work in urbanized centers. The data show that the impact is even worse in countries where income per capita is lower, although urbanization, if sufficiently financially supported, could be a main driver for the strengthening of mitigation and adaptation actions (cities accounting for 70% of global emissions, of which 20% is generated by buildings and constructions sector alone), shifting from business-as-usual to green infrastructure.

⁴⁰ United Nations (UNDESA) (2015). "World Population Prospects". Available at: https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf

Since 2012, in the attempt to raise the adequate capital to confront the unprecedented urbanisation and the rapid environmental deterioration, municipalities and cities have started to issue green bonds, viewed as a safe financial instrument with low risk profile. In fact, they can help them access to low-cost capital to finance green infrastructure projects or implement adaptation actions. Besides that, meeting investors' needs, who want this type of asset in their portfolio, they may enlarge the number of people and institutions with an interest in their cities (i.e. increasing visibility and the economic impact of tourism)⁴¹.

Nevertheless, municipalities and cities often lack of know-how, adequate political and legislative power to enter the bond market, and can't fully benefit from the fundamental value it is able to generate, attracting diversified investments and institutions. In Developing countries, accessible capital to invest in water, energy, and transportation systems is even more limited for subnational entities, and they are forced to borrow from the banking sector whose loan terms are often unsuitable. They could draw from capital markets at cheaper price but less than 20% of cities have access to local capital markets and only 4% to the international ones⁴². In addition, the low credit ratings prevents developing countries from the use of municipal green bonds at scale. Since other **barriers** frequently preclude their access to adequate financial resources, such as lack of transparency at institutional level and higher quantity of upfront capital expenditure for green infrastructure when compared to high-carbon solutions in the short-term⁴³,

⁴¹ Climate Bonds Initiative (CBI) (2016). "New Green Bonds for Cities project: Supporting Cities in Accessing Green Infrastructure Finance". Available at: <https://www.climatebonds.net/2016/09/new-green-bonds-cities-project-supporting-cities-accessing-green-infrastructure-finance>

⁴² Climate Policy Initiative (CPI) (2016). "Understanding green bond data can help cities in developing countries tap the market". Available at: <https://climatepolicyinitiative.org/2016/09/06/understanding-green-bond-data-to-help-cities-developing-countries-tap-market/>

⁴³ Climate Bonds Initiative (CBI) (2016). "New Green Bonds for Cities project: Supporting Cities in Accessing Green Infrastructure Finance". Available at: <https://www.climatebonds.net/2016/09/new-green-bonds-cities-project-supporting-cities-accessing-green-infrastructure-finance>

participation in the bond market can provide the amount of low-cost capital they need to spur a “green revolution” at domestic/municipal level.

To assist them in the issuance of bonds, essential **measures** to accelerate the growth of this market are needed: providing capacity building and technical assistance, guarantees or tax incentives for credit enhancement, promoting transparency through reporting mechanisms. The role of the public sector is therefore paramount.

The city of Johannesburg in South Africa has already paved the way, issuing the first emerging market green city bond in 2014 with a maturity period of ten years priced at USD 139 million. It’s considered the pioneer of this new market approach, having for the first time entirely used proceeds in favour of green initiatives that reduce GHG emissions such as hybrid-fuel buses, waste-water plants and the solar energy. Now, more municipalities in the USA and EU are following the example.

Conversely, in the context of developed countries, another remarkable initiative promoted by the CBI is the green City Bond Coalition: a global partnership of cities and affiliated entities set up bearing in mind the importance of the exchange of best practices, enhancing capacity building and allowing the expansion of a tailored green bond market. Knowledge sharing, strategic support for the realization of bankable projects and education programmes feature the services its members can access.

In an already well-structured market such as in EU and USA, credit enhancement to de-risk investments is the main hurdle for the definitive take-off of green municipal bonds, since investors want to make their green bonds safe investment-grade bonds. With the support of the public sector, reluctance will last as far as the market matures and rating agencies have a clear picture of the credit performance.

4.3.3 International Finance Institutions

International financial institutions (IFIs) are those providing financial support for the purpose of global economic and social development. Among them, the most prominent are Multilateral Development Banks (MDBs), creations of a plurality of nations both from developed countries as donors and developing countries playing the role of recipients, and they include Bretton Woods Institutions. They include also UNFCCC Financial Mechanisms such as the Green Climate Fund (GCF) and the Global Environmental Facility (GEF), domestic development banks and some bilateral financial institutions.

The extent to which they operate in their representing countries and assign priorities of actions was set in the Addis Ababa Action Agenda, which calls on developed countries to implement their engagement towards the jointly mobilization of USD 100 billion yearly by 2020, while ending poverty, protecting the planet and prosperity for all.

In 2015, the collective commitment of the MDBs amounted to more than USD 25 billion in climate finance, of which 93% of their own resources, having invested almost USD 131 billion in climate action in the last five years⁴⁴. Together with bilateral development banks, they are also working to increase green investments by coordinating and scaling up activities to strengthen policy, building institutional capacity, providing access to finance, and delivering technical support to client countries and their private sectors. Sustainable infrastructure investments will allow the low-carbon, high-resilience pathway needed to realize climate change objectives indeed. It's worth noting that half of development finance channeled into infrastructure projects comes from bilateral

⁴⁴ European Investment Bank (EIB) (2015). "Joint report on Multilateral Development Banks' climate finance". Available at: http://www.eib.org/attachments/documents/joint_mdb_report_on_climate_finance_2015.pdf
Miyamoto, K., Biousse, K. (2014). "Official Support for Private Sector Participation in Developing Country Infrastructure". OECD Development Co-operation Working Papers, No. 19. OECD Publishing.

sources⁴⁵, and 75% of total climate finance was committed through loans in 2015, while the remaining amount was addressed by guarantees, equities, policy-based loans and other instruments.

As represented in the Table 1, MDBs and IFIs (such as the Green climate Fund) can play multiple roles in the green bonds universe, qualifying for both the issuance and the provision of guarantees.

Green Bonds issued to date by International Financial Institutions (“IFIs”) are **green use of proceeds bonds**, that expose investors to the credit risk of the institution rather than to the project risks. Besides that, the issuance of AAA-rated green bonds qualifies IFIs as key players for the take-off of the market while increasing the investors’ confidence in this type of transactions. As such, through the strategic issuance of green bonds, they can expand the market, engaging more investors and let them become familiar with the new asset class. Compared to the private sector issuance, they provide low risk profile investments and are definitely more attractive.

In addition, MDBs and IFIs also provide guarantees in two different forms: risk guarantee, that covers all or part of the amount of the green bonds transaction; credit guarantee, that insure against non-payment by a borrower, enhancing their creditworthiness.

The former one covers the risks associated with the implementation of a specific project, and can be political, commercial or otherwise, ranging from currency inconvertibility to expropriation to political violence. Among them, the political risk insurance, that will be analysed in depth later on in the chapter, fully covers the risk posed by a government’s actions or inactions that may result in its non-payment to the buyer (e.g. removal of a feed-in tariff). Credit guarantees, in contrast, are generally partial and do not cover the

⁴⁵ Miyamoto, K., Biousse, K. (2014). “Official Support for Private Sector Participation in Developing Country Infrastructure”. OECD Development Co-operation Working Papers, No. 19. OECD Publishing.

entire amount in order to ensure a diligent use of resources by the lender. In fact, backing the entire green bonds issuance is likely to contaminate the market for an MDB's own bonds, especially in developing economies. Where markets are not well structured, "the MDB bonds and the bonds with a 100% MDB guarantee end up competing for scarce resources among the same investor base"⁴⁶.

The role of IFIs is, therefore, essential to catalyze finance and scale up investments, particularly targeting the private sector, helping countries meet emissions-cutting pledges under the Paris Agreement, translating them into a pipeline of bankable and financeable projects. In order to transparently allow both donors and recipients align with their commitment, MDBs have developed an harmonized framework for impact reporting on projects to which green bond proceeds have been allocated, stressing the importance of transparency and accountability in the green bonds market, allowing its maturity and capturing more funding. It was requested by investors who were receiving reports from issuers with different parameters, and it contains post-issuance transparency guidelines. Originally elaborated by four MDBs – EIB, WB, IFC and African Development Bank – now it can rely on the support of eleven signatories (also Development Banks adopted this approach), all green bond issuers. The document has two parts describing respectively how best proceeds can be use used to refinance other projects, and challenges and guidelines for impact reporting. Four core indicators are also delivered: annual energy savings and annual GHG emissions reduction or avoidance for EE sector; annual renewable energy produced and capacity of renewable energy plants for RE sector. The GHG emission reductions remains the fundamental impact indicator for green bond reporting.

⁴⁶ Overseas Development Institute (ODI). 2014. "Guarantees for development". Available at: <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9398.pdf>

4.4 Case studies

4.4.1 The Green Climate Fund (GCF)

Established in 2010 as an operating entity of the Financial Mechanism of the UN Framework Convention on Climate Change under Article 11, the GCF aims to support the global response to climate change through the allocation of its resources to climate resilient actions in highly vulnerable contexts, particularly Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States (FCCC/CP/2011/6 and Add.1). As a fund, it's meant to directly engage the private sector in the transition towards low carbon emissions and sustainable development through a variety of financial instruments (grants, concessional loans, guarantees and equity), properly supporting innovation and providing additional finance in both mitigation and adaptation needs thanks to its risk-bearing capacity⁴⁷. Having currently received pledges of USD 10.3 billion, the GCF is poised to become the key vehicle for large-scale international climate finance and is committed to reach yearly USD 2.5 billion in funding⁴⁸, qualifying itself as the main fund for the global mobilization of USD 100 billion by 2020.

Later on, this paper will point out how linking the two institutions could help enhanced result-based climate finance and leverage private resources. At the moment, it seems more appropriate describing the role an entity like the GCF can play in the capital market while assisting with the structuring of a green bond at its first initiative, producing a concrete example of institutional funds mobilization towards small and medium sized

⁴⁷ Available at: <https://www.greenclimate.fund/about-gcf/global-context#history-facts-visual>

⁴⁸ Mikolajczyk, S., et al. (2016). "Linking the Clean Development Mechanism with the Green Climate Fund". Available at: http://www.climatefocus.com/sites/default/files/Linking%20the%20Clean%20Development%20Mechanism%20with%20the%20Green%20Climate%20Fund%20v3_0.pdf

energy service companies (ESCOs) through a green asset-backed security (ABS). Having already described potential implication of using green bonds to finance RE projects, the paper will focus on the impact green bonds may produce on EE projects structuring and financing, acknowledging their potential contribution for the achievement of the zero emissions target by 2100. Worthnoting for the sake of clarity, the construction risk large-scale RE projects phase will not be taken into consideration, given that it does not pose any threat for the EE implementation.

Although energy efficiency (EE) accounts just for 3% of the energy theme in the climate-aligned universe, it significantly increases productivity and reduces production costs, resulting in a high cost-benefit ratio of private sector initiatives. Considering that, collectively, energy, transport, buildings and industry represent 81% of the sectors covered by the green bond market (CBI State of the market, 2016), it's obvious why reducing energy consumption has already become a priority. Nevertheless, there are both historical barriers, such as the lack of accurate data, limited knowledge and subsequent conservative financial approach, along with barriers related to the specific regulatory framework and business tendency. In the case of SMEs, the economic viability of a EE project mainly depends on their access to adequate finance from local financial institutions (LFIs). SMEs have usually a limited balance sheet which results in a higher risk for the domestic bank and, thus, in a higher collateral and higher interest rates. In addition, LFIs have also limited capacity and expertise, and are not willing to invest in brand new technologies. Green bonds are therefore the instrument through which small and medium project implementers can reach the market by pooling their green projects, that are issued and then backed by the quantity of energy they achieve to save, and benefit from more suitable terms and conditions into the capital market. Providing an alternative source of finance to EE projects through the issuance of a green ABS is, therefore, the purpose of the "IDB's Energy Efficiency Green Bond in Latin America and

the Caribbean Programme”⁴⁹ (that is at its initial stage), in which the total amount requested to the GCF equals USD 217 million (of which USD 2 million are not reimbursable in the form of grant to absorb the cost of analyses and implementation), whose funding activity results in a combination of loans and guarantees, envisaging minimum emission reduction of 13.2 million tCO₂e and receiving 780 million dollars of total financing⁵⁰. Although the necessary combination of requirements such as progressive approach of investors, appropriate legal and regulatory framework and sufficient amount of EE projects to be pooled, the programme have the potential to be replicated above and beyond LAC, whereby similar barriers are in place, targeting the scale up of private sector investments for mitigation activities. In fact, it demonstrates how capital markets can move mainstream institutional funds into energy efficiency, eventually tackling global financing shortfalls. In addition, the GCF’s financing reduces the risk of default and enhances the credit rating of the bond, providing an important signaling effect that will trigger the crowd-in of institutional investors.

The programme, that aims at improving EE in separate sectors such as food, industry, automotive, hotels and hospitals, will take advantage of the lesson learnt during the implementation of the pilot project in Mexico, to be then replicated in Colombia, Dominican Republic and Jamaica, where both local capital market and EE market have different level of development. The structure is made of two parts: (i) the **Accumulation step**, in which a senior loan from IDB (Inter-American Development Bank) and a co-loan from GCF provide suitable rates of the financial terms applied to the transaction. Loans do not target individual activities but a special purpose vehicle (SPV) that will accumulate and finance all the ESCOs’ project, and to which the assets are sold. Then, the SPV will securitize them, pooling the debt into a uniform investment product which

⁴⁹ Green Climate Fund (GCF) (2015). “Energy efficiency Green Bonds in Latin America”. Available at: <http://www.greenclimate.fund/-/energy-efficiency-green-bonds-in-latin-america-and-the-caribbean>

⁵⁰ Green Climate Fund (GCF) (2015). Funding Proposal Summary for FP006. GCF/B.11/04/Add.06

can be traded as any other security either domestically or internationally, safeguarding the borrowers from any type of claim⁵¹, creating the ABS; (ii) the **Mobilization Step**, through which the GCF and the IDB provide a partial credit guarantee to the investors, allowing them to purchase the bond at a lower risk, enhancing their credit capacity, making the purchase of the green bond more attractive since losses are limited in case borrowers will default. The intervention of the GCF will enable project developers of small and medium dimensions to reach a portfolio of funders who, otherwise, would have never stepped in.

The value added generated by the involvement of the GCF can be summarized as follows: it wards off the bankruptcy risk as the debt is transferred off the companies' balance sheet; the requirements of some key investor, like pension funds, of a minimum issuance size and a high credit ratings are fulfilled by the securitization; its economic support will help increase the dimension of the programme and streamline its impact, responding to the immediate need of climate actions.

Considering that the amount of pledges announced, signed and disbursed by donors is equal to USD 9.9 billion⁵², it is clear that the problem has to be found in the allocation of funding rather than in its availability. Main reasons are: the lack of a consistent projects pipeline; the stringency of procedural rules to be followed; rigorous investment criteria for the evaluation of funding proposals established to support high-quality, bankable project. In fact, a limited number of entities have the capability to elaborate a proposal likely to be approved under these specific requirements.

Given that, aware that urgent actions have to be taken since postponing interventions is no more acceptable, this paper suggests to address these issues through a possible linkage

⁵¹ REUTERS, Financial Glossary, 2015

⁵² Climate Funds Update. 2016: "Status of pledges and contributions". Available at: https://www.greenclimate.fund/documents/20182/24868/Status_of_Pledges.pdf/eef538d3-2987-4659-8c7c-5566ed6afd19

between the GCF and the CDM, leveraging new sources of private capital while strengthening the Fund's results-based approach.

The main benefits that can emerge from this type of collaboration can be highlighted as follow: (i) availability of an extensive projects pipeline and monitoring methodologies successfully applied, supporting additional and high quality CDM projects not implemented, stalled or abandoned, while providing a single, consolidated and streamlined MRV system to projects proponents who, until now, have developed their own monitoring approaches under the GCF, preventing from a precise comparability of results; (ii) transparency and environmental integrity, where an independent verification to ensure the compliance of GCF criteria is carried out by Designated Operational Entities (DOEs) accredited by the CDM Executive Board; (iii) crowd-in of private climate finance, since the private sector has already become familiar with the CDM during the last decade, valuing its de-politicised nature and its capacity of documenting the environmental impact of funding projects⁵³.

4.4.2 CDM Refinance Facility and Paris Climate Bond

At the eleventh session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) held in Bonn in March 2016, while exploring innovative uses of IFIs to revitalize the CDM and leverage its unique experience on implementing mitigation action in developing countries, the idea of the CDM Refinance Facility (CRF) emerged.

⁵³ Mikolajczyk, S., et al. (2016). "Linking the Clean Development Mechanism with the Green Climate Fund". Available at: http://www.climatefocus.com/sites/default/files/Linking%20the%20Clean%20Development%20Mechanism%20with%20the%20Green%20Climate%20Fund%20v3_0.pdf

The BNP PARIBAS commercial bank, whose principal aim is to play a major part on the green bonds market by becoming one of the three top European issuers by 2018, established a task force for the elaboration of a CDM project refinancing facility targeting the private sector, especially in emerging economies, towards the reduction of the existing climate financial gap within the framework of the Paris Agreement. In a similar way, the Paris Climate Bond is a refinancing structure exclusively established for registered CDM projects through the issuance of green bonds. Since generating predictable cash flows is a key determinant criteria, the selected CDM projects are mainly grid-connected wind and PV projects in emerging economies. The latter one is slightly different due to the simultaneous presence of a group of finance, advisory, legal, and consultancy institutions (including Climate Mundial), which then establishes a private project company (PPC) to perform the same function as the BNP Paribas. The PPC—at a later stage—can potentially be transformed into a YieldCo and go public to raise capital at the equity market. In contrast, the CDM-RF is a debt instrument only

The basic idea is to raise funds mainly from institutional investors through the securitization of different registered CDM projects/programmes or new projects committing registration under the UNFCCC. As for the Case Study 2, a special-purpose public company with limited liability will issue the asset-backed projects bond, whose proceeds will replace higher capital cost CDM project loans with cheaper finance to systematically provide additional green investments⁵⁴. The fundamental **difference** between the two schemes and the energy efficiency bond issued by the IDB lies in the fact that the CRF and PCB will include exclusively CDM projects to secure the

⁵⁴ United Nations Framework Convention on Climate Change (UNFCCC) (2016).” Report on the workshop on financing and use of the clean development mechanism by international climate finance institutions”. Available at: http://cdm.unfccc.int/filestorage/e/x/t/extfile-2016062014444615220062016_workshop_report_final.pdf/20062016_workshop%20report_final.pdf?t=RUx8b2hyMH A0fDBKeqeBFguFSqw2GbOeDbpf

environmental integrity of the actions through the registration, issuance and cancellation of CERs operated by the UNFCCC.

Projects must issue CERs to be eligible and are selected in consultation with investors based on a commercial risk/return decision (preference for RE projects that ensure **low marginal costs** and **steady return on capital invested**). Moreover, CERs will be automatically cancelled to ensure the transparency of operations and the environmental integrity while leading to significant GHG emission reductions.

By pooling CDM projects, it will be possible to take advantage of the existing MRV system and related methodologies, enabling credible and transparent result-based climate finance, comparability of results and additionality. In fact, the demonstration of the mitigation impact of each intervention is necessary in order to meet both the need of investors who want to be sure that their contributions will impact on environmental and social issues, and the need of countries that will have to regularly report on their NDCs progresses in the aftermath of the Paris Agreement. However, the complexity of the structure requires the provision of credit enhancement by a recognized institution, both in the form of a co-loan and a guarantee for the successful uptake of the CDM asset-backed security. In fact, the high heterogeneity of the projects package due to the simultaneous involvement of different countries, sectors, legal frameworks and technologies, increase the investment risk investors have to face, especially taking into the implicit political and economic uncertainty of developing countries.

In this context, the GCF could potentially play an important role by “providing either risk equity or credit enhancement for the issuance of green bonds where the assets are the underlying CDM projects”⁵⁵, although it would be advisable to allow other credit

⁵⁵ United Nations Framework Convention on Climate Change (UNFCCC) (2016).” Report on the workshop on financing and use of the clean development mechanism by international climate finance institutions”. Available at: http://cdm.unfccc.int/filestorage/e/x/t/extfile-2016062014444615220062016_workshop_report_final.pdf/20062016_workshop%20report_final.pdf?t=RUx8b2hyMH A0fDBKeqeBFguFSqw2GbOeDbpf

institutions, such as MDBs or development banks, to support this risk reduction financial action.

Considering the current lack of standardization of principles, most of green bonds introduced to date have not been transformative and respective projects would have been implemented anyway. Therefore, the value added of CRF and PCB is represented by the fact that the CDM structure could serve as a standard to certify the integrity of bonds issued under this scheme, providing a unique solution and a bankable pipeline of projects to refinance through the capital market, meeting the growing investors demand and bridging the existing financial gap. Moreover, the participation of the GCF could expand the reach of the facility while making investments safer.

Acknowledging that, currently, there will be no price benefit for the use of the CDM since the demand for green bonds is larger than their issuance. However, once the standardization of principles and methodologies will move forward, the establishment of a solid base for the development of the green bonds market will take place and a return differential is likely to emerge (UNFCCC 2016).

5. Conclusions

In the aftermath of the Paris Agreement, the need of an unprecedented disbursement of public and private financial resources clearly arose, both at domestic and international level, to systematically green all investments and ignite a paradigmatic shift from high-carbon approaches to a climate-resilient pathway. Considering that public budgets and bank's lending capabilities are limited, since the challenge of bridging the existing financial gap cannot be met with public sector funds and bank finance alone, engaging the private sector through the green bond market is, therefore, crucial. Nevertheless, the

market is still at its early stage and the process towards its successful development promises to be quite long and complex.

This research has essentially highlighted four key components that define the green bonds scenario and, for each of them, aims to point out main policy actions likely to overcome technical, procedural and environmental integrity challenges the private sector faces today in the popularisation of debt instrument. At this respect, themes and respective sound actions are presented as follow:

Market development: support the standardization of definitions and best practice guidelines for labelled Green Bonds to ensure the most appropriate utilization of proceeds and the safeguard of the environmental integrity at international level; encourage a systemic reporting activity based on qualitative performance indicators and quantitative performance measures through the provision of Green Bonds tax incentives.

Issuance: adopt a negative list in order to exclude specific project types and technologies with higher environmental/social costs; promote knowledge sharing, education programmes and technical support for the realization of bankable projects' pipeline; strategic issuance by DFIs with low risk profile, allowing investors to become familiar with the new asset class.

Instruments: strengthen aggregation mechanisms (e.g. ABS, covered green bonds) within the green bonds framework towards the involvement of SMEs, helping them deal with the minimum issuance size and the high upfront capital required by green infrastructures projects; leverage the IFIs' creditworthiness and funding capability to provide credit enhancement and political risk insurance in unstable developing countries with a weak investors' base.

Investments: active involvement in the green bond capacity building and training through the establishment of knowledge sharing platforms at regional level, promoting coordination and cooperation among countries facing similar challenges; implement tax incentives and exemptions to match the supply with the larger investors demand for green bonds, and allow all types of investors to be eligible and active players in the market.

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