### GREEN BONDS AS AN INSTRUMENT FOR FINANCING RENEWABLE ENERGY PROJECTS

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#### DOI: https://doi.org/10.31410/EMAN.2020.111

**Abstract:** The paper analyses green bonds as sources of financing renewable energy projects. Green bonds are a relatively new form of financing and thanks to increased investors' climate awareness, the market has seen an enormous growth in the last few years. Therefore, the guidelines and standards adopted in financial markets clearly indicate what should be considered a green investment and are a key to further development of the market and achieving the goals of green financing. The goal of the theoretical approach to green bond market in the paper is to identify the key barriers that prevent many countries from taking advantage of this new but growing source of financing renewable energy. The lack of appropriate institutional arrangements for managing green bonds, issuing a minimum volume and high transaction costs are the key obstacles to the development of green bond market. The overall conclusion of the paper is that with just the right measures, many countries could make full use of green bonds to finance climate change adaptation and mitigation projects and thus increase renewable energy capacities.

Keywords: Green bond, Renewable energy, Renewable energy projects, Climate change.

#### 1. INTRODUCTION

I gnoring the exposure to environmental threats is a problem that threatens and questions the survival of the rich and the poor, the "privileged" and the "subordinate". The most alarming of the issue poses the greatest challenge for the future of humanity and imposes the need for a solution at the global and not only at the national level of individual countries (Vujović, S., Vujović, T., 2017). Stopping, or at least mitigating the effects of climate change involves reducing dependence on fossil fuels and developing renewable energy technologies. However, the transition to renewable energy requires an appropriate policy of fostering technological innovations that are of great importance in choosing and (re)constructing lifestyles. Despite the many and deeply rooted habits that contribute to the emission of harmful gases, the practice of people's daily life in interaction with technology can be radically changed (Mišković, 2020). Specifically, the fight against climate change has led to certain trends globally, in terms of shifting investments towards new areas, such as: energy efficiency, technology advancements and renewable energy sources (Mazumdar, Rajeev, 2016).

In recent years, a growing investor demand has led to the development of green bond markets. The term "green bonds" refers to the bonds whose revenue is used to fund projects that do no harm to the environment (renewable energy resources, water and energy efficiency, bioenergy and low-carbon transport). This signifies an obligation for the funds raised to be used exclusively for financing or refinancing "green projects", funds or business activities (Stojanovic, 2019).

Starting from the fact that climate change requires action at the global level, the paper initially analyzes global investment market in renewable energy. Redirecting global capital to sustain-

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able solutions requires a greater supply of efficient and desirable instruments in the capital market; therefore, every investment decision must be accompanied by an adequate and optimal choice of financing sources. The fact that green bonds are innovative financial instruments that do not represent an additional risk to investors, the paper continues to analyze the green bond market, which has experienced an enormous growth in the developed countries in recent years. On the other hand, many developing countries are excluded from this growing funding source they need to implement renewable energy projects. Building on the fact, the paper at the end highlights the most significant barriers preventing the developing countries from taking advantage of a new but growing source of financing for renewable energy projects. The paper concludes by proposing potential measures that could lead to the development and growth of green bond market in the developing countries.

#### 2. GLOBAL RENEWABLE ENERGY INVESTMENT FLOW

Energy has been and remains a key factor in the development of most countries, regardless of the fact that it was thought that the need for energy would be decreasing with the development of new technologies. In recent years, however, the main requirement that has been put before the energy sector is security of supply which, at the same time, puts environmental protection at the forefront, that is, the use of renewable energy sources. As the awareness of individuals, with the help of media and various other campaigns, grows, so does their need to be more responsible to the environment. Consequently, renewable energy sources have become a compelling proposition for global investment. (Figure 1) (Frankfurt School-UNEP Centre/BNEF, 2019).







As can be seen from Figure 1, total investments in renewable energy sources, without major hydroelectric projects, increased from \$40.6 billion in 2004 to \$272.9 billion in 2018, which is

by 12% less than the record of \$308.9 billion in 2017. As far as capital hydropower investments are concerned, in 2018 they totaled to about \$16 billion. In 2018, the total figure of 272.9 billion consisted of \$236.1 billion for projects such as wind farms, solar parks and biomass plants, by 11% less than in the same period a year earlier. The rest of the funding was directed to solar capacities of less than 1MV (\$36.8 billion), by 14% less than in 2017. Also, when analyzing global investment in renewable energy sources, another investment trend can be observed, and that is a geographical shift towards emerging and developing markets (Figure 2) (Chapter 1, Renewables capacity growth in 2018).





## Figure 2. Investment in renewable energy capacity, developed vs developing countries, 2004-2018, \$bn

Source: Chapter 1, Renewables capacity growth in 2018

As can be seen in Figure 2, up to 2014 most of the investments in renewable energy sources was directed towards the developed countries with the largest investments being \$187 billion in 2011. It can be seen from the same Figure that after this period the developing countries have increased their investments. Specifically, the largest volume of investments was recorded in 2017 when they reached \$194 billion. However, in 2018 there is a decline in investments in the developing countries and a slight increase in the developed countries. More specifically, the developing countries invested \$125.8 billion in renewable sources, which is about 10% more than the previous year. In contrast, the developing countries allocated \$147.1 billion for these investments, 24% less than in 2017. These changes are the result of a consumption decrease in China and India; namely, their total investment fell by 36% to \$99.6 billion, while in "other emerging economies", the investments rose by 22% to \$47.5 billion.

Despite positive investment trends, many developing countries and emerging economies still have largely untapped potential to invest in renewable energy (Africa, the Middle East, South-east Asia and Southeast Europe). Having in mind these, greater investment in renewable energy

sources is required so that the developing countries could benefit from energy transformation. In addition to the increasing technological and geographical diversity, investments in renewable energy in the developed countries are witnessing the expansion of new business models and financial products that can encourage investors to finance renewable energy projects. The examples include the growth of the green bond market.

#### 3. GREEN BONDS AS A NEW TOOL FOR FINANCING RENEWABLE ENERGY PROJECTS

Green bonds support project finance in the field of mitigation of climate change effects. In addition, their value lies in the fact that the issuer undertakes to direct the funds rose to the financing of the projects that have a positive impact on the environment. This marks the obligation to use the funds collected exclusively for financing or refinancing "green projects", funds or business activities.

In accordance with the principles of green bonds, the funds raised are directed to (Vella, 2018) [7]:

- Renewable energy,
- Energy efficiency (including efficient buildings),
- Sustainable waste management,
- Sustainable land use,
- Conservation of biodiversity,
- Clean transport,
- Sustainable water management (including clean and/or drinking water), and
- Adapting to climate change.

In contrast to the conventional bonds, green bonds are used to finance specific "green" investments and are not an additional risk to investors. Compared to bank deposits, bonds tend to provide higher profitability, liquidity and stability that meet the most diverse investors (Ilić et al. 2019) [8]. The funds raised must be spent on renewable energy and sustainable green projects (Figure 3).



Low-carbon energy transformation annual investment need (through 2050)

Figure 3. Green bond issuances, renewable energy power investment, renewable energy power investment need, low-carbon energy transformation investment need and global bond issuances (USD, annual)

Sources: IRENA, 2019a

Green bonds can be viewed as an experiment, which has shown that capital markets can be a source of financing initiatives to solve climate change. The key objective is to offer investors, along with the bonds, a product that meets their investment return targets which include the risk, as well as to support the finance of the projects that reduce greenhouse gas emissions on one side, while on the other, to help countries adapt to the impacts of the climate change (Knežević at al., 2013) [10]. On an annual basis, green bonds raised USD 167 billion in 2018, while the total bond market raised around USD 21 trillion (SIFMA, 2019) [11].

#### 4. GREEN BOND MARKET

In addition to the fact that green bonds are a relatively new financial instrument in climate protection, their market has experienced a remarkable growth since 2007. As shown in Figure 4, the first multilateral development institution to issue a \$1 billion bond in 2007 was European Investment Bank (EIB). A year later, the World Bank issued a second green bond to finance climate projects, mitigation of and adaptation to climate change. However, during the 2008 financial crisis, investors found environmental projects risky and unprofitable, thereby reducing interest in green bonds. After this period, increasing investor awareness of the benefits of green investments and the impact of the climate change on the financial stability of the developed countries has led to an exponential growth of green bond issuance (Chiesa, 2017).



Source: CBI 2019a

The key factors for the market development were the introduction of the International Capital Market Association (ICMA) in January 2014 and the principles of green bonds, which are the basis for many existing green labels. Since that time, the market has been on the rise so that \$42 billion was issued in 2015, four times more than in 2013. The same trend continued in 2016 when aggregate green bond emission was \$87 billion. Specifically, the European Bank for Reconstruction and Development (EBRD) raised €1.64 billion in 2016 through 57 bond issues in eight different currencies. Finally, the 2015 Paris Agreement paved the way for a new trend in green finance. Moreover, in its latest report in 2017, the Climate Bonds Initiative noted that

the worldwide supply of green bonds exceeded \$155 billion in 2017 (Ceres, 2014) [14]. Overall, annual global green bond issuances rose from USD 37 billion in 2014 and USD 167 billion in 2018 (Figure 4).

Along with other innovative capital market instruments, green bonds can support new or existing green projects by accessing and channeling long-term capital into more "green" categories (Figure 5) (IRENA, 2020).



**IRENA** analysis based on data from the Environmental Finance Bond Database (subscription required) \*2019 includes data up to and including November 2019.

# Figure 5. Breakdown of green bond issuances by use of proceeds, by cumulative volume (USD), 2010-2019\*

#### Source: IRENA, 2020

According to an IRENA study, of a sample of over 4,300 green bonds, as of the categories of revenue use, 50% of bonds (by volume, in USD) had renewable energy, while 16% was for renewables only. On a regional basis, in Europe were dedicated (by volume, in USD) 21% of green bonds, 19% in Africa, 16% in the Americas and 14% in Asia Pacific (IRENA, 2020). These figures indicate that green bond market faces many challenges that threaten its development, especially in the developing countries.

#### 5. BARRIERS TO THE DEVELOPMENT OF THE GREEN BOND MARKET IN THE DEVELOPING COUNTRIES

When talking about the development of green bond market in developing countries, we must bear in mind that there are certain barriers that can vary from country to country. These range from institutional to market barriers and are considered to be the most challenging for the development of green bond market and the development of green economy concept.

*Institutional barriers* – Green bonds primarily require technical skills to monitor and evaluate the use of funds throughout a project life cycle, which many developing countries lack. A recent

survey by the G20 (Green Finance Study Group) found that the respondents (74%) recorded a lack of knowledge of the existing international practices regarding green bond transactions as an important barrier to the market development. This applies to many developing countries, where the knowledge gap is exacerbated by the fact that the benefits of green bonds have not yet attracted the attention of policymakers, issuers and investors. The lack of commonly agreed standards for green bonds and their novelty may justify the knowledge gap. Furthermore, in some developing countries do not enable green bonds emission inappropriate institutional arrangements. Often, different sectors of ministries with different mandates and skills achieve different, if not conflicting, goals in implementing government policy. These differences between priorities and mandates may lead to a diminished political influence by the ministries of the environment, meaning that effective coordination between the Ministry of Finance and the Ministry of the Environment is necessary for the green bond market development (Obradovich, Zimmerman, 2016).

*Market barriers* – The development of green bond market in the developing countries is slowed down by the following market barriers:

- 1. minimum size issuance,
- 2. emission currencies, and
- 3. high transaction issuance costs.

The issue of minimum size refers to the minimum value that a green bond must carry in order to be attractive to the issuer. According to the world's leading agency Moody's, green bonds must have a minimum value of \$250 million. However, many green projects in developing countries do not meet the minimum size required by investors. Namely, in many countries, low population density combined with high poverty rates make small projects more attractive especially in rural areas. The size of most of these small projects barely exceeds \$10 billion on average, suggesting that the minimum size required by investors could be a barrier to breaking into the developing countries markets (UNCTAD, 2017).

Further, transaction costs refer to the costs incurred by the issuer to obtain a green label certificate from an independent auditor and to produce regular documents showing the allocation of green bond revenue over the project life cycle. More specifically, transaction costs are very significant when examining an issuer's creditworthiness along with the technical assessment of the potential environment impact of his project and can range from \$10 to \$100,000. These costs are a barrier for small green bond issuers.

Finally, the insignificant barrier to expanding green bond market in the developing countries is probably the currency of the bond issue. A review of the Climate Bond Initiative database shows that between 2005 and 2017, investors used mainly Renminbi (32%), USD (26%) and EUR (20%). Accordingly, if developing countries (most have non-convertible currencies) wish to raise large amounts of capital in international financial markets, they must issue their green bonds in international currencies (Kaminker, 2016).

#### 6. CONCLUSION

Globally, the orientation towards renewable energy sources is a way to ensure a higher level of energy, economic, environmental, technological and political security of each country. Renewable energy sources are a sustainable and greener substitute for carbon-based energy and support global determination in pursuing the Sustainable Development Goals. This worldwide concern

is setting itself up as a generator of green bond market development. Green bonds are channeling finances toward low-carbon investments. While companies and local governments in the developed and emerging countries are increasingly issuing green bonds, a number of institutional and market barriers are preventing the developing countries from grasping all of their benefits. The lack of knowledge about how it works, inadequate institutional arrangements, minimum size issues, currencies and high transaction costs are the key obstacles hindering the development of green bond markets in the developing countries. However, with the right measures, these countries could make full use of green bonds to finance renewable energy projects. The potential measures include: efficient coordination between the ministries of finance and environment, efficient use of multilateral and national development banks to manage green bonds, providing guarantees of local governments for issuing and promoting local markets where domestic investors could issue green bonds in local currency. Accordingly, increasing government assistance, together with favorable policies and regulations, can play a key role in the development of green bond market and the growth of renewable energy market in the developing countries.

Although the paper has reached its goal of examining the growth of renewable energy and green bond markets, as well as identifying key obstacles preventing the developing countries from taking advantage of this method of financing renewable energy, its limitations should not be neglected. First, by looking at the developing countries as a homogenous whole, the paper neglects the differences in terms of economic characteristics. Second, the relative lack of academic literature on green bonds in the region has been a challenge for the author in conceptualizing the theoretical framework of the paper. Nonetheless, in the author's view, the paper is the basis for some further research in this area and perhaps an attempt to draw the attention of policy makers and investors to the importance of developing a green bond market for financing renewable energy sources in Serbia.

#### REFERENCES

- CBI, (2019a). *Green bonds: The state of the market 2018*, Climate Bonds Initiative, www. climatebonds.net/resources/reports/green-bonds-state-market-2018.
- Ceres, (2014). Green Bond Principles 2014: Voluntary Process Guidelines for Issuing Green Bonds. Boston. https://www.ceres.org/resources/reports/green-bond-principles-2014.
- Chiesa, M., (2017). (In Press) The Green Bond Market: a new green trend, https://www.quad-rantefuturo.it/settori/the-green-bond-market-a-new-green-trend.html.
- CHAPTER 1, (In Press) Renewables capacity growth in 2018, https://olc.worldbank.org/system/files/Chapter%201\_1.pdf
- Frankfurt School-UNEP Centre/BNEF, (2019). *Global trends in renewable energy investment* 2019. Frankfurt School UNEP Collaborating Centre for Climate & Sustainable Energy Finance and BloombergNEF, Frankfurt am Main, Germany, wedocs.unep.org/ bitstream/ handle/20.500.11822/29752/GTR2019.pdf?sequence=1&isAllowed=y.
- Ilic, B., Stojanovic, D., Djukic, G., (2019). Green economy: mobilization of international capital for financing projects of renewable energy sources, *Green Finance*, 1(2), 94–109. doi: 10.3934/GF. 2019.2.94 www.aimspress.com/article10.3934GF.2019.2.94
- International Renewable Energy Agency (IRENA), (2019a). *Transforming the energy system and holding the line on rising global temperatures*, Abu Dhabi.
- International Renewable Energy Agency (IRENA), (2020). *Renewable energy finance: Green Bonds*, Brief 03, January, https://www.irena.org/publications/2020/Jan/RE-finance-Greenbonds

- Jun, M., Kaminker, C., Kidney, S., & Pfaff, N. (2016). Green Bonds Country Experiences Barriers and Options, *Input Paper In support of the G20 Green Finance Study Group*. http://unepinquiry.org/wpcontent/uploads/2016/09/6\_Green\_Bonds\_Country\_Experiences\_Barriers\_and\_Options.pdf. 2016.
- Knežević, S., Bilić, M., Babić, Ž. (2013). Problemi savremenog doba globalnog karaktera -zaštita životne sredine i obezbeđivanje investicija u uslovima ekonomske krize, *Menadžment u hotelijerstvu i turizmu*, 1(1), 41-54.
- Mazumdar, I., Rajeev, V. P. (2016). Green bond considerations in the renewable energy sector, World Wide Journal of Multidisciplinary Research and Development WWJMRD, 2(4), 48-56. www.wwjmrd.com e-ISSN: 2454-6615
- Mišković, M. M. (In Press) 18.01.2020. Klimatske promene i svakodnevni život, http://www.politika.rs/sr/clanak/445714/Pogledi/Klimatske-promene-i svakodnevni-zivot
- Obradovich, N., Zimmerman, B. (2016). African Voters Indicate Lack of Support for Climate Change Policies, *Environmental Science & Policy*, 66, 292–298. https://doi.org/10.1016/ j.envsci.2016.06.013
- Securities Industry and Financial Markets Association SIFMA, (2019). Capital markets fact book 2018, www.sifma.org/resources/research/fact-book/
- Stojanovic, D. (2019). Green finance a trend which accompanies the concept of sustainable economic development, Paper presented at *Proceedings of the 9th International Symposium on Natural Resources Management*, Zajecar, Serbia, May 31, 2019 (pp. 348-355), Faculty of management Zajecar.
- UNCTAD, *The Least Developed Countries Report: Transformational Energy Access.* New York: United Nations Publications. Sales No. E.17.II.D.6. https://doi.org/10.1163/ej. 9789004180048.i-962.602. 2017.
- Vella, H., (2018). Global Green Bond Partnership: reinvigorating green energy investment, again, https://www.power-technology.com/features/global-green-bond-partnership/
- Vujović, S., Vujović, T., (2017). Promocija "zelene" urbane mobilnosti u funkciji održivog razvoja, *Ecologica*, 24 (88), 962-96.