

GREEN INVESTMENT FINANCING ALTERNATIVES

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Abstract. The article is aimed to analyse problems of financing the green investments – one of the more important green economics growth engines. Increasing flows of green investment condition the necessity of instruments for effective financing of these flows. In the article, concept and importance of green investment is revealed, green investment change tendencies are discussed. Based on the research in scientific literature, also on research of various organizations and research institutions, main green investment financing instruments are identified. Given the importance of private capital, as one of the most important green projects financing sources, the barriers of this capital to participate in the green investments financing are revealed. The role of public financial institutions is revealed and – based on the actual cases – their green investment financing instruments are analysed. Comparative analysis of literature sources and green investment financing instruments application case analysis are performed. Analysis showed, that there are neither financing instruments that would be universal to all the green projects, nor the universal set of such instruments. Application of these instruments depends on various factors, such as size of investment project, investment area etc. Based on the analysis results, recommendations for the further research are formed: to estimate the effectiveness of green investment financing instruments; to research the possibilities of usage of innovative financing instruments for the green investment projects financing.

Key words: green investment, green investment financing instruments, green growth.

JEL code: F21, G20, H81, Q54

Introduction

Climate change is one of the most pressing challenges facing the planet. Worldwide during the active transition to green economy, issues related to green growth, green investments, green finance attract more and more attention of researchers and practitioners. Global and EU states agreements (Kyoto Protocol, the Paris Agreement, the 2030 Agenda for Sustainable Development, the EU strategy "Europe 2020" and others) show a particular concern about climate change problems of both developed and developing countries. In 2015, the Paris Agreement signed by 179 countries of the world to reduce global warming by 2035 – is one of the larger-scale agreements, thanks to which an especially important step was taken in solving a globally pressing climate warming problem. The extent of the Agreement is reflected by the number of participating countries (both developed and developing). The objectives set in the Paris Agreement and the 2030 Agenda for Sustainable Development will require "... an unprecedented mobilization of both public and private finance - some USD 90 trillion over the next 15 years" (Financing sustainable

development, 2016). Ambitious goals lead to the need for financing instruments that can meet the necessary green investment flows.

The scientific literature that deals with green investment financing issues is not abundant. There is a lack of scientific research on the complex analysis of green investment financing instruments, their main peculiarities, application specifics or the effectiveness estimation. Due to the high practical significance, this question is usually discussed by world-class organizations, research institutes (Organisation for Economic Co-operation and Development (OECD), Climate Policy Initiative, Global Green Growth Institute, World Bank, World Resources Institute) in works (reports, presentations of research results, etc.). As the theme of green investment is relatively new, scientists (Lindenberg N., 2014; Green Finance, 2016; Eyraud L., Wane A., 2011) focus on green economy, green investment, green finance definitions searches.

Certain financing instruments for the use of green investment financing issues were discussed at M.C. Voica, M. Panait, I. Radulescu (2014), L. Olmos, S. Ruester, S. Liang, (2012), H.B. Dulal, R. Dulal, P.K. Yadav (2015) scientific

publications, studies carried out by various organizations, research institutes surveys, usually covering specific countries', case studies analysis. Recently, more attention of researchers is attracted to issues of renewable energy, energy efficiency increase.

The aim of the article - to explore the green investments financing alternatives. To achieve the aim the following tasks were set: to reveal the essence of green investment, the importance of sustainable economic development and to overview global trends in green investments; identify key green investment financing instruments; disclose private green investment financing instruments and mechanisms.

The research methods are as follows: analysis of scientific literature; grouping, comparing, specifying and generalising of information.

Research results and discussion

1. The global green investment tendencies of changes

In scientific literature, the term of green investment is usually associated with investment in environmental protection, renewable energy sources, increased energy efficiency and other projects. In literature (Inderst, G., Kaminker, Ch., Stewart, F., 2012), the following green investment areas are identified: 1. General Environmental Management; 2. Renewable energy; 3. Combustion technologies for improved efficiency; 4. Climate change mitigation; 5. Indirect contribution; 6. Transportation; 7. Buildings. According to M.C. Voica, M. Panait, I. Radulescu (2014), green investments can incorporate other investment approaches like- ESG (environmental, social and governance), SRI (sustainable responsibility investing), RI (responsible investing), SI (sustainable investing), double or triple bottom-line Investing, universal ownership concept etc. These investments play a significant role in the economics green growth, which is critical for the implementation of sustainable development goals. According to the OECD, green growth means fostering economic growth and

development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being of relies. In order to green growth, it is necessary to catalyse investment and innovation, which will underpin sustained growth and give rise to new economic opportunities.

Various studies by global organizations, institutions (World Bank, the OECD, World Resources Institute) speak about the recently fast-growing green investment flows, growth of which should be even faster in the future. According to the World Research Institute's study (Bishop R., 2014), from 2015 to 2030, the transition to low-carbon economy will require USD 93 trillion of investment in transport, energy and water areas.

The rapid growth in green investments flows are shown by results of different studies. One such example was the World Resources Institute's study, which showed that in the period of 2012-2014, green investments flows in different regions grew from more than 30 % in Asia to nearly 80 % in the USA. Although, according to green investments flow change Europe is the leader, where these investments have increased by about USD 15000 bn, the growth was much lower than in the USA and reached below 60 %.

The growing investment demand leads to the need for financial instruments that would be used for green investment financing.

2. Green investment financing instruments

Scientific literature, studies carried out by various European and world organizations, research centres, financial institutions, surveys analysing the green economy projects, financing issues, show that there are no universal instruments appropriate for financing of all the green economy projects. Their choice is determined by various factors: the size of a project, the type of investment, financing instrument source availability, state, financing institution and others. According to G. Inderst,

Ch. Kaminker, F. Stewart (2012) financing instruments can't in themselves be green - greenness is derived from the uses to which they are being put - underlying assets or activities. The most common conventional financing instruments (such as loans and securities), for their specific purpose only - to finance green investment projects, take on a new form and can be called new, innovative investment instruments. Examples of such instruments are green loans, green bonds and other.

The authors dealing with the implementation of green investment and their financing issues do not provide a single approach to the investment financing instruments, their composition, suitability. N. Lindenberg (2014) separates green investment financing instruments into three categories: instruments that provide financing directly to projects (equity, grants, loans, credit lines); instruments do not directly transfer money, but transfer knowledge or mitigate risk (guarantees, technical assistance); instruments are used to raise additional private funds that, then, can be transferred to green projects via one of the above mentioned instruments (green bonds and structured funds). P. Del Rio, P. Mir-Artigues (2014) studying renewable electricity projects, divide financing instruments into primary and secondary. M.C. Voica, M. Panait, I. Radulescu (2014) present two main forms of green investment: green equity and green bonds. S. Venugopal, A. Srivastava C. Polycarp, E. Taylor (2012) divide financing instruments and mechanisms that encourage participation of private capital in green investment financing into two groups: public support mechanisms; public financing instruments (lending, equity investment, de-risking instruments). These instruments are particularly important in order to attract private capital investment in green projects.

An analysis of scientific literature allows us to identify the key green investments financing instruments. These instruments are: budget

financing instruments, green bonds, green equity, green loans.

Budget financing instruments. Budget financing instruments have a clearly significant role in the financing of green investment. The budget funding usually appointed with regard to the state programs. As the various countries of the world carry out a sufficient number and variety of programs to finance green projects, we will take a look at EU programs, funds (or part of the funds) are used for green projects. Table 1 shows the 2014-2020 programs implemented by the EU, their budget and funding areas.

Table 1

EU funded green investment

Fund/ Programme	Funding, EUR bn	Funding areas
Horizon 2020	19.2	Energy efficiency; renewable energy; sustainable urban mobility
LIFE	3.4	Climate change mitigation and adaptation; climate governance and information
European Structural and Investment Funds (ERDF, CF, EAFRD, EMFF)	114	Energy efficiency; renewable energy and smart grids; environment protection; low carbon economy

Source: authors' construction based on European Commission data

The funding of these programs is not hundred per cent, but it is important financing tool for innovative investments, often characterized by a high risk. It is worth noting that these programs contribute to green economy initiatives implemented by the EU. 28 October 2014, the Council of the European Union adopted conclusions on the European Semester and the "Europe 2020" greening, i.e. to include sustainability and resource efficiency issues in the "Europe 2020" strategy. By the way, the European Union's aim is to achieve, by the end of 2030 energy efficiency would reach 40 %, the production of energy from renewable energy sources would increase to 30 % and greenhouse gas emissions compared to 1990 would level

down to 40 %. For the period of 2014-2020, 20 % of the EU budget will be allocated to climate-related action. Given the EU's objectives, it can be expected that in the coming years 2021-2027 period, the focus on climate change issues will increase and this will condition more green investment funding needs.

Green bonds. Green bonds are one of the more efficient capital market instruments with climate change-related projects examples. This is a debt security, which is different from conventional bonds by its purpose - to finance green investment projects. Green bonds are an alternative to bank loans, providing direct access to capital markets. Like any other bond, green bond is a fixed income (coupon) financial instrument for raising capital from investors through the debt capital market (Green Bonds, 2015). The strength of green bonds is that they can bundle various projects together in a single Security (Lindenberg N., 2014). Although the green bond market is relatively young (the first green bond was issued by Europe Investment Bank in 2007), it is one of the fastest growing markets in the last few years. In 2012-2016, this market has grown more than 30 times. In 2012, there were USD 2.6 bn green bonds issued and in 2016 even for USD 81 bn (Climate Bonds Initiative, 2017). In 2017, an especially active green bond market growth is planned. It is scheduled to issue securities for USD 130 bn. This growth speaks about the aim of countries to effectively address climate change, using this prospective financial instrument. The largest green bonds publisher is the World Bank, which, since 2008, issued green bonds for more than USD 9.7 bn in 18 currencies. Most green bonds were issued for funding of renewable energies and energy efficient sector projects. For instance, in 2015, renewable energies took 48.8 %, and energy efficient projects - 19.6 % of the green bond issue amount.

Green equity. Green equity is an equity, the purpose of which is to finance green projects. As

providers of property become owner of the project, this form of financing constitutes a strong commitment (Lindenberg N., 2014). Growth in number of companies engaged in green projects encourages growth of the need of this funding instrument as one of the financing options. Investment in green equity attractiveness, the return trend is best reflected by green equity indices. Analysing green equity indices one can observe the difference in constituent number of companies, sectors. Some indices include only a certain sector businesses. For example, The S&P Global Clean Energy Index, comprising 30 companies involved in clean energy related businesses. However, there are indices that include a variety of sectors. One of the examples of such indices is the NASDAQ OMX Green Economy Index, covering 13 sectors (energy efficiency, pollution mitigation, renewable energy generation, etc.). This index belongs to the NASDAQ Green Economy Family group index, which comprises more than 70 indexes. In recent years, we are able to monitor the growth of many indices, which indicates investment in green projects becomes more attractive. However, it can be seen that green investment returns tend to be lower than the non-green investments. It is associated with a higher risk of green investment. Moreover green projects generally have higher capital costs, particularly at the beginning of implementation of projects (The Green Investment Report, 2013). For these reasons, the state uses various public instruments to reduce risks in green projects investment and encourage private green investments.

Green loans. Green loan is a type of loan, which is used by financial institutions (mainly banks and credit unions) in many countries around the world to finance the environmentally friendly services and products. Usually, this instrument is used to finance the projects concerning renewable energy, energy efficiency, water use management and carbon reduction.

3. Private green investment promotion instruments

Recently, researchers are focusing more on private investment as one of the green investment financing alternatives problematic consideration. As budgetary resources are not sufficient to provide the necessary funding (Lindenberg N., 2014), it is necessary to attract private green investment. Scientific publications, practical studies mentioned barriers restricting private capital involvement in promoting green growth financing: greater investment in green projects costs; unstable legal and economic environment; distortionary subsidies; lack of liquid debt and equity markets and others. In order to overcome these barriers, governments should seek to mobilize private green investment by: creating an enabling environment for long term green investment; efficiently using public budgets and investments; through private green investment risk minimization instruments. As shown by the analysis of literature, the risk is one of the most important reasons influencing the lack of private green investment.

In the scientific literature, various organizations conducted studies, no universal green investment risks classification was provided. A variety of risks types is determined by various factors: amount of the investment, investment area, a state in which the project is realized, and so on. Certain types of risk (e.g., economic risk, industry risk, political risk) are inherent not only to green, but also to the usual investments. In literature (The Green Investment Report, 2013; Micale V., Frisari G., Herve-Mignucci M., Mazza F., 2013; Amin A., Naidoo Ch., Whitley Sh., 2014; Lindenberg N., 2014), it usually referred to these green investments types of risk: political risk, economic risk, technological risk, environmental risk, operational risk.

In order to reduce the risk for private investors and create an attractive investment environment in green projects, various public instruments are applied. Public financial instruments are designed to reduce real or

perceived risk and / or to increase return on investment (Amin A., Naidoo Ch., Whitley Sh., 2014). In literature (The Green Investment Report, 2013; Amin A., Naidoo Ch., Whitley Sh., 2014; Waissbein O., Glemarec Y., Bayraktar H., Schmidt T.S., 2013), it is generally referred to these de-risking financial instruments: grants, loan guarantees, insurance. These instruments may be used at different points in an investment program cycle to target different investors (Amin A., Naidoo Ch., Whitley Sh., 2014).

Grants - are resources, which are intended to finance green investment, not expecting the money be repaid. This instrument is easily applicable to all kind of projects, especially for early project development phase (Lindenberg N. 2014). The main advantages of this instrument: simple to implement and manage; gives viability to a project; covers full cost of adaptation, complements other instruments; reduces administrative costs, as no payback is required. The main drawback of the instrument is that there are no reflows and hence it is expensive for public budgets.

To promote the private green investment, **guarantees** and innovative **insurance** instruments are used. They are provided by governments and financial development institutions and often are intended to decrease the political risk. Political risk guarantees are particularly useful in developing and emerging markets (The Green Investment Report, 2013). One of the examples of political risk minimizing guarantees providing institutions is the World Bank Group's Multilateral Insurance Guarantee Agency (MIGA).

Apart from the discussed de-risking instruments, public support mechanisms are applied. The main purpose of such mechanisms is to promote the private green investment. Examples of such mechanisms are the following: feed-in tariffs, renewable energy quotas and repealing support for "brown" sectors (The Green Investment Report, 2013). They are used to raise

the private investment level by reducing the cost of capital of green growth.

An important role in leveraging private capital is performed by public financing facilities (PFIs). PFIs can provide financing (through a variety of financing instruments) and advisory services (providing assistance to public authorities in creating favourable conditions for private sector In 2012, the World Resources Institute (WRI)

conducted a study that aimed to identify two types of international PFIs (Climate investment Funds and Development Bank) 2005-2011 applied green investment financing instruments, their structure, proportions and the like. 214 projects were studied. Table 2 illustrates the survey of results relating to the applied financing instruments.

Table 2

PFIs financing instruments

Institution		Number of projects reviewed	Financing instruments (% of all projects)
International Climate Funds (ICF)	Clean technology fund (CTF)	25	Loans and grants (NA); Equity (NA); Guarantees (NA)
	Global environment facility (GEF)	80	Grants (49 %); Loans (44 %); Guarantees (7 %)
World Bank Group (WBG)	Public sector arms: International bank for reconstruction and development (IBRD); International development association (IDA)	40	Loans (93 %); Credits (3 %) Grants (4 %)
	Private sector arm: International finance corporation (IFC)	55	Loans (81 %); Quasi-equity (8 %); Equity (9 %); Risk-sharing facilities (2 %)
	Private sector arm: Multilateral investment guarantee agency (MIGA)	14	Political risk guarantees (100 %)

Source: authors' construction based on World Resources Institute data

Analysing the financing instruments structure applied by PFIs, one can observe that loans and grants were applied most often. The most popular instrument of financing was loans. Of all the 214 projects financed almost half (56 %) were financed through this instrument.

The examination of various instances of the practical application of financial instruments it can be seen that there is no universal instrument for financing or a combination thereof, which would suit all the green projects. The quantity of instruments applied to the projects financing varies, as well as their proportions. Practice shows that in different institutions application of the same instrument has certain peculiarities.

Most PFIs (e.g. WBG) provide financing instruments not only to green, but also other projects. However, the world practice shows growing institutions specializing in the financing of a number of green projects. One of those

institutions is a rapidly rising Green Investment Bank (GIB). It is a public entity established specifically to facilitate domestic private investment into low-carbon, climate-resilient (LCR) infrastructure (Green Investment Banks, 2015). In December 2015, in the world there were 13 national and regional/local level GIB: in the United States, Australia, Japan, the United Kingdom, Malaysia and others. Most GIBs were set up in 2014-2015. The first of its kind bank was established in the United Kingdom in 2012. GIB plays a particularly significant role in financing green investment projects in emerging markets. By the way, as evidenced in recent years, the green banks are already successfully leveraging private capital in a number of countries and proving that such investments can be profitable.

Conclusions, proposals, recommendations

- 1) Green investment plays important role in solving currently especially important problems of climate change and in reaching tasks of green growth of economics. Global-wide agreements (The Paris Agreement and the 2030 Agenda for Sustainable Development), rapid increase of green investment volume and ambitious tasks – to mobilize more than USD 90 trillion of public and private finance for the climate change problem solving – necessitates the increase of financing need. This increase can be sustained by using green investment financing instruments.
- 2) Analysis of green investment financing instruments showed, that there are neither financing instruments that would be universal to all the green projects, nor the universal set of such instruments. Selection of the financing instruments is determined by various factors: investment area, accessibility of the financing source, development level of the country, size and type of the project, conditions by the institution that provides financing etc.
- 3) The main reason for the insufficient levels of private green investments is higher risk to compare it to the risk of common investments. Even though traditional instruments (such as loans and guarantees) are often used to minimize the risk and create appealing environment for private investing, performed analysis has revealed other, more rarely used, but equally important means for private green investment stimulation.
- 4) Obviously, development of capital market should add to the active use of such instruments as green bonds and cause the appearance of new financing instruments, which would be aimed at effective financing of green investment projects. Moreover, important role in sufficient financing of necessary investments will be held by the specialized financial institutions – Green Investment Banks. Establishment and development of these institutions is important step of the countries towards the promotion of active private capital involvement and towards more effective usage of green investment opportunities in the capital market.
Recommendations for the future research
- 5) To estimate the effectiveness of green investment financing instruments. As most of green investments financing instruments (e.g. green bonds) are quite new and statistical data is limited, in the future it is important to estimate the effectiveness and benefit of such instruments usage.
- 6) To perform further researches on the possibilities of usage of innovative financing instruments for the green investment projects financing.

Acknowledgement. This research was funded by a grant (No. TAP LU-4-2016) from the Research Council of Lithuania.

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