

## GREEN FINANCE TO COMBAT CLIMATE CHANGE

Alina RYDZEWSKA

Silesian University of Technology, Faculty of Organization and Management, Zabrze;  
Alina.Rydzewska @polsl.pl, ORCID: 0000-0002-4535-3585

**Purpose:** The aim of this paper is to analyze the importance of finance for climate change.

**Design/methodology/approach:** The paper attempts to answer the question: what is the meaning of finance in the processes related to environmental protection, what is the development trend in the field of the so-called instruments of green finance and what are the purposes of the particular instruments. The following research methods were used: literature review, desk research (UNCTAD reports, GIIN, Sustainable Debt, Green Finance in Poland,) and deductive reasoning.

**Findings:** The market for green finance instruments is growing rapidly. For both green bonds and sustainable funds and impact investments, the growth rate in the number and value of instruments has been the highest in recent years. The analysis of investment directions indicates that they are related to activities concerning environmental protection or other aspects of sustainable development.

**Practical implications:** The importance and need for creating conditions (legislative, technical, educational) for the development of green finance instrument market was indicated.

**Originality/value:** The paper offers cognitive value as it contributes to the body of knowledge regarding the relevance of green in addressing climate change.

**Keywords:** green finance, green bonds, sustainable funds, impact investments.

**Category of the paper:** Conceptual paper.

### 1. Introduction

The climate change is no longer just a distant future scenario, it is a reality. Since the beginning of measurements, approximately 150 years ago, the effects associated with climate change have not been as severe as in recent years. The summer of 2019 was, in accordance with the Zentralanstalt für Meteorologie und Geodynamik in Vienna (ZAMG), the second warmest summer in terms of temperatures, approximately 2.7°C above the long-term average. Furthermore, it was one of the seven driest years since the measurements began (1767) (<https://www.zamg.ac.at/cms/de/klima>).

The Global Risks Report presented at the 2019 World Economic Forum in Davos states that environmental risks are ranked highest by companies and their importance will continue to grow, especially those related to climate change (The Global Risks Report, 2019). This is due to the fact that hot weather, crop failures, and storms cause damage to property as well as fatalities. In 2018, there were already approximately twice as many heat-related deaths as traffic fatalities. Frequent and extreme flooding, increased numbers of hurricanes and increasingly prolonged droughts, as well as rising sea levels pose threats of ecological disaster on a global scale. In addition, they are causing permanent damage to ecosystems. The 2019 report of the World Biodiversity Council (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) (IPBES, 2019) states that the Earth is heading towards ecological collapse and, if climate change is not stopped quickly, many animal and plant species will become extinct. Higher temperatures are causing species to die off because numerous living beings can only survive within a certain temperature range. In particular, a worrying phenomenon is the extinction of pollinating insects. This poses threats to the plant reproduction processes, as well as to the animal food chain, and also threatens food security.

In order to curb drastic climate change and its consequences, the United Nations Paris Agreement on Climate Change, which entered into force on November 4, 2016, has set a major goal. It is to limit the global temperature rise to below two Celsius degrees by the end of this century compared to pre-industrial levels and to make efforts to keep the temperature rise below 1.5 degrees. In order to comply with the 1.5 standard, it is necessary to achieve a net zero level of greenhouse gas emissions by 2050 at the latest. This means that a climatic balance between greenhouse gas emissions and their absorption will be achieved, among other things, by creating forests that absorb CO<sub>2</sub>. Structural transformations such as phasing out the burning of coal, oil and natural gas are also prerequisites.

The European Union and a number of UN member states made a commitment in September 2019 to achieve climate neutrality by 2050. To achieve this goal, financial resources are required to be allocated to pro-environmental investments. Article 2, section 1c of the Paris Agreement explicitly formulates the link between financial flows and climate-friendly actions (<https://unfccc.int/...>). Worldwide, around EUR 82,500 billion have already been invested in environmentally friendly and climate protection-related investments. This is because the financial sector is a lever for climate action.

The purpose of this paper is to analyze the importance of climate change finance, specifically the role of so-called green finance in environmental finance.

## 2. The rationale for the emergence of green finance

The economic and financial systems have a key role in combating climate change. On the one hand, they involve channeling financial flows into sustainable development investments, e.g. for energy and transport transformation in order to achieve climate neutrality. On the other hand, it is necessary to reduce climate-damaging activities in order to limit climate risks. This is essential for the financial system itself.

The entry into force of the Paris climate policy is associated with a relatively rapid process of phasing out the use of fossil fuels. This means that energy sources, which provide the basis for numerous industrial processes, services and infrastructure, as well as some areas of daily life (transport, diets, etc.), should undergo structural changes. All sectors of the economy are affected, however, some will be transformed to a greater extent and others to a lesser extent (Rydzewska, 2021). The key sectors that should be transformed are greenhouse gas emitters such as power plants, mining and fossil fuel industries, the transport sector and agriculture. The steps developed for structural transformation are diverse in nature. They involve, among others, the reconstruction of the energy system based on renewable energy, the creation of climate-friendly transport. The presented areas create a huge investment potential. At present, about 2% of EU GDP is invested in the energy system and related infrastructure. If the economy is to become greenhouse gas neutral, investment must rise to 2.8% of GDP, or about EUR 520 to 575 billion per year. In terms of the baseline, these are additional investments of between EUR 175 and 230 billion per year. Similar figures are presented by the IPCC's special report on 1.5°C temperature change, which predicts that the value of investments to limit temperature rise should amount to 2.5% of global GDP between 2016 and 2035. In contrast, the renewable energy report, "Clean Energy Investment Trends 2018", puts global investment in 2018 at USD 332.1 billion. This amount excludes large hydroelectric plants (hydroelectric projects), though it also includes energy storage and the electric mobility sector, with the vast majority of investments in solar and wind (Clean Energy Investments Trend, 2018). The financial data presented shows the values of financial resources, but the most important point is that both investments already made and future investments should be allocated to achieve the climate goals set in Paris. As published in Nature, climate-friendly investments must overtake fossil fuel technologies by 2025 at the latest. (McCollum et al., 2018).

Climate protection measures, the implementation of which requires investment, simultaneously support the economic and financial systems. The Report of the Global Commission on the Economy and Climate of 2018 has calculated that climate-friendly infrastructure (transport, energy, etc.) will have an additional positive impact on the economy, amounting to about EUR 23,000 billion by 2030. These investments would not only reduce the risk of damage from climate change, but also make the air cleaner, create millions of new jobs, improve quality of life, and provide an opportunity for the economy to grow.

### 3. The essence and instruments of green finance

The concept of so-called green finance is an ambiguous term. It is used interchangeably with such terms as sustainable finance, ethical finance, sustainable and responsible investment, green bonds.

In a narrow sense, green finance is identified with financing of pro-environmental activities. In a broad sense, it is associated with funds allocated for investment in environmental protection, as well as aimed at preventing, minimizing and compensating for environmental and climate damage. These actions will have to involve changes in legal (regulatory), economic and institutional terms that will take on a character, shape and size that serves to redirect capital to a green, environmentally sustainable economy (Zielone Finanse w Polsce, 2021, p. 5).

Within the framework of green finance, various types of instruments may be distinguished. The difference between them and traditional forms is that in most cases, in addition to classic financial criteria, they take into account categories of ecological, social and ethical evaluation. These instruments are of different nature.

The first instrument discussed, the most well-known, is green bonds, also known as green loans. Their structure coincides with the general essence of bonds. The issuer, by issuing a debt security, borrows and then redeems the paper from the creditor (bondholder) at an agreed date, with interest. In turn, the funds obtained through the issue are used directly for investments in green projects: e.g. to improve energy efficiency, to expand renewable energy sources or to develop environmentally friendly transport infrastructure. Issuers of green bonds can be international institutions (supranational, quasi-governmental and agency green bonds (SSA bonds), the state (treasury/governmental green bonds), municipalities (municipal green bonds), companies (corporate green bonds) and financial institutions (financial sector green bonds).

Another instrument is sustainable funds. They are a type of investment funds which, in addition to generating a financial return, are also aimed at ethical, ecological and social objectives. These investments can include both companies with green operations and countries that meet specific sustainability requirements. The investment strategies of sustainable investment funds are highly diversified. One of them is targeting problems related to the SDG strategy (Sustainable Development Goals) ([www.un.org/sustainabledevelopment/...](http://www.un.org/sustainabledevelopment/)).

Impact investing is investing funds in projects that generate profits and have a positive environmental or social impact. They mainly include projects where the social effect is in the foreground, i.e. social benefit that exceeds the business goal. The emergence and growing popularity of this instrument is related to the popularization of the ESG concept, i.e. socially responsible investment taking into account the needs of the environment, social responsibility and corporate governance. The impact investment market provides equity to fund activities that help solve some of the world's most pressing problems. These include sectors such as sustainable agriculture, renewable energy, conservation, microfinance, and affordable and accessible basic services, including housing, healthcare and education.

The last of the described instruments is crowdfunding. This instrument involves collecting funds from a great number of small investors (mainly Internet users) and using them to finance projects. In most cases, the goal of financing is determined to encourage maximum participation. With regard to green finance, numerous climate protection projects as well as social initiatives are currently financed by this means.

#### 4. Analysis of the use of green finance instruments in financing pro-environmental goals

In accordance with the theoretical considerations presented, the instruments that are recognized as means of financing climate protection goals are green bonds, sustainable funds, impact investments and crowdfunding funds.

One of the most dynamic financial instrument markets in the world is the green bond market. In 2021, the annual value of issuance of these instruments reached USD 522.7 billion and exceeded the threshold of half a trillion USD. This represents an increase of 75% over the previous year and an increase of over 1250% with respect to 2015 (Fig. 1). The green bond market is currently estimated to be worth about USD 1.6 tn.

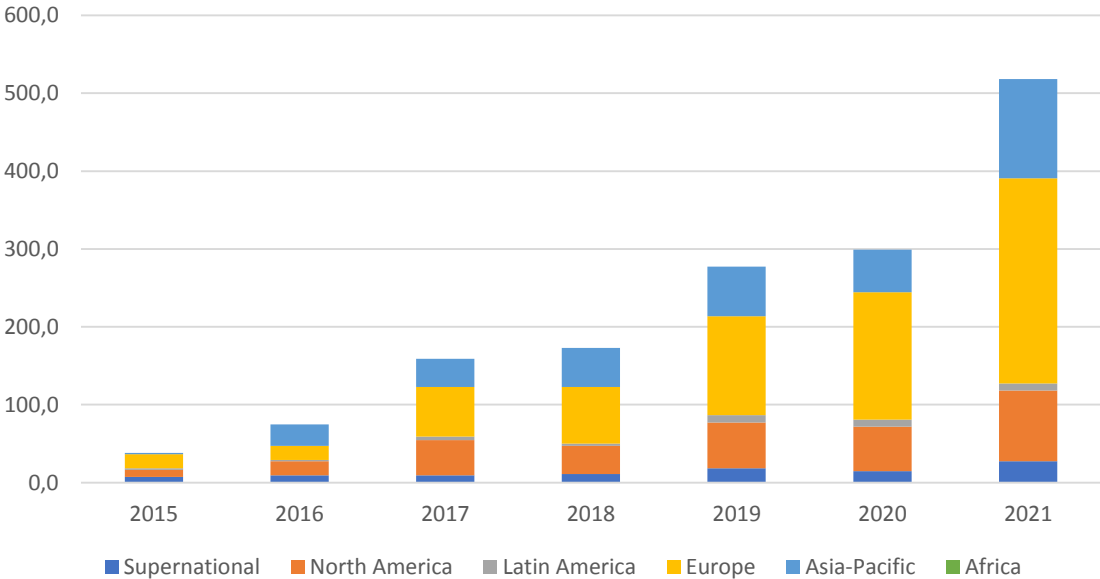
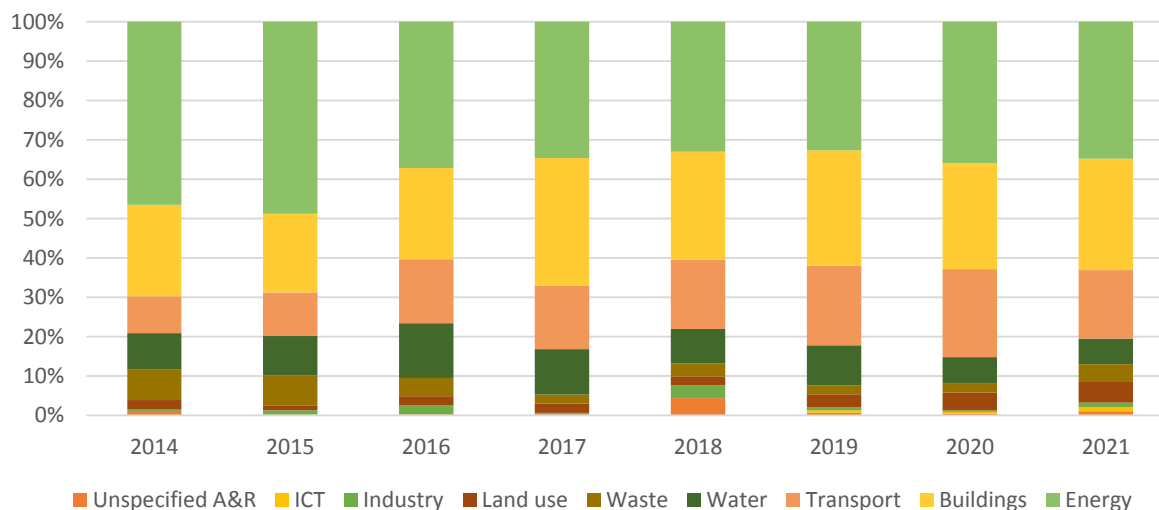


Figure 1. Green bond issuance volume by region (USD billions) Adapted from: Sustainable Debt, Global State of Market 2021, Climate Bonds Initiative.

The most active region for green bond issuance was and still is Europe. In 2021, half of the issuance volume came from Europe (USD 265 billion). The most dynamic growth in this region was in corporate (136%) and sovereign (103%) financial bonds. The next region in terms of issuance volume was Asia Pacific (USD 129.5 billion). North America, on the other hand, declined in importance (issuance volume of USD 92 billion in 2021). SNAT issuers were the

fourth largest source of green bonds, with annual volume doubling to USD 27.3 billion. This increase may be explained by a USD 13.9 billion debut from European Union (EU) green bonds. The lowest volume of green debt securities was recorded by Latin America and Caribbean (USD 8.2 billion).

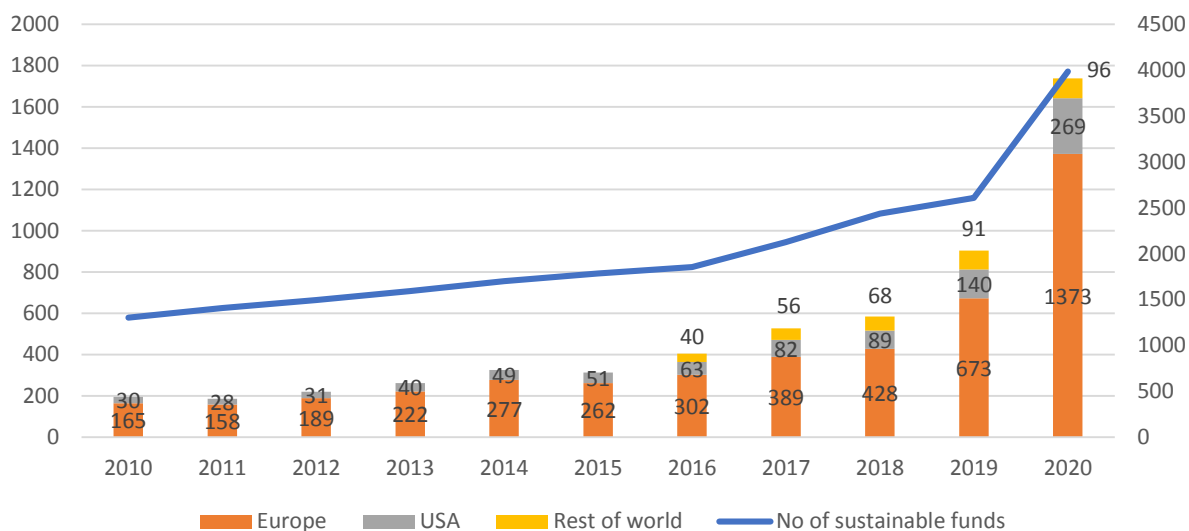


**Figure 2.** Use of Green Bond proceeds Adapted from Sustainable Debt, Global State of Market 2021, Climate Bonds Initiative.

Funds from green bond issuance were primarily used to finance the needs of 3 sectors: Energy, Transport and Buildings. This trend is evident throughout the period under study (Fig. 2). In 2021, these three sectors together accounted for 81% of the total amount of issuance. Energy and Transport were the most supported by issuers from the non-financial corporate sector providing 40% and 27% of total capital respectively. Construction received the most support from financial corporations (37.5%).

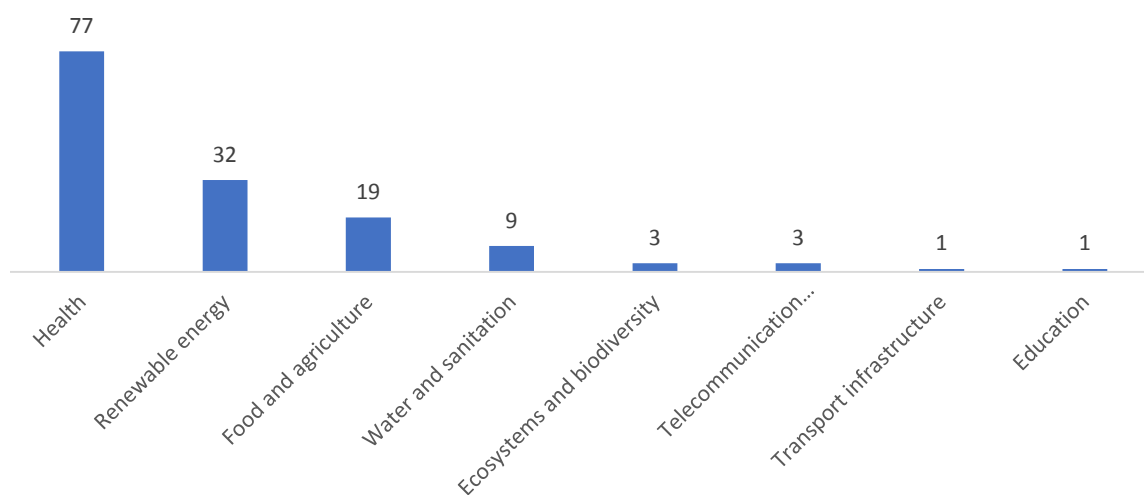
Sustainable funds are another instrument analyzed. Due to the trend of increasing interest in the issue of sustainable development, one can observe in recent years that investments of funds are directed towards this type of activities.

As shown in Figure 3, the number of balanced funds, i.e. (investment funds and ETFs), has grown rapidly since 2016. As reported by Morningstar and TrackInsight, the total number of balanced funds from 2016 to 2020 nearly doubled, while asset values more than quadrupled from USD 405 billion to more than USD 1.7 trillion. This pace has accelerated significantly over the past two years, particularly in terms of AUM, which grew by more than 50% in 2019 and then nearly doubled in 2020. The majority of balanced funds are located in Europe (73%), followed by North America (18%). Other regions, including developing countries, account for less than 10% of funds located in Europe.



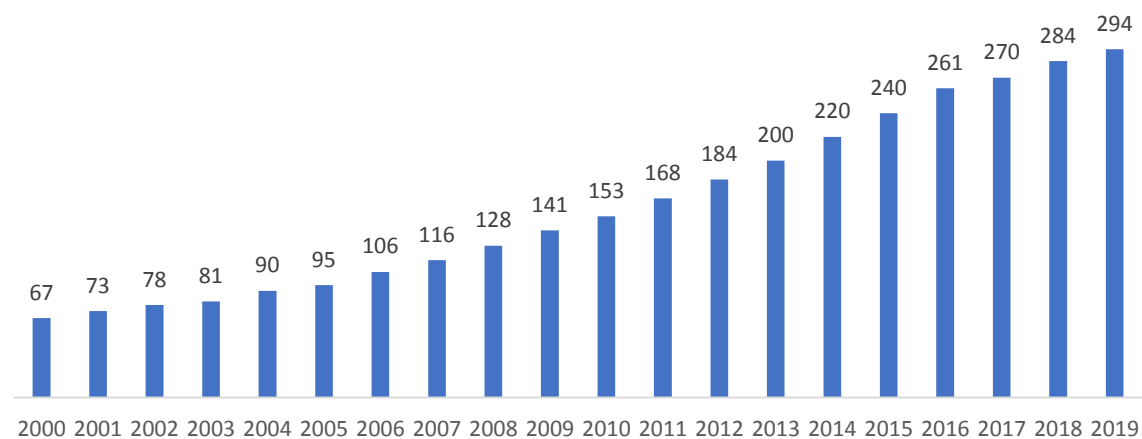
**Figure 3.** Number of sustainable funds and assets under management, 2010-2020, Adapted from: The rise of the sustainable fund market and its role in financing sustainable development, UNCTAD 2021, p. 6.

One of the investment strategies of sustainable funds is to target sustainability themes or sectors, including the SDGs. UNCTAD's analysis of 800 sustainable equity funds showed that approximately 27 percent of them (USD 145 billion of their total assets (AUM)) are invested in eight key SDG sectors (Figure 4). Health sector, is the most invested SDG sector for sustainable funds (USD 77 billion). These were followed by renewable energy (USD 32 billion), food and agriculture (USD 19 billion), and water and sanitation (USD 9 billion).



**Figure 4.** Deployed assets across eight SDG sectors, 2020 (billions of dollars), Adapted from: World Investemen Report 2021, Investing In Sustainable Recovery, UNCTAD, p. 221 (pdf).

In terms of climate impact, sustainable fund stocks tend to outperform the overall fund market. Compared to the MSCI ACWI index, they have higher exposure to cleantech (about 3.5 percentage points higher) and water treatment (about 2.5 percentage points higher), and lower exposure to fossil fuels (excluding coal) (over 3 percentage points lower) and coal (over 1.5 percentage points lower) (UNCTAD 2021, p. 13).



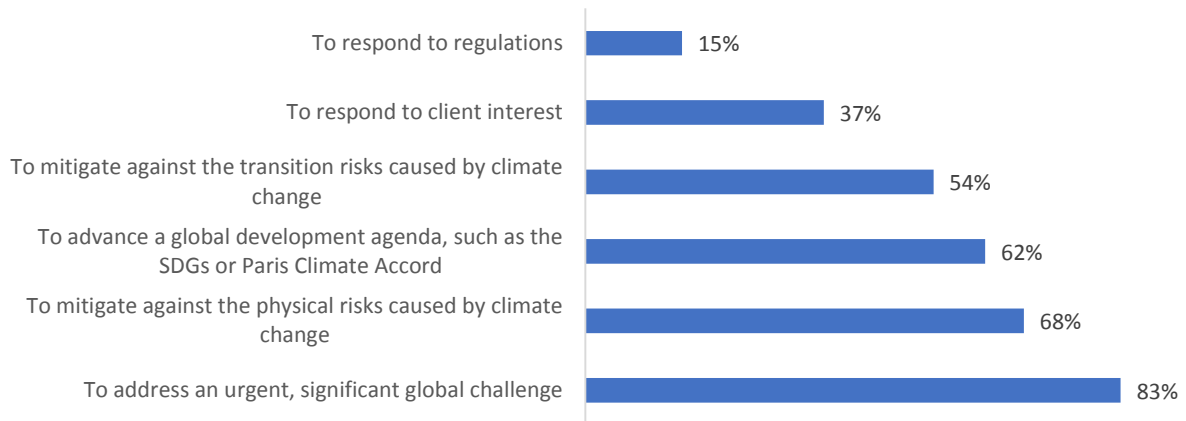
**Figure 5.** Cumulative number organization making impact investments, Adapted from: GIIN, Annual Impact Investor Survey 2020.

With respect to the impact investment market, a study conducted among 294 organizations that invest in environmental and social impact activities shows that just over half of all respondents (52%) began investing in impact projects within the last decade. More than three-quarters of respondents (77%) are based in developed markets, with another 21% in emerging markets. Seven percent of impact investments are based in SSA (Sub-Saharan Africa), 6% in LAC (Latin America and the Caribbean), and 3% in Southeast and South Asia. Most respondents are based in the United States, followed by the United Kingdom, Canada and the Netherlands.

The motives for impact investments vary. However, it is worth noting that the fourth most important goal is “contribution to a global agenda, such as the UN Sustainable Development Goals or the Paris Climate Agreement” (62% indicated as very important and 30% somewhat important). This indicates that impact investors are becoming increasingly aware that significant capital flows are needed to address the climate crisis.

While as reasons for undertaking impact investments focused on climate protection, most respondents (83%) do so in order to “address an urgent, significant global challenge”. More than two-thirds seek to ‘mitigate against the physical risks caused by climate change’ (Fig. 6), such as droughts, storms, and floods, among other natural disasters resulting from increased temperatures, rising sea levels, and changes in weather patterns. By contrast, only 54% address climate change through impact investments in order to mitigate against the transition risks caused by climate change—that is, unplanned or abrupt changes to businesses or assets that may occur after an investment transaction—such as changes in policies, shifts to low-carbon technologies, or other liabilities. More than one-third of respondents address climate change in response to client interest, while just 15% do so in response to regulations.

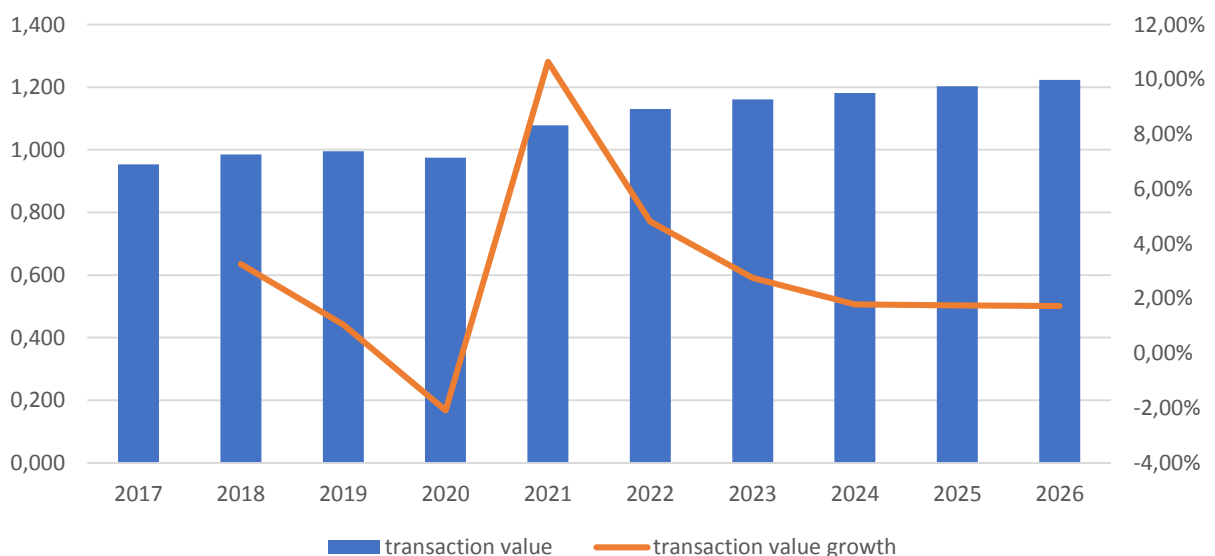




**Figure 6.** Reasons for addressing climate change through impact investments. Adapted from: GIIN, Annual Impact Investor Survey 2020.

Respondents take various approaches to address climate change through their investments. Most commonly, impact investors seek investments that mitigate climate change by reducing greenhouse gas emissions (84%). Meanwhile, close to the same proportion of respondents (82%) seek investments that prevent future greenhouse gas emissions. Perhaps unsurprisingly, 78% of those that seek to reduce greenhouse gas emissions also seek to prevent future emissions (GIIN, 2020).

The last green finance instrument analyzed is crowdfunding. Unfortunately, there is no data on collections organized for the purpose of financing environmental protection activities. However, based on data concerning the entire crowdfunding market, it can be concluded that the same tendencies are observed on the market related to financing pro-ecological investments.



**Figure 7.** Transaction value and annual growth rate of crowdfunding transactions (forecast) from 2017 to 2026. Adapted from: Sources: <https://www.statista.com/outlook/dmo/fintech/alternative-financing/crowdfunding/worldwide>.

Figure 6 shows that the value of crowdfunding transactions is growing through 2017 (except for the exceptional year of 2020), and the growth rate is projected to continue at 2% through 2026. The value of transactions in crowdfunding is projected to reach USD 1.13 billion in 2022, rising to USD 1.22 billion in 2026. The average funding per campaign in the crowdfunding segment amounts to US\$6.15k in 2022.

In 2020, the global crowdfunding market was valued at 12.27 billion U.S. dollars and was forecast to double by 2027, growing at compound annual growth rate (CAGR) of 11 percent ([https://www.statista.com/outlook/...](https://www.statista.com/outlook/)).

## 5. Conclusions

Financing climate protection and other pro-environmental activities faces a significant challenge. It is only by mobilizing additional capital, including private capital, that climate challenges may be financially addressed. This is why the term “green finance” was developed to refer to the financial streams for climate protection.

The presented analysis of the development trends of selected green finance instruments shows that this market is developing rapidly. For both green bonds and sustainable funds and impact investments, the growth rate in the number and value of instruments has been the highest in recent years. The main issuers of these instruments are developed countries. This is due to both the wealth of these countries and their awareness of the need for climate investment. The analysis of investment directions indicates however that they are related to activities concerning environmental protection or other aspects of sustainable development.

At the same time, it should be emphasized that the potential of green finance is not exhausted. In order to achieve the EU’s environmental goals of climate neutrality by 2050, more, and above all private, capital urgently needs to be mobilized and directed towards climate-related investments. To this end, action must be taken at supranational as well as national level to develop sustainable development measures. These actions should address four areas: a stable institutional environment (e.g. changes in regulations), systemic market education (e.g. available platforms for sharing knowledge and experience), competitive financing (e.g. new financial instruments to support the transition and provide funding for innovation); technological and expert support (e.g. availability of knowledge and materials, tools to support analysis of available ESG factors) (Zielone Finanse w Polsce, 2020, p. 93).

The considerations conducted in the paper and the conclusions formulated:

- contribute to the development of theory on instruments supporting climate protection actions, in particular financial instruments included in the so-called green finance,
- in the management aspect, they indicate the need to improve the processes related to the development of legal frameworks, technological and expert support, education and development of financial instruments for activities related to sustainable development,
- from the social point of view, they indicate the need for further support for activities, including those of a financial nature, in the field of pro-ecological activity, due to their social importance.

The limitation of this paper is the lack of data on the use of the whole range of instruments that finance investments related to sustainable development. However, it should be mentioned that the green finance market is developing and new tools are still being created. The paper may therefore serve as a basis for further analysis in the development of instruments used to finance pro-ecological activities.

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