

International Climate Finance Within the Framework of Sustainable Economy

Fatih KAYHAN¹ – Onur ÖZDEMİR²

Abstract

The aim of this paper is to review climate finance from the standpoint of sustainable economy. It covers international climate finance. As a method, descriptive analysis is employed by examining recent global figures. Findings indicate that climate finance public-private split has increased in favor of private sector throughout the time, the households/individuals take the highest amount for private sector, while the national development finance institutions receive the largest amount for the public, climate finance instruments were not equally distributed among each other. The paper concludes that climate-oriented projects as part of sustainability in economy are becoming key and pivotal issue in global and local finance and more funds have been directed to 'climate finance' in international loan markets by local and international financial institutions with the rise of the notion of sustainability.

Keywords: Climate Finance, Sustainable Economy, Sustainability

JEL Codes: G20, G28, Q56

Sürdürülebilir Ekonomi Çerçevesinde Uluslararası İklim Finansmanı

Öz

Bu çalışmanın amacı, iklim finansmanını sürdürülebilir ekonomi perspektifinden incelemektir. Çalışmanın kapsamı, uluslararası iklim finansmanını içermektedir. Yöntem olarak, güncel küresel verilere dayalı betimleyici analiz kullanılmıştır. Elde edilen bulgular, zaman içerisinde iklim finansmanında kamu-özel sektör ayrımının özel sektör lehine artış gösterdiğini ortaya koymaktadır. Özel sektör içerisinde en yüksek payı hanehalkı/bireyler alırken, kamu sektöründe ise en fazla fonu ulusal kalkınma finansman kuruluşlarının aldığı görülmektedir. Sonuç olarak, ekonomi ve finans alanında sürdürülebilirliğin bir parçası olarak iklim odaklı projeler, küresel ve yerel finansman kaynaklarında giderek daha merkezi ve belirleyici bir unsur haline gelmektedir. Sürdürülebilirlik anlayışının yükselişiyle birlikte, yerel ve uluslararası finansal kuruluşlar tarafından uluslararası kredi piyasalarında 'iklim finansmanı'nda artış gözlemlenmektedir.

Anahtar Sözcükler: İklim Finansmanı, Sürdürülebilir Ekonomi, Sürdürülebilirlik

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¹ Corresponding Author, Doc. Dr., İstanbul Medeniyet Üniversitesi, Turizm Fakültesi, Turizm İşletmeciliği Bölümü, fatih.kayhan@medeniyet.edu.tr, ORCID-ID: 0000-0001-7844-8663

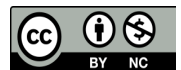
² Doc. Dr., İstanbul Gelişim Üniversitesi, İktisadi İdari ve Sosyal Bilimler Fakültesi, Uluslararası Ticaret ve Finansman (İngilizce), onozdemir@gelisim.edu.tr, ORCID-ID: 0000-0002-3804-0062

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1. Introduction

Recently, the terms ‘sustainability’ and ‘sustainable economy’ have become key concepts. Within this context, climate finance is central, connecting sustainable economy and finance. The Climate Change Program defines climate finance as funding - local, national, or international, from public, private, or alternative sources - used to support efforts to reduce and adapt to climate change.

Climate finance means using public, private, and alternative funds to support climate change mitigation and adaptation at local, national, and international levels.

It helps drive the shift toward low-carbon, climate-resilient development, especially in developing countries that are most affected by climate change.

As an important part of global climate governance, climate finance is highlighted in the UNFCCC and the Paris Agreement, which stress that developed countries must provide financial support to developing countries (UNFCCC, 2023; Roberts & Weikmans, 2017).

Climate finance uses different tools such as grants, low-interest loans, guarantees, green bonds, and equity investments. However, challenges like insufficient funding, unequal distribution, lack of transparency, and misalignment with national priorities still limit its effectiveness (Buchner et al., 2021).

The aim of this study is to review climate finance globally from the perspective of sustainability. As far as the scope of the study is concerned, this study is limited to the financial products/instruments and institutions that issue these instruments or provide funding.

Descriptive analysis is utilized in this study to examine the recent data on the loans provided to climate finance.

Contribution of this study to the literature is as follows: This study provides very recent global figures with a specific reference to the new international products issued to fund climate related projects.

Parts of the study are as follows: Section 2 includes literature review. Section 3 is about data, methods and analysis of stylized facts. Section 4 is related to the findings. The last section is the conclusion and discussion part.

2. Literature Review

International climate finance plays an important role in the analysis of global climate governance, by allowing the transfer of financial sources from developed to developing countries, to support both mitigation and adaptation strategies. Based on the argument that all countries share responsibility but some can do more, developed countries are expected to take the lead in providing climate funding, as stated in the UN climate agreements (UNFCCC, 2023).

A large body of studies have examined the institutional structure, operational effectiveness, and political dynamics based on the context of international climate finance. Roberts and Weikmans (2017) highlight ongoing problems such as the definition of climate finance, the lack of coordination in funding mechanisms, sustained credibility issues between donors and recipients. These problems are further exacerbated due to restrictions in tracking and reporting systems, which undermine transparency and accountability (Weikmans & Roberts, 2019).

The Climate Policy Initiative, for instance, is used in several empirical studies to reveal that global climate finance has surpassed USD 600 billion annually, whereas funding tends to prioritize mitigation and is often directed toward middle-income countries. Adaptation finance and funding for the least developed countries remain insufficient (Buchner et al., 2021). Michaelowa and Michaelowa (2017) support this view by arguing that climate finance often reflects donor interests rather than recipient needs of vulnerability.

The other studies also emphasize the importance of need for climate finance in terms of the development process of recipient countries and the broader goals of a transition (Nakhooda et al., 2014). For instance, green bonds, blended finance, and climate risk insurance are used as innovative financial instruments to strengthen funding capacity to a large extent. However, the systemic imbalances should be considered to understand the necessary concerns in terms of accessibility, equity, and capacity (OECD, 2022).

Recent literature shows that body of international climate finance is characterized by dynamic factors, which exhibit growing financial needs, rising institutional engagement, persistent structural imbalances, and the emergence of new financial and technological enhancements. Although climate finance has expanded throughout the time in its magnitude, global mitigation and adaptation efforts are still fails, especially for countries most at risk from climate change.

A common point in recent reports emphasize the growing strategic role of multilateral development banks (MDBs). Bazbauers (2025) points out that MDBs have emerged as conventional development financiers within the central coordinators of global climate capital. They use concessional resources to encourage private investment and develop climate-resilient project, including in rural regions. Nonetheless, their capacity is constrained by the degree of enough capital, and conservative risk-management methods in which they limit the scale of climate finance. Several MBDs reports indicate that climate-related commitments are historically high but the adaptation finance and early-stage project pipelines still fall short.

Another major aspect highlighted in the literature focuses on climate justice and the unequal distribution of climate finance. Dafermos (2025) argues that current climate finance may accidentally widen global disparities due to the following reasons: (i) reliance on debt-based instruments, (ii) imbalanced geographical allocations, and (iii) the

marginalization of low-income countries in governance processes. The studies based on technology transfer (Jee et al., 2024) emphasize that the role of intellectual properties which can restrict the developing countries' access to climate technologies. Therefore, they highlight the imperative for cooperative innovation arrangements and more equitable institutional governance.

A major challenge in the literature is the growing lack of adaptation finance. For instance, according to the *Adaptation Finance Gap Update* (UNFCCC, 2023) estimations, the developing countries have an annual deficit of USD 194-336 billion. Regarding the OECD (2025) and Wei et al. (2025) findings, there are some major points about this problems such as the central role of hybrid funding instruments, climate-risk insurance mechanisms, and investment strategies focused on resilience to fill the deficit. Nevertheless, they also find that the current degree of financial flows are inadequate, highly fragmented and frequently inconsistent with adaptation priorities.

Regional studies provide additional insights. In Asia-Pacific, the estimations of IMF show that there is an USD 800 billion financing gap for the low-carbon transition, caused by structural problems in financial system and inconsistent climate disclosures. Unlike other regions, Africa suffers from climate finance sectors due to ongoing underinvestment. Climate Policy Initiative (2024) highlights that Africa receives less than 3% of global climate funds while facing high climate risks.

A recent study shows that innovative financial and technical instruments have growing importance over time. Li et al. (2025) argue that integrated carbon markets that use both taxation and cap-and-trade to provide reliable adaptation funding. Additionally, Vaghefi et al. (2025) present AI tools that improve transparency to monitor investments and point to a broader technological change in climate finance governance.

Finally, studies on climate finance points to empirical evidence that such investments can reduce emissions and bolster resilience, although prevailing assessment frameworks remain heterogeneous and methodologically uneven. Wei et al. (2025), Zoungrana (2024), and Kaya and Leblebicioğlu (2025) find that climate finance improves environmental quality and adaptation, but also reveal the need for better standard measures.

3. Data, Methodology and Analysis

3.1. Method

Descriptive analysis is employed in this paper to examine the climate finance within the context of sustainable economy.

To this end, stylized facts (figures) are used: The figures are derived from London Stock Exchange Group, Climate Policy Initiative.

3.2. Stylized Facts

The following international figures are included to analyze the recent numbers in

climate finance in the Globe:

Global Sustainable Bond Issuance (by type),

Global Sustainable Bond Outstanding Amount (by type),

Global Sustainable Bond Issuance (by currency type) and % of Self-Labeled Green Bonds in Total Green Bonds.

These data & figures are received from London Stock Exchange Group.

Also, the following figures are covered to understand the current numbers in international climate finance:

Share of Climate Finance Instruments by Sectors (2023),

Climate Finance Public-Private Split,

Climate Finance by Private Sector Actors,

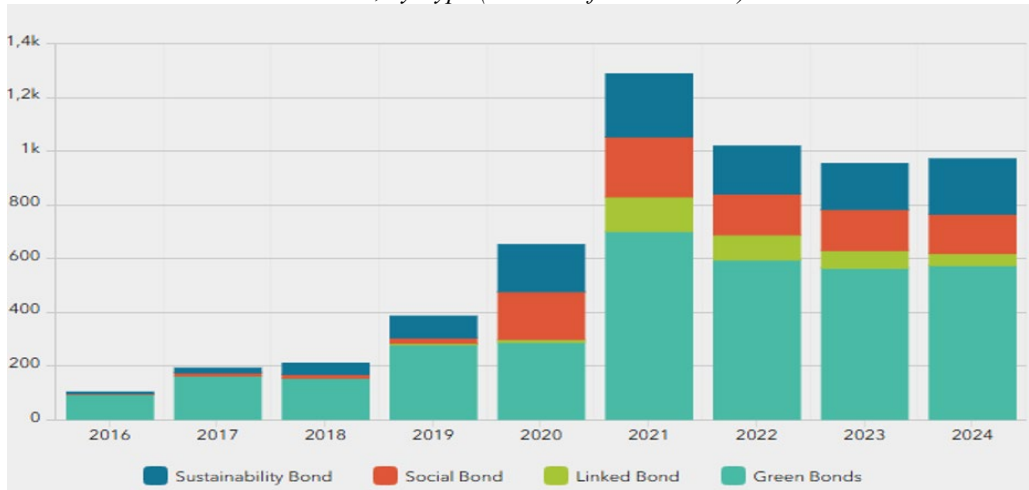
Climate Finance by Public Sector Actors,

Climate Finance Instruments by Sector in 2023,

Total Climate Finance Flows by Region (2023), Total Climate.

Figure 1.

Global Sustainable Bond Issuance, by Type (Billions of U.S. Dollars)

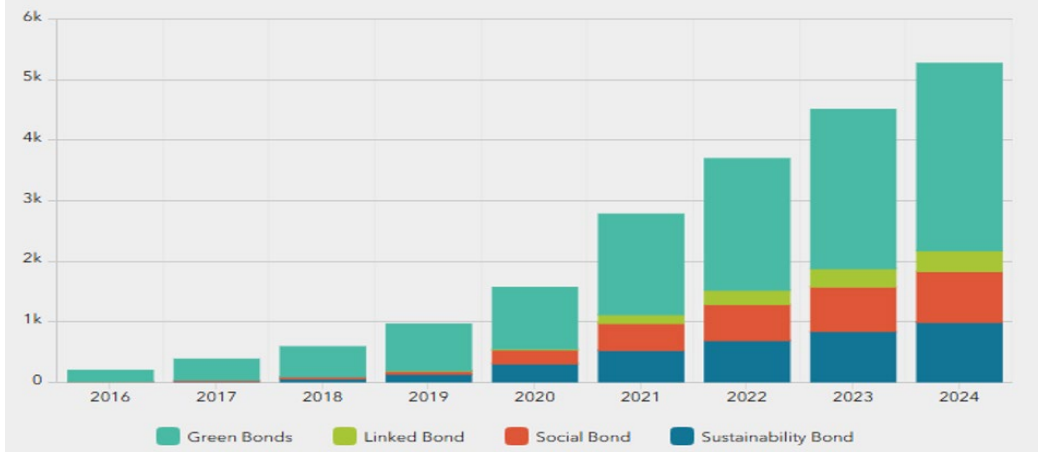


Source: London Stock Exchange Group

As can be seen from Figure 1, there has been considerable increase in issuance of global sustainable bonds since 2016. The weight of green bonds has been more than other instruments, sustainability bonds, social bond, linked bond.

Figure 2.

Global Sustainable Bond Outstanding Amount, by Type (billions of U.S. dollars)

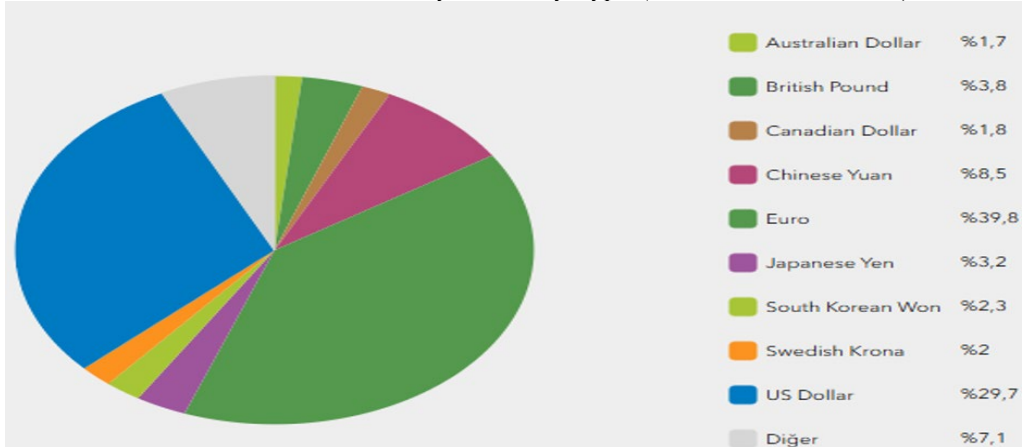


Source: London Stock Exchange Group

It can be easily seen from the above figure that outstanding amount of global sustainable bonds have inclined remarkably. Out of total balance, amount of the green bonds has been larger than other types of global sustainable bonds, linked bond, social bond and sustainability bond.

Figure 3.

Global Sustainable Bond Issuance, by Currency Type (Cumulative-All Years)

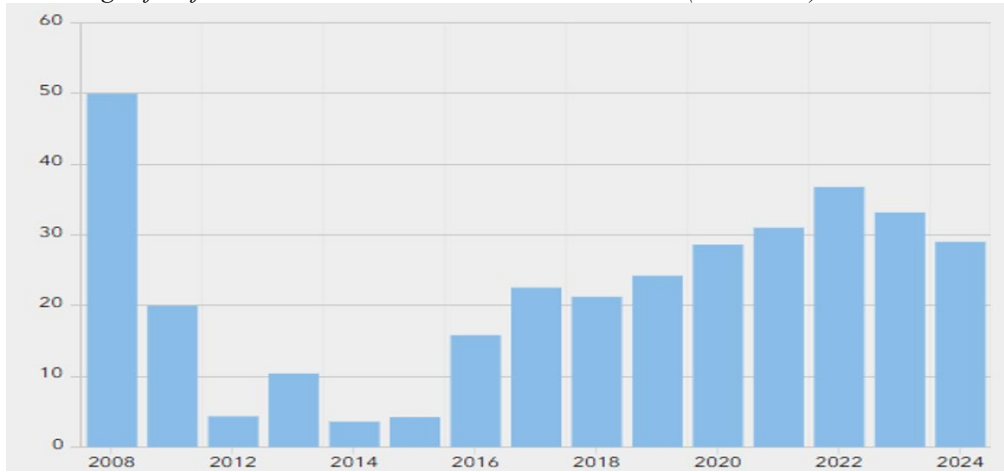


Source: London Stock Exchange Group

The figure illustrates the fact that Euro and US Dollar type global sustainable bond issuance has had dominance over other currencies. It is also clear that Euro type bond issuance is greater than US Dollar type bond issuance.

Figure 4.

Percentage of Self-Labeled Green Bonds in Total Green Bonds (2006-2024)

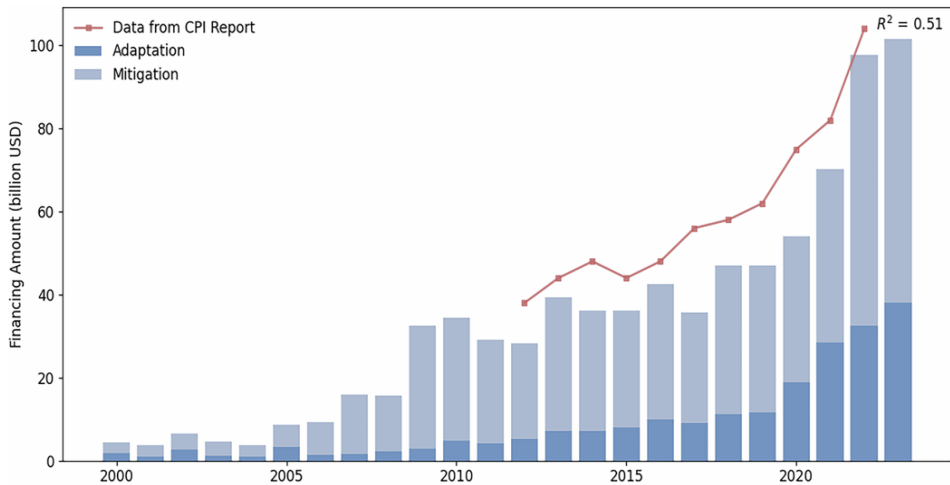


Source: London Stock Exchange Group

Figure 4 shows that until 2014, there had been a decrease in the percentage of self-labeled green bonds, however after 2016, there has been a steady incline in the percentage of self-labeled green bonds in total green bonds.

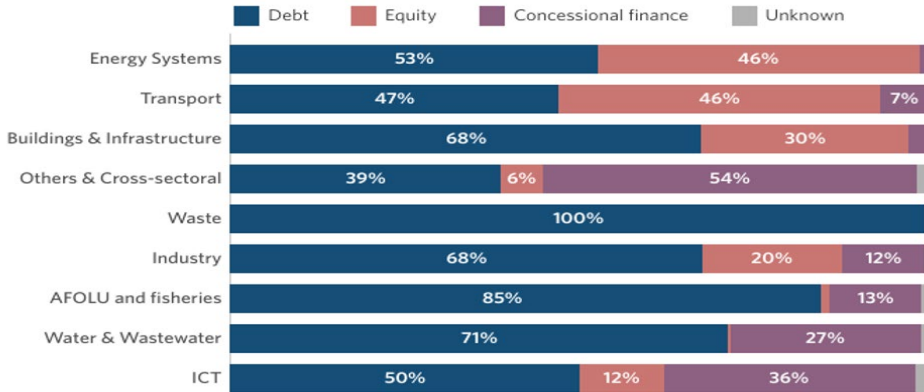
Figure 5.

Financing Amount- Adaptation and Mitigation (Billion USD)



Source: Fang et al. (2025)

Adaptation and mitigation are the key elements of climate finance. It is evident that both financing adaptation and mitigation went up after 2005. Additionally, mitigation-financing has been much greater than adaptation-financing.

Figure 6.*Share of Climate Finance Instruments by Sectors (2023)**Source: Climate Policy Initiative*

As can be observed from the above that different industries have varied share of climate finance tools. Apparently, for energy systems, there is a balance between the share of debt-financing (53%) and other funding instruments. However, waste industry is fully funded by debt-financing. For water & wastewater sector, most of the funding is by way debt financing. All in all, it can be alleged that for all industries -on average- debt financing is preferred instead of other financial instruments.

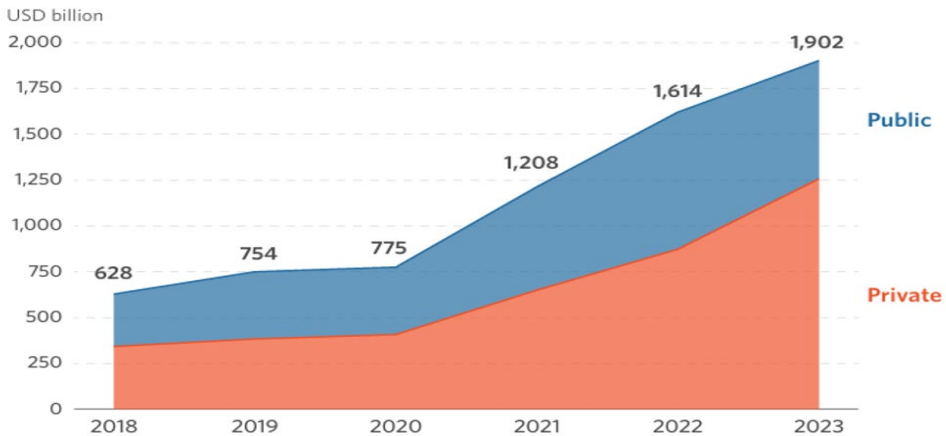
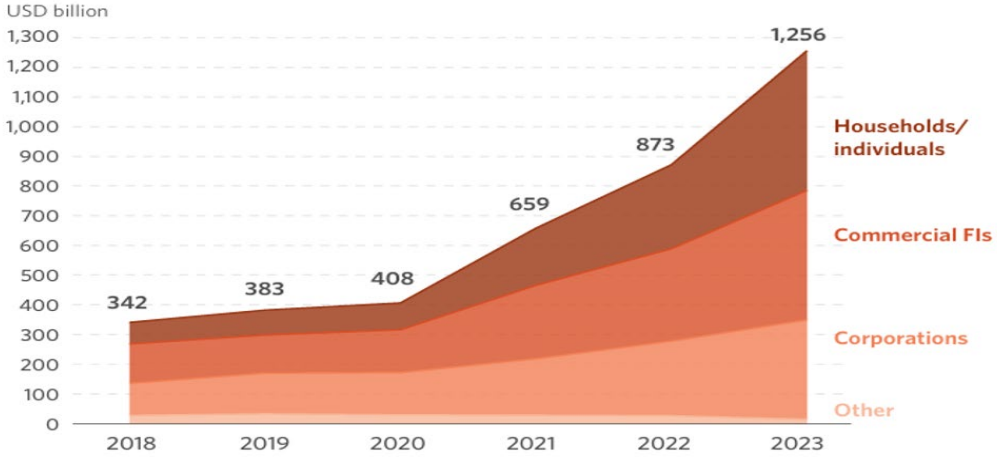
Figure 7.*Climate Finance Public-Private Split**Source: Climate Policy Initiative*

Figure 7 illustrates clearly that until 2020, there had been a kind of balance between public and private climate finance, but after 2020 private-financing has been larger than the public one.

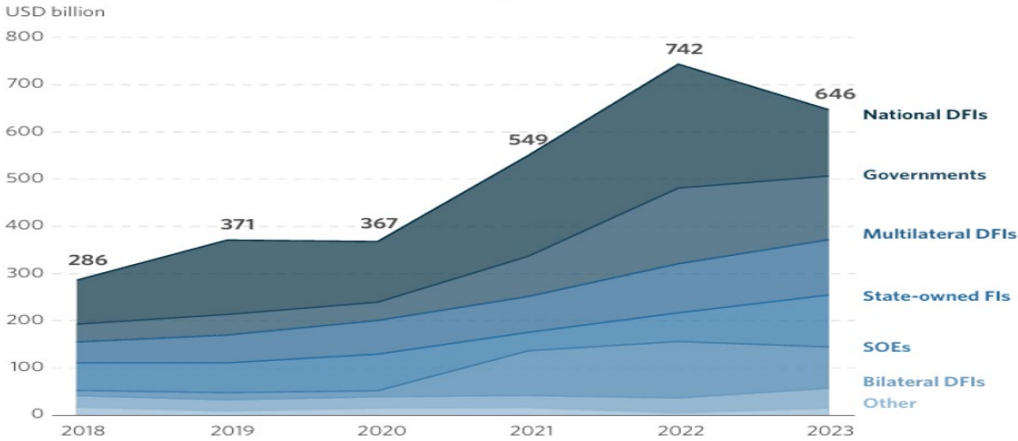
Figure 8.
Climate Finance by Private Sector Actors



Source: Climate Policy Initiative

When we look at the above figure, it can be observed that between 2018 and 2023 there was a fair distribution of climate finance by private sector actors, namely households/individuals, commercial FIs, corporations and other actors. Here, the other actors include funds, institutional investors and unknown actors.

Figure 9.
Climate Finance by Public Sector Actors

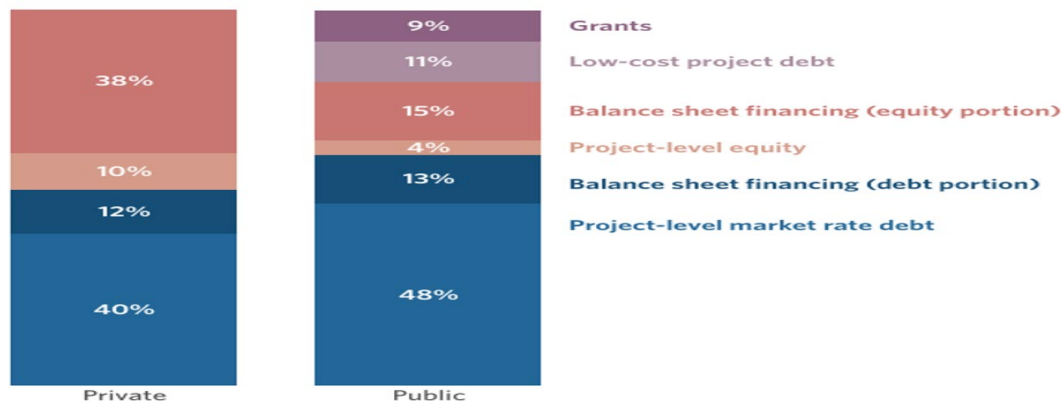


Source: Climate Policy Initiative

As can be seen from the above figure, national DFIs have had a slightly more share in climate funding when compared to governments, multilateral DFIs, state-owned FIs (financial institutions), SOE (state-owned enterprises), bilateral DFIs and others. Other public actors are export credit agencies, institutional investors, multilateral climate funds, public funds, philanthropies and unknown actors. DFI refers to national development

finance institutions.

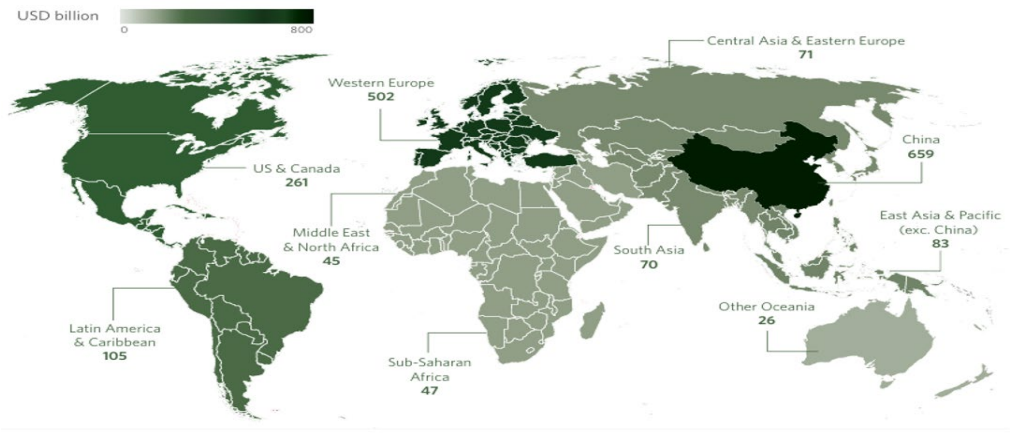
Figure 10.
Climate Finance Instruments by Sector in 2023



Source: Climate Policy Initiative

Figure 10 indicates the fact that for private sector, project-level market rate debt and balance sheet financing (equity portion and debt portion) has greater share in climate finance in 2023. The same fact applies to public.

Figure 11.
Total Climate Finance Flows by Region, 2023

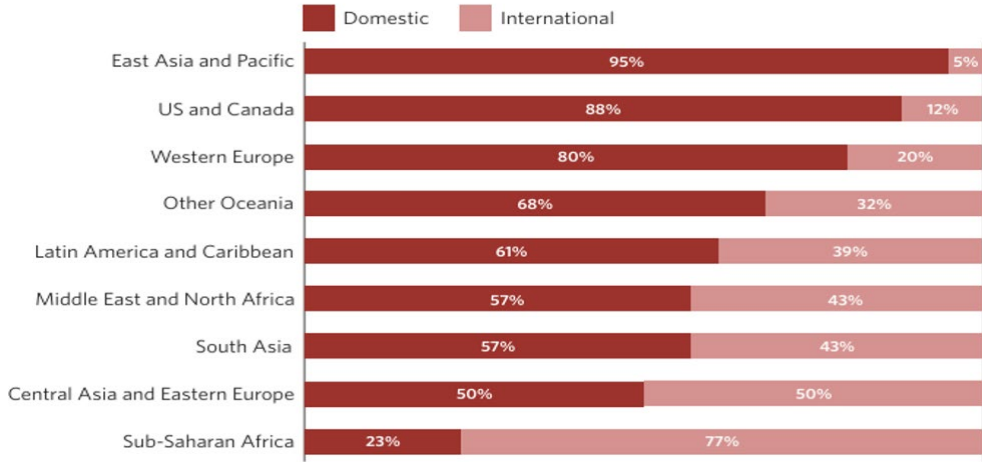


Source: Climate Policy Initiative

This figure makes it clear that in 2023 most of the total climate finance flows focused on China and Europe. The second largest flows were seen in North and South America.

Figure 12.

Total Climate Finance Domestic-International Split by Region, 2023

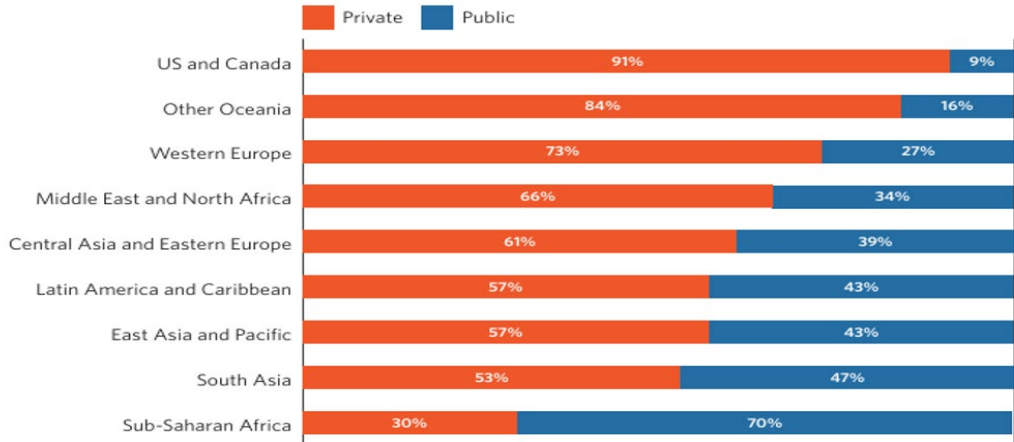


Source: Climate Policy Initiative

This figure indicates that in 2023 most of the climate finance was domestic. For East Asia and Pacific region, considerable amount of climate finance was domestic one. On the other hand, for Sub-Saharan Africa region, the reverse is valid. This very fact is attributable to the development level of world regions, developing economies need foreign/international financing.

Figure 13.

Total Climate Finance Public-Private Split by Region, 2023



Source: Climate Policy Initiative

The last figure refers to a stylized fact that in 2023 for developed countries (US, Canada and Western Europe), private sector provided more funding than public sector. On the other hand, for developing economies like Sub-Saharan Africa, private industry was

more active in providing financial support for climate finance. This very fact is again quite comprehensible since developed economies enable private sector to be more active in funding.

4. Findings

Findings from the above mentioned stylized facts (figures) are as follows:

Issuance peaked in 2021, with green bonds consistently making up the largest share, followed by social bond, linked bond and sustainability bonds.

Number of self-labeled green-bonds in total green bonds was relatively low at the beginning of Great Depression, but it increased after 2016 to 2024, approximately 30 percent.

The adaptation vs. mitigation levels show that the mitigation is stronger than adaptation (Fang et al., 2025).

Climate finance public-private split has increased in favor of private sector throughout the time. The households/individuals take the highest amount for private sector, while the national DFIs receive the largest amount for the public sector.

Climate finance instruments were not equally distributed among each other in which they cover grants, low-cost project debt, balance sheet financing (equity or debt portions), project level equity, and project-level market rate debt.

For both private and public sectors, project-level market rate debt was the highest percentage.

The highest percentage of domestic climate finance is in East Asia and Pacific region but of the international climate finance gets more by the Sub-Saharan Africa.

5. Conclusion and Discussion

Sustainability and sustainable economy have been the key concepts in recent times. In accordance with the significance of sustainable economy, the notion of climate finance plays a pivotal role as a subcategory and intersection point of finance and sustainable economy. The term climate finance is defined by Climate Change Program as ‘local, national and international funding which is funded by private, public and alternative financial systems and intended to back up adaptation and mitigation efforts in the face of climate change.

Climate finance accounts for the allocation of financial resources from different sources (public, private) to support climate change mitigation and adaptation works across national and international frameworks. It is effective in facilitating the change towards climate-resilient development, especially in developing countries which are influenced by the adverse effects of climate disproportionately.

Funding climate-oriented projects as part of sustainability in economy and finance is becoming key and pivotal issue in global and local (country-specific) finance. More funds have been placed in ‘climate finance’ in international loan markets by local and international financial institutions with the rise of the notion of ‘Sustainability’. International figures also suggest that climate finance should be analyzed not only by looking at the domestic ingredients. It should also be investigated with a vast amount of different data.

Recent literature (from 2024-2025) indicates that funding volume by multilateral development banks have increased to historic highs. Increasingly, climate finance promotes mitigation and adaptation, and innovative tools like carbon markets are becoming popular. These can be seen as advances. On the other hand, there are noteworthy channels: The adaptation finance gap keeps expanding. Multilateral development banks encounter structural limits that constrain their capacity to mobilize capital. It can also be alleged that emerging direction in climate finance is that focus is deepened on equitable distribution and that digital tools are increasingly employed to make transparency better.

Descriptive analysis is employed as a methodology. Hence, the findings are based on recent figures in this field.

This paper suggests that global and local funding for climate finance, a significant pillar of sustainable economy and finance, should be increased to enhance businesses. While preparing and issuing ‘Regulatory Framework’ in Türkiye (primary law and secondary law documents) in banking and finance, policy makers should take ‘climate finance-related instruments’ into consideration.

It is also suggested that green bond guide, sustainable loan classification should be introduced in an effort to increase lending for climate finance as far as Türkiye is concerned. The final recommendation is the introduction and improvement of green collateral regime which could enable the firms to have more access to funding.

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Ethical Statement: The authors declare that scientific and ethical principles have been adhered to in this study, and all sources used have been properly cited.

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