



*Greening Energy
Market and Finance*



University
of Economics
in Katowice

Green bonds and beyond – greening of financial markets

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Schedule

- 1. Some theoretical notes**
- 2. Green Bond market**
- 3. Strategies to establish a sustainable financial system**





Part 1

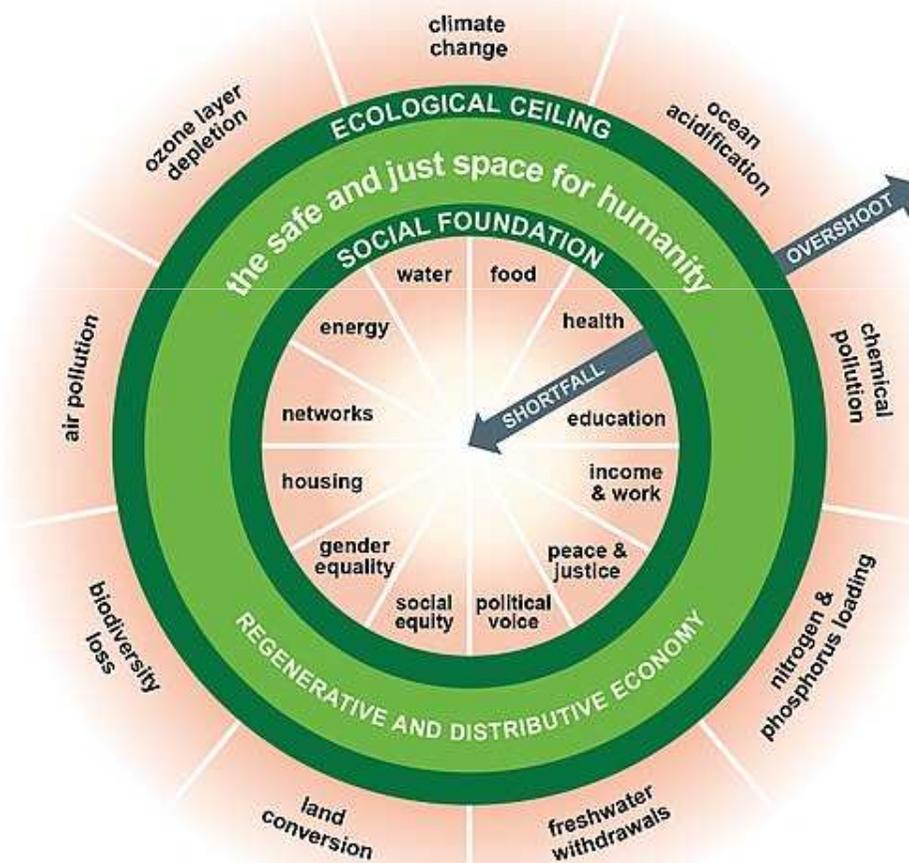
SOME THEORETICAL NOTES



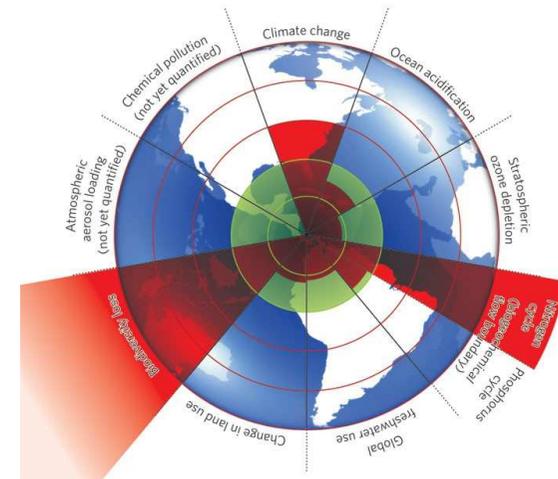
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Doughnut (economic model)



- 1 NO POVERTY**
Waste water treatment projects
- 7 AFFORDABLE AND CLEAN ENERGY**
Wind farms and solar PV projects, green buildings
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**
Maintenance and upgrade of public transport and infrastructure projects
- 11 SUSTAINABLE CITIES AND COMMUNITIES**
Low carbon public transport projects
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION**
Waste management projects
- 13 CLIMATE ACTION**
Flood protection projects
- 14 LIFE BELOW WATER**
Ranaturation projects
- 15 LIFE ON LAND**
Sustainable agriculture and forestry projects



Source: Oxfam. Rio+20. Rockström et al (2009)

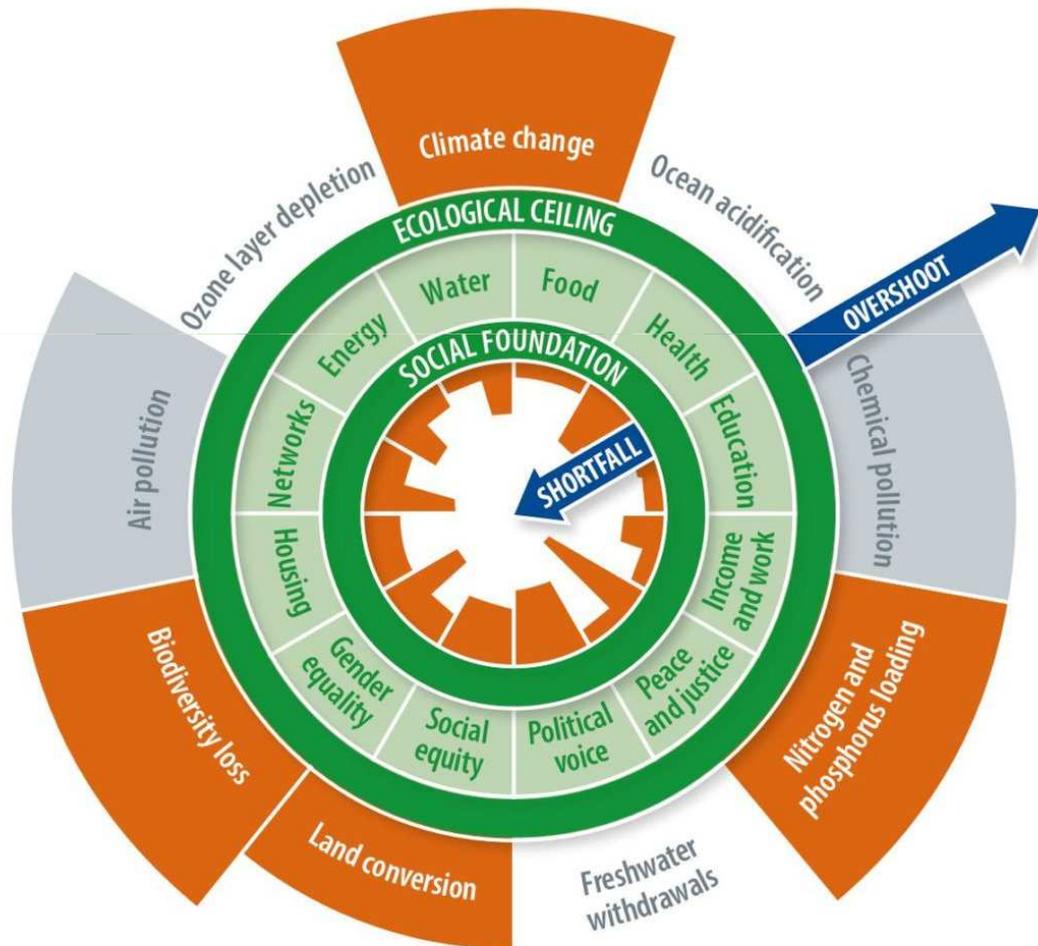


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Doughnut (economic model)

The doughnut of social and planetary boundaries



<https://goodlife.leeds.ac.uk/>

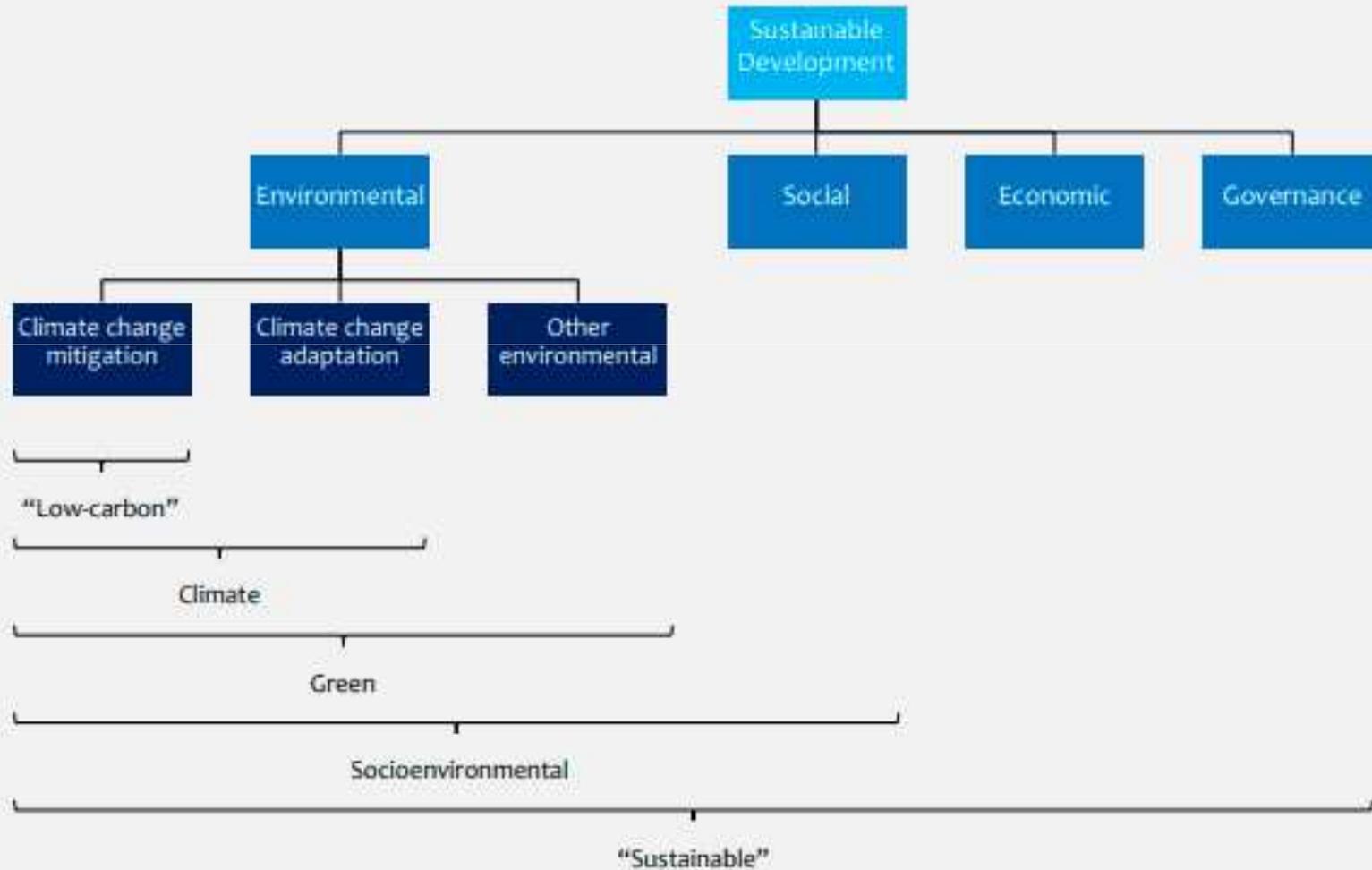
Source: Kate Raworth



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Defining Sustainable Finance



Source: UN (2018: 6).



Sustainable finance

Sustainable finance is defined as the incorporation of environmental, social, and governance (ESG) principles into business decisions, economic development, and investment strategies.

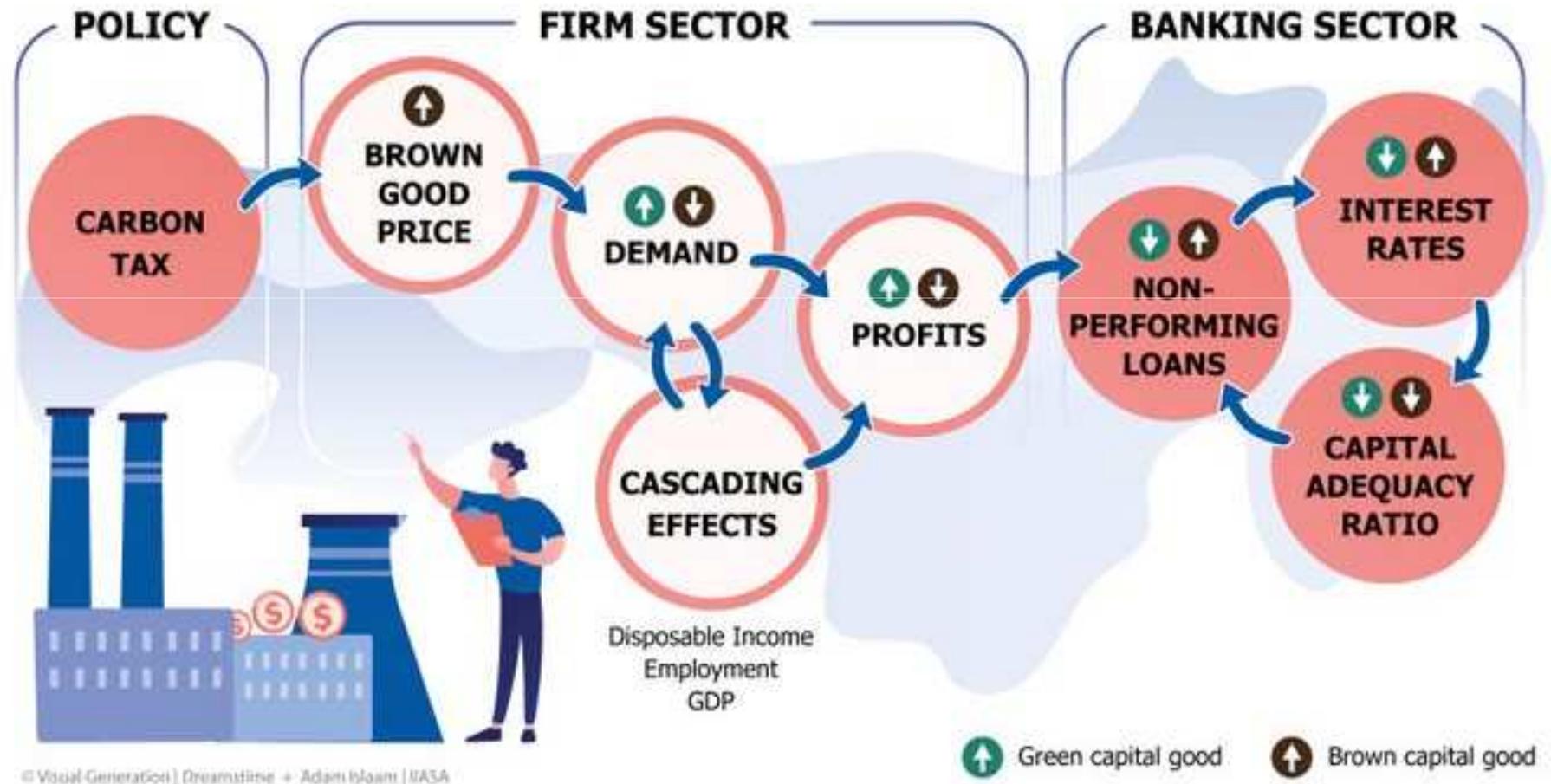
Key Pillars	Key Themes
Environment	Climate change
	Natural resources
	Pollution and waste
	Opportunities and policy
Social	Human capital
	Product responsibility
	Relations
Governance	Corporate governance
	Corporate behavior



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What we expect





- Green finance is any structured financial activity that's been created to ensure a better environmental outcome.
- The value of green bonds traded could soon hit \$2.36 trillion (by 2023).
- The European Central Bank is getting heavily involved in green finance.
- The top three green bond issuers are the US, China and France.
- The World Economic Forum's Green Horizon Summit focuses on how green finance can help in the recovery from COVID-19.



Part 2

GREEN BOND MARKET



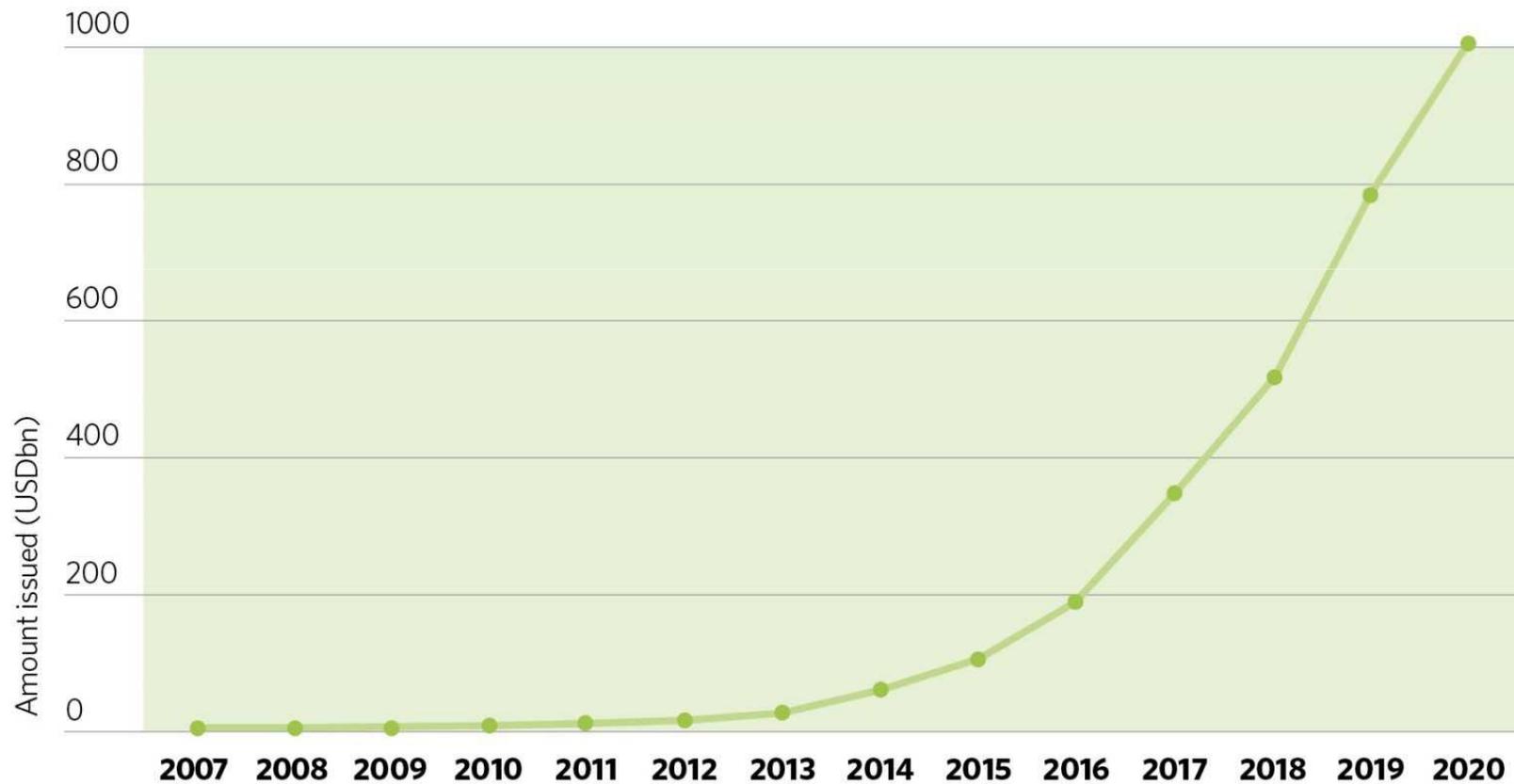
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Green bond

The \$1 trillion: cumulative progression

Climate Bonds Initiative



© Climate Bonds Initiative 2020



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Milestones green bond industry

Green Bond milestones

2007
First-ever green bond Issued by European Investment Bank (EIB) (USD 807.2 million)

2014
First Certified Climate Bond, Belectric Solar, UK

2015
GB Market hits the \$100bn mark in cumulative issuance

2016
First green sovereign issuance: **Poland**

2017
France comes to market, later going on to becoming the largest Sovereign to date
Fiji Sovereign issue to market
Nigeria becomes the first Certified Sovereign Issuer
GB Market hits \$250bn in cumulative issuance

2018
Indonesia comes to Market
Belgium issues Sovereign (SGB)
Lithuania issues SGB
Ireland SGB
GB Market hits \$517bn in cumulative issuance

2019
The Netherlands becomes the Largest Certified Sovereign
Chile becomes first sovereign issuer out of the Americas
GB Market hits \$783bn in cumulative issuance

2020
Green Bond Market hits \$1 Trillion December

© Climate Bonds Initiative 2020



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Green bond

- A green bond is a fixed-income financial instrument like any other bond. However, these bonds are issued to raise financing for climate change solutions. They can be issued by governments, banks, municipalities, or corporations in any debt format, such as private placement, securitization, and covered bonds.
- Bonds are labelled green by the issuer and should be qualified as green by an independent party



Application of ESG factors across Asset Classes

Asset Class	Type
Equity	Negative (exclusionary) and positive (best-in-class) approach
Debt Fixed Income	Traditional corporate bonds
	Traditional sovereign bonds
	ESG money market funds
	Green bonds
	Social bonds
	Sustainability bonds
Debt Bank Loans	Green mortgage-backed securities (MBS)
	Green loans
	Sustainability-linked loans
Alternative Investment	Green real estate investment trusts (REIT)
	Private equity (PE) and venture capital (VC)





Application of ESG factors across Asset Classes

Debt Fixed Income	Examples
Traditional corporate bonds	Bonds with proceeds used for funding new and existing projects with environmental benefits (not labeled).
Traditional sovereign bonds	Bonds issued by governments with proceeds used for funding projects with environmental benefits (not labeled).
Green bonds	Specific bonds that are labeled green, with proceeds used for funding new and existing projects with environmental benefits.
Social bonds	Bonds that raise funds for new and existing projects that create positive social outcomes.
Sustainability bonds	Bonds with proceeds that are used to finance or refinance a combination of green and social projects.
Green mortgage-backed securities (MBS)	Green MBS securitize numerous mortgages that go toward financing green properties (Fannie Mae)





Green bonds

Green bonds are fixed income securities which finance investments with environmental or climate-related benefits (*Fu, S. Li, A.W. Ng*).

Specifically, these bonds have the following features:

- ✓ proceeds are allocated exclusively to green projects,
- ✓ proceeds are tracked and managed in a reliable manner, and
- ✓ transparency is ensured by reporting after the issuance of the bonds.





Green projects

Green bonds have been used to finance:

- ✓ climate projects,
- ✓ pollution prevention,
- ✓ sustainable agriculture,
- ✓ sustainable water management and
- ✓ other environmental initiatives.



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Types of Green Bonds (ICMA)

Green bond issuing entities can make use of a variety of structures related to the “use of proceeds”

- ✓ Green „Use of Proceeds” Bond;
- ✓ Green „Use of Proceeds” Revenue Bond;
- ✓ Green Project Bond;
- ✓ Green Securitized Bond;





Types of Green Bonds (ICMA)

Type	Proceeds raised by bond sale are	Debt recourse
Green "Use of Proceeds" Bonds	Earmarked for green projects	full recourse to the issue and sharing the same credit rating as the issuer.
Green "Use of Proceeds" Revenue Bonds	Earmarked for or refines green projects	Non-recourse to the issuer and repays investors based on a revenue stream such as tolls, fees, and taxes.
Green Project Bonds	Ring-fenced for the specific underlying green project(s)	Recourse is only to the project's assets and balance sheet.
Green Securitized Bonds	portfolios of green projects or proceeds are earmarked for green projects	Recourse is to a group of Green Project(s) linked together (e.g. solar leases or green mortgages)



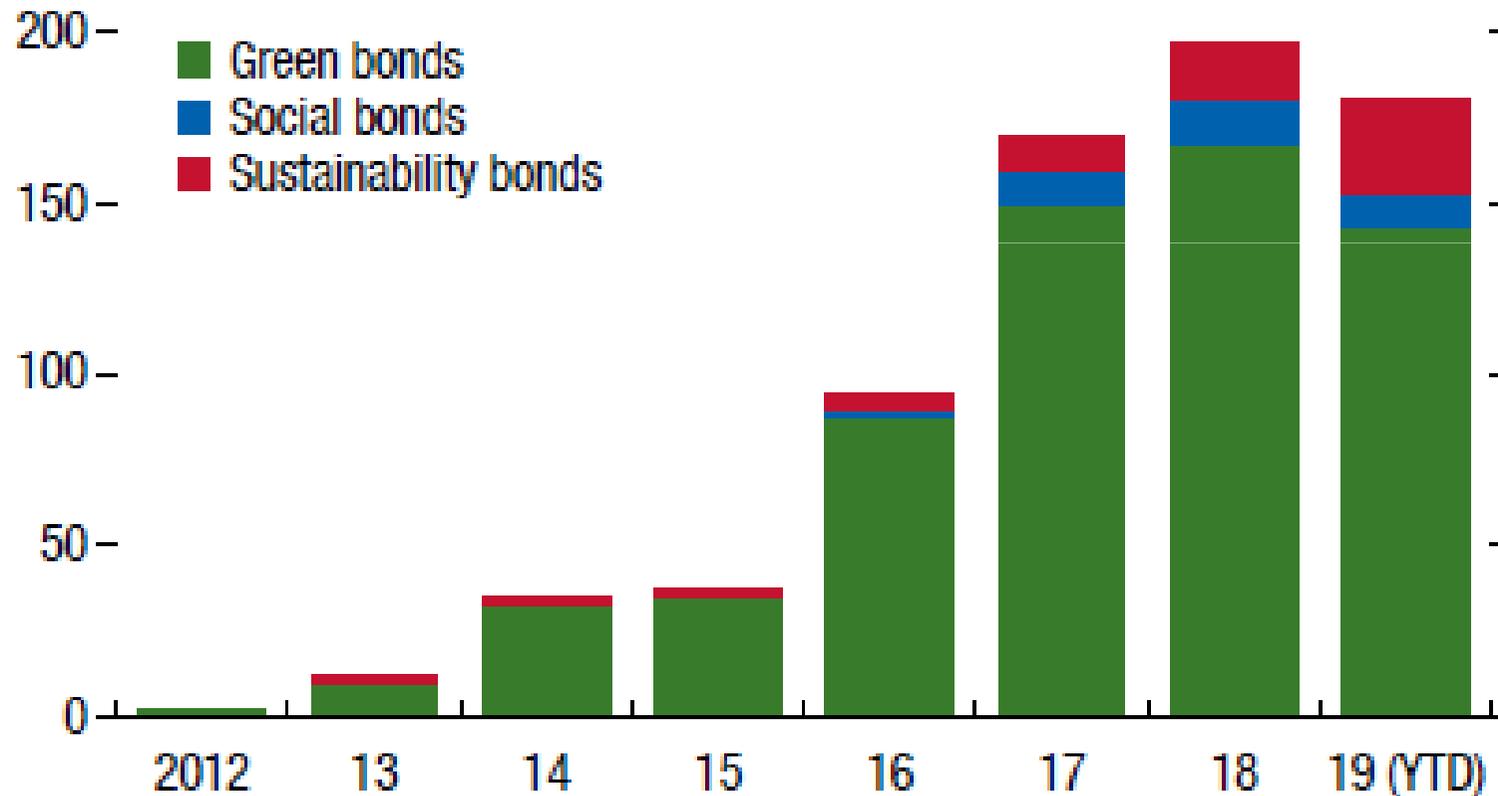


IMF, Global Financial Stability Report.

October 2019 p.88

DOI: <http://dx.doi.org/10.5089/9781498324021.082>

1. Sustainability-Linked Bond Issuance (Billions of US dollars)



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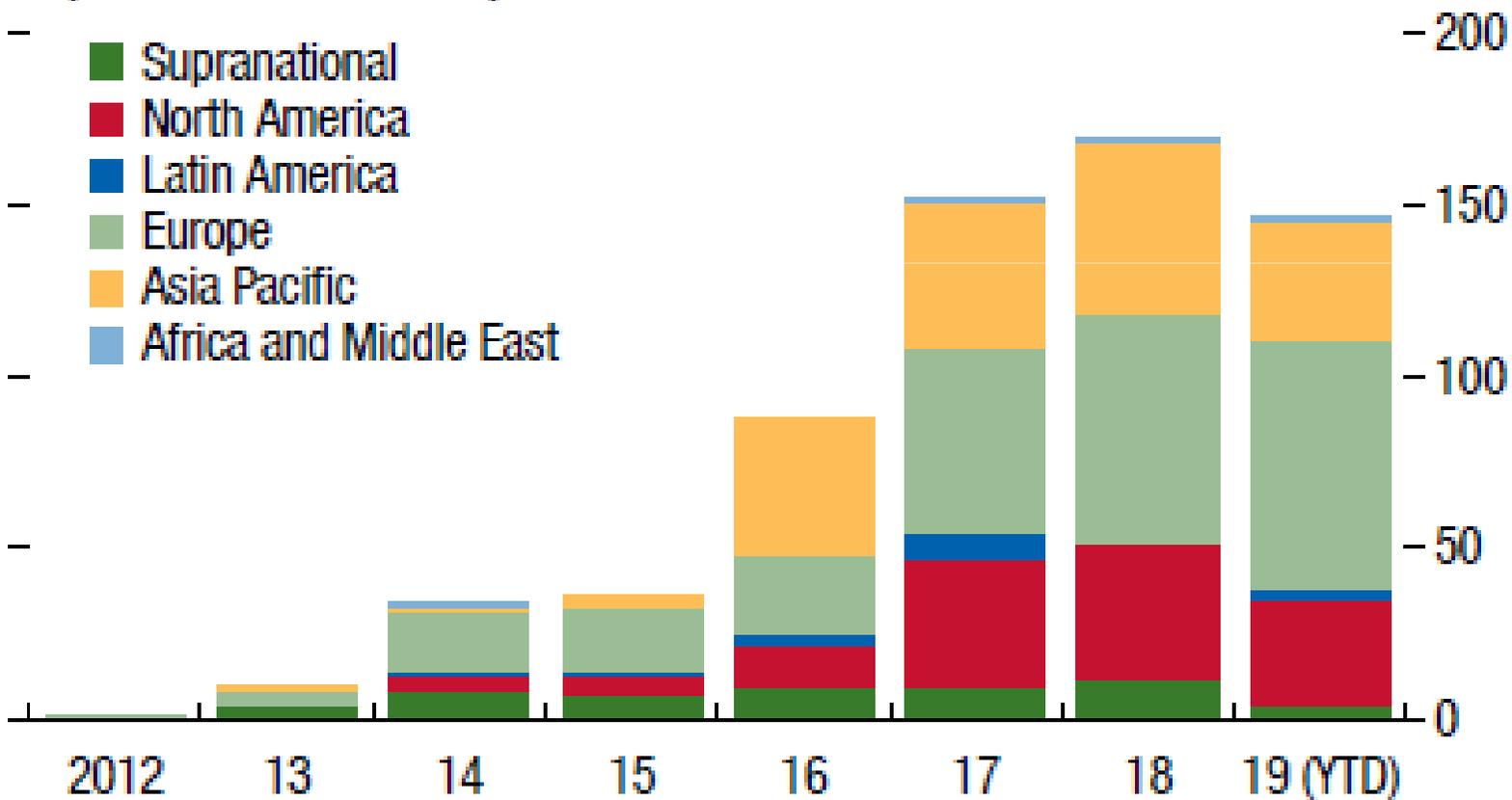


IMF, Global Financial Stability Report.

October 2019 p.88

DOI: <http://dx.doi.org/10.5089/9781498324021.082>

2. Green Bond Issuance by Region (Billions of US dollars)



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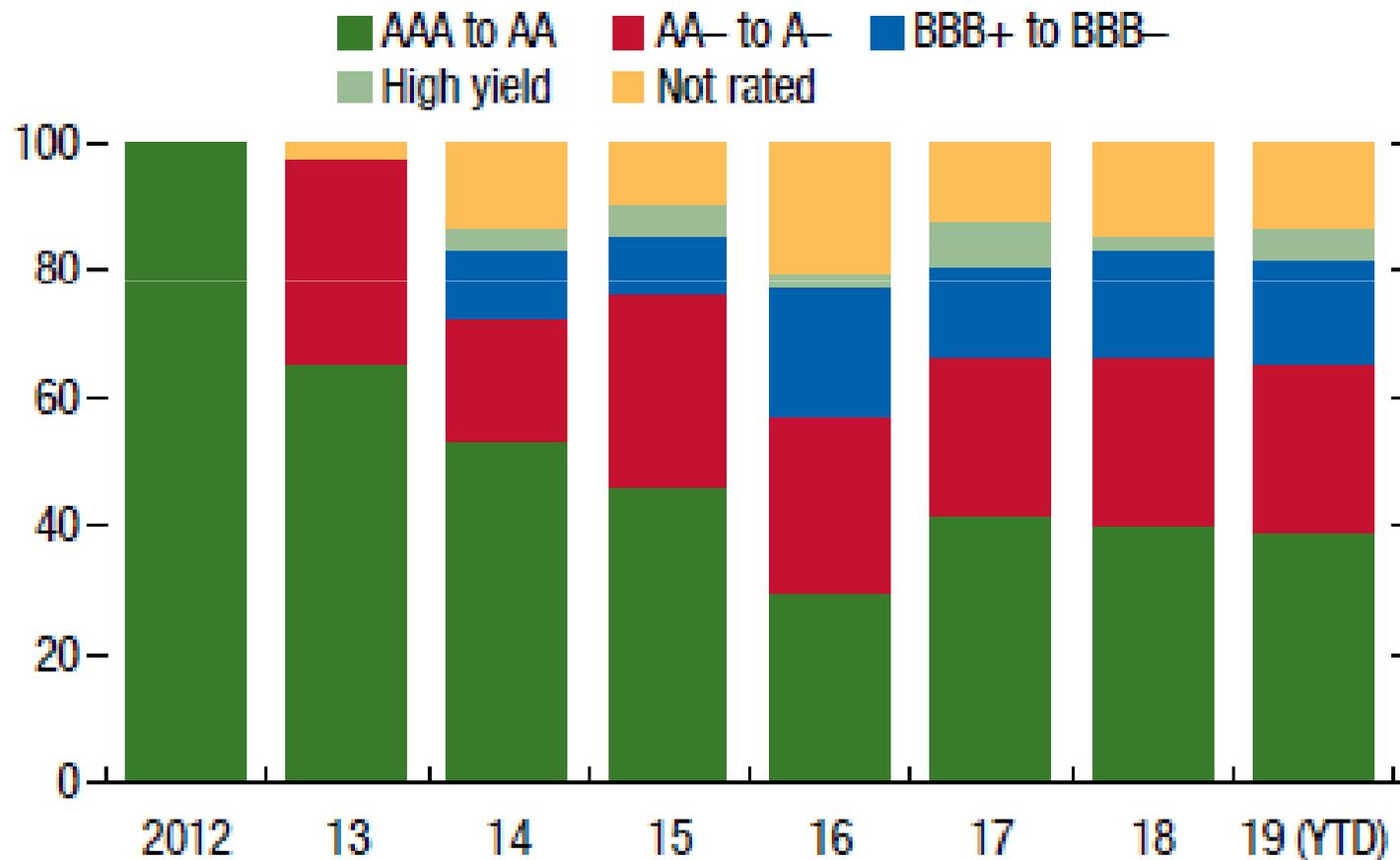


IMF, Global Financial Stability Report.

October 2019 p.88

DOI: <http://dx.doi.org/10.5089/9781498324021.082>

3. Green Bond Issuance by Credit Rating (Percent of total)



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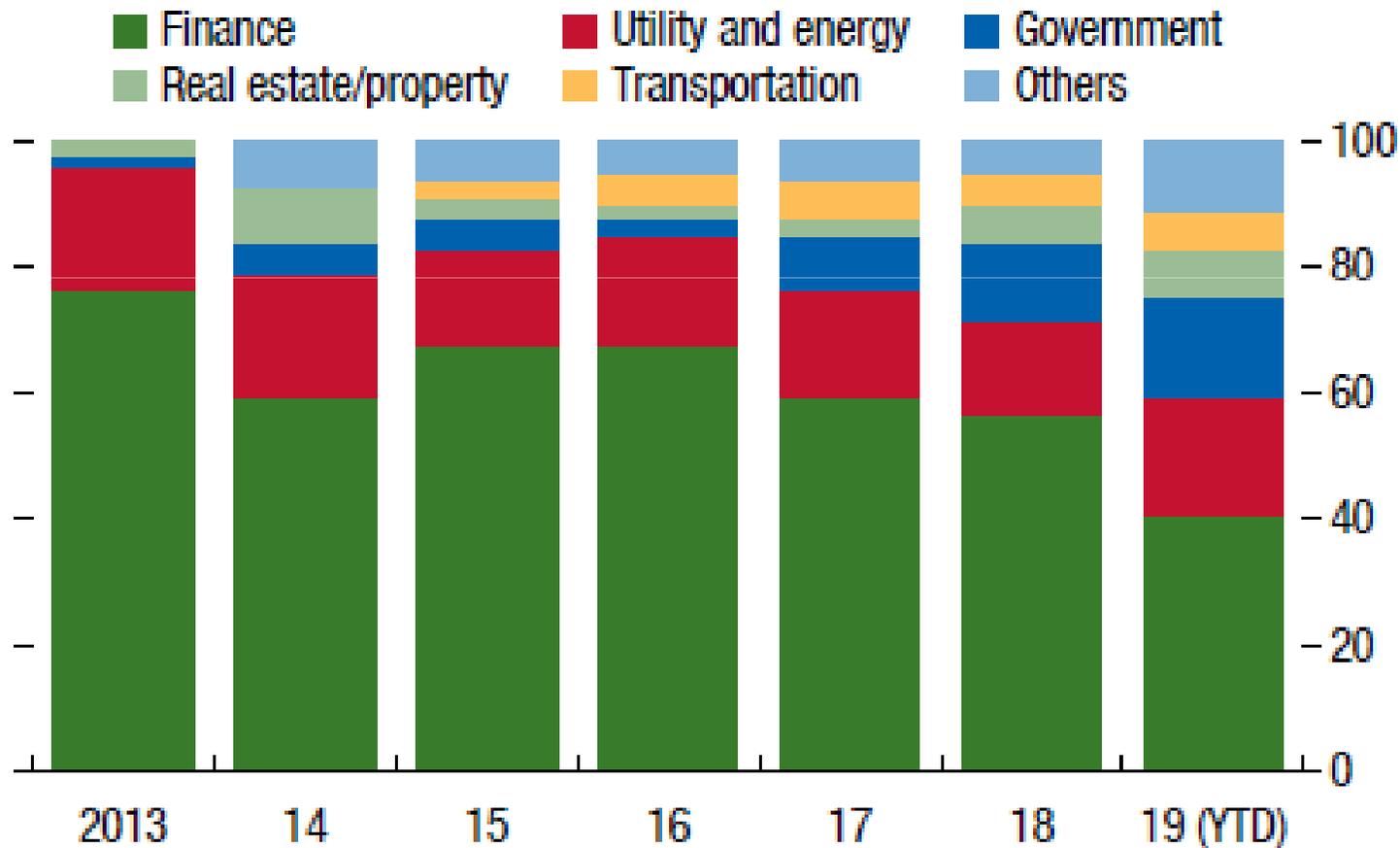


IMF, Global Financial Stability Report.

October 2019 p.88

DOI: <http://dx.doi.org/10.5089/9781498324021.082>

4. Green Bond Issuance by Sector (Percent of total)



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First green bond (2007)

https://www.youtube.com/watch?v=i3gIJrABLSc&index=1&list=P_Luz9mCSZhLGklkMaOJTBKkiKwzoHFt6Sx

There is no standard for what kinds of activities can be funded by green bonds. Lack of common standards or criteria, causes that vast majority of green bonds are self-labeled by the issuer. (World Bank & CICERO)



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First sovereign bonds

First sovereign Green Bonds were issued in 2016
in Poland

<http://pubdocs.worldbank.org/en/893761541540770521/BS-5-R-Zima-Sovereign-Green-Bonds-in-Poland.pdf>



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Who decides what is „green”?

Pre-issuance reviews:

- ✓ **third party assurance** – following *Green Bond Principles* (GBP/ICMA) – checked by audit firms;
- ✓ **Second Party Opinion (SPO)** - analyzing the “greenness”, providing „rating” – ESG service providers (CICERO, Sustainalytics);
- ✓ **Green Bond Rating** – rating agencies – (Moody’s, S&P)
- ✓ **Climate Bonds Certification** - *Climate Bond Standards* (Climate Bond Initiative) – CBI Certification Scheme





Third party assurance Green Bond Principles (GBP)

A voluntary process guidelines ICMA that recommend transparency and promote integrity in the development of the Green Bond market by clarifying the approach for issuance of a Green Bond.

The GBP have **four core components**:

- (1) the use of proceeds
- (2) the process for project evaluation and selection
- (3) the management of proceeds
- (4) Reporting

<https://www.icmagroup.org/sustainable-finance/>



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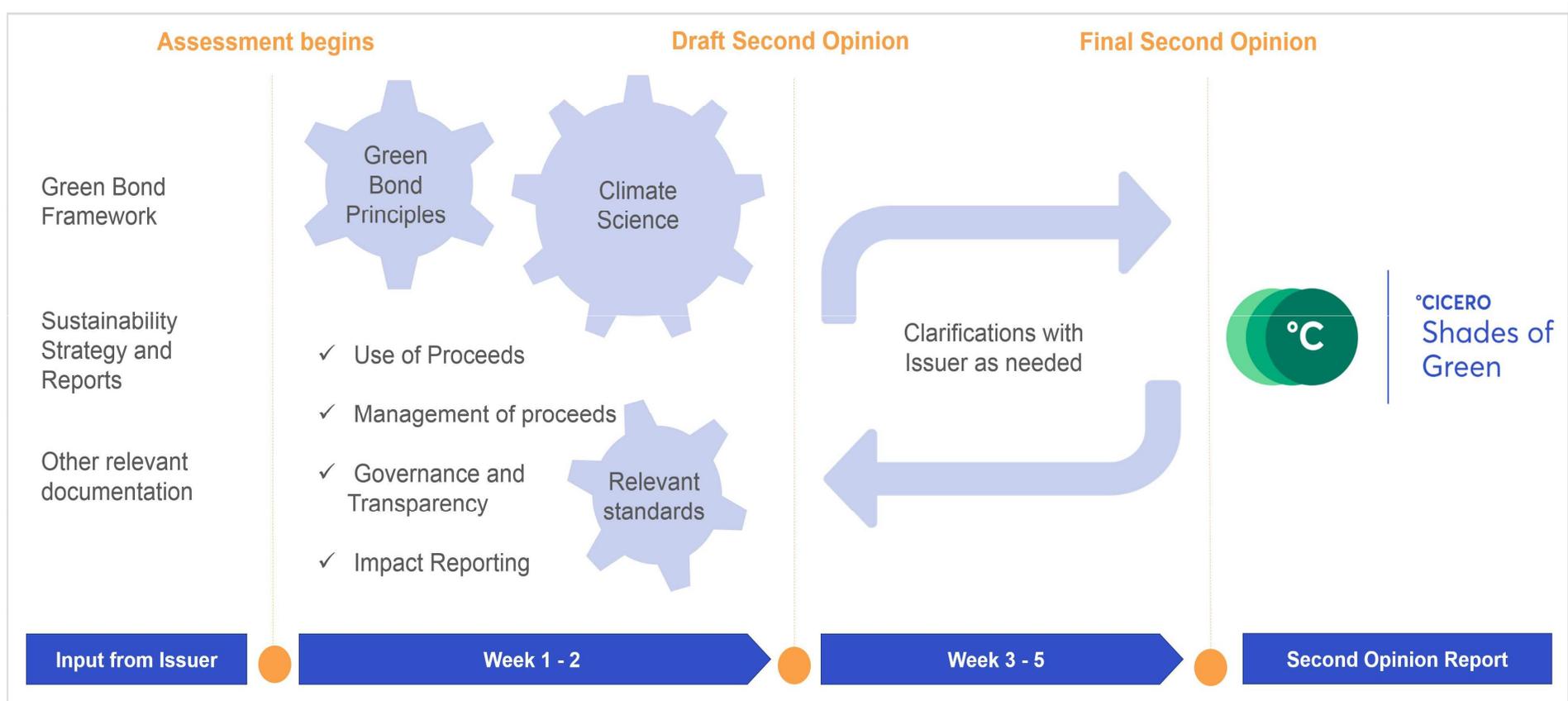
Second Party Opinion (SPO) World Bank & CICERO

The World Bank decides what projects can be eligible for green bond proceeds based on its own selection criteria.

These criteria were reviewed by the Center for International Climate and Environmental Research University of Oslo (CICERO). CICERO also certified the International Finance Corporation's criteria for green bonds.



The process of getting a CICERO Second Opinion on a green bond framework



Source: <https://cicero.oslo.no/en/posts/single/CICERO-second-opinions>



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CICERO Shades

SHADES OF GREEN AND BROWN

EXAMPLES



Dark green is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future.



Wind energy projects with a governance structure that integrates environmental concerns.



Medium green is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet.



Green buildings with a high level of certification and energy efficiency



Light green is allocated to projects and solutions that are environmentally friendly but do not by themselves represent or contribute to the long-term vision.



Hybrid personal vehicles



Light brown for efficiency improvements in projects that are associated with fossil fuel use but do not necessarily promote locking-in of emissions. Changes in the way assets are used may position them in the light green category.



Efficient fossil fuel cargo vessels



Medium brown projects can be lower emissions, but still represent risk of locking in fossil fuel infrastructure and are exposed to risk of stranded assets.



New infrastructure for natural gas



Dark brown for the heaviest emitting projects, with the most potential for lock-in of emissions and risk of stranded assets.



New infrastructure for coal

Source: <https://www.cicero.green/latestnews/2020/5/13/launching-cicero-shades-of-green-assessment-for-companies-and-equities>



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Climate Bonds Certification

Climate Bonds Standards (CBS)

The Climate Bonds Initiative (CBI) developed standards for a bond to be eligible for an industry-recognized label of “Certified Climate Bond.” It is a climate bonds taxonomy to define eight broad categories — Energy, transport, water, buildings, land-use and adaptation infrastructure, industry, waste management, ICT — which are then further defined with criteria, explanations and restrictions.

<https://www.climatebonds.net/files/files/CBI-Taxonomy-Sep18.pdf>

<https://www.climatebonds.net/standard/taxonomy>

<https://www.climatebonds.net/files/files/cbi-gb-methodology-061020.pdf>



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Last 3 months issues

[Labelled Green Bonds Data: Latest 3 Months | Climate Bonds Initiative](#)



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The issuers of green bonds

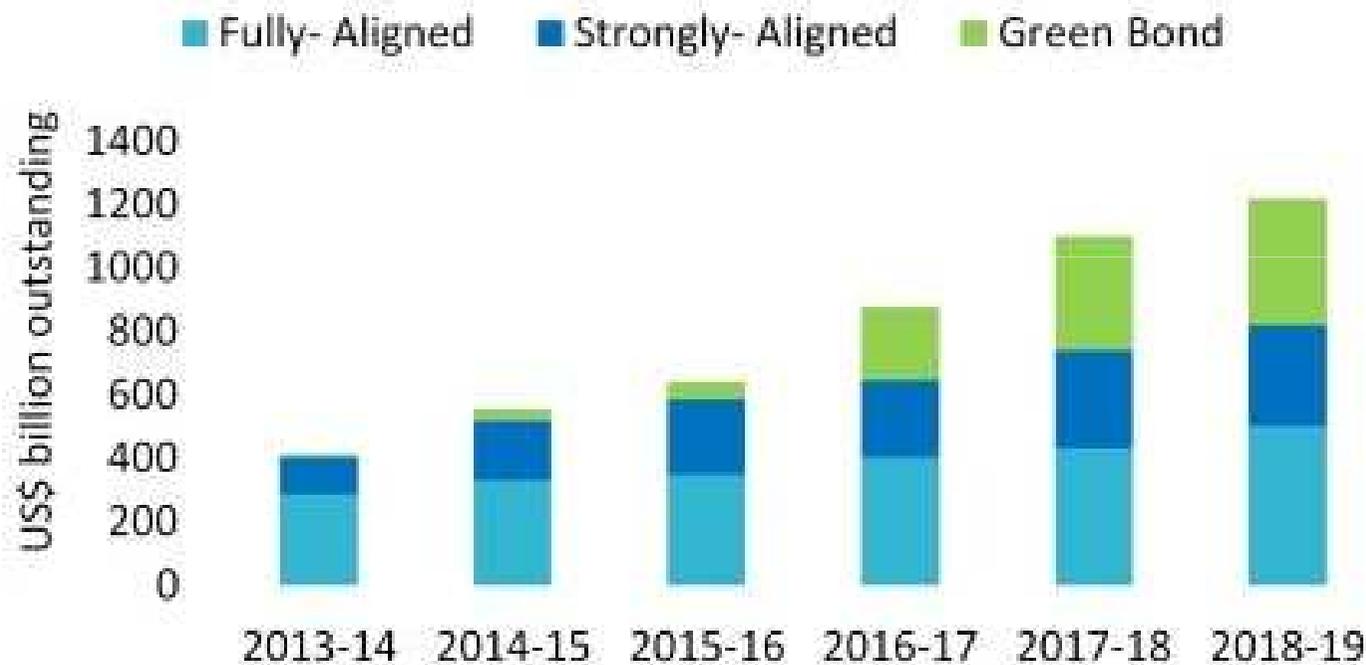
- ✓ **Classic Green Bond Issuers:** include only those bond issuers who allocate at least 75% of the proceeds to green assets, are aligned with the Climate Bonds Taxonomy (the standards which are used to label a bond 'Green'), and who provide sufficient information on the revenues used to finance these projects.
- ✓ **Strongly Aligned Issuers:** These include those bond issuers that derive 75%-95% of revenues from climate-aligned assets and green business lines.
- ✓ **Fully Aligned Issuers:** These include those bond issuers that derive over 95% of revenues from climate-aligned assets and green business lines.





The issuers of green bonds

A Climate Bond Universe of US\$ 1.45 Trillion (2018-19)



Source: Climate Bonds Report

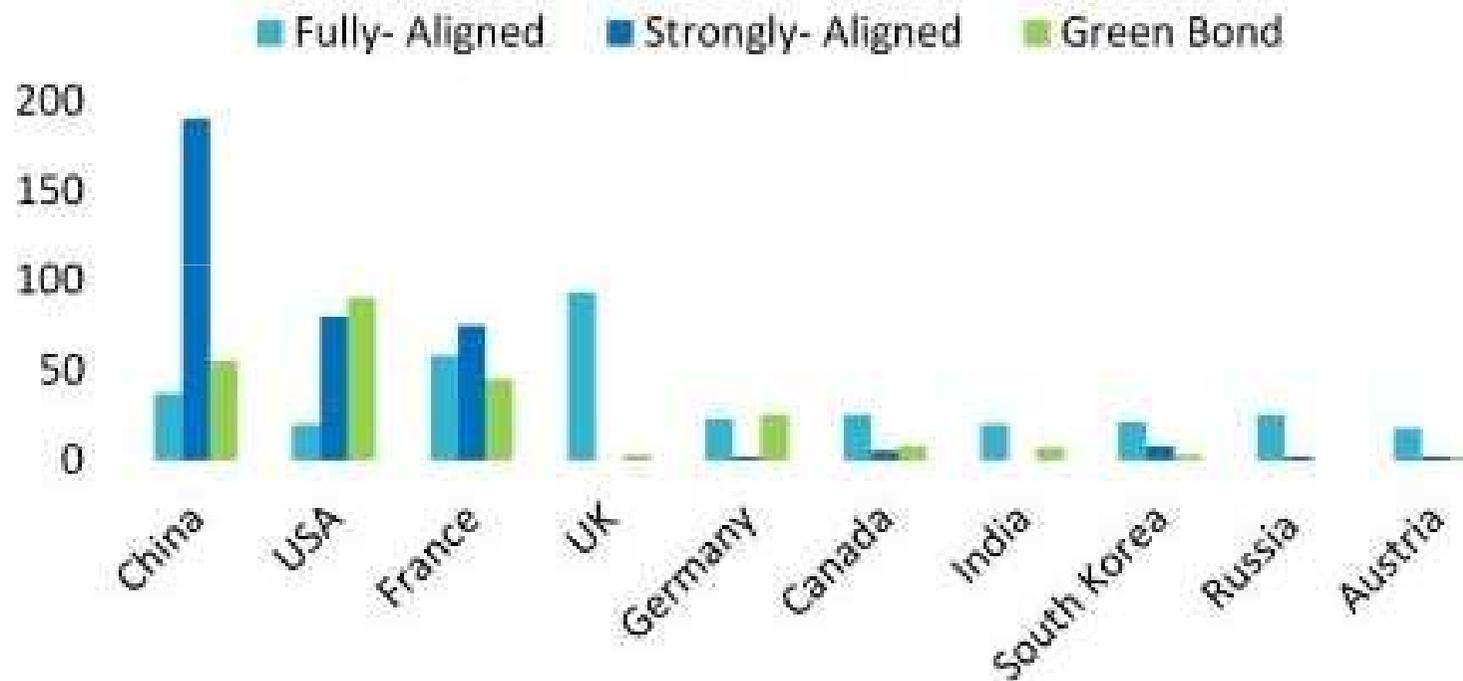


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The issuers of green bonds

2018 Country-wise Categorisation (US\$ billion)



Source: Climate Bonds Report



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Examples

Example 1 – Physical assets (windfarm) Company A develops, constructs and operates windfarms. It plans to build a portfolio of six facilities, amounting 500 MW and looks for financing sources. As a windfarm is a physical green asset, Company A is looking to diversify its financing sources and plans to issue a Green Bond under the EU GBS. In addition, the financed amounts could include costs for connecting the project with grid.

Example 2 – Financial green assets (mortgage loans) A bank is looking to finance a portfolio of green real estate mortgages. The bank can do it by issuing green bonds, either not secured by these green mortgages (e.g. senior green bonds), or secured by these green mortgages (e.g. covered bonds, asset-backed securities, etc.). The green mortgages are the financial green assets, which are ultimately linked to real economy green investments.



Green bonds benefits

Investors	Issuers
Reputational benefits (e.g. marketing can highlight support for green investment);	
Articulation and enhanced credibility of sustainability strategy (“money where your mouth is”);	
Lack of additional risk, green bonds can be incorporated into pension funds’ existing asset allocations;	Access to “economies of scale” as majority of issuance costs are in setting up the processes;
Improving diversification of bond issuer base;	Improving diversification of bond investor base;





Example

Issuer	PepsiCo
Issuance date	October 2019
Nominal value	\$1 billion
Nominal currency	USD
Rating (issuer, bond)	A+ (S&P), A (Moody's)
Framework	Green bond
Tenure	30 years
Coupon	2.875%
Use of proceeds	Eco-friendly plastics, water use efficiency, packaging, and cleaner transportation
Bookrunners	Morgan Stanley, Goldman Sachs, Mizuho Financial group

<https://sec.report/Document/0001047469-19-005653/0001047469-19-005653.txt#ds41801> description of debt securities



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Example

Issuer	U.S. State of Massachusetts
Issuance date	September 2014
Nominal value	\$350 million
Nominal currency	USD
Rating (issuer, bond)	AA+ (Fitch), Aa1 (Moody's), AA+ (S&P)
Framework	Green bond
Tenure	3 to 17 years
Coupon	2.45%
Subscription level	3 times
Investor base	Residents and local retail investors
Use of proceeds	Water projects, offshore wind port facilities, energy-efficient buildings, and restoration and preservation projects
Bookrunners	Morgan Stanley

<https://www.climatebonds.net/files/files/DC%20Water%20case%20study%20-%20final%281%29.pdf>



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Part 3

STRATEGIES TO ESTABLISH A SUSTAINABLE FINANCIAL SYSTEM



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EU Taxonomy

Green Projects should contribute substantially to at least one of the six environmental objectives of the EU Taxonomy Regulation:

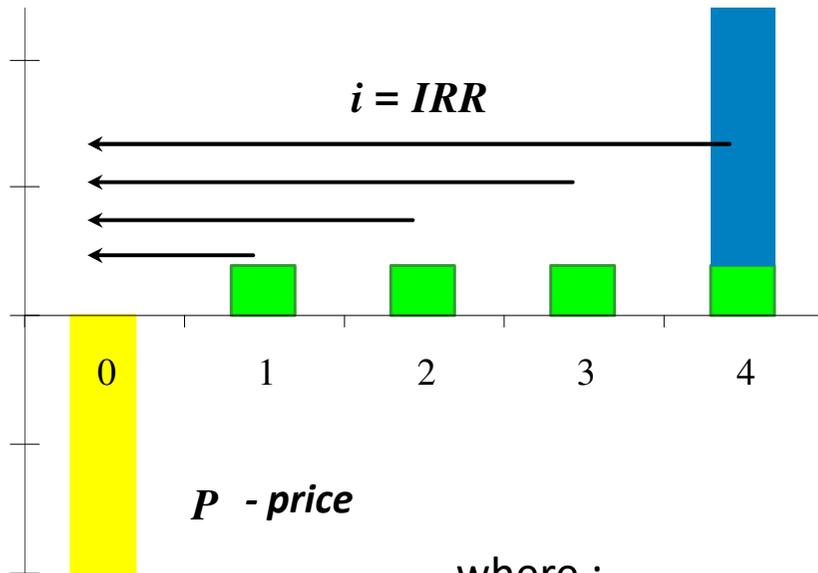
1. Climate change mitigation;
2. Climate change adaptation;
3. Sustainable use and protection of water and marine resources;
4. Transition to a circular economy;
5. Pollution prevention and control;
6. Protection and restoration of biodiversity and ecosystems.



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Price for a coupon bond



$$P = FV + FV - (i_{cp} - i) \frac{1 - (1 + i)^{-n}}{i}$$

$$P = FV + FV \left(\frac{i_{cp}}{m} - \frac{i}{m} \right) \frac{1 - \left(1 + \frac{i}{m}\right)^{-nm}}{\frac{i}{m}}$$

where :

P – bond's price

FV - nominal

i – desired interest rate

i_{cp} – coupon rate

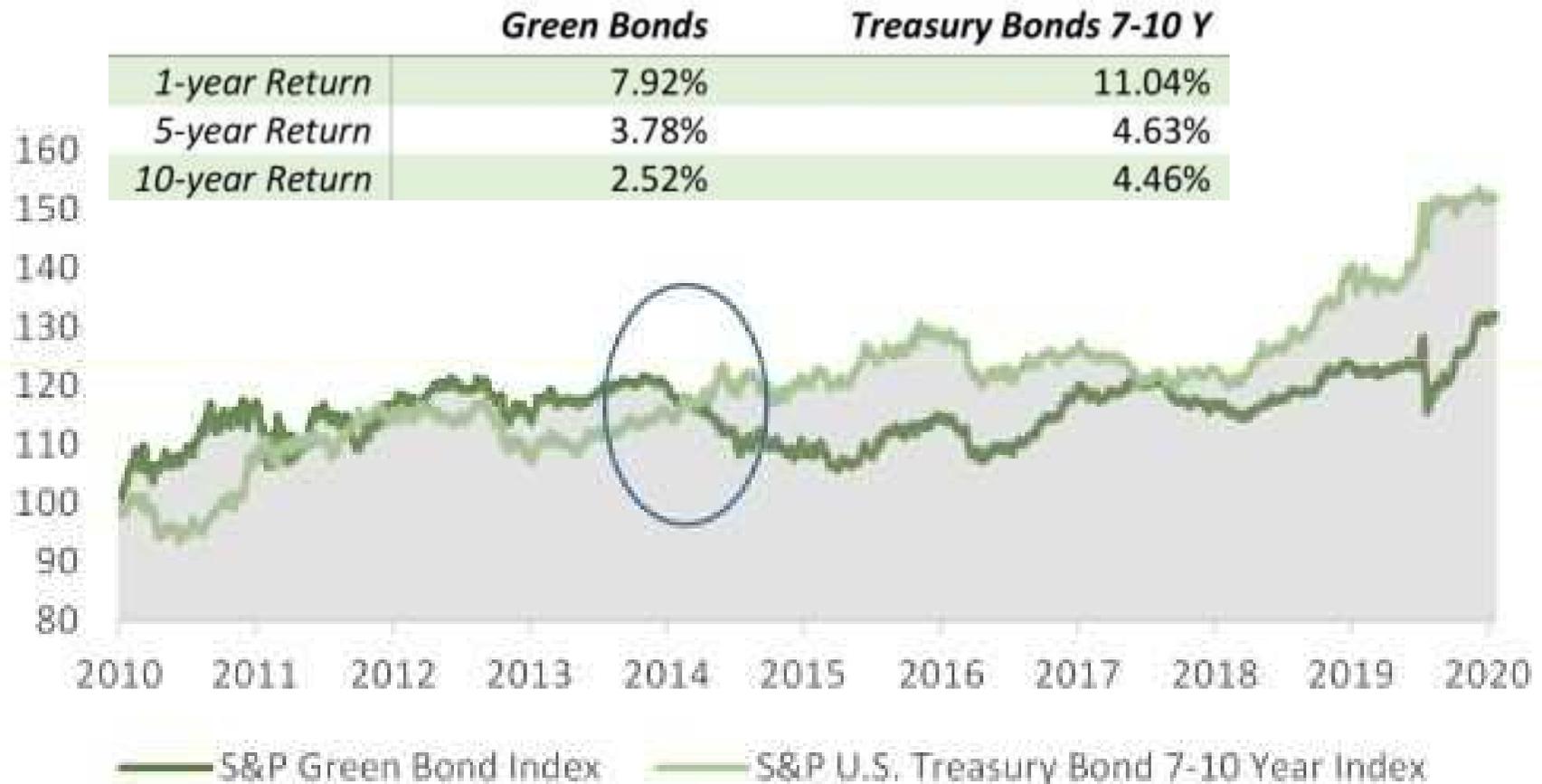
n – time to maturity **in years**, m – number of coupons in a year



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Historical performance



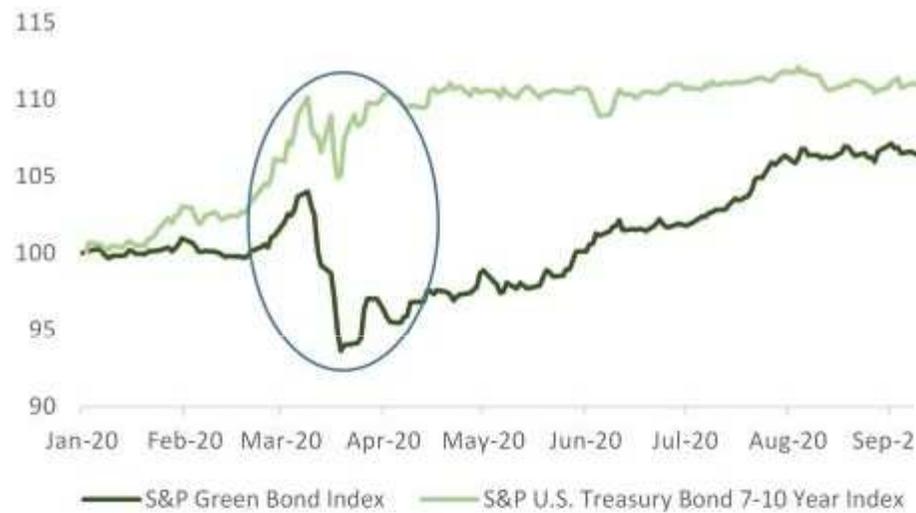
Source: S&P Global



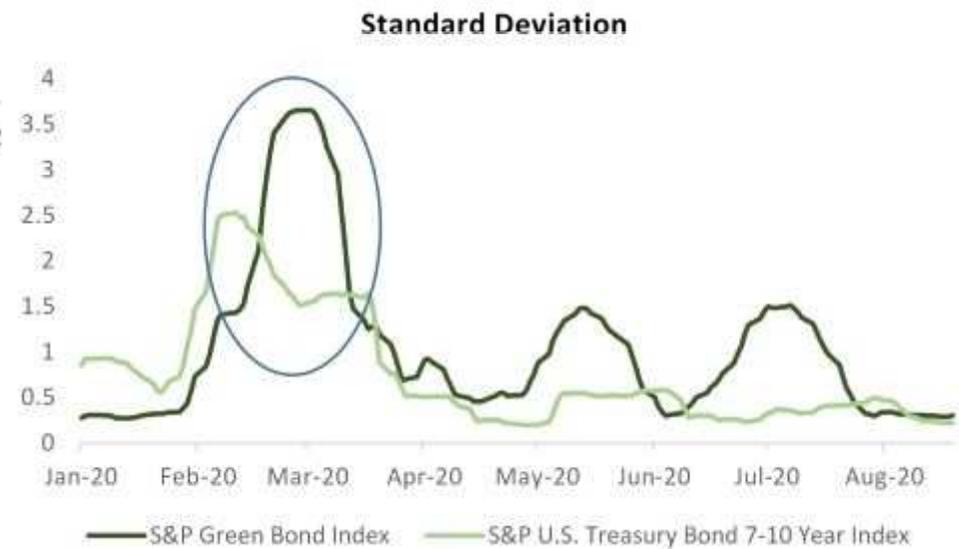
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Covid 19 consequences



Source: S&P Global



Source: S&P Global



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Greenium

- an the idea to obtain a cheaper cost of funding by issuing debt with a specified „use of proceeds” that have positive environmental and/or social impacts as compared to traditional bonds.
- investor with a preference for green bonds would need to accept a lower yield for an otherwise identical security from the same issuer.

Arguments against the existence of a greenium :

- limits on the ability of an investor wishing to allocate capital to green bonds (the same mainstream risk-adjusted returns as for „normal” bonds.
- the possibility for arbitrage.
- difficulties in finding (isolating) a greenium - bond yields are affected by many factors: seniority, structure, size and liquidity.



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Why the green yield is lower?

- ✓ Fed Stimulus Program, UK Government's International Climate Fund (ICF), steps taken by the Chinese government to achieve the long-term goal being carbon-neutral
- ✓ exponential increase in Green Bond issues
- ✓ strong demand for these bonds among green investors who are increasingly becoming enthusiastic about the ESG style of investing in this era of climate change.
- ✓ green bonds have a positive correlation of 0.304 with T-Bonds and 0.647 with the S&P 500.





IQ – Green swan?

Carbon-intensive companies, such as oil and gas companies and car manufacturers, are typically also capital intensive and thus issue more corporate bonds. By taking assets proportional to the market, the ECB's asset portfolio is skewed towards high-carbon companies relative to low-carbon companies. The carbon intensity (defined as carbon emissions divided by sales) of the ECB's corporate bond portfolio is 57 percent higher than the average carbon intensity of EU companies. This large carbon bias makes the ECB a brown central bank.

<https://www.bruegel.org/2021/02/a-brown-or-a-green-european-central-bank/>

<https://voxeu.org/article/brown-assets-might-be-next-subprime>



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2Q - Green Finance: Solution or Trap?

In a capitalist society, we tend to recognize things only when there is an economic value attached to them. This has led to the creation of green bonds.

Types of green finance	Elements of (green) finance	Forms of regulation	Implications
Neoliberal green finance	Private green finance	Voluntary standards (CSR, ESG)	No or very limited positive environmental effects legitimising finance, opposing general binding environmental rules
	Private green finance supported by public money	Subsidies, including public risk taking (guarantees)	Transfer of public finance to private (finance)

https://www.mattersburgerkreis.at/dl/musLJMJKONOIqX4KooJK/JEP_2020_4_2_J_ger_Schmidt_Global_Political_of_Green_Finance_Regulationist.pdf



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