GLOBAL CORPORATE GREEN INVESTMENT AND THE UN SUSTAINABLE DEVELOPMENT GOALS

How green bonds can help close the funding gap

CORPORATE KNIGHTS & CLIMATE BOND INITIATIVE

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Research and report preparation were undertaken by Corporate Knights (Wendy Shen-Juarez, Toby A.A. Heaps) and the Climate Bonds Initiative (CBI) (Bridget Boulle and Monica Filkova).
Editing was led by Jordan MacInnis.
Design was led by Jack Dylan with assistance from Ahshan Habib.

About BNP Paribas

BNP Paribas is a leading bank in Europe with an international reach. It has a presence in 72 countries, with more than 202,600 employees, of which almost 155,000 in Europe. The Group has key positions in its three main activities: Domestic Markets and International Financial Services (whose retail-banking networks and financial services are covered by Retail Banking & Services) and Corporate & Institutional Banking, which serves two client franchises: corporate clients and institutional investors. The Group helps all its clients (individuals, community associations, entrepreneurs, SMEs, corporates and institutional clients) to realise their projects through solutions spanning financing, investment, savings and protection insurance.

In Europe, the Group has four domestic markets (Belgium, France, Italy and Luxembourg) and BNP Paribas Personal Finance is the European leader in consumer lending.

BNP Paribas is rolling out its integrated retail-banking model in Mediterranean countries, in Turkey, in Eastern Europe and a large network in the western part of the United States. In its Corporate & Institutional Banking and International Financial Services activities, BNP Paribas also enjoys top positions in Europe, a strong presence in the Americas as well as a solid and fast-growing business in Asia-Pacific.

About Corporate Knights

Corporate Knights is a media and investment research company that produces rankings and financial product ratings based on sustainability performance. Corporate Knights also acts as Secretariat to the Council for Clean Capitalism, a group of CEOs from leading Canadian companies dedicated to advancing a more sustainable economy. The company's media division publishes *Corporate Knights Magazine*, the world's largest-circulating publication focused on responsible business. Recently named Magazine of the Year by the National Magazine Awards Foundation of Canada, *Corporate Knights Magazine* is printed quarterly and has a circulation of 147,500. The magazine reaches some of the world's most influential business and political decision-makers as an insert in Canada's *Globe and Mail* and *The Washington Post* in the United States.

About Climate Bonds Initiative

The Climate Bonds Initiative (CBI) is an investor-focused international not-for-profit that promotes investment in projects and assets necessary for a rapid transition to a low carbon and climate resilient economy. The strategy is to develop a large, liquid green and climate bonds market to help drive down the cost of capital for climate projects, especially in developed and emerging markets. CBI is a special member of the Green Finance Committee of China Society of Finance and Banking, a member of the European Commission's Technical Expert Group on Sustainable Finance and a co-convenor of Mexico's Climate Finance Council, the India Green Bond Council, and Brazil's Green Finance Initiative. For more information, visit www.climatebonds.net.

MESSAGE FROM BNP PARIBAS

The United Nations Sustainable Development Goals (SDGs), established in September 2015, offer a roadmap to a more sustainable future for everyone on the planet. The SDGs are now a widely-used standard against which public and private sector entities can measure their activities.

Meeting the SDGs, however, comes at a price, and there are few parties that are both willing and able to pay. An estimate by The United Nations Conference on Trade and Development (UNCTAD) suggests that the cost of delivering the goals could be between $5 and $7 trillion per year, with a funding gap of some $2.5 trillion per year in developing countries. Finance needs to be mobilized jointly from public, private and multilateral sources, and it needs to be done quickly.

BNP Paribas has placed sustainability at the heart of its strategy, which includes comprehensive policies to regulate lending to sensitive sectors such as palm oil, defence and mining, withdrawing from coal, non-conventional fossil fuels or tobacco and pursuing activities such as renewable energy or affordable housing that contribute to a more sustainable future. The SDGs are fully incorporated into BNP Paribas' business plan. Indicators have been developed to assess the extent to which lending activity is directed towards the goals, ambitious targets have been set, and related incentives have been introduced to affect the compensation of the firm's top 6,300 managers. To date, BNP Paribas has arranged over €155 billion in financing to meet the SDGs, with a goal to reach or exceed €185 billion by 2020.

The bank has committed to being a leading player in the fast-growing market for green, social, and sustainable bonds, wherein proceeds are allocated to activities that provide quantifiable environmental and social benefits. In this capacity, it is able to support the sustainability ambitions of corporate and institutional investors for whom it acts as a financing bridge. Pioneering work has also been done in developing "Positive Incentive Loans" in which the interest paid by the borrower is linked to the achievement of sustainability targets.

However, to achieve critical environmental and social goals, we need to accelerate the funding of the transition from harming activities to more sustainable ones. It is with this objective in mind that BNP Paribas is fully committed to support the development of a Clean Transition Bond market, providing funding access to clients that may not be eligible for the established green bond market but are looking to embark on courageous and necessary transformation or improvement plans.

– Stephanie Sfakianos

Head of Sustainable Capital Markets,

BNP Paribas

EXECUTIVE SUMMARY

While 17 percent of current investment by large public corporations is already green, there's an urgent need to mobilize even more capital to help build a lower-carbon and more sustainable economy. And while less than five percent of 2017 corporate green investments were financed via certified green bonds, they have the potential to play a much larger role.

Corporate Knights and Climate Bonds Initiative assessed 7,000 of the world's largest companies, representing all publicly traded companies with US$1 billion+ in revenues. Collectively, these companies were found to have made capital and research and development expenditures of $3.6 trillion in 2017. We then applied a recently developed, sector-specific taxonomy to determine what proportion of their revenues – and, by extension, their CapEx and R&D – can be classified as having clear and specific environmental benefits. This yielded a figure of $611 billion in green investments by non-financial sector corporations in 2017.

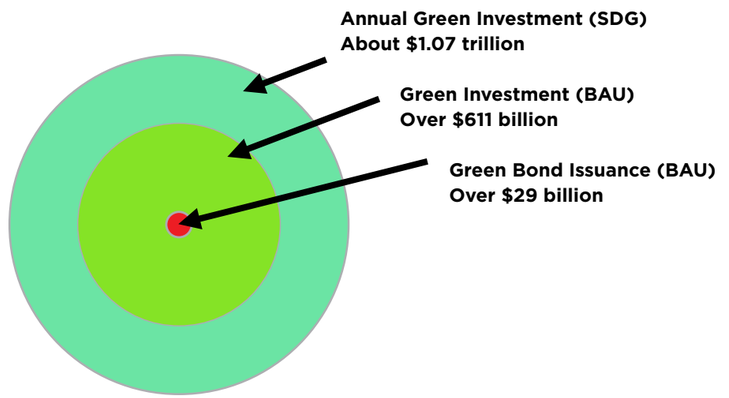
In order to reach "SDG alignment"– which must include urgent action to combat climate change we estimate that total corporate CapEx and R&D spending needs to be boosted from $3.6 trillion to $3.8 trillion annually, while the green component of that investment needs to rise from $611 billion (17 percent of the total) to about $1.07 trillion (28 percent of the total). Over 87 percent ($399 billion) of the additional annual green investments required arise in the most transition-exposed sectors (energy, utilities, automotive, steel and cement).

While large, the incremental investment requirement identified in the report is modest in proportion to the estimated $117 trillion in assets under management and loan books held via publicly traded financial corporations. There is also strong and growing investor interest in financing green activities. But with 2018 annual issuance of certified corporate green bonds of only $78 billion (including $49 billion from financial corporations and $29 billion from non-financial corporations – the same figure for 2017), much stronger linkages are needed between green-motivated capital providers and the corporate initiatives that urgently require such funding. Potential solutions include:

- Agreement on taxonomies and definitions for green activities, revenues and investments, in particular to facilitate "Clean Transition Bonds" – a form of green bond that would finance de-carbonization activities within high-carbon sectors that would otherwise likely be bypassed by conventional green bond issuers.
- Broader efforts on the part of banks and other financial issuers to raise and recycle capital through securitization of their green loan books (the report estimates banks have outstanding green loan books of $390 billion, which could be securitized and issued as green bonds).
- A move away from strict, in-or-out specifications of how green bonds proceeds are used by companies, in favour of an approach though which companies that pass a credible test for their own SDG-alignment would see all of their debt issuance qualified as green.

This report also evaluates the green bond issuance potential of a representative cross-section of 21 of the 2019 Global 100 Most Sustainable Corporations in the World. This includes a determination of likelihood of green bond issuance, and percentage of green investment requirements that could be covered by such an issuance. These companies alone have incremental green capital requirements of approximately $43 billion annually in order to move to full SGD alignment, a significant portion of which could be covered by green bond offerings.

Figure A: Green Investments and Green Bond Issuance



INTRODUCTION

From power generation to electric cars to energy efficiency, the green economy is now growing faster than the regular economy. Unilever's sustainable brands, for example, are growing 46 percent faster than the rest of its business.[xlii]

However, to prevent catastrophic climate change and to help companies deliver on the SDGs, more investment is needed. Large corporations and the financial sector have the collective power to allocate trillions of dollars of capital already in the system to the urgent task of saving the planet. Green bonds can be a critical tool with which to achieve this common goal.

Although the green bond market is growing at pace across the world, current corporate and financial sector green bond issuance remains comparatively small. Yet there is no shortage of demand. Investors across the world, with and without green mandates, are seeking green bonds from non-financial and financial issuers. Banks have big green loan books ripe for securitization to recycle capital and asset managers are in a prime position to raise funds via debt markets to allocate via their investment arms into superior-yielding green investments.

For the sake of their resilience, if not the climate's, non-financial corporations, in particular those in the most transition exposed sectors, need to adopt new practices. Many large capital providers are ready to finance well-articulated corporate green investment and transition strategies in green bond markets and other instruments.

Achieving scale may require going beyond green bonds that specify use of proceeds to "in or out" criteria at a company level. If a company passes a credible test for being on a SDG aligned path, then all finance it raises should count as green or SDG aligned. This may result in lower financing costs for companies that meet investor demand for SDG aligned and climate proof solutions, creating a virtuous cycle of capital.

This research evaluates current and SDG aligned annual green investments of all publicly traded companies with annual revenues over US$1 billion. We also highlight a representative sample of twenty-one companies that are leaders in their sectors and assess the role that green bond markets could play in financing these investments.

Two scenarios are presented:

1) **The business as usual (BAU) scenario** examines current levels of corporate green investment via capital expenditure and research and development channels.
2) **The UN SDG (SDG) scenario** estimates green investment levels required to close the SDG funding gap, based on estimates by the Global Infrastructure Hub and Corporate Knights/Climate Bonds Initiative.

METHODOLOGY GREEN INVESTMENT

In order to estimate the green investment potential for each year up to 2020, the following 2017 data was sourced from corporate disclosures and converted to USD: Total Capital Expenditures (CapEx), Total Research and Development (R&D), Total Loans and Total AUM for applicable financial institutions.[1,2]

Bond data was collected from Thomson Reuters and Climate Bonds Initiative.

The Corporate Knights Clean Revenue percentage is based on a company's revenue from all goods and services which have clear environment or social benefits. [3]For the purposes of this report, we extracted only environment-related goods and services, known therein as the 'green revenue percentage.'
The green revenue percentage is a subset of the clean revenue percentage.

As a result, the clean revenue percentage and green revenue percentage of a company may differ from other published Corporate Knights material detailing corporate "clean revenues." Green revenue percentage includes revenue from clean transition, low carbon economy and circular economy revenue segments.[i]

All public companies with annual revenue greater than US$1 billion (n=7148) in 2017 were evaluated to assign a green revenue percentage score. The green revenue score was determined through a combination of manual research evaluating corporate disclosures and segmented revenue analysis. Manual research[4] was carried out on companies that were identified as having a green revenue of at least 20 percent according to analysis of segmented revenues using FactSet RBICS and other commercial databases. All other companies were assigned a "green revenue" score based on the portion of revenue earned from FactSet Revere Business Industry Classification System (RBICS) sub-industry segments (n=1433) which are fully consistent (47 sub-industries counted at 100 percent) or partially consistent (137 sub-industries counted at 20 percent) with the environmental components of the Corporate Knights Clean Revenue Taxonomy.

All figures are in U.S. dollars unless otherwise stated.

In order to calculate the annual green investment for BAU and SDG aligned scenarios, we used specific assumptions for each GICS sector, see Table 1 below. In some cases, these were broken out further to better pinpoint transition financing requirements.

Using the 2018 and 2019 projected infrastructure investments from the Global Infrastructure Outlook in an BAU and SDG aligned scenario, the average of the BAU and SDG Infrastructure investment difference is 23.4 percent.
This is the estimated increase that is necessary to close the gap between the BAU scenario and the SDG scenario used for all sectors with the exception of Energy, Cement and Steel.[ii] For these highly exposed transition sectors, still at nascent stage of transition, we used specific assumptions in line with industry best-practices and thresholds thought to be ambitious but reasonable in the view of Corporate Knights and Climate Bonds Initiative.

[1]Bloomberg USD currency conversion takes the average currency exchange USD in the year for data not reported in USD. [2]Bloomberg CapEx only includes the Purchasing of Plant, Property and Equipment and in a few cases intangible assets if it is not counted separately in the annual reports. [3]See link for the Corporate Knights Clean Revenue definition and Taxonomy https://www.corporateknights.com/channels/responsible-investing/clean-revenue-taxonomy-definition-15422903/. [4]The manual green revenue percentage is calculated using the Corporate Knights Clean Revenue Taxonomy. The percentage is a synthesis of the following sources: Green Goods and Services (U.S. Bureau of Labor Statistics), Environmental and Clean Technology Products Economic Account (Statistics Canada), Climate Bonds Taxonomy (Climate Bonds Initiative), Sustainable Taxonomy (High-Level Expert Group in Sustainable Finance), Environmental Goods and Services Sector (Eurostat), China Green Bond Endorsed Project Catalogue, Green Bond Principles, Taskforce on Climate-related Financial Disclosure recommended metrics, other private sector rating agencies with green or sustainability taxonomies, and consultation with leading industry experts and government agencies covering all relevant Corporate Knights Industry Groups (CKIGs).

METHODOLOGY TABLE

Table 1: GICS Sector Assumptions for Methodology

AUTOS

WHAT IS BAU
(CapEx+R&D)*40%

WHAT COULD BE SDGS BY 2020
(CapEx+R&D)*40%*123.4%

BAU EXPLANATION
Based on review of major auto companies' corporate disclosures of green CapEx and R&D.

SDG EXPLANATION(1)
Assumes 23.4% boost to Zero Emission Vehicle (ZEV) investments in line with requirements to close SDG gap.

ASSET MANAGERS/ INDURANCE

WHAT IS BAU
Green AUM

WHAT COULD BE (SDGS)
Green AUM*123.4%

BAU EXPLANATION
Assumes the green investment book is mostly liquid.

SDG EXPLANATION(1)
Assumes investors to boost green AUM by 23.4% by 2020 in line with requirements to close the SDG gap.

BANKS

WHAT IS BAU
Outstanding green loan book*10% (assuming 10% of loans turn over annually)

WHAT COULD BE (SDGS)
Green loan book*10%*123.4%

BAU EXPLANATION
Assumes average green loan is 10 years, with 10% of book rolling over and replaced each year.

SDG EXPLANATION(1)
Assumes the green loan book is increased by 23.4%, in line with levels to close the SDG gap, by targeting green corporate/public loans, building energy efficiency loans and ZEVs leasing.

ENERGY

WHAT IS BAU
Clean revenue%*(CapEx+R&D)

WHAT COULD BE (SDGS)
(CapEx+R&D)*50%*123.4%

BAU EXPLANATION
Assumes that CapEx reflects current clean revenue mix.

SDG EXPLANATION(1)
Assumes half of current investments are greened and then increased by 23.4 percent to reflect the capital-intensive nature of the low carbon economic transition in line with leadership examples by Ørsted and Neste Corp.

MATERIALS CEMENT & STEEL ONLY

WHAT IS BAU
Clean revenue%*(CapEx+R&D)

WHAT COULD BE (SDGS)
(CapEx+R&D)*25%*123.4%

BAU EXPLANATION
Assumes that CapEx reflects current clean revenue mix.

SDG EXPLANATION(1)
Assumes a quarter of current investments are greened and then increased by 23.4 percent to reflect the capital-intensive nature of the low carbon economic transition.

OTHER SECTORS

WHAT IS BAU
Clean revenue%*(CapEx+R&D)

WHAT COULD BE (SDGS)
Clean revenue%*(CapEx+R&D)* 123.4%

BAU EXPLANATION
Assumes that CapEx reflects current clean revenue mix.

SDG EXPLANATION(1)
Assumes that green CapEx increases by 23.4% in line with what is required to close SDG gap.

UTILITIES

WHAT IS BAU
(CapEx+R&D)*70%

WHAT COULD BE (SDGS)
(CapEx+R&D)* 70%*123.4%

BAU EXPLANATION
Assumes 70% of new power investment is clean in line with IEA's global average.

SDG EXPLANATION(1)
Assumes 23.4% boost to clean power investments in line with requirements to close SDG gap.

(1) SDG investment levels reflect the capital-intensive nature of the SDG low carbon transition. The calculations assume that green investment grows by 23.4 percent (Global Infrastructure Outlook) to close the gap between BAU and SDG, while other investments remain constant, and that the capital-intensive nature of a SDG scenario leads to a commensurate increase in debt to close the SDG funding gap . For Energy companies, the SDG scenario assumes half of current investments are greened and then increased by 23.4 percent to reflect the capital-intensive nature of the low carbon economic transition, assuming the emissions intensive investment is scaled back in favour of a smaller basket of transition-aligned projects and increased green diversification. For Cement and Steel companies, the SDG scenario assumed 25percent or a quarter of the current investments are greened, due to the expensive nature of low carbon cement and steel, that is increased by 23.4 percent to reflect the capital-intensive nature of moving to these low carbon products.

METHODOLOGY GREEN BOND ISSUANCE

Throughout this report we have assumed that companies may finance green CapEx and R&D investments through a variety of means including the issuance of green bonds.

For 21 Sector Leaders, a low, medium or high indicator was attributed to each company based on the likelihood of future green bond issuance to raise capital for the green investments. This indicator is based on the following:

- **Low:** If the company's bond issuance in 2017 and 2018 is low and does not include green bonds, we have assumed the company is not a regular bond issuer and therefore the green bond issuance potential is low.
- **Medium:** If the company has not yet issued any green bonds but is a regular debt issuer or has issued a green bond prior to 2017.
- **High:** If the company has recent previous green bond issuances and is a regular debt issuer.

Note that the potential likelihood does not necessarily reflect the issuer's credit rating or ability to issue additional debt.

We have indicated what role bond debt *could* play in financing green investment in the following way:

- **0–25 percent:** The company's regular debt program is small (less than 25 percent) compared to the green investment projections for 2019 and 2020. We therefore suggest that debt issuance could be a small source of funding to meet green investment projections.
- **26–100 percent:** The company's regular debt program at 26 percent up to 100 percent of the size of the green investment projections for 2019 and 2020. We therefore suggest that debt issuance could be a moderate source of funding to meet green investment projections.
- **100 percent+:** The company's regular debt program is at least as large as the green investment projections for 2019 and 2020. We therefore suggest that debt issuance could be a large source of funding to meet green investment projections.

These assumptions are based on each company's historical issuances. It is worth noting that issuance changes year to year and that a company may raise a higher level of debt than historical averages in order to transition to a low carbon economy.

GLOBAL ANNUAL CORPORATE INVESTMENT

At present, the total annual green investment by about 7148 large publicly-traded corporations we assessed is estimated to be over $611 billion, which could increase to about $1.07 trillion in 2020 in a SDG aligned scenario.

In a SDG aligned scenario, we assume current levels of non-green CapEx and R&D investment stay the same through 2020, while green investment increases by 23.4 percent (Table 2). There are exceptions in the SDG aligned scenarios for the following sectors:

- **Energy:** Assumes half of current investments are greened and then increased by 23.4 percent to reflect the capital-intensive nature of the low carbon economic transition.
- **Cement and Steel:** Assumes a quarter of current investments are greened and then increased by 23.4 percent to reflect the capital-intensive nature of the low carbon economic transition.
- **Utilities:** 30 percent of the traditional investment will remain the same in a SDG scenario, while the remaining 70 percent of green investment grows by 23.4 percent to close the gap between BAU and SDG.

Table 2: GlobalAnnual Corporate Investment through to 2020 ($M of USD)

GICS SECTOR [1]	GREEN INVESTMENT (BAU)	TOTAL INVESTMENT (BAU)	ANNUAL GREEN INVESTMENT (SDG) THROUGH 2020	TOTAL ANNUAL INVESTMENT (SDG) THROUGH 2020	ANNUAL INCREMENTAL GREEN INVESTMENT THROUGH 2020	ANNUAL INCREMENTAL INVESTMENT THROUGH 2020
Communication Services	$35,977	$422,214	$44,396	$430,632	$8,419	$8,419
Consumer Discretionary excluding Auto	$7,346	$224,165	$9,065	$225,884	$1,719	$1,719
Automotive	$121,915	$304,787	$150,430	$333,286	$28,515	$28,498
Consumer Staples	$6,132	$191,419	$7,567	$192,854	$1,435	$1,435
Energy	$4,281	$489,656	$302,118	$546,946	$297,836	$57,290
Cement	$142	$13,679	$4,220	$14,479	$4,078	$800
Steel	$539	$38,622	$11,915	$40,881	$11,376	$2,259
Health care	$30,515	$257,100	$37,656	$264,241	$7,141	$7,141
Industrials	$71,551	$550,942	$88,294	$567,685	$16,743	$16,743
Information Technology	$59,209	$446,422	$73,064	$460,277.20	$13,855	$13,855
Materials excluding Cement and Steel	$23,642	$249,035	$29,175	$254,567.13	$5,532	$5,532
Real Estate	$4,183	$105,050	$5,162	$106,029	$979	$979
Utilities	$245,600	$350,858	$303,071	$408,328	$57,470	$57,470
Total	$611,033	$3,643,948	$1,066,131	$3,846,089	$553,867	$202,140
Financials	$117,032,382	$117,032,382	$310,637	$117,234,522	$58,905.15	$202,140

Source: Global Corporate Green Investment and the SDGs (CK, CBI, Corporate Annual Reports)

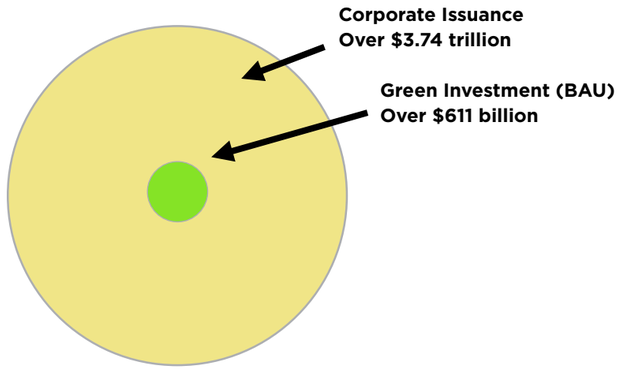
Note: Above figures for publicly traded corporations only

(1) With a few sector exceptions, Green Investment levels are determined by corporate reporting and use a company's current "green" revenue percentage as a proxy for its green investment percentage. In the case of banks (financials), the "green" revenue percentage was applied to the outstanding loan book assuming that 10 percent of the loan book turns over each year. In the case of insurance companies and asset managers, the "green" revenue percentage was applied to the assets under management. In the case of utilities and auto industry, both of which are in an accelerated transition, we assumed 40 percent of auto investments are green in line with corporate disclosures and that 70 percent of utilities investment is green in line with the latest global average calculated by the International Energy Agency. Green revenue percentages were obtained by reviewing corporate disclosures and mapping each company's FactSet Revere Business Industry Classification System (RBICS) segmented revenues to Corporate Knights Clean Revenue Taxonomy and only focusing on the environmental benefits.

GLOBAL ANNUAL CORPORATE INVESTMENT

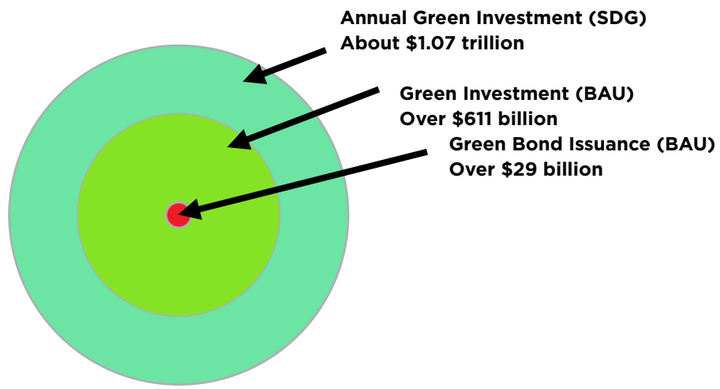
Annual corporate green investment by large publicly traded companies was valued at an estimated $611 billion in 2017, and represents 17 percent of total corporate investments. Global debt issuance was a record $6.8 trillion in 2017, and corporate borrowing represented more than 55 percent of the figure, or $3.74 trillion.[iii] Total corporate non-financial issuance exceeds total corporate green investment, which suggests the bond market could play a role in increasing global green investments, and that there is a significant opportunity for a greater share of green bonds amongst the total bond issuances.

Figure 1: 2017 Corporate Green Investment and Corporate Issuance



Corporate green bond issuance ($29 billion) represents a minor portion (5 percent) of corporate green investments ($611 billion), suggesting significant opportunities for increased corporate green bonds in both BAU and SDG alignedscenarios.

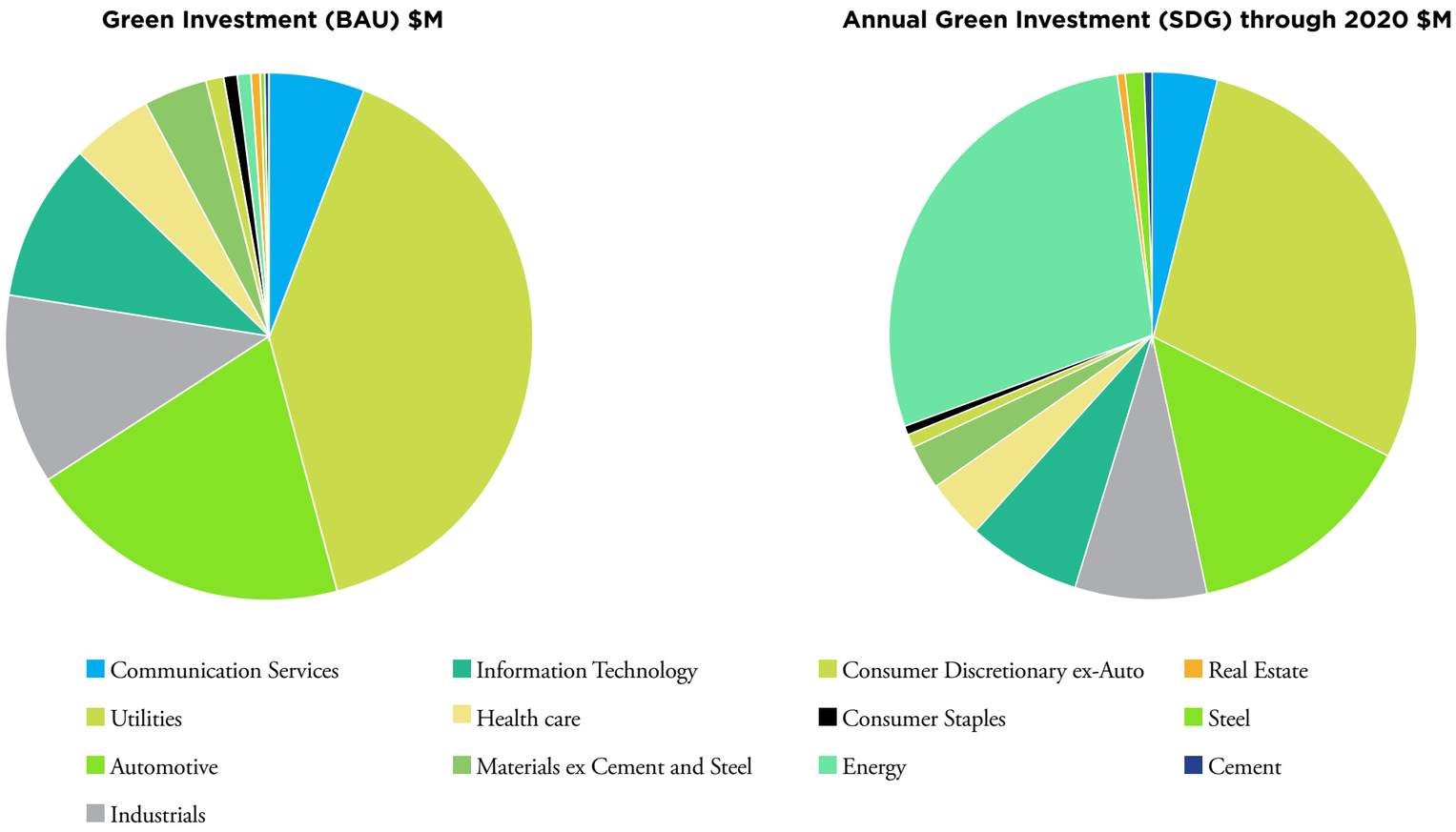
Figure 2: Green Investments and Green Bond Issuance



Utilities (40 percent) sector accounts for the majority of current corporate green investment, followed by Autos (20 percent), Industrials (12 percent) and Information Technology (10 percent) sectors. In a SDG aligned scenario, the largest corporate green investments are made by both utilities (28 percent) and energy (28 percent) companies due to their increased focus on more capital intensive low carbon fuels, materials and extraction techniques. Following Utilites and Energy is Auto (14 percent), Industrials (8 percent) and Information Technology (7 percent) sectors.

GLOBAL ANNUAL CORPORATE INVESTMENT

Figure 3: Annual Green Investment in BAU and SDG Aligned Scenarios

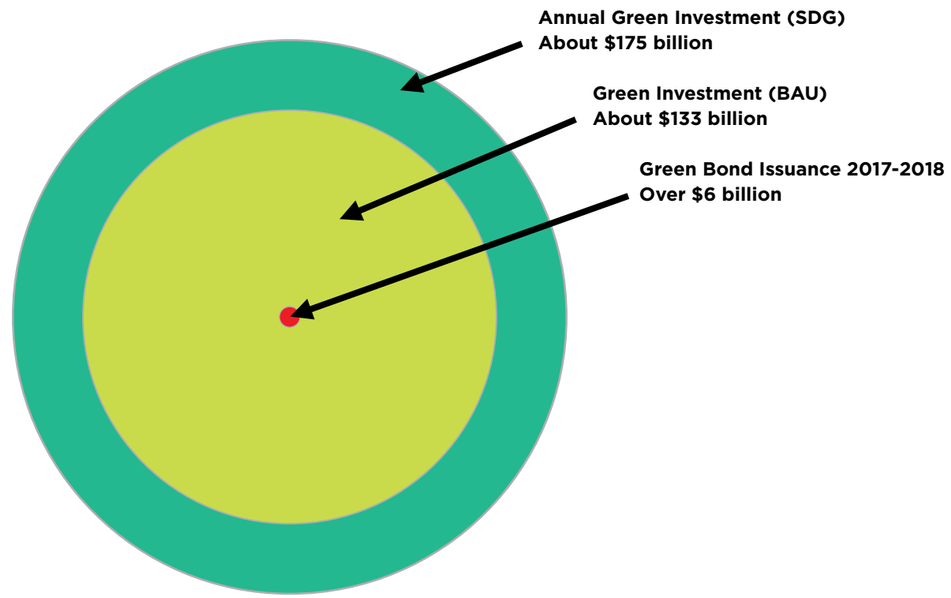


Utilities (40 percent) sector accounts for the majority of current corporate green investment, followed by Autos (20 percent), Industrials (12 percent) and Information Technology (10 percent) sectors. In a SDG aligned scenario, the largest corporate green investments are made by both utilities (28 percent) and energy (28 percent) companies due to their increased focus on more capital intensive low carbon fuels, materials and extraction techniques. Following Utilites and Energy is Auto (14 percent), Industrials (8 percent) and Information Technology (7 percent) sectors.

21 SECTOR LEADERS

Our research indicates twenty-one companies from a representative sample of sector leadars are currently making about $133 billion per year in green capital allocations combined. In a SDG aligned scenario, the annual green capital allocation rises by a third to about $176 billion. An analysis of the companies' bond offerings over the past two years shows that a portion of the incremental $43 billion difference between the business-as-usual (BAU) scenario and the SDG scenario could be covered via the issuance of green bonds.

Figure 4: Green Investments and Green Bond Issuance from 21 Sector Leaders



COMPANY PROFILES USE OF PROCEEDS

Communications

Tech giants are expected to consume 20 percent of all electricity by 2025, and a number of them are fast becoming the largest corporate purchasers of renewable energy.[iv] Facebook's global operations has committed to using 100 percent renewable energy by the end of 2020.[v] In 2017, Google reached its 100 percent renewable energy target through renewable energy purchases.[vi] Corporate Knights estimates that the carbon emissions reduction impact of Google using 100 percent renewable—it's over 5 million tonnes per year—is the equivalent of taking one million cars permanently off the road. Most recently, the telecommunications company Verizon issued a $1 billion green bond to help meet its commitment to covering half of its operational electricity use with renewable sources by 2025.[vii] The funds will go towards the production of solar and hydrogen fuel cell electricity at existing properties as well as investments in larger solar and wind farms near Verizon's larger facilities.

Assumptions:

• **BAU:** Annual green investment is calculated by multiplying the company's green revenue percentage by the CapEx and R&D spend.

• **SDG:** Annual green investment is calculated by multiplying the company's green revenue percentage by the CapEx and R&D spend. A 23.4 percent boost to clean power investments is in line with requirements to close the funding gap between BAU and SDG scenarios.

Alphabet Inc.

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD OF GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$29,510.91	Low	0-25%
SDG	$36,416.46	Low	0-25%

Alphabet Inc. is a collection of businesses that includes Google as well as Access, Calico, CapitalG, GV, Nest, Verily, Waymo, and X.[viii]

In 2017, Google became the world's biggest corporate buyer of renewable energy.[ix] The company made renewable energy investments of $788 million in 2016 and $531 million in 2017.[viii] In fiscal 2017, Google sourced 100 percent of its electricity from renewable energy sources.[iii] This makes its data centres and core offering green and gives the company a green investment potential of approximately $30 billion based on its CapEx and R&D investment. In a SDG aligned scenario, it is assumed that Alphabet will invest over $36 billion in green investments including increased clean power purchasing agreements and battery investments. These investments would mitigate the company's carbon footprint, generate up to 200 percent more clean energy than it can use, and make Alphabet net negative.[ix]

Given its strong cash position, Alphabet does not need to issue debt. The company has not issued any bonds in the past two years so its BAU green bond issuance potential is low. While Alphabet does not need to issue debt to raise money for investments, in a SDG aligned scenario it can be assumed that if Alphabet chose to issue green bonds, it could start by using the funds to cover the BAU aligned green investment and increase its clean power purchasing agreements and battery investments.[ix]

AUTOS

The car industry is changing. Sales of plug-in cars rose by 42 percent from 2016 to 2017 and grew eight times faster than the regular economy.[x]

In addition, the new European Union (EU) rules indicate that zero-emission vehicles will need to comprise 40 percent of all European sales by 2030.[xi]

Leaders like Volkswagen Group (VW) have made ambitious pledges.

For example, the last VW combustion engine car will be developed in 2026, and there will be an electric version of each of its 300 group models by 2030.[xii,xiii]

In the span of a year and half, VW pledged to increase its investments on electric and autonomous vehicles three times from €20 billion by 2030 to €34 billion by the end of 2020 to €44 billion by the end of 2023.[xiv]

This represents more than 50 percent of all investments made by VW over the same period. Reuters analyzed 29 global automakers and found they are investing at least $300 billion together on electric vehicles.[xv] For the purposes of this paper, we use the EU's rule of 40 percent as a leading proxy and assume that the automotive industry's green investments currently represent 40 percent of total investments.

Assumptions:

• **BAU:** Based on industry reports and the EU's Zero Emission Vehicles 40 percent quota, we extrapolate that 40 percent of total CapEx and R&D spend each year goes towards zero emission vehicles.

• **SDG:** BAU green investment levels of 40 percent are boosted by 23.4 percent in line with the requirements to close the SDG gap.

Tesla Inc

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD OF GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$4,792.89	High	26-100%
SDG	$5,914.42	High	26-100%

Tesla Inc., formerly Tesla Motors Inc., is a pure play automotive and energy company that manufactures electric cars and solar panels through its subsidiary SolarCity Corporation. Tesla and Panasonic are partners in Gigafactory 1 and 2. The former manufactures electric vehicle battery cells and the latter produces photovoltaic modules.[xvi]

In the 2017 fiscal, Tesla had a CapEx ($3.415 billion) and R&D ($1.378 billion) spend of almost $4.8 billion. Assuming the CapEx and R&D hold steady for 2019 and 2020, Tesla's projected annual green investment potential for 2019 and 2020 is approximately $4.8 billion and over $5 billion if one includes operating leases. The proceeds of any green bonds issued by Tesla could go to projects in Gigafactory 1 and 2 to further the Model 3 battery packs or to drive trains and energy storage products and solar panels. (Tesla currently produces the world's leading lithium-ion batteries.) In a SDG scenario, there would be an estimated $6 billion in green investment and approximately $6.2 billion including operating leases.

Tesla is a regular issuer of debt with over $2.7 billion in 2017. 100 percent of its products support the low carbon economy. Given this, its debt can be seen as green and in fact most green bond databases including Climate Bonds Initiative and Bloomberg count Tesla and SolarCity bonds as green.

The potential for future green issuance is therefore high and could cover 26–100 percent of the green investment in both BAU and SDG scenarios.

Bayerische Motoren Werke (BMW) AG

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD OF GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$5,437.77	Medium	26-100%
SDG	$6,710.21	Medium	26-100%

BMW, the luxury automotive and motorcycle company, has committed to boosting electric vehicle sales with a sales target of 500,000 electrified vehicles by the end of 2019.[xvii] By the end of fiscal 2017, 103,080 electrified vehicles were sold (2,463,500 is the number of total vehicle sales in fiscal 2017).[xviii]

By contrast, approximately 2.4 million BMW vehicles were sold worldwide in 2017.[xv] In 2017, the company's R&D expenses of €4,920 million (almost $5.6 billion) included vehicle electrification and development work on autonomous driving.

AUTOS [CONT]

In 2017, BMW invested over $13.6 billion (CapEx over $8.03 billion, R&D about $5.6 billion) in vehicle electrification and development work on autonomous driving.[5,xiv] We project an average annual green investment of approximately $5.4 billion in 2019 and 2020, which rises to about $5.5 billion including electric car leases. In a SDG aligned scenario we estimate over $6.7 billion of green investment and approximately $6.8 billion including electric car leases.

BMW is a regular issuer of debt with over $11 billion in 2017 and approximately $19 billion in 2018. The company has issued green bonds in the past but has not issued a green bond within the past two years, so the likelihood of a future green bond issuance is medium, with potential funding of 26–100 percent of the green investment in a BAU and a SDG scenario.

Toyota

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$8,503.73	High	100%+
SDG	$10,493.60	High	100%+

In December 2017, the Japanese automotive manufacturer Toyota committed to selling more than 5.5 million electrified vehicles per year by 2030.[viii] In addition, the company committed to a target of at least 50 percent of vehicle sales being electric by 2030.[xix] Toyota earned approximately $21.3 billion (CapEx over $11.6 billion, R&D over $9.6 billion) in investments in 2017, and over JPY $5.9 quadrillion (almost $53 billion) in operating leases and sold 1,520,600 Hybrid, plug-in hybrid and fuel cell vehicles (out of the total 8,964,394 vehicles sold in fiscal 2017).[xx] We project average annual green investments of $8.5 billion in 2019 and 2020, and over $12 billion when including electric vehicle and hybrid operating leases. In a SDG aligned scenario, we estimate about $10.5 billion of green investment and up to approximately $15 billion when including electric vehicle and hybrid operating leases.

Toyota issues green bonds regularly through the Toyota Motor Credit Corporation, its financing arm, and it introduced the auto industry's first ABS deal in 2014. Since then it has issued over $5.3 billion in green ABS and the likelihood of future green bond issuance is high.

Toyota's global corporate bond issuances are large compared to its green investment projections, so the likely proportion of green investments covered by green bonds is 100 percent+ for both BAU and SDG scenarios.

[5]The R&D expense of €4,920 million or almost $5.6 billion is only for vehicle electrification and development work on autonomous driving. This figure was taken from BMW's 2017 Annual Report (p74) and not from Bloomberg. $6.9 billion is the total R&D expense from Bloomberg.

ENERGY

Switching to renewables remains challenging for most energy companies, particular in the oil and gas sector. A 2018 Goldman and Sachs Report, *Re-imagining Big Oils,* predicted that oil companies would need to invest at least nine percent of CapEx in 2019 to maximize profitability during the low carbon transition.[xxi] However, oil and gas leaders such as Ørsted A/S (formerly DONG Energy) and Neste Oyj, with green revenue percentages of 58 percent and 25 percent respectively, have demonstrated that rapid diversification and profitability are not mutually exclusive. Ørsted, a global leader in offshore wind, recently announced its commitment for 99 percent of its energy generation to be green by 2025.[xxii]

Assumptions:

• **BAU:** Annual green investment is calculated by adding the CapEx and R&D then multiplying by the individual company's green revenue percentage.

• **SDG:** We assumed that 50 percent of total CapEx and R&D investment will be directed toward green to close the gap between the leaders in the Oil & Gas sector and the average Big Oil company. This would entail decreasing traditional emissions-intensive oil and gas projects while increasing transition aligned projects and green diversification.

Suncor Energy

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$48.60	Medium	100%+
SDG	$3,331.97	Medium	0-25%

In 2017, Suncor Energy made over $5.4 billion in investments (over $5 billion in CapEx, $350 million in R&D), with about one-percent of green revenue based on ethanol production at the St. Clair Ethanol Plant as well as wind production in Ontario and Western Canada.[xxiii]

Assuming the green revenue percent does not change, we project the average annual green investment to be $48.6 million in 2019 and 2020. In a SDG aligned scenario we estimate that half of BAU total investments are greened and then increased by 23.4 percent so that green investment rises to over $3.3 billion.

Suncor issues debt sporadically ($750 million in 2017, none in 2018) and has not issued a green bond in the last two years. The likelihood of green bond issuance in the next two years is medium. If Suncor chose to issue a green bond at this moment, its issuance could likely exceed the total amount of green investment. In a SDG scenario, however, the issuance could only cover 0–25 percent of the green investment.

ENERGY (CONT)

Total SA (Total)

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$118.90	Medium	100%+
SDG	$9,056.94	Medium	0-25%

Total is an integrated oil and gas company and has committed nearly 20 percent of its portfolio to the low carbon business by 2035.[xxiv] By Total's definition, this encompasses downstream gas, renewable energies, energy storage, energy efficiency, clean fuels and carbon capture.[xxiv] Much of this would not qualify as green under the Climate Bonds Taxonomy or Corporate Knights Clean Revenue Taxonomy. Through its affiliates, Total Solar, SunPower, Total Eren and Quadran, Total is producing solar and hydroelectricity.[xx] In 2017, Total acquired Saft Groupe S.A, a world leader in advanced-technology batteries for signalling and backup battery systems for metros and railways.[xxv]

Total made approximately $14.7 billion (CapEx approximately 13.8 billion, R&D $912 million) in investments in 2017. About one percent of its revenue was determined to be green as per the Corporate Knights Clean Revenue Taxonomy. Assuming the green revenue percentage does not change, we project the average annual green investment to be approximately $119 million in 2019 and 2020. In a SDG aligned scenario, we estimate half of BAU total investments are greened and then increased by 23.4 percent so that green investment rises to over $9 billion.

Total is a regular issuer of debt (over $2 billion in 2017 and approximately $2.8 billion in 2018), but they have not issued a green bond. The likelihood of green bond issuance in the next two years is medium. However, if Total chose to issue a green bond in the next two years, its issuance could likely exceed the total amount of green investment. However, in a SDG-scenario the issuance could cover 26–100 percent of the green investment.

BANKS

Through short-term financing as well as specialized long-term solutions, banks play an important role in the shift to a sustainable economy. Many economies are financed through bank credits. In the European Union, for example, the banking share in the total debt of non-financial corporations in the fall of 2017 was 82 percent.[xxvi] To reduce the cost of capital and increase their availability for green projects, banks could securitize their green-related loans and sell them off as green bonds.

Assumptions:

• **BAU:** Green investment was calculated based on the current green loan book, assuming the average green loan is 10 years, or has a loan term of 10 years, and that 10 percent of the loan book rolls over and is replaced each year.

• **SDG:** The green loan book will grow by 23.4 percent by targeting green corporate and public loans, and by building energy efficient loans and electric vehicles in line with levels to close the SDG gap.

Banco do Brasil

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR FUTURE GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$4,492.18	Medium	0-25%
SDG	$5,543.36	Medium	0-25%

Banco do Brasil, Brazil's government-controlled bank, was the first financial institution to operate in the country and has 60 percent of the market share in agribusinesses.[xxvii] Banco do Brasil's total loan book is over $187 billion, and 24 percent[6] is from green loans. An outstanding green portfolio of approximately $54 billion includes loans for renewable energy, energy efficiency, sustainable building, sustainable transportation, sustainable tourism, water, fishing, forest, sustainable agriculture and waste management.[xxvii] Some examples include the Sustainable Family Farming (PRONAF) program and the Low-Carbon Agriculture (ABC) program.[xxvii]

In a BAU aligned scenario, we estimate the bank will make almost $4.5 billion green loans per annum. In a SDG aligned scenario, annual green loan volumes grow to over $5.5 billion.

Banco do Brasil is a regular issuer of debt (over $1 billion in 2017 and over $750 million in 2018). The likelihood of green bond issuance is medium. Given the size of the current debt program this will likely cover less than 25 percent of future green investment.

Bank of America

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$948.18	High	100%+
SDG	$1,170.05	High	100%+

Bank of America is a global leader in wealth management, corporate and investment banking and trading and it operates across the United States and in over 35 countries.[xxviii] Its total loan book is over $948 billion with an estimated one percent from green loans to finance clean energy, energy efficiency, water conservation, sustainable transportation, and other environmentally supportive activities.[xxix]

Bank of America has $9 billion of green loans outstanding. Assuming the green loan book does not change, we estimate the bank will make almost $950 million in green loans annually, and in a SDG aligned scenario, annual green loan volumes will grow to almost $1.2 billion.

In 2013, Bank of America became one of the first ever issuers of a corporate green bond with a $500 million deal. Since then, it has issued four green bonds amounting to over $3.2 billion. Bank of America is a regular issuer of

[6]Does not include social related and/or housing loans.

BANKS [CONT]

debt including approximately $38 billion in 2017 and over $46 billion in 2018. The likelihood of green bond issuance is high and the issuance of a green bond in either a BAU or a SDG scenario could fully fund the bank's green investments.

BNP Paribas

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD OF FUTURE GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$9,555.07	High	100%+
SDG	$11,790.95	High	100%+

With four domestic retail banking markets in Europe and operations in 73 countries, BNP is Europe's leading provider of banking and financial services.[xxx] By the end of fiscal 2017, the BNP total renewable energy financing portfolio amounted to €12.3 billion and it has committed to €15 billion in renewable energy financing by 2020.[xxx]

BNP Paribas's total loan book is about $947 billion, 10 percent[7] of this comes from green loans including renewable energy and mass transit financing such as BNP's subsidiary in Senegal, BICIS. The financing for BICIS includes work on the regional express railway (TER) line linking Dakar with its new international airport, and the financing of Kenya's Arror and Kimwaterdams.[xxx]

Assuming the green loan book does not change, we project BNP will make $9.6 billion in green loans annually over the next two years. In a SDG aligned scenario, annual green loan volumes could grow to almost 12 billion, all of which could be fully funded by green bonds.

BNP Paribas is a regular issuer of debt (in 2017 and 2018, BNP Paribas' total debt issued was about $20 billion and $50 billion respectively) and as a regular green bond issuer has issued over $1 billion in green bonds since 2016. The likelihood of future green bond issuance is therefore high, and the issuance of green bonds in either a BAU or a SDG scenario could fully fund the bank's green investments.

[7]Does not include social related and/or housing loans.

INSURANCE

Some asset owners have made bold commitments to increase their green AUM. The Dutch pension fund PGGM has committed to quadrupling its green investment to €20 billion by 2020, AXA has a target to triple its green investments to $14.7 billion by 2020 and La Caisse de dépôt et placement du Québec (CDPQ) is committed to boosting its green investments by 50 percent from CAD $16 billion to CAD $24 billion by 2020.[xxxi,xxxii]

Assumptions:

• **BAU:** Green investment is calculated using the green revenue percentage multiplied by the current AUM.

• **SDG**: Green investments will increase by 23.4 percent by 2020 in line with requirements to close the SDG gap.

Sun Life Financial (Sun Life)

	GREEN INVESTMENTS BY 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$43,342.80	Low	0-25%
SDG	$53,485.01	Low	0-25%

Sun Life Financial is a Canadian Financial Institution that has been investing in clean and renewable energy for more than 30 years.[xxxiii]

As of the 2017 fiscal year, Sun Life has $5 billion CAD invested in clean and renewable energy projects (total renewable energy investment portfolio), and more than $2 billion invested in environmentally-friendly and sustainable transportation projects, including a 2017 investment to finance new passenger rail upgrades in the United Kingdom.[xxxiii]

In a SDG aligned scenario, green investments would increase to over $53 billion.

Sun Life does issue bonds but its issuancewas less than $300 million over the last two years. This is low given the company's size and its green AUM. Sun Life has issued green bonds in the past but has not issued a green bond for the past two years, the likelihood of a green bond issuance is therefore low. If Sun Life were to issue a green bond, it could fund less than 25 percent of the green investment in both BAU and SDG scenarios.

FINANCIAL ASSET MANAGERS

It is assumed that asset managers with third party AUM will have additional constraints. In the SDG aligned scenario, asset allocation decisions for third party management will still able to boost green AUM by 23.4 percent by 2020 in line with requirements to close the SDG gap. This would take place through a combination of increased treasury or general account investments and default offerings.

Assumptions:

- **BAU**: Green investment is calculated by multiplying the green revenue percentage by the current AUM.
- **SDG:** Green investments increase by 23.4 percent in line with requirements to close the SDG gap.

Amundi Asset Management (Amundi)

	GREEN INVESTMENT BY 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$12,686.10	Low	0-25%
SDG	$15,654.64	Low	0-25%

Amundi is a subsidiary of Credit Agricole and was set up to house its asset management operations.[xxxiv]

Amundi's total AUM is over $1.7 trillion, and about $12.7 billion (€10.6 billion)[8] in assets support energy transition and green growth.[xxxv] These assets include thematic funds for renewable energy and Green Bonds such as the Amundi Green Bonds which invests in the green bond market and in debt securities of green technology companies.[xxxv] In a SDG aligned scenario, Amundi makes about $15.7 billion in green investments. Amundi's green AUM is a proxy for its ability to deploy green investments. There is no reason why Amundi couldn't issue green debt to maintain its green investments on a level with the BAU or SDG scenario. While direct comparisons cannot be made between asset managers and owners, this is what the Canada Pension Plan Investment Board (CPPIB) did in June 2018 when it issued a $3 billion CAD bond with proceeds going to investments in renewable energy, sustainable water, wastewater management and Green Buildings (LEED Platinum certified).[xxxvi]

Amundi is a debt issuer however its issuance volumes are low ($290 million in 2018) compared to the projected green investment volumes for 2019 and 2020. Amundi has issued green bonds in the past but have not issued any green bonds in the past two years, the likelihood of green bond issuance is therefore low. If Amundi were to issue a green bond, it could fund 0–25 percent of the green investment in both BAU and SDG scenarios.

[8]Does not include AUM supporting social related and/or housing programs.

INDUSTRIALS AND OTHER GICS SECTORS

Industrials, manufacturers and many other GICS Sectors play a large role in the green economy as these front-line products will drive the change towards a more sustainable future.

Assumptions:

- **BAU:** A company's current annual green revenue percentage multiplied by its current CapEx and R&D levels, assuming the CapEx and R&D reflects the current green revenue mix.
- **SDG:** The green CapEx and R&D increase by 23.4 percent in line with requirements to close the SDG gap.

Bombardier

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$838.94	Medium	100%+
SDG	$1,035.25	Medium	26-100%

Bombardier is a leading manufacturer of planes and trains. The company made over $1.6 billion in investments in 2017 while earning 51.5 percent of its revenue from transportation including commuter, regional and intercitytrains, electric and diesellocomotives and mass transit signalling and systems.[xxxvii] Assuming the investment and the transportation revenue percentage holds steady over the next two years, we project average annual green investments of approximately $834 million in 2019 and 2020. In a SDG aligned scenario, we estimate over $1 billion in annual green investment.

Bombardier issued almost $1 billion in bonds in 2017 and has issued green bonds in the past but not within the past two years. So the likelihood of future green bond issuance is medium. If Bombardier were to issue a green bond, it could fund over 100 percent of the green investment in a BAU and SDG scenario.

Siemens AG

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$3,949.41	Medium	100%+
SDG	$4,873.57	Medium	100%+

Siemens AG is a German technology company with a core business in electrification, automation and digitization.[xxxviii]

Siemens made $8.4 billion (CapEx appropriately $2.7 billion, R&D over $5.7 billion) in investments in 2017 and 47 percent of its revenue came from the following green sources: Siemens Energy Management Division (smart grids, electrical storage and monitoring fluctuating renewable energy sources), Siemens Building Technologies Division (automated energy management technology) and the Siemens' strategicunit, Siemens Gamesa Renewable Energy (SGRE), which includes onshore and offshore wind power.[xxxviii] Assuming its investment and green revenue percentage remains constant, we project an average annual green investment of over $3.9 billion in 2019 and 2020. In a SDG aligned scenario, we project $4.9 billion in annual green investment.

Siemens is a regular issuer of debt and issued $7.5 billion in 2017 and over $3.1 billion in 2018, but no green bond issuance for the past two years, so the likelihood of future green bond issuance is medium. If Siemens were to issue a green bond, it could fund the full green investment in both BAU and SDG scenarios.

ABB Group (ABB)

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$1,293.53	Medium	26-100%
SDG	$1,596.21	Medium	26-100%

ABB is a leader in electrification products, robotics and motion, industrial automation and power grids. They serve global customers in the utilities, industry and transport and infrastructure sectors.[xxxix]

INDUSTRIALS AND OTHER GICS SECTORS (CONT)

ABB earned over $2.3 billion in investments in 2017. 55.9 percent of this revenue came from green sources including energy efficient, renewable energy, and resource efficient products, services and solutions such as micro-grids, SMART sensor systems, and fast charging equipment for electric cars and buses.

Assuming its investment and eco-efficient portfolio remains steady, we project average annual social investments of over $1.29 billion in 2019 and 2020. In a SDG aligned scenario, we project approximately $1.6 billion in green investment.

ABB is a regular issuer of debt and issued approximately $852 million in 2017, and $1.5 billion in 2018, but no green bond issuance for the past two years, so the likelihood of future green bond issuance is medium. If ABB were to issue a green bond, it could fund 26–100 percent of the green investment in both BAU and SDG scenarios.

Unilever

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$762.02	Medium	100%+
SDG	$940.33	Medium	100%+

Unilever is a global consumer goods company whose Sustainable Living Plan outlined its goal to use 100 percent sustainably sourced agricultural raw materials by 2020.[x1,x1i]

Unilever earned $2.7 billion (CapEx $1.704 billion, R&D $1.016 billion) in investments in 2017 while earning 28 percent of its revenues from 26 brands.[x1ii] These brands include Vaseline, Sunlight, Sunsilk, Dove, Lipton, Hellmann's and Knorr.[xlii] The brands' sustainable sourcing features have had a positive impact on agriculture and land use, both of which contribute significantly to global emissions.[x1iii]

We project Unilever's average annual green investments to be $762 million in 2019 and 2020. In a SDG aligned scenario, we estimate that approximately $940 million in green investments could be serviceable via green bond markets.

Unilever was an early green bond issuer with its 2014 £250 million ($415 million) Sustainability Bond. While the company has not issued a green bond since then, they are a regular issuer of debt, so there is a medium likelihood they would and that it could fully cover green investment projections in either a BAU or a SDG scenario.

HP Inc.

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$708.44	Low	0-25%
SDG	$874.21	Low	0-25%

HP is one of the leading global providers of personal computing, imaging and printing products and other related technologies, solutions and services.[xliv] In 2017, HP committed to reducing the GHG emission intensity of its product portfolio by 25 percent by 2020.[xlv]

HP made about $1.6 billion in CapEx and R&D investments in 2017, while earning 44.5 percent of its revenue from green products such as EPEAT, EnergyStar, products with closed loop systems, and product-as-a-service revenue. EPEAT and EnergyStar Products make up 90 percent of the HP's Personal Systems and 53 percent of Printers (EPEAT Gold or Silver respective). 82 percent and 93 percent of Personal Systems and Printers respectively are Energy Star 6.1 or 7.01 certified.[xlii]

INDUSTRIALS AND OTHER GICS SECTORS (CONT)

Assuming the investment and percentage of green products and services remains constant, we project HP's average annual green investments to be over $708 million in 2019 and 2020. In a SDG aligned scenario, we project over $874 million in green investment. As HP is not a regular issuer of debt, the likelihood is low that it would issue green bonds in the future. If HP did issue a green bond approximately 0–25 percent could fund the green investments for both BAU and SDG scenarios.

Teck Resources

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$39.92	Low	0-25%
SDG	$49.27	Low	0-25%

Teck Resources is a diversified mining company focused on mining steelmaking coal, copper, zinc and energy.[xlvi] Teck made over $1.8 billion in in CapEx and R&D investments in 2017.[xlvi] Over one percent of its total revenues count as green. This figure is based on the low carbon economy end use research developed in *The Growing Role of Minerals and Metals for a Low Carbon Future*, a 2017 World Bank Report.[xlvii] As more information becomes available about the broad low carbon economy applications of certain minerals and metals in transport and green buildings, these low carbon economy end-use thresholds will increase significantly. For example, a copper or zinc mine that is operating to credible third-party standards may qualify as 100 percent green investment in the near future

For the time being, assuming the investments and the percentages of minerals mined do not change, we project Teck's annual average green investments at approximately $40 million in 2019 and 2020, with approximately two percent of the portion of the minerals mined going to low carbon end uses. In a SDG aligned scenario, we project over $49 million in green investment. However, since Teck is not a regular issuer of debt, the likelihood is low that it would issue green bonds in the future. If Teck did issue a green bond approximately 0–25 percent could fund the green investments for both BAU and SDG scenarios.

UPM- Kymmene (UPM)

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$348.58	Low	0-25%
SDG	$430.14	Low	0-25%

UPM is a forest-based bioindustry company that makes recycled products from renewable and biodegradable raw materials.[xlviii] UPM made over $410 million in CapEx and R&D investments in 2017 while earning 85 percent of its revenues from FSC certified products (newsprint, paper and plywood) and biofuels.[xlviii]

Assuming the investment and percent of clean products remains steady, we estimate average annual green investments of approximately $349 million in 2019 and 2020. In a SDG aligned scenario, we estimate that there could be over $430 million in green investment. However, as UPM is not a regular issuer of debt, the likelihood is low that it would issue any future green bonds. If UPM did issue a green bond, approximately 0–25 percent could fund the green investments in both BAU and SDG scenarios.

City Developments Limited (CDL)

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$100.54	High	26-100%
SDG	$124.07	High	26-100%

CDL is a leading global real estate operating company with 100 locations in 28 countries.[xlix] CDL made over $111 million in CapEx investments in 2017, and earned 90 percent of its revenue from its Green Mark Gold certified properties.[xxxvi] In 2018, CDL was awarded the GRESB Sector Leader for Office buildings in Asia.[1]

INDUSTRIALS AND OTHER GICS SECTORS (CONT)

Assuming its investments and green revenue percentage remains steady, we project average annual green investments of over $100 million in 2019 and 2020. In a SDG aligned scenario, we estimate over $124 million in green investment.

CDL issued a SGD $100 million ($71 million) green bond in 2017 which was certified by the Climate Bonds Initiative. This is the only bond CDL has issued in the past two years. As CDL previously issued a green bond, the likelihood is high that it would issue future green bonds and that it could fund 26–100 percent of the green investments in both BAU and SDG scenarios.

UTILITIES

Global demand for renewable energy has increased. This has been driven in part by cost considerations; in many markets, renewables are cheaper than fossil fuel power. According to the International Energy Agency's (IEA) most recent figures, in 2016 and 2017 renewable energy accounted for more than half of the new power generation capacity added worldwide and made up over 70 percent of power investments.[li] Global renewable power generation capacity increased four times since the start of this century and will continue to increase.[li]

Assumptions:

• **BAU:** 70 percent of annual new power investment is clean in line with IEA. The share of clean power sources (renewables and nuclear) in new generation investment was over 70 percent in 2017, up from less than 50 percent a decade ago.[li]

• **SDG:** 23.4 percent boost to clean power investments in line with requirements to close SDG gap.

Acciona

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$618.23	High	0-25%
SDG	$762.89	High	0-25%

Acciona is a conglomerate group dedicated to the development and management of infrastructure and renewable energy.[xlix] Its major business lines include renewable energy, sustainable infrastructure, water and services as well as other businesses such as logistics and transportation services, financial services and wineries.[lii]

Acciona earned over $883 million in CapEx and R&D investments in 2017.[liii] 34 percent of its revenue came from renewable energies, water and other environmental activities such as the management, prevention, reduction or correction of the environmental impacts generated by a company's activities, the generation of renewable energies and the integrated management of the water cycle.[liii]

Assuming the investment as well as the percent of clean services remains steady, we project Acciona's average annual green investments at $618 million in 2019 and 2020. In a SDG aligned scenario, we estimate the possibility of approximately $762 million in green investment.

Acciona is already a green bond issuer and has issued three green bonds since 2016 with a total issuance of $266 million. Although it did not issue any debt in 2017 and 2018, it has a high likelihood of issuing a green bond in future. Green bond issuance could fund between 0–25 percent of the green investments in both BAU and SDG scenarios.

Iberdrola

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR GREEN BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$4,620.76	High	26-100%
SDG	$5,702.01	High	26-100%

Iberdrola is a leading electricity company and among the largest utilities in the world.[liv]

Iberdrola made over $6.6 billion in CapEx and R&D investments in 2017 while earning 48 percent of its revenue from clean renewable energy generation and transmission from wind, hydroelectric, mini-hydro, solar and cogeneration.[liv] Assuming the investment and percentage of renewable

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generation and transmission does not change, we project average annual green investments of over $4.6 billion in 2019 and 2020. In a SDG aligned scenario, we estimate the possibility of approximately $5.7 billion in green investment.

Iberdrola is a regular issuer of green bonds and since 2014 it has issued over $9 billion in green bonds. Based on the average of the past two years of bond issuance, approximately $3 billion of its green investment could be funded via bond issuances. Iberdrola is already well on track for this with 100 percent of bond issuance labelled green in 2018, making it a likely candidate for issuing a future green bond. Green bond issues could fund between 26–100 percent of Iberdrola's green investments in both BAU and SDG scenarios.

Table 3: Annual Corporate Investment from 21 Sector Leaders ($M of USD)

COMPANY NAME	GREEN INVESTMENT (BAU)	TOTAL INVESTMENT (BAU)	ANNUAL GREEN INVESTMENT (SDG) THROUGH 2020
Alphabet Inc.	$29,511	$4,793	$36,416
Tesla Inc.	$4,793	$13,594	$5,914
BayerischeMotoren Werke AG	$5,438	$21,259	$6,710
Toyota	$8,504	$5,400	$10,494
Suncor Energy	$49	$14,679	$3,332
Total SA	$119	$376	$9,057
Banco do Brasil	$4,492	$448,642	$5,543
Bank of America	$948	$2,028,926	$1,170
BNP Paribas	$9,555	$2,210,496	$11,791
Sun Life Financial	$43,343	$778,147	$53,485
Amundi Asset Management	$12,686	$1,714,337	$15,655
Bombardier	$839	$8,403	$1,035
Siemens AG	$3,949	$2,314	$4,874
ABB Group	$1,294	$2,721	$1,596
Unilever	$762	$1,592	$940
HP Inc.	$708	$1,815	$874
Teck Resources	$40	$410	$49
UPM-Kymmene	$349	$112	$430
City Developments Limited	$101	$883	$124
Acciona	$618	$6,601	$763
Iberdrola	$4,621	$7,759	$5,702
Total	$132,717	$7,273,260	$175,956

Source: Bloomberg

CONCLUSION

From power generation to electric cars to energy efficiency, the green economy is now growing faster than the regular economy. Unilever's sustainable brands, for example, are growing 46 percent faster than the rest of its business.[xlii]

However, to help companies achieve the United Nations Sustainable Development Goals and prevent catastrophic climate change, more investment is needed. Large corporations as well as the financial sector have the collective power to allocate trillions of dollars of capital already in the system to the urgent task of saving the planet. Green bonds can be a critical tool with which to achieve these goals.

Box 1 — Transition Bonds

The majority of global emissions come from electricity generation and the production of commodities by carbon-intensive industries.[lv] The goal of the Paris Agreement is to hold the increase in global average temperatures to well below two degrees Celsius above pre-industrial levels, and it requires global greenhouse gas (GHG) emissions to reach net-zero by 2055–2080. An emerging portfolio of new technologies and near-commercial technologies makes it possible for carbon intensive industries to transition to the low carbon economy.

Corporate Knights and the Council for Clean Capitalism developed the Clean Financing for Heavy Industry Taxonomy in consultation with Alberta Innovates.[lvi] The taxonomy outlines advanced material harvesting from bitumen feedstock such as asphalt, carbon fibres and other advanced carbon materials such as graphene, carbon foam and nanotubes, as well as cleaner oil extraction with at least a 50 percent reduction in emissions against the applicable regional benchmark on a well-to-refinery basis. In North America, the benchmark average is 10.3 g CO2/MJ.[lvii] For green investments to be meaningful in a SDG aligned scenario, we assume up to half of the CapEx and R&D spend could be allotted to green products, with half or more of these investments going toward green diversification or transitionary products.

Switching to renewables remains challenging for most energy companies, particularly those in the oil and gas sector. The use of transition bonds for transition projects could assist this sector in bringing greater focus to the monumental task of diversifying beyond fossil fuels.

Beyond the fossil fuel industry, there is ample opportunity to radically decarbonize some of the largest sources of greenhouse gas emissions using innovative and often capital-intensive processes. Some of the most carbon-intensive commodities such as steel and cement (which collectively make up almost a tenth of global GHGs) can be produced in cleaner ways and using more carbon efficient processes. However, both low carbon steel and cement at present are too expensive to implement.[lviii,lix] In order to attract green-minded investors, carbon intensive commodity companies need to lay out a sound strategy, governance, metrics and targets to demonstrate that they are able to succeed in the low carbon economy. The Taskforce on Climate-related Financial Disclosure offers a strong framework with which to do so.

Box 2 — Social Bonds — Glaxosmithkline (GSK) Example

	GREEN INVESTMENT P.A. TO 2020 IN $MILLIONS	LIKELIHOOD FOR SOCIAL BOND ISSUANCE	POTENTIAL PERCENT OF DEBT IN MEETING GREEN INVESTMENT PROJECTION
BAU	$4,655.17	Medium	26%-100%
SDG	$5,744.48	Medium	26%-100%

GSK made over $7.8 billion in CapEx and R&Dinvestments in 2017.[lx] 60 percent of its products have equitable pricing strategies targeting priority countries.[lxi] Assuming that its investments and equitably-priced product mix remain steady, we project average annual social investments to be approximately $4.7 billion in 2019 and 2020. In a SDG aligned scenario, we estimate GSK could invest over $5.7 billion in social investments. GSK is a regular issuer of debt (over $2.7 billion in 2017 and over $2.8 billion in 2018), making for a medium likelihood of future social bond issuances where the issuance could fund 26–100 percent of the social investments.

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