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Financing Mechanisms to Support Sustainable Business Practices

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This paper is a survey of financing mechanisms supporting sustainable practices, examining current practice and promising ideas under development. It divides the financing spectrum into the standard categories of equity and debt, plus policy-based practices and public/private partnerships (a/k/a blended finance). Each section includes a brief description of financing categories and practices; examples of each, i.e., what they are being used to accomplish and by whom; and provides estimates of the current scale of the markets, where available.

Introduction & Summary of Findings

Direct investment to support sustainable practices is conducted at scale across the spectrum of debt and equity financing instruments. It is growing rapidly and has moved very much into the mainstream of finance, leaving its niche status behind.

Global debt and equity financing for clean energy and a green transition, for instance, totaled just over half a trillion US$ in 2020, up over 50% in the past five years.[1] An overlapping, but broader category of investment -- debt issuance and lending meeting environmental, social and governance (ESG) criteria, shows even steeper growth trajectory, growing five-fold from 2016 to $783 billion in 2020. [2]

This growth is expected to continue. For instance, the International Energy Agency (IEA), an OECD affiliate, projects annual non-fossil fuel investment to grow to $1.4 trillion in the coming decade and comprise roughly two-thirds of energy investment in the 2030s.[3]

Another measure, the value of assets under management (AUM) in companies identified as meeting some measure of sustainability, grew to $17.1 trillion in the United States in 2020, fully 1/3rd of AUM in the US, as compared to 1/5th of AUM in 2016.[4] This is an indirect measure, as it reflects the market value of companies rather than new investment into the companies or into any particular sustainable activity. Although an indirect measure of sustainable activity, it is certainly a direct marker of strong and growing investor interest. And investor interest is increasingly playing out as a driver of change, as shareholders are more frequently using their positions as owners to press corporate management to adopt more sustainable practices.

In addition to substantial growth, there are other themes that apply widely across the sustainable financing spectrum:

- Although sustainable investment is logically measured by dollars invested, levels of investment do not necessarily equate to direct sustainability impact. This can be for several different reasons. Most broadly, financing can go directly into creating assets supporting sustainable goals, such as a wind farm or new affordable housing units, or it can simply represent a change of ownership, such as most stock market activity, or a change of the financial structure underlying a particular asset, which is often the case for a debt financing. Or, unfortunately, a nominally sustainable investment might, in fact, have no sustainable impact.

[1] Bloomberg NEF; Energy Transition Investment Hit $500 Billion in 2020 -- For First Time; Jan 19, 2021
[2] As compiled by Bloomberg and reported in Gillespie, T. & Ritchie G.; Debt Engineers Tackle Climate Change with Bonds to Rewild Land; Bloomberg Green; Feb 28, 2021
[3] Eaton C. & Elliott R.; Oil and Gas Industry Faces a Slow Recovery from Pandemic Lows; Wall Street Journal; Jan 17, 2021
[4] US SIF Foundation (US SIF); Report on US Sustainable and Impact Investing Trends 2020. US SIF Foundation; Report on US Sustainable, Responsible & Impact investing Trends 2016

- Financing that results in a change of ownership or a change in financial structure without creating a new sustainable asset can nonetheless materially support, promote and expand ESG activities. Stock purchases, for instance, enable shareholder engagement to promote and expand companies' sustainable practices. The stock market and the ability to refinance debt obligations both promote the liquidity in capital markets that most investors need before they will make a loan or investment. That is, liquidity, in the form of selling stock or refinancing debt provides the exit strategy lenders require. Without an exit strategy, most investors would not make the primary investment needed to create the sustainable asset in the first place.
- Definitions are changing. In equity markets, most activity is focused on tightening definitions, as it is currently too easy for fund managers to make unsupported claims of ESG alignment. In debt markets, which have well-established guidelines and transparency protocols, some definitions are becoming broader. Broader standards do not necessarily mean relaxed standards. Instead, there is a recognition that a wider variety of activities support a sustainable future. For instance, strict definitions of "green" are seen to exclude important transition activities where investment in inherently brown industries can help them become more clean – greener, if not exactly green.
- With increased scrutiny on standards and definitions, the importance of transparency is becoming paramount. Attempts to define what is or is not a sustainable investment will always generate levels of disagreement. Guidelines, accompanied by strict transparency and reporting protocols, may be a path past definitional controversies, while enabling investors to judge whether a particular investment is sufficiently sustainable to meet their objectives.
- Policy support for sustainable finance is generally increasing, though not yet to levels that many say is needed to meet critical goals, such as Paris Agreement objectives. In the US, the Securities and Exchange Commission (SEC) is beginning to step in to guard against economic risks associated with climate change, as well as, within the limits of its authority, to support efforts promoting economic opportunity.
- Perhaps the area that lags the most is actual measurement of sustainable impact. It's easy enough to measure dollars invested, but impacts are often imputed or estimated by formula. There are good reasons for this – it is hard, if not impossible, to measure, for instance, reductions in poverty levels or improvements in health associated with a specific investment. It is even hard to measure more straightforward matters, such as greenhouse gas (GHG) emissions avoided. But these impacts are the point of sustainable investment, and to the extent measurements are imprecise, investments will be placed with levels of inefficiency and critical sustainability goals will remain elusive.

How these themes are playing out – an examination of climate investment:
Many of these themes play out in green finance, where, along with substantial growth, a seeming cascade of markers promise to promote green finance yet further into the mainstream from the niche it so recently occupied. Nonetheless, much more progress is needed.

Among many others, the markers of progress include:

- The European Union, along with the United Kingdom, Japan and over 100 other countries, have pledged to achieve net zero GHG emissions by 2050. China, the world's largest GHG polluter, has set a net zero goal of 2060, and in the US, the largest per

capita GHG polluter among major economies, the new administration has stated it plans to set a goal of economy-wide net zero emissions by 2050.[5]

- Hundreds of major corporations have pledged to attain net zero operations by 2050. These include not only such sustainability leaders as Unilever, Apple, and Microsoft,[6] which have set net zero targets by the 2030's, but also, paradoxically, Shell and several other major oil companies,[7] as well as General Motors, which has announced it will invest $35 billion towards developing electric vehicles by 2025 and stop producing gasoline-powered cars by 2035.[8]
- The costs of wind and solar power continue to plummet, dropping 70% and 89%, respectively, from 2009 to 2019, and they are now the unsubsidized low-cost option for new power capacity in much of the world.[9] The cost of lithium-ion batteries needed to store renewables-generated power fell by 97% from 1991 to 2018, including a 50% drop from 2014 to 2018.[10] As a related matter, in the US, renewable energy consumption in 2019 exceeded that of coal for the first time since the early industrial days of the late 1800s.[11]
- The Business Roundtable, in a 2019 statement signed by 181 CEOs, revised its definition of the purpose of a corporation, noting that it includes multiple stakeholders, not simply shareholders, and involves "Supporting the communities in which we work" and "embracing sustainable practices across our businesses."[12] Similarly, the CEO of BlackRock, the world's largest asset manager, with $8.7 trillion in AUM as of the end of 2020, has called on all companies to disclose how their business will be compatible with a net zero economy.[13]

Mark Carney, the UN Special Envoy on Climate Action and Finance and the former Governor of the Bank of England, in a February 2021 interview, described the "enormous acceleration" of sustainable solutions from a "CSR" to a "C-suite issue." That is, from a Corporate Social Responsibility issue (pointedly, not C-suite), to now, where, "It's an absolutely strategic issue for virtually every company."[14]

And yet, despite all the positive news, a great deal more progress is necessary to meet the Paris climate targets. In a February 2021 report on the combined impact of the latest Nationally Determined Contributions (NDCs) under the Paris Agreement, the UN's climate agency found that combined GHG emissions would decline by less than 1% by 2030, as compared to a 2010 baseline, "far short" of the 45% reduction required by 2030 to meet a 1.5°C 2050 goal.[15] The UN Secretary General called the report a "red alert."[16]

[5] United Nations; Climate Action; Net-Zero Pledges Grow; Ambition Falls Short; undated (ca. Spring 2020). United States, Executive Office of the President [Joe Biden]; Executive Order on Tackling the Climate Crisis at Home and Abroad; Jan 27, 2021
[6] Kelion, L.; Apple's 2030 Carbon-Neutral Pledge Covers Itself and Suppliers; BBC News; Jul 21, 2020
[7] Shell Media Relations; Shell Accelerates Drive for Net-Zero Emissions with Customer-First Strategy; Feb 11, 2021
[8] Mufson, S.; General Motors to Eliminate Gasoline and Diesel Light-Duty Cars and SUVs by 2035; Washington Post; Jan 28, 2021. Colias, M.; GM Raises Electric-Car Bet, Will Add More Battery Factories; Wall Street Journal; Jun 16, 2021
[9] Roser, M.; Why Did Renewables Become So Cheap So Fast? And What Can We Do to Use This Global Opportunity for Green Growth? Our World in Data; University of Oxford; Dec 1, 2020
[10] Hannah, Ritchie; The price of batteries has declined by 97% in the last three decades; Our World in Data; University of Oxford; Jun 4, 2021
[11] US Energy Information Administration; U.S. Renewable Energy Consumption Surpasses Coal for the First Time in Over 130 years; May 28, 2020
[12] Business Roundtable; Business Roundtable Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans'; Aug 19, 2019
[13] BlackRock; 2020 Annual Report. Fink, L.; Larry Fink's 2021 Letter to CEOs; BlackRock; 2021
[14] Kelly, J.; Bloomberg Invest Talks: A Conversation with Mark Carney; Feb10, 2021
[15] United Nations Framework Convention on Climate Convention (UNFCCC); Nationally Determined Contributions Under the Paris Agreement; Synthesis Report by the Secretariat; Feb 26, 2021
[16] Sengupta, S.; Global Action Is 'Very Far' From What's Needed to Avert Climate Chaos; New York Times; Feb 26, 2021

How is it possible to make so much progress and still fall so far short of the goal?

Many reasons, starting with too much business as usual. The OECD, in a 2018 report, estimated that investment of $6.9 trillion per year would be needed until 2030 to meet climate and development goals, and other studies suggest $3 trillion per year until 2050.[17] If investment has now grown to the range of $1 trillion per year, it is an impressive figure, representing a great deal of growth and progress, but nonetheless well short of estimated need.

Investment in energy production is instructive. For all of the growth in renewables, investment in fossil fuels continues apace, suggesting that, to date, renewables are on balance a source of yet more power, rather than a replacement of existing fossil fuel power. Annual investment in renewables is now at about the same level as fossil fuels, a remarkable achievement given the size of the fossil fuel industry, and, as noted, the IEA projects investment in renewables to substantially exceed fossil fuel investment in the coming decades. Even still, it projects investment in fossil fuels to remain at about the same level as currently.[18] This means, unless something changes markedly, the world will make slow inroads against the overwhelming predominance of fossil fuels. IHS Markit projects that fossil fuels will still supply 77% of energy demand by 2030, as compared to 80% in 2020.[19] In a May 2021 roadmap, the IEA projects that investment in new fossil fuel production must end immediately if we are to reach net zero by 2050, and investment in renewables must triple its growth trajectory.[20]

It would be unfair to limit the discussion of business as usual to oil companies and their investors. Not only are there many other examples, but they tend to have something in common -- they are producing commodities and products that are strongly in demand by the public. The IEA estimates that over 50% of the emissions reductions needed to reach net zero can be driven by consumer choices.[21] We use at lot of things, and there tend to be industrial processes behind the things we enjoy. And while China may produce air pollution that resembles dystopian science fiction, its per capita CO2 emissions are less than half those of the US.[22]

China, the world's leader in total emissions,[23] perhaps neatly encapsulates this discussion of too much business as usual. China leads the world in installed renewable energy capacity, nearly triple the US, which is second.[24] Its primary source of power, however, is coal,[25] which it continues to increase, commissioning triple the new coal power capacity of the rest of the world combined in 2020. But there is good news, too. China's new wind and solar capacity in 2020 was more than triple the coal capacity added (119 GW vs. 38 GW).[26]

If wind and solar are indeed the lowest-cost source of new power, why build any new coal-fueled power plants? The answer may be jobs, as there are millions of households in China and around the world whose livelihoods depend on fossil fuel production and use. In country after country, those households create what may be the single most powerful constituency for business as usual. Recognizing the validity of these economic concerns, the EU has created a "Just Transition Mechanism," a plan of public and private investment to address the social and economic effects of the transition to a low-carbon economy.[27]

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[17] OECD/The World Bank/UN Environment; Financing Climate Futures: Rethinking Infrastructure; OECD publishing; 2018
[18] International Energy Agency, as referenced in Eaton C. & Elliott R.; Jan 17, 2021
[19] Eaton C. & Elliott R.; Jan 17, 2021
[20] International Energy Agency (IEA); Net Zero by 2050: A Roadmap for the Global Energy Sector; May 2021
[21] ibid
[22] Union of Concerned Scientists website; Each Country's Share of CO2 Emissions; Aug 12, 2020
[23] ibid
[24] International Renewable Energy Agency website; Installed Renewable Energy Capacity/Country-Rankings
[25] US Energy Information Administration website; International Data/China
[26] Centre for Research on Energy and Clean Air; China Dominates 2020 Coal Plant Development; Global Energy Monitor; Feb 2021
[27] European Commission; The Just Transition Mechanism: Making Sure No One is Left Behind; Jan 2020

Greenwashing, the PR side of business as usual, is another reason actual progress towards Paris goals is falling short of the progress we sometimes feel we are making. All those net zero pledges and those ESG-aligned investment funds? A lot of them don't stand up to scrutiny.

Every net zero pledge is full of assumptions and limitations and needs to be read closely to be understood, but substantive pledges include a science-based plan, with Paris-aligned interim CO2 reduction targets, and corporate executives managing towards annual and even monthly targets. That is, it is not just a 2050 pledge, it is also a year-by-year action plan, with deliverables this year, next year, and the year after that. And there is a lot of expertise available to help companies achieve genuine reductions in emissions, water use, etc., through operational efficiencies, substitutions of power sources and other strategies. Over 1400 companies around the world are working with the Science Based Target initiative (SBTi) to create plans that are fact-based, measurable, transparent, and consistent with what the latest climate science shows will lead to a 2.0°C goal or better. SBTi has approved about half of the companies' plans at this point, and over 500 conform to a 1.5°C goal. SBTi is a joint initiative of CDP, the World Resources Institute, the World Wide Fund for Nature, and the United Nations Global Compact.[28] Similar initiatives include the UN's Race to Zero Campaign which, along with businesses, includes cities, regions, investors, and universities collectively responsible for 25% of global CO2 emissions.[29]

Unfortunately, many of the net zero pledges by companies and countries are just that, a pledge, and not much more. And sometimes what appears to be progress is just progress on paper, but not in actuality. Both Shell and BP have reduced their carbon footprints by selling (i.e., divesting) certain carbon intensive assets. But it's simply a direct transfer to the carbon account of a different company, without necessarily any reduction in emissions into the atmosphere. In 2020, BP's emissions reductions from divestments were five times greater than its reductions from operational efficiencies.[30] And the acquirers' future profits likely depend on them exploiting their newly acquired assets to the fullest. Further, to the extent that assets are sold from public companies to privately held companies, disclosure requirements are reduced and the likelihood of public pressure is far lower, simply due to lack of information and visibility.

National pledges can have similar shortcomings. Currently, only a few countries' pledges carry the weight of law, although others, including the EU, have proposed legislation.[31] But "the weight of law" does not necessarily mean that a plan meets a scientifically rigorous 1.5°C target. As one example, the largest single source of energy categorized as renewable in the EU is currently biomass, largely wood pellets.[32] Wood may be technically renewable, because trees grow back. And, yes, they capture CO2. But they grow back and capture carbon over the course of decades. Meanwhile, wood burned today releases all that captured CO2 today. The EU, a climate change leader in so many ways, chooses to say that wood is a carbon neutral source of energy.[33] US biofuel policies share similarities, replacing a portion of fossil fuels with technically renewable plant-based sources. This, in a domino effect, has triggered a boom in demand for palm oil which is met by clearcutting tropical rain forests for monocultural palm tree growth.[34] In

[28] Science Based Targets initiative website
[29] United Nations Framework Convention on Climate Change; Race to Zero Campaign; as of Jul 7, 2021
[30] Adams-Heard, R.; What Happens When an Oil Giant Walks Away; Bloomberg Green; Apr 15, 2021.
BP; 2020 Sustainability Report
[31] Energy & Climate Intelligence Unit; Net Zero Tracker
[32] European Commission; Eurostat Statistics Explained; Archive: Wood as a Source of Energy;
Mar 27, 2019
[33] Vaughan, C.; The Loophole: How American Forests Fuel the EU's Appetite for Green Energy; Food & Environment Reporting Network; Apr 29, 2019
[34] Lustgarten, A.; Palm Oil Was Supposed to Help Save the Planet. Instead It Unleashed a Catastrophe. The New York Times; Nov 20, 2018

both cases, the EU and the US make progress on paper towards stated renewable energy goals as carbon emissions rise and other environmental goals, such as biodiversity, are sacrificed.

And just as renewable does not necessarily mean sustainable, science-based does not necessarily mean reality-based. That takes us to offsets, such as carbon that can be captured by forests that a company pledges to save or create. In theory, carbon captured by a specific set of trees equates to a calculable percentage of a company's emissions. But successful offset strategies face a series of hurdles. For instance, preserving existing forest adds zero carbon capture to the equation. And saving one tract may simply displace a clear cut to the next tract. New forest, meanwhile, takes many years to reach significant levels of carbon capture. Even assuming that all the math is right and all the pledged offsets would be new and additional, is there enough available arable land on earth to accommodate all that forest? Maybe not. One study suggests that the offset pledge of a single oil company (Eni SpA, based in Italy) would take 6% of the earth's forest carbon-capture capacity.[35] SBTi does not count offsets towards companies' net zero targets.[36]

ESG-aligned investment funds can incorporate all these ambiguities and more, as they do not necessarily disclose what criteria they use when choosing companies for inclusion in a fund labeled as ESG-aligned. The US SIF, in its 2020 Report on US Sustainable and Impact Investing Trends, noted that "we continue to see a significant increase in ESG assets for which limited information is disclosed."[37] And others have noted that sustainability is "good for Wall Street's bottom line," with one survey showing fees on ESG funds 43% higher than their non-ESG counterparts despite being no more expensive to run. And the funds' holdings might not differ much, or differ much on impact, either.[38]
The problem is not that there are no ESG standards. Quite the opposite, there are a plethora, an "alphabet soup" of standards, it is often said – such as SASB, TFCD, GRI, CDP, IIRC, CDSB, and the closely-related SDGs.[39] Many choices, all high quality and deeply informed, differing in certain ways -- and none of them have been mandatory, although that is starting to change.

All of this adds up to what may be a perfect environment for greenwashing – great interest in sustainability and few enforceable standards. So companies and investment funds have huge incentives to say what they know people want to hear and wide latitude in what they claim and how they say it.

But this high tide of greenwashing may be ebbing, for where go investors at scale, so go financial regulators. The EU has been working on an interlocking set of regulations for several years, and the first set went into effect in March 2021. In the US, the Biden administration has formally announced a plan to create policies addressing the full range of climate-related risks to the US financial system,[40] and the SEC and the Federal Reserve have begun research and deliberations of appropriate regulations. There appears to be a great deal of will and momentum for change.

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[35] Mackenzie, K.; Big Oil's Net-Zero Plans Show the Hard Limits of Carbon Offsets; Bloomberg Green; Mar 1, 2021
[36] Science Based Targets initiative website; FAQs/Does the SBTi Accept all Approaches to Reducing Emissions
[37] US SIF; 2020
[38] Wursthorn, M.; Tidal Wave of ESG Funds Brings Profit to Wall Street; Wall Street Journal; Mar 16, 2021. Carlson, D.; Your ESG Investment May be a 'Light-Touch' Fund and Not as Green as You Think; Marketwatch; Jan. 4, 2021. Zweig, Jason; You Want to Invest Responsibly. Wall Street Smells Opportunity.; Wall Street Journal; Apr 16, 2021. Schwegler, Dr. R., et. al.; Sustainability Funds Hardly Direct Capital Towards Sustainability: A Statistical Evaluation of Sustainability Funds in Switzerland & Luxembourg; INFRAS Research & Consulting; May 3, 2021.
[39] Sustainability Accounting Standards Board (SASB); The Task Force on Climate-Related Disclosures (TFCD); Global Reporting Initiative (GRI); CDP, formerly known as the Carbon Disclosure Project; the International Integrated Reporting Council (IIRC), the Climate Disclosure Standards Board (CDSB); the UN Social Development Goals (SDGs).
[40] United States, Executive Office of the President [Joe Biden]; Executive Order on Climate-Related Financial Risk; May 20, 2021

The regulators are able to act within their existing powers and obligations to protect investors and to protect the economy, and their actions and deliberations fall within the long-recognized frameworks of adequate and accurate disclosure, as well as the need to protect against foreseeable economic risks. This is playing out in the US and elsewhere in several different ways:

- With growing pressure to require investment funds to disclose exactly what they mean by ESG and how their investments conform to the definition, there is also growing pressure for unified sustainability standards, much as there are unified standards for financial accounting. The goal is meaningful sustainability disclosures and data that is comparable across time and across companies. Fortunately, this is work that can readily build upon many of the existing voluntary standards, and the International Accounting Standards Board announced, in March 2021, its intention to do just that, with an initial focus on climate-related reporting before moving on to the broader set of ESG topics.[41] Meanwhile, the SEC, in April 2021, issued a "risk alert" detailing the various ways that ESG-labeled funds' actual portfolio management practices may diverge from their stated ESG approaches.[42]

- Publicly-traded corporations are already required to disclose material risks. What is new is that the SEC is more actively considering climate change as a material risk.[43] This can be growing physical risk, due to storms, wildfires, etc., such as those that sent Pacific Gas and Electric into bankruptcy in 2019, and/or transition risk, such as for carbon-intensive industries whose reported asset valuations may assume business as usual, but could plummet under reasonably foreseeable greener scenarios (i.e., stranded asset exposure).

- Most broadly, there is systemic risk to the economy. A 2020 report from the US Commodity Futures Trading Commission (CFTC) subcommittee on Climate-Related Market Risk, in its first sentence, states that "Climate change poses a major risk to the stability of the U.S. financial system and to its ability to sustain the American economy."[44] Similarly, the US Federal Reserve has now joined the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). The NGFS was launched in 2017 to "share best practices, contribute to the development of environment and climate risk management in the financial sector, and to mobilize mainstream finance to support the transition toward a sustainable economy." The NGFS now has 90 members, most of which are national central banks. [45] The Federal Reserve has stated its intent to understand and regulate financial institutions' exposures to climate-related physical risks and transition risks. Chairman Jerome Powell describes this as "something that we're taking on as part of our traditional regular statutory mandate."[46]

One of the biggest questions is how far elected officials will be willing to intervene to accelerate a sustainable transition. McKinsey estimates that roughly 50% of the investment needed for the EU to reach net zero by 2050 is not currently profitable and will require interventions such as a price on carbon.[47] Similarly, the CFTC report's first finding is that "financial markets will only be able to channel resources efficiently to activities that reduce greenhouse gas emissions if an economy-wide price on carbon is in place at a level that reflects the true social cost of those

[41] Cohn, M.; IFRS Foundation Moves Ahead on International Sustainability Standards Board; Accounting Today; Mar 8, 2021. Schwartzkopff, F.; Global Securities Watchdog Targets Greenwashing in ESG Plan; Bloomberg Green; Mar 9, 2021
[42] US Securities & Exchange Commission (SEC); The Division of Examinations' Review of ESG Investing;
Apr 9, 2021
[43] SEC; Acting Chair A.H. Lee Statement on the Review of Climate-Related Disclosure; Feb 24, 2021
[44] Commodity Futures Trading Commission (CFTC), Market Risk Advisory Committee, Climate-Related Market Risk Subcommittee; Managing Climate Risk in the U.S. Financial System; Washington, D.C.; 2020
[45] Central Banks and Supervisors Network for Greening the Financial System (NGFS); Charter; Jul 2020. NGFS website; Membership
[46] NPR; Transcript: NPR's Full Interview with Fed Chairman Jerome Powell; Mar 25, 2021
[47] McKinsey; How the European Union Could Achieve Net-Zero Emissions at Net-Zero Cost; Dec 3, 2020

emissions."[48] There is growing stated support for carbon taxes, including in unexpected places, such as the American Petroleum institute.[49] But there is no consensus on the appropriate level, and many politicians have thus far found proposing carbon taxes likely to raise more opposition than support (see, for instance, the Yellow Vest protests in France). We see this caution with President Biden, whose very wide-ranging climate agenda does not include any direct levies on carbon.

If politicians are guided by public opinion, then perhaps we can expect their caution on carbon prices and other aggressive policy interventions to start to melt away. A Yale study shows significant growth in public concern in the US over the course of five years. In 2015, those termed "dismissive" of climate change and opposed to policy interventions slightly outnumbered those termed "alarmed." By 2020, the alarmed outnumbered the dismissive by nearly 4 to 1, and a majority of those polled (54%) were alarmed or concerned vs. 18% who were dismissive or doubtful.[50]

It appears that year after year of heat waves, wildfires, coastal flooding, stronger and more frequent hurricanes, and other natural disasters are driving shifts in public opinion, preferences, choices and demand. Those preferences, as expressed by investors, voters and consumers, are the ultimate drivers of policy choices and corporate behavior. Preferences, of course, are not financing mechanisms, but financing mechanisms are simply tools, and they are useless in the absence of demand for the financing objective. Indicator after indicator shows that demand for sustainable solutions is high and growing,[51] and this is manifest in the growth of green finance, as well as the mounting pressures that investors are placing on major corporations regarding their ESG performance.

[48] CFTC, Climate-Related Market Risk Subcommittee; 2020
[49] American Petroleum Institute; Climate Action Framework; undated;
[50] Leiserowitz, A., et. al.; Global Warming's Six Americas in 2020; Yale Program on Climate Change Communication; 2020
[51] As examples: Riquier, A. & Beals, R.K.; As Boomers Hand Over the Keys to the Stock Market, Sustainability-Minded Younger Investors Let Their Consciences Lead; MarketWatch; Jun 2, 2020
Hamilton, L.C.; Millennials and Climate Change; University of New Hampshire, Carsey School of Public Policy; Mar 13, 2017. Muro, M. et al.; How the Geography of Climate Damage Could Make the Politics Less Polarizing; Brookings Institution; Jan 29, 2019.

Overview of Sustainable Investment Strategies

The remainder of this paper looks at specific activity across the financing spectrum, starting with a brief review of different sustainable investment strategies, and then examining practices in equity investment, debt financing, policy interventions designed to spur private investment, and, lastly, blended approaches, with combinations of private for-profit, public, and private philanthropic investment.

The Global Sustainable Investment Alliance identifies seven strategies[52] investors can pursue to support sustainability:

- ESG integration is the broadest category, with Bloomberg putting it at about 2/3rds of sustainable investment. As noted, it is not a well-defined term, and different investors and different funds give the term different meanings, ranging from careful evaluation of ESG ratings to non-specific and undisclosed consideration of ESG factors. There is a very wide range of factors that can be attributed to ESG, and the US SIF reports that the most common ESG factors considered by US money managers are climate change and corporate anti-corruption practices, with executive pay the fastest growing concern (in 2020 as compared to 2018). For US institutional investors, conflict risk was the top factor, followed by climate change.[53]
- Shareholder engagement, which covers a wide array of activities and communications between investors and companies, can also be a specific investment strategy, with investors purchasing shares with the intent of engagement to change corporate policies.
- The earliest "socially responsible" funds tended to use negative screens – often excluding arms manufacturers, or perhaps tobacco or alcohol, as many of these early funds were faith-based. The negative screen concept remains relevant, both in its original iterations, as well as more recent screens such as excluding fossil fuels or firms scoring low on ESG factors. The UN's Principles for Responsible Investment (PRI) summarize negative screening as a strategy to "Avoid the worst performers."[54]
- Positive screening is the strategy of including the best performers relative to industry peers, and/or actively including companies due to the environmental or social benefits of their products and services.[55]
- Thematic investing, sometimes considered a subset of positive screening, specifically targets certain sectors or niches of the market for inclusion in a portfolio. It could be a specific asset class, such as green buildings, or a specific attribute, such as companies scoring high in diversity or gender equity evaluations.
- Norms-based screening involves screening investments against minimum standards of business practice, such as those issued by the International Labour Organization or the OECD.
- Impact and community investing tends to be most directly focused on particular positive social or environmental outcomes, and is often associated with investment in specific projects creating specific and measurable impacts. Although the term "impact investing" is frequently used, it is somewhat vague as an investment strategy, with investors defining impact in accordance with their own preferences. Community investing is

[52] Global Sustainable Investment Alliance; Global Sustainable investment Review; 2020
[53] Kishan, S.; Good Business newsletter; Bloomberg Green; Aug 18, 2021. US SIF; 2020 Report.
[54] Principles for Responsible Investment; Screening; May 29, 2020
[55] ibid

intentionally directed to markets that have been historically underserved by traditional investors, and is often conducted by mission-oriented funds such as Community Development Financial Institutions (CDFIs).

Use of one strategy does not preclude use of another, and investors often use them in combination with each other. It's also important to keep in mind that these strategies tend to be general descriptions of investment approaches, rather than strict and sharply defined strategies (though negative and positive screens can be fairly clearly delineated). In addition, while these strategies can be used to support sustainability objectives, certain of them can also be used for other objectives. A thematic investor, for instance, could choose oil production companies just as easily as renewable energy companies. Similarly, shareholder engagement could be directed towards expanding fossil fuel production, rather than limited emissions.

Equity Investment

Secondary market equity investment, otherwise known as purchasing shares of publicly-listed companies through the stock market or investing through mutual funds or exchange-traded funds (ETFs), measures in the trillions of dollars and is the largest area of sustainable finance by dollar volume.

This category of investment, trading shares after the initial public offering, isn't direct investment in sustainability. Instead, it is taking ownership of the company, in some fraction. As owners, shareholders can promote sustainability in at least two ways – direct shareholder engagement/activism and the indirect market pressures and incentives that flow from demand for ESG-directed investment. Both are growing and reflect investors' desire to place their investments in companies supporting long-term sustainability. The two strategies are related, as ESG investment also gives the investors standing to engage with management. There's a third category, active and targeted divestment, that can also have a sustainability impact, though its effectiveness is much debated.

Shareholder engagement and activism. The rapidly growing interest in sustainable investing creates incentives for asset managers to pressure companies to adopt long-term thinking. Private asset managers, who seek to attract more investment (i.e., get more business) by touting their ESG strategies, are under increased scrutiny and increased pressure from their investors to use their positions as major shareholders to press companies for real change. Similarly, public pension funds directly or indirectly accountable to elected officials are choosing both activism and ESG-directed investment as a means of reflecting policy preferences of their constituents.

In addition to helping attract more customers, an ESG engagement strategy also helps asset managers better balance their investment portfolio with the nature of their obligations. That is, the pension funds, as well as the many institutional investors managing retirement funds, need to be looking well into the future, and they can use their position as major shareholders to press companies to adopt longer-term thinking, as well. In fact, asset managers often do *not* do so, and this has been noticed by the SEC, which specifically cited proxy voting "inconsistent with advisers' stated approaches" in its April 2021 ESG Investing Risk Alert.[56]

[56] SEC; Apr 9, 2021

It has also been noticed by activist investors, who have not only targeted certain companies, but also certain asset managers, such as BlackRock, to get them to vote in line with their ESG and sustainability policies and public statements.[57] Historically, major asset managers have voted as recommended by companies' management, i.e., typically against shareholder proposals, a position activists found increasingly at odds with ESG goals. In 2020, BlackRock voted in favor of 6% of shareholder environmental proposals, 7% of social proposals, and 17% of corporate governance proposals. In 2021, through April, in line with its CEO's increasingly strong statements, BlackRock had supported 91% of environmental, 23% of social, and 26% of governance proposals.[58]

BlackRock is not alone in its shift, as shareholder engagement is broadly on the rise. Ernst & Young (EY), which conducts an annual survey of 60+ institutional investors with over $38 trillion AUM, describes the increase in company-shareholder engagement as one of "the most dramatic shifts" they have observed over the past 10 years, calling it "a defining governance trend." And just as sustainability has shifted "from a CSR to a C-suite issue" within corporations, engagement on ESG matters has similarly shifted from the province of niche socially-responsible funds very much into the institutional investor mainstream. EY notes that even index fund managers, historically labeled as "passive," have become active stewardship leaders. The investors surveyed consider climate risk, with a focus on physical disruption, as the biggest threat facing companies in their portfolios. As the top three drivers of corporate success, they named 1) the overall quality of a company's strategy and the ability to execute on that strategy; 2) ESG integration into company strategy; and 3) diversity of staff, management and Board members.[59]

Shareholder engagement on issues related to diversity, equity and inclusion (DEI) have jumped dramatically as civil rights concerns have grown in society at large. Shareholder proposals addressing workforce and board diversity nearly doubled in 2021 as compared to 2020. The proposals averaged over 60% support, and there is a general press for more transparency on diversity issues. One new category of proposal called for independent racial equity audits. Though these proposals did not receive majority support, they did receive 30% support, on average, a high figure for first time proposals, and a figure that, for many issues, would prompt Board action to address the concern.[60]

Shareholders are pushing for transparency and pushing back against the concept that companies can make statements in support of diversity and inclusion and then continue with business as usual, the DEI equivalent of greenwashing. The NYC Comptroller, who manages multiple public employee retirement systems, last year called on the 67 S&P 100 companies that made public statements in support of racial equity and/or diversity and inclusion to disclose employee breakdowns by race, ethnicity and gender. This is information the companies compile and report annually to the US Equal Employment Opportunity Commission, but it is not public, unless disclosed by the companies. Some, but not all, have complied with requests to release this data.[61]

While DEI issues made major advances, climate-related issues tended to dominate the proxy battle news. Significant engagement campaigns include:

[57] As examples: McCloskey, K.; Is BlackRock Finally Aligning Climate Policy and Proxy Voting; Proxy Preview; Mar 16, 2021. As You Sow; Shareholders to BlackRock: It's Time to Walk the Talk, Implement Business Roundtable's 'Purpose of a Corporation'; Dec 17, 2019
[58] Lim, D.; BlackRock Starts to Use Voting Power More Aggressively; Wall Street Journal; Apr 30, 2021
[59] Raval, A. & Mooney, A.; Money Managers: The New Warriors of Climate Change; Financial Times; Dec 26, 2018. Ernst & Young; 2021 Proxy Season Preview
[60] Bradford, H.; Investors Press Companies on DEI; Pensions & Investments; Jul 9, 2021
[61] Stringer, Scott; Comptroller Stringer and Three New York City Retirement Systems Call on 67 S&P 100 Companies Who Issued Supportive Statements on Racial Equality to Publicly Disclose the Composition of their Workforce by Race, Ethnicity and Gender; July 1, 2020. Bradford, H. Jul 9, 2020.

- In 2017, holders of 62% of ExxonMobil's shares, opposing management, voted in favor of a resolution calling for more climate information disclosure, including the impact on the firm of a transition to a low carbon economy. ExxonMobil remains at odds with many shareholders, who feel it is still not providing appropriate levels of disclosure. It has, for instance, disclosed its scope 1 and 2 emissions, but not the estimated 90% of its emissions associated with the actual use of its products (scope 3), and many feel the company is not preparing itself for a low-carbon future.

  In 2021, activist shareholders, with the support of BlackRock, Vanguard, State Street and major public pensions, defeated three existing Board members, replacing them with new members who they feel can help guide the company towards a sustainable path. The Wall Street Journal described the activists' level of success as "unprecedented." Shareholders also voted, against the company's recommendation, for Exxon to report annually on how its lobbying aligns with the goals of the Paris Agreement.[62]

- In 2018, Royal Dutch Shell pledged to set firm carbon limits, with executive pay linked to success in meeting those targets. Shell had been under pressure from the Church of England Pension Board and others, and its CEO attributed Shell's action to "dialogue" with those major investors.[63]

  This remains a controversial engagement, as Shell continues to invest in new fossil fuel resources, and its reduction targets are based on carbon intensity, rather than absolute carbon reductions. Moreover, the legal disclosures accompanying Shell's updated plan caution that "Shell's operating plans and budgets do not reflect Shell's Net-Zero Emissions target." Shell's "aim" is to do so in the future, "in step with the movement towards a Net Zero Emissions economy within society and among Shell's customers."[64] Nonetheless, Shell retains support from the Church of England Pension Board and others pushing the company towards change, indicating the degree to which engagement is not only a matter of science-based targets, but also a process -- a matter of navigating situations and relationships for the sake of reaching future goals.[65]

- In 2019, Glencore, the world's largest mining company by revenues[66] and one of the largest coal producers, agreed to cap coal production at current levels. In a statement, Glencore recognized climate change science, supported the goals of the 2015 Paris Agreement, and pledged to "invest in assets that will be resilient to regulatory, physical and operational risks related to climate change." Glencore attributed its actions to "engagement with investor signatories of the Climate Action 100+ initiative."[67] More recently, Glencore has put together a 2050 net zero plan, including a 40% reduction in total emissions by 2035, that depends, in part, on reduced levels of coal production.[68]

As suggested by these examples, engagement can involve shareholders working with management to create a path forward, or it can involve a proxy fight, with shareholders trying to force change by voting against the wishes of company management. Institutional investors have generally preferred to work with management, rather than engage in public proxy fights. For instance, when BlackRock voted against Exxon management on climate disclosures in 2017, it took pains to make clear the degree to which it had attempted to work with management before

[62] Olson, B.; Exxon Shareholders Pressure Company on Climate Risks; Wall Street Journal; May 31, 2017. Mufson, S.; The Fight for the Soul – and the Future – of ExxonMobil; Washington Post; May 22, 2021. Matthews, C.; Activist Wins Exxon Board Seats After Questioning Oil Giant's Climate Strategy; Wall Street Journal; May 26, 2021. Grossman, R. & Stronski, N.; What the ExxonMobil Shareholder Votes Mean; Skadden, Arps, Slate, Meagher & Flom LLP; Jun 16, 2021.
[63] Raval, A. et al.; Shell Yields to Investors by Setting Target on Carbon Footprint; Financial Times; Dec 2, 2018. Financial Times Editorial; Shells' Carbon Emissions Targets are a Clear Model for Others; Financial Times; Dec 8, 2018
[64] Shell Media Relations; Feb 11, 2021
[65] Bousso, R.; Shell Shareholders Increase Pressure for Further Climate Action; Reuters; May 18, 2021
[66] Murray, J.; Profiling the Top Five Largest Mining Companies in the World; NS Energy; Apr 9, 2021
[67] Glencore Statement; Furthering Our Commitment to the Transition to a Low-Carbon Economy; Glencore website; Feb 20, 2019
[68] Lund-Yates, S.; FTSE 100 – the 5 Highest ESG Rated Companies; Hargreaves Lansdown; Mar 3, 2021

coming to its vote.[69] BlackRock's 2021 voting record suggests that more aggressive changes in corporate engagement are underway as asset managers press companies to adapt not only to the urgency of climate change, but also to a more widespread consensus on a need to address matters of diversity and social equity.[70]

Some investors are far more likely to fight management publicly. Large public pension funds, such as California Public Employees' Retirement System (CalPERS), tend to be more willing to fight publicly than private asset managers, often choosing to file a shareholder resolution, which can be withdrawn upon reaching a negotiated agreement. Absent an agreement, they may lead a proxy fight. Other investors, like many hedge funds, are specifically activist, investing in companies for the very reason that it gives them standing to oppose management, with the goal of forcing changes intended to improve the company's performance and value. Engine No. 1 may currently be the most prominent of these funds. Founded in December 2020 with an estimated $250 million in capital (i.e., tiny in the world of public equity), it nonetheless led the way, gaining support from other shareholders, in the 2021 effort to "refresh" Exxon's Board membership.[71]

Glencore, the mining company, cited work with Climate Action 100+. Climate Action 100+ is an investor initiative, launched in 2017, "to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change." Its membership currently includes over 500 investors with more than $50 trillion in collective AUM. It is specifically engaging with 167 (i.e., "100+") companies accounting for an estimated 80% of annual global industrial emissions. The initiative's goals are to improve governance, curb emissions throughout the value chain and strengthen climate-related financial disclosures.[72]

The Climate Action 100+ strategy marries engagement with transparency, and in March 2021, it released its first overall assessment of the "100+" companies' progress towards a Paris-aligned 2050 net-zero target. The assessment, termed the Net-Zero Company Benchmark, makes plain how much more work there is to be done. It shows the following:

- About half of the companies have announced a 2050 net-zero goal, but only about half of these commitments fully cover the companies' "most material emissions."
- It does not appear that near-term actions are adequate to meet long-term goals. Only eight companies meet all short-term (up to 2025) assessment criteria.
- Only six companies "explicitly commit to aligning their future capital expenditures with their long-term emissions reduction target(s)," and zero have committed to aligning future expenditures with the goal of limiting temperature rise to 1.5°C.
- 87% of the companies have board-level oversight of climate-related matters, but only 1/3rd tie a portion of executive compensation directly to the companies' emission reduction targets.
- Almost three quarters of the companies commit to or support using the TCFD disclosure recommendations, but only 10% disclose information that both encompasses the entire company and conforms to a 1.5°C scenario.[73]

[69] BlackRock Press Release; Supporting a Shareholder Proposal Following Extensive Management Engagement; BlackRock.com; May 31, 2017
[70] BlackRock; Our 2021 Stewardship Expectations
[71] Kishan, S.; Hedge Fund Veteran Chris James to Start Impact-Investing Firm; Bloomberg; Dec 1, 2020. Eccles, R. & Mayer, C.; Can a Tiny Hedge Fund Push ExxonMobil Towards Sustainability? Harvard Business Review; Jan 20, 2021
[72] Climate Action 100+ website
[73] Climate Action 100+ website; Climate Action 100+ Issues its First Ever Net-Zero Company Benchmark of the World's Largest Corporate Emitters; Mar 22, 2021

These Climate Action 100+ findings are in line with the results of a PwC survey of over 5,000 corporate CEOs around the world. While 30% cite climate change as an "extreme concern," 27% are "not very concerned" or "not concerned at all," and 60% have not yet factored climate change into their strategic risk management activities. Over-regulation is an extreme concern of 42% of the CEOs.[74]

What's next in shareholder engagement? Yet more engagement, for one. Vanguard, the 2nd largest asset management firm, with over $7 trillion AUM, has, like BlackRock, revised its 2021 proxy voting policies. It is now "likely to support" proposals requesting disclosure on workforce demographics, as well as disclosure on "how climate change risks are incorporated into strategy and capital allocation decisions," including climate change impact assessments. Vanguard may also vote against directors where there is "lack of sufficient progress on board diversity" and where there is inadequate disclosure or oversight of "material or manifested risks – including social and environmental risks". Vanguard also specifically points towards corporate political activity, stating that it "may vote in support" of further disclosure of political spending and lobbying activity.[75]

Beyond the asset management giants, it's reasonable to assume that the success of Engine No. 1 in its action against the Exxon Board will trigger yet more activity and challenges from activist funds. If that is the case, it is not a given that hedge fund activists will consistently or predominantly challenge management in favor of long-term sustainability. Hedge funds' typical fee structures favor immediate gains for shareholders, i.e., a shorter-term outlook, and research suggests hedge fund investment is more likely to result in reduced sustainability performance over time.[76] A second reason for caution is that the economics of Engine No. 1's investment and intervention are as yet unclear. Nonetheless, its proxy voting success has, with all the subtlety of a 2x4 to the head, caught the attention of the investment and corporate management worlds, and corporate Boards and management are doubtless devising strategies to more successfully engage with shareholders, including activist funds, to anticipate and in some fashion accommodate (or divert), rather than lose to, the next such challenge. Similarly, activist investors are doubtless looking at Engine No. 1's success in using climate risk to make a primarily financial case for change, thereby gaining support not only from investors who use an ESG lens, but also from investors who do not. We will see how and if other activist investors may be able to use the broader reach of stakeholder capitalism, with its acknowledgement of corporations' responsibilities to employees, consumers and community, including the supply chain, to make successful financial arguments.[77]

It's also possible that this sudden flexing of asset managers' voting powers could trigger a reaction in quite another direction. Even as they press for improvements to companies' ESG performance, the asset managers are highlighting their growing concentration of power. Under current US regulation, the asset managers have voting power over the shares they hold for millions of investors. This gives BlackRock, Vanguard, State Street, Fidelity and a handful of others collective voting control over virtually every large US corporation. Jack Bogle, the late founder of Vanguard, observing the success of the index fund industry he founded, stated that he does "not believe that such concentration would serve the national interest."[78] John Coates, as a Harvard law professor, referring to the leaders of these investment firms, termed it "The

[74] PwC website; PwC 24th Annual Global CEO Survey; 2021
[75] Vanguard website; Fast Facts About Vanguard. Vanguard.com; Summary of the Proxy Voting Policy for U.S. Portfolio Companies; Apr 1, 2021
[76] DesJardine, M. R. & Durand, R.; Disentangling the Effects of Hedge Fund Activism on Firm Financial and Social Performance; Strategic Management Journal; Jan 3, 2020
[77] Wharton Business Daily; Why Engine No. 1's Victory Is a Wake-up Call for ExxonMobil and Others; knowledge.wharton.upenn.edu; Jun 15, 2021
[78] Bogle, J.; Bogle Sounds a Warning on Index Funds; Wall Street Journal; Nov 29, 2018

Problem of Twelve…the likelihood that in the near future roughly twelve individuals will have practical power over the majority of U.S. public companies."[79] He is now with the SEC and perhaps in a position to do something about this, though it is not clear what a true solution might be given the structure and investing logic of index funds, other large mutual funds and ETFs. Perhaps true "shareholder democracy" would require passing the voting power through to the actual investors.[80] But that would be impractical in the extreme -- asking millions of individuals to vote on multiple matters before hundreds of companies. Investors would be flooded with information, far more than they could digest, including from sources with underlying and not easily discerned agendas. Even the most diligent few investors would be hard-pressed to be reasonably informed on more than a handful of matters before a handful of companies. Both Bogle and Coates suggest several approaches to dilute the concentration of investment funds' power while trying to preserve the funds' investment efficiencies. Most important may be rules to improve transparency, try to eliminate conflicts of interest, and formally devolve voting decisions to a variety of managers in the investment firms.[81] The impact of all of these ideas on sustainable investing is hard to predict, but they would likely strengthen investors' and regulators' confidence that asset managers were making proxy votes and investment decisions on the merits.

Perhaps the next step is that some of these matters won't require shareholder engagement at all. One SEC commissioner has called for "mandatory public disclosure" of information regarding companies' GHG emissions "and how they are managing — or not managing — climate risks internally." She notes that the SEC already has the power, indeed "a core purpose…to develop and enforce disclosure requirements for public companies rooted in the interests of investors and the public."[82]

The SEC is going a similar direction on DEI issues. Chairman Gensler has asked SEC staff to propose diversity disclosure requirements,[83] and, in August 2021, the SEC approved a Nasdaq stock exchange requirement for listed companies to meet certain board diversity objectives, or explain why they are unable to do so. Nasdaq specifically cited an analysis of "over two dozen studies that found an association between diverse boards and better financial performance and corporate governance."[84] This new requirement moves the US stock market a step closer to the objectives of the UN's Sustainable Stock Exchange Initiative. There are now 26 stock exchanges around the world mandating ESG disclosure as a condition of listing. The 26 exchanges' listings include over 16,000 companies with a market capitalization of over $20 trillion.[85]

Growth of ESG-directed investment funds. The growth of ESG-directed investment funds is a direct statement of investor demand for shares of ESG-positive companies. Holding other factors constant, this demand will raise the price of these companies' shares, and therefore the value of the companies. This, in turn, creates an incentive for management to maintain ESG-positive policies and for other companies to adopt these policies. As discussed above, it also gives investors standing to engage with management.

[79] Coates, J.; The Future of Corporate Governance Part I: The Problem of Twelve; Harvard Law School; Sep 20, 2018
[80] Sommer, J.; A Glimpse of a Future with True Shareholder Democracy; NY Times; May 21, 2021
[81] Ibid. Bogle, J.; Nov 29, 2018. Coates, J. Sep 20, 2018. and NY Times articles previously cited
[82] Lee, A.H.; Big Business's Undisclosed Climate Crisis Plans; New York Times; Sep 27, 2020
[83] Bradford, H.; Jul 9, 2021
[84] Nasdaq website; Nasdaq to Advance Diversity through New Proposed Listing Requirements. Dec 1, 2020. Nasdaq website; Nasdaq's Board Diversity Rule: What Nasdaq-Listed Companies Should Know; Aug 17, 2021
[85] Sustainable Stock Exchange Initiative website; Stock Exchange Database

While the concept of ESG-oriented investment funds was pioneered by firms like Domini Social Investments, which launched in 1991 and currently has over $2 billion under management,[86] it has taken off in the past several years with the entrance of BlackRock and other investment management giants.

The US SIF Foundation (the Forum for Sustainable and Responsible Investment) reports investing in the US using ESG and related sustainable strategies at $17.1 trillion in 2020, 1/3rd of AUM in the US, as compared to 1/5th of AUM in 2016.[87] Global investment trends are similar, with the exception of Europe, where reported sustainable investment levels declined as compared to 2018 (discussed below).[88]

The ESG investment numbers are huge, both in absolute terms and in terms of the rate of growth. But they need to be understood most accurately as indicators of investor interest and not necessarily as accurate indicators of growth in sustainable practices by major corporations. The US SIF, even as it reports the increases in sustainable investment, also reports that investment managers frequently "did not disclose the specific ESG factors that they consider, reporting only that they consider ESG in general."[89]

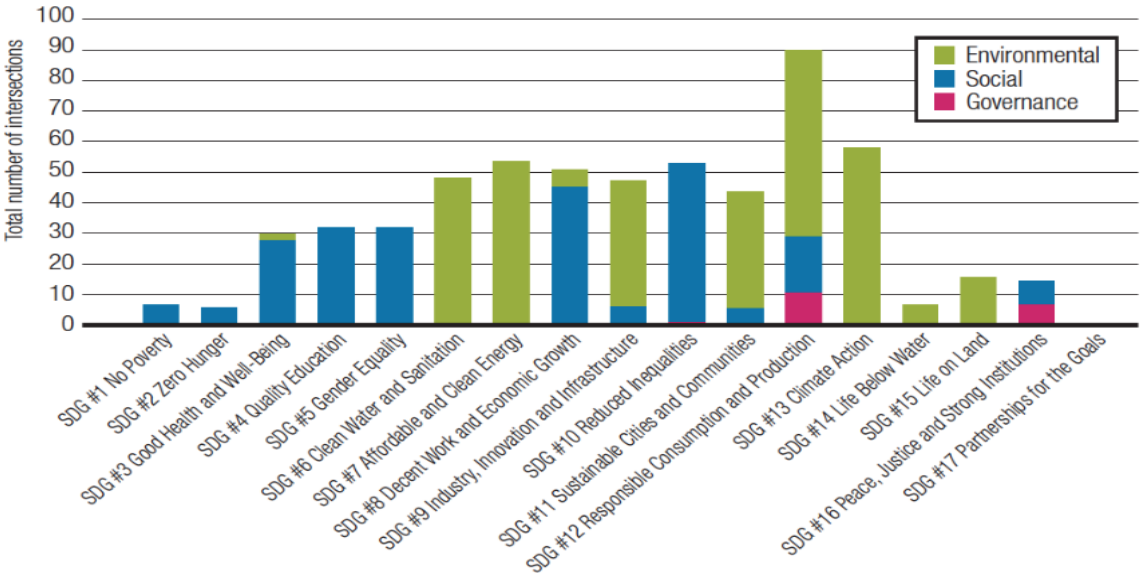
So it's hard to know exactly what's being accomplished, and the lack of a common set of ESG standards and a widespread lack of reporting transparency is a problem that, as noted above, financial market regulators are now taking up with increasing seriousness. As ESG definitions become more specific, uniform and regulated, it may be that fewer funds qualify for an ESG label, as appears to be the case in Europe. European sustainable investment assets dropped by $2 trillion to $12 trillion, as compared to 2018, per data from the Global Sustainable Investment Alliance. This is attributed to changing definitions associated with the transition to the implementation of the European Union's more rigorous sustainable finance standards.[90] As such standards become more global, we may see reported ESG investment totals fall, as they have in Europe – and this could mask an actual an actual increase in ESG investment that meets objective and substantive standards.

As discussed above, the problem is not a lack of standards, but a lack of common standards and a lack of agreed-upon transparency protocols that enable investors to understand what an investment fund means when it claims, for instance, ESG integration.

While the hard work of establishing appropriate protocols moves forward, some investors are using the UN's Sustainable Development Goals (SDGs) as a ready-made guide to meaningful sustainable investment. The many specific "targets" underlying the SDGs' 17 broad goals closely track many ESG factors. Exhibit 1 below shows the alignment of the SDGs to ESG considerations as analyzed and categorized by ClearBridge Investments.

[86] Domini Social Investments website
[87] The figures are predominantly, though not totally, investment in publicly traded companies. US SIF 2020; US SIF Foundation Report on US Sustainable, Responsible and Impact Investing Trends, 2014.
[88] Global Sustainable Investment Alliance; 2020
[89] US SIF 2020
[90] Global Sustainable Investment Alliance; Global Sustainable Investment Review 2020; Marsh, A.; European ESG Assets Shrank by $2 Trillion After Greenwash Rules; Bloomberg Green; Jul 18, 2021

Exhibit 1: Alignment of ESG Considerations to SDGs[91]



ClearBridge is not alone, as it is not unusual to see both investment firms and firms receiving investments define their work in terms of alignment with various SDGs. This extends to asset management firms launching ETFs and mutual funds investing in companies demonstrating an alignment with the SDGs.[92] So the SDGs are gradually being embraced as a guide and "universal language" of sustainability. That said, the SDGs, like ESG considerations, are broad enough that almost any company could plausibly claim alignment with at least one of the SDG goals and targets. So transparency is once again paramount, as investors must be able to ascertain the extent to which a particular investment meets the investors' sustainability objectives.

By many measures, sustainable funds have been providing better financial returns than broader indexes. S&P reports that companies in its Dow Jones Sustainability Index (DJSI) have outperformed its Global Broad Market Index over the past 1, 3 and 5 years (by 4.48, 1.08, and 1.78%, respectively (as of June 30, 2020).[93] Similarly, Morningstar reports that 75% of ESG-screened index funds outperformed broad market equivalents in 2020, and 88% out-performed over five years through 2020. An NYU Center for Sustainable Business meta-analysis of over 1100 peer-reviewed papers published between 2015 and 2020 found that ESG investing can provide benefits during a social or economic crisis, and that the financial benefits grow stronger over a longer investment time horizon. But it is not pure up, up, up, as non-ESG's outperformed in the first quarter of 2021, but the overall trends have been well established.[94]

There's no one theory on why ESG funds have been generally outperforming the market. On the one hand, it stands to reason that firms with good governance practices will tend to do well over time. They are more likely to have a longer planning horizon than other firms, and this will likely make them more attuned to and prepared for broader environmental and social risks. On the other hand, ESG funds are likely to be more heavily weighted towards tech firms, which

[91] McQuillen, M.J.; Sustainable Development Goals Provide Practical Framework for ESG Investing; Proxy Preview; 2021
[92] US SIF; Investing to Achieve the UN Sustainable Development Goals; 2020
[93] S&P Global; The Evolution of Sustainable Investing Rewards; Jun 26, 2020
[94] Lefkovitz, D. & Solberg, L.; ESG Doesn't Thrive in Every Market Environment; Morningstar; Apr 12, 2021. Atz, Ulrich, et. al.; Do Corporate Sustainability and Sustainable Finance Generate Better Financial Performance? A Review and Meta-analysis; SSRN; Sep 9, 2020.

have been among the overall market's best performers for some years, ESG or not. And they have been underweighted on fossil fuel stocks, which have underperformed the market. Have the ESG funds otherwise identified the companies with the best governance, or the best policies throughout their supply chains? As ESG definitions are unified, the true drivers of value can be better identified.

The strong financial performance of ESG funds over time has gradually undercut a long-standing argument that "socially responsible" investment necessarily underperforms the broader market. This positive performance record underlay a milestone ruling in 2015, when the US Dept. of Labor found that incorporation of ESG-related factors into investment decision-making can be compatible with retirement funds' fiduciary responsibilities.[95] Indeed, many investors now believe that *ignoring* ESG factors is *in*compatible with fiduciary responsibility. In what amounts to an affirmation of the 2015 ruling, the Biden administration has ordered agencies to determine any actions that can be taken to protect workers' savings and pensions from climate-related risks.[96]

Divestment. How about divestment? Can selling fossil fuel stocks be considered a reverse financing mechanism to promote sustainability?

Divestment has a number of angles. The current divestment movement traces its roots to a 2011 Carbon Tracker report that found proven fossil fuel reserves were five times the level consistent with a 2°C scenario,[97] and divestment is perhaps most commonly seen as a statement of personal or institutional values. But it is also a portfolio diversification and risk management strategy, as in the decision of the Norwegian sovereign fund (itself a product of Norway's oil profits) to eliminate oil and gas exploration companies from its portfolio.[98] And it can enable an investor to purchase better-performing stocks, as energy stocks have generally underperformed the market over the past five to 10 years. In that regard, a divestment decision can certainly be a responsible fiduciary decision, and probably has been a good investment decision in recent years.[99]

But does it promote sustainability, meaning, in this context, reduced CO2 emissions? Perhaps, but the evidence from prior divestment campaigns suggests it is more likely to succeed as a political strategy rather than from financial pressure that may flow from the sale of stock shares. Studies to date are mixed on the effect of the divestment campaign on share prices of fossil fuel companies. Evidence from prior divestment campaigns (not climate-related) have generally found no effect on share prices.[100]

And there can be a counterproductive aspect. Just as Shell and BP, as part their low-carbon transition strategy, are divesting certain carbon-heavy assets by selling them to firms making no such transition pledge, so does divestment of stock shares mean replacing one share owner with another. The likely result over time is the companies' shares become more concentrated in the hands of investors who are not interested in challenging management on sustainability issues.

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[95] US Department of Labor; Interpretive Bulletin Relating to the Fiduciary Standard Under ERISA in Considering Economically Targeted Investments; Oct 26, 2015
[96] United States, Executive Office of the President; May 20, 2021
[97] Carbon Tracker Initiative; Unburnable Carbon: Are the World's Financial Markets Carrying a Carbon Bubble?; Jul 13, 2011. McKibben, Bill; The Powerful New Financial Argument for Fossil-Fuel Divestment; The New Yorker; Apr 3, 2021
[98] **Milne, R.; Norway's Oil Fund Shake-up Raises Hackles; Financial Times; Mar 11, 2019**
[99] *Grantham, J.;* The Mythical Peril of Divesting from Fossil Fuels; London School of Economics, Grantham Research Institute on Climate Change and the Environment; Jun 13, 2018. BlackRock Sustainable investing; Investment and Fiduciary Analysis for Potential Fossil Fuel Divestment: Phase 1; 2020. Lefkovitz, D. & Solberg, L. Apr 12, 2021. Plantinga, A. & Scholtens, B.; The Financial Impact of Fossil Fuel Divestment; Climate Policy, Vol. 21, 2021 - Issue 1; Aug 17, 2020
[100] Pollin, R. & Hansen, T.; Economics and Climate Justice Activism: Assessing the Fossil Fuel Divestment Movement; University of Massachusetts Amherst, Political Economy Research Institute; April 24, 2018. Ansar, A. et al.; Stranded Assets and the Fossil Fuel Divestment Campaign: What Does Divestment Mean for the Valuation of Fossil Fuel Assets? University of Oxford, Smith School of Enterprises and the Environment; Oct 2013. Dordi, T. & Weber, O.; The Impact of Divestment Announcements on the Share Price of Fossil Fuel Stocks; Sustainability, MDPI, Open Access Journal, vol. 11; Jun 2019

The political side of a divestment campaign is another matter. Successful divestment campaigns result in heightened awareness of a problem, stigma towards those contributing to the problem, and support for alternatives[101] – which in this case would mean such things as greater demand for renewables, and perhaps support for carbon taxes, higher auto mileage standards, and other steps that drive down demand for fossil fuels. But there is a flip side. To the extent divestment is understood as a political strategy, rather than an analytically-based investment strategy, it becomes a two-way street. In May 2021, for instance, a group of 15 US State Treasurers warned that they may pull their states' funds from financial institutions that do not invest in fossil fuel companies.[102]

In the face of these various considerations, different funds are adopting different strategies. The University of California, for instance, explained that it made its endowment divestment decision simply on financial grounds, seeing fossil fuel assets as "a financial risk."[103] CalPERS (the California Public Employees Retirement System) is a founding member of Carbon Action 100+, which is to say it is heavily involved with engagement strategies. CalPERS has divested its shares in coal companies, but has more broadly chosen to maintain a voice with management rather than severing ties.[104] New York State's pension plan has chosen to divest over the course of several years.[105]

Whatever the strategies and whatever their impact, one thing is quite clear – more and more investors are joining this divestment campaign. A divestment campaign organizer, 350.org, puts the figure at 1,325 institutions, heavily weighted towards faith-based organizations, universities, foundations, cities and other public entities. The institutions collectively control $14 trillion in investment assets.[106]

Private Equity & Venture Capital refer to direct investment into firms that are not publicly listed. Both private equity and venture capital investors seek returns well above standard market levels, and there is every indication that these investors see substantial opportunity in sustainable investing. Pitchbook, a financial data company, reported $16.4 billion in venture capital investments into technologies intended to combat climate change in 2020, a record level.[107]

Venture capital is early-stage investment, often into start-up companies controlled by an entrepreneur with a promising but unproven idea and vision. Control of the company generally remains with the founding entrepreneur, and venture firms profit by selling shares when the promising idea works out and turns into a revenue-generating product. Depending on the stage of a company's development, venture investment into a single company is generally in the low millions.

Private equity investment is generally at a later stage of corporate development, and the private equity firms typically purchase a controlling interest in a firm. As compared to institutional investors purchasing shares of publicly listed companies, therefore, private equity investors don't seek to engage with and attempt to influence management. They *direct* management. The firms they purchase are typically smaller than publicly listed firms, but they can nonetheless be quite large, with assets in the tens and even hundreds of millions.

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[101] ibid
[102] State of West Virginia, Office of the State Treasurer; Letter to John Kerry, Special Presidential Envoy for Climate; May 24, 2021
[103] Bachher, J.S. & Sherman, R.; Opinion: UC Investments are Going Fossil Free. But Not Exactly for the Reasons You May Think; Los Angeles Times; Sep 17, 2019
[104] CalPERS; CalPERS' Investment Strategy on Climate Change; Jun 2020
[105] Barnard, A.; New York's $226 Billion Pension Fund Is Dropping Fossil Fuel Stocks; NY Times; Dec 9, 2020
[106] Go Fossil Free website; https://gofossilfree.org/divestment/commitments/
[107] Harder, Amy; VC Investments into Climate Change Technology Reach Record High; Axios; Jan 14, 2021

In 2021, Bridgewater Associates, described in the Wall Street Journal as the world's largest hedge fund, launched a sustainable-investing venture to provide "investment solutions for clients pursuing sustainability goals alongside their financial targets." Bridgewater described it as a response to client demand. "Every day we hear from a different client who we didn't think would be into" sustainable investing, "Now they are saying, 'It's part of my mandate.'"[108]

Historically, firms engaged in private equity and venture capital investment are not well known to the public, and often prefer privacy to publicity. But the urgency and high-profile nature of climate change, in particular, has attracted certain well-known investors who not only see opportunity, but also appear to want to be seen as providing solutions. Examples of private equity and venture capital investment for sustainable purposes include:

- In 2018, KKR launched a $1 billion fund to invest in companies aligned with the UN Sustainable Development Goals (SDGs).[109] Its initial investments through the fund were a Singapore-based energy efficiency company and an Indian waste collection company, supporting the Indian government's "Clean India" campaign.[110] KKR had previously teamed with the Environmental Defense Fund to improve the environmental performance of companies in KKR's portfolio though an effort called the "Green Solutions Platform."[111]
- Bill Gates launched Breakthrough Energy Ventures in 2015, raising $2 billion in two rounds from about 30 individuals. The fund invests in solutions towards getting to "net-zero emissions while making sure everyone, everywhere has access to the affordable, reliable energy they need to thrive." The fund's investments include a company developing an electric car battery intended to charge more quickly and hold more power at a lower cost compared to EV batteries currently available. It also invests in new designs for nuclear energy, which it considers a necessary element of an energy mix that is net zero at supply levels adequate to meet demand in a world with reduced poverty.[112]
- Amazon created a $2 billion fund, The Climate Pledge Fund, to invest in companies developing products or services that "reduce carbon emissions and help preserve the natural world." Amazon created the fund in conjunction with the Amazon-initiated Climate Pledge, under which signatory companies agree to "meet the Paris Agreement 10 years early" -- net zero by 2040 through "real business changes and innovations, including efficiency improvements, renewable energy, materials reductions, and other carbon emission elimination strategies," while neutralizing "any remaining emissions with additional, quantifiable, real, permanent, and socially-beneficial offsets." Technical partners to the Pledge include The Nature Conservancy and SBTi.

More than 100 companies, with $1.4 trillion in annual sales and five million employees, have committed to the Pledge.[113] Initial Pledge Fund investments include a company reducing and sequestering CO2 in cement (CarbonCure Technologies), a company recycling batteries and e-waste to reclaim high value metals (Redwood Materials), and a new start electric vehicle company (Rivian Automotive) from which Amazon plans to purchase delivery vehicles.

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[108] Bridgewater Associates; Bridgewater Associates Launches Sustainable Investing Venture; Apr 14, 2021. Patterson, S. & Ramkumar, A.; Green Finance Goes Mainstream, Lining Up Trillions Behind Global Energy Transition; Wall Street Journal; May 22, 2021
[109] Bank, D.; What We Know About KKR's $1 Billion Global Impact Fund; Impact Alpha; Apr 30, 2018
[110] Chasan, E.; KKR Turns to Impact Fund Co-Investing With $510 Million Deal; Bloomberg; Feb 10, 2019
[111] KKR website
[112] Breakthrough Energy website. Binkley, C. Bill Gates Has a Master Plan for Battling Climate Change; Wall Street Journal; Feb 15, 2021. Quantumscape website
[113] Amazon website; The Climate Pledge Fund. The Climate Pledge website; Net Zero by 2020. Amazon website; The Climate Pledge Celebrates Surpassing 100 Signatories; Apr 21, 2021

Amazon's efforts have triggered accusations of greenwashing. The Pledge and the Pledge Fund were launched after an internal campaign by Amazon employees to get the company to reduce its carbon footprint and overall use of resources, and there is no doubt that there is a substantial public relations element involved. Nonetheless, it appears that Amazon has gone to some lengths to bring in substantive partners to make the work of the Pledge and the Pledge Fund real.[114]

- Circulate Capital is a new investment firm focused on reducing ocean plastics by investing in waste management and recycling firms, with a focus on five countries in south and southeast Asia that are the source of most ocean plastics. It made its first investments in 2020, totaling $40 million. Its investment fund totals $106 million, largely raised from consumer products corporate partners, including Pepsico, Coca-Cola, Unilever, and Danone, that are major users of plastics and have an interest in solving this waste "leakage" problem. Circulate estimates its initial investments have created 210 jobs and prevented 1,330 tons of plastic pollution leakage. Circulate's fund is backed by a $35 million guarantee from the U.S International Development Finance Corporation in collaboration with USAID.[115]
- Congruent Ventures is an early-stage fund with $300 million in AUM, and it has just raised a new $175 million fund. Portfolio companies include Meati, developing mushroom-based "meats" and a firm developing software to reduce energy and materials use in manufacturing. Congruent's investment partners include Microsoft's Climate Innovation Fund and the Surdna Foundation.[116]

These examples are but a few of the many funds and investors seeing opportunity in new companies creating efficiencies and other sustainable improvements. With corporations by the hundreds making net zero pledges, and countries, as well, there appears to be a very large market looking for innovative solutions.

Initial Public Offerings (**IPOs)** – IPOs for green companies, sometimes called green IPOs, is not a precise category, as there is no precise definition of a green company, but it could include renewable and energy efficiency companies, recycling and waste management companies and clean transport, such as Tesla, which had an IPO in 2010.[117]

IPOs mark the transition of a company from private equity to publicly owned and traded shares (i.e, "going public"). The IPO enables a company to raise new capital from institutional and individual investors. It also sets a market valuation for the company's shares and creates a liquid market for existing shareholders (those who were private equity before the IPO) should they wish to sell.

As a current example, Rivian Automotive, the electric vehicle start-up backed in part by Amazon's Climate Pledge Fund, is planning an IPO for later in 2021. Rivian is reportedly working with Goldman, Sachs and other advisors on the IPO and seeking a market valuation of $70 billion. Rivian expects to deliver its first vehicle, a pickup truck, prior to the IPO.[118]

IPOs are regulated by the SEC, which requires certain disclosures about the company prior to approving the IPO. They include information about the company's business, strategy, financial condition, risk factors, and the company's plans for use of IPO proceeds. The SEC reviews the

[114] Amazon; Amazon Announces First Recipients of Investments from $2 Billion Climate Pledge Fund; Business Wire; Sep 17, 2020. Ethical Consumer; Amazon and Microsoft: Greenwashing in the Technology Industry?
[115] Circulate Capital website
[116] Shieber, J.; As Capital Pours in to Climate Investments, Congruent Ventures Closes on $175 Million for Early Stage Bets; Techcrunch.com; Apr 22, 2021
[117] Kiersz, A.; Tesla's IPO Was 8 Years Ago; Business Insider; Jun 29, 2018
[118] Porter, K.; et. al.; Electric-Truck Maker Rivian Selects Underwriters for IPO; Bloomberg; May 28, 2021

information, but does not vouch for its accuracy, and offers no opinion with regard to risk levels or the likelihood of a company's success. After the IPO, companies are subject to public reporting requirements on a quarterly and annual basis. The reports provide current updates on financial condition and other information provided with the IPO.[119]

The process of getting SEC approval for an IPO generally takes 6 to 12 months,[120] which is to say, the process is long and difficult, and one does not know what the capital market conditions will be like when the company is finally ready for its IPO. The process also includes certain restrictions designed to maintain a fair and sober public sale. These include an enforced "quiet period," during which companies' approved documents, available to all, must do the talking in the marketplace. And the documents' financial information is limited historical actuals, and do not include financial forecasts, so as to preclude marketplace swindles based on wild predictions of soaring success.

As is its custom, Wall Street has figured out a way around many of these constraints. In the past two years, many effective IPOs have been accomplished via special purpose acquisition companies, or SPACs. SPACs themselves are public companies, but they are shells, and they sidestep the IPO process for startups by acquiring startups via merger. Through this merger, the startup fills the shell and becomes the public company without going through an IPO. The advantages for the owners of the SPAC include not only speed, but also the ability to talk up the transaction and make optimistic projections of future success, thereby attracting other investors.[121]

The Wall Street Journal reports that, from March 2020 through May 2021, SPACS agreed to about 35 mergers worth nearly $95 billion with companies tied to green energy, electric cars, and other uses considered sustainable.[122]

The SEC is taking a look at SPACs, and they may not be quite so prevalent in the near future. That is, because the IPO process is designed by the SEC to help maintain a fair, orderly and sober investment market for companies newly going public, and because SPACs are seen as a detour around SEC regulation, the SEC has issued a series of alerts, designed to warn and protect investors and cool the market. SEC Chairman Gensler has highlighted what he called the "risks inherent to SPAC transactions," noting that "those who stand to earn significant profits from a SPAC merger may conduct inadequate due diligence and mislead investors."[123]

The yieldco is another investment structure that went through a highly visible green IPO growth stage several years ago.[124] Although available for any number of uses, yieldcos have been particularly associated with wind and solar projects. The first yieldco IPO was in 2013,[125] and by mid-2015, the yieldco market had raised $16 billion through nine IPOS and secondary capital offerings. By 2016, two aggressively expanding companies in the field had declared bankruptcy,[126] and there has been little new activity since.

[119] SEC; Investor Bulletin: Investing in an IPO
[120] PwC; Roadmap for an IPO; A Guide for Going Public
[121] Patterson, S. & Ramkumar, A.; May 22, 2021
[122] ibid
[123] Michaels, D. et. al.; SPAC Hot Streak Put on Ice by Regulatory Warnings; Wall Street Journal; Apr 16, 2021. Michaels, D.; SEC Weighs New Investor Protections for SPACs; Wall Street Journal; May 26, 2021. Elstein, Aaron; Feds Accuse a SPAC and its Merger Partner of Misleading Investors; Crain's NY Business; Jul 15, 2021
[124] Konrad, T.; The YieldCo Boom and Bust: The Consequences of Greed and a Return to Normalcy; GreenTech Media; May 13, 2016
[125] Kinrade, T.; A Sixth YieldCo Goes Public as the Asset Class Has its First Anniversary; Solsystems.com; Jul 18, 2014
[126] Hals, T. & Groom, N.; Solar Developer SunEdison in Bankruptcy as Aggressive Growth Plan Unravels; Reuters; Apr 21, 2016; Fitzgerald, P.; Spain's Abengoa Files for Chapter 15 Bankruptcy in U.S.; Wall Street Journal; Mar 29, 2016

Although yieldcos have perhaps been insufficiently flexible under varying market conditions, the structure of the instrument itself is instructive. The yieldco concept is akin to an equity version of asset-backed securities (ABS) and comparable to real estate investment trusts (REITs), in which performing assets, such as solar fields with long-term power purchase agreements (PPAs) in place, are transferred from a parent company into a spin-off entity with predictable cash flow based on the PPAs. Investors purchase shares in the spin-off (the yieldco), which typically makes quarterly dividend payments. The funds raised through the equity sale (the IPO) can then be used by the parent to develop the next set of projects, which, when completed and with PPAs in place, can be spun-off into the same or another yieldco.

Yieldcos, as companies and unlike ABS, are designed to be perpetual. To maintain share value, they depend on a continually renewing stream of projects and PPAs, but the yieldco model can be financially vulnerable under rising interest rate environments. Because yieldcos are, as the name implies, designed for yield, they are most attractive to investors when their dividend payments are high as compared to alternative investments. When interest rates rise, yieldcos tend to lose value.[127] Similarly, as a way to raise capital, yieldco IPOs only make sense when the cost of equity capital is lower than debt. Large utility companies can often borrow at lower rates and thereby become a lower cost source of capital for renewable resources as compared to a yieldco.[128]

Debt Financing

Debt financing to support sustainable activities, including bonds and loans, is divided between "use of proceeds" financings, such as green bonds, that specifically delineate how funds can be spent, and "sustainability-linked" financings, where borrowers can use funds as they choose, but must hit designated sustainability-linked performance indicators or suffer a financial penalty, such as a higher interest rate.

Use of proceeds financings predominate, and they include corporate, municipal and sovereign bonds, as well as certain loans. As financial instruments, use of proceeds bonds do not differ from other bond financings, but uses of the funds raised are limited to green and/or social uses, which are disclosed in advance. The labels enable investors to target their investments to these uses.

Uses of debt financing are often more clearly delineated than equity financing. That is, when purchasing stock in a company, one in effect purchases a sliver of every single activity of the company. With use of proceeds financings, funds go to specific and identified tasks and projects. Nonetheless, there are inherent questions as to what can and should qualify as "green" or "social," and as sustainable debt investment grows, so does the pressure for greater clarity and stricter oversight, as it has in equity markets.

The International Capital Market Association (ICMA) has established Green, Social, Sustainability, and Sustainability-Linked (GSS) Bond Principles,[129] and these frameworks have largely formed the basis of the market to date:

[127] Sweet, C.; IPOs Bring Fresh Wind for Green Investing; Wall Street Journal; May 5, 2015
[128] Hoium, T.; Why Utilities (Not Yieldcos) Are Dominating Renewable Energy Finance; The Motley Fool; Mar 16, 2018
[129] International Capital Market Association (ICMA) website; Sustainable Finance link.

- Green bonds are designed to have an environmental benefit.
- Social bonds intend to achieve a positive social outcome, typically for a lower-income or otherwise underserved population, and uses include affordable housing and access to essential services such as healthcare and education. In 2020, ICMA clarified its Social Bond guidance to specifically include COVID-related efforts.
- Labeled sustainability bonds[130] combine both environmental and social uses.
- Sustainability-linked bonds differ from the other categories in that borrowers commit to pre-disclosed strategies and outcomes (key performance indicators), without specific restrictions on exactly how they will use the funds to meet those ends. The outcomes should be measurable, externally verifiable, and should represent a material advance towards ESG goals beyond a business-as-usual trajectory.

The GSS Principles are voluntary, so they don't literally govern the market. They are effective, nonetheless, for several reasons. The ICMA, which put them together, is composed of major capital markets participants with a great deal of credibility and influence. The GSS Principles are based in disclosure and transparency, and they build upon the substantial foundation of financial and legal disclosure already required of bond offerings. The disclosures required of GSS bond issues are more or less one more step in a well-established process, rather than anything fundamentally different, and they are therefore easily adopted. GSS issues generally include third-party reviews, and the Principles provide a standard framework guiding issuers to provide the type of information investors demand. ICMA maintains a database of GSS issuers who have followed its framework, with links to third-party reports.[131]

Not all issues have a third-party publicly-available review (confirming that funds have been used as planned), but a study by the Climate Bonds Initiative (CBI), a UK-based NGO, found that 88% of use of proceeds bond issues, by dollar volume, had made a report available, with the percentage of issuers providing these public reports rising over time.[132] Keeping in mind that all public bond offerings include official statements with a great deal of disclosure, vetted by lawyers, etc., there is general confidence in this market, whether or not there is a third-party review.

Financial market regulators in some countries, including China and India, have established their own frameworks. They largely track the ICMA principles, although with some divergence. "Harmonization" of frameworks is an on-going process, prodded forward by the considerable incentive of attracting investors from around the globe.

In the United States, many sustainable bond uses fall within the longstanding domain of the municipal bond market, including environmental bonds for clean water and affordable housing bonds. This means that last year's housing bond might be this year's social bond, and some of the market's growth is from exactly this kind of switch in nomenclature for normal activities of government. On the other hand, many bonds for qualified activities do not carry a sustainability label. In a 2018 study, CBI put US climate-aligned municipal outstanding issuance at $264 billion, of which only $14 billion specifically carried a sustainability label.[133] This gap has closed somewhat since then, but labeled sustainable debt remains a fraction of the municipal market.[134] Nonetheless, it remains the fact that the size of the sustainable bond market does not

[130] A note on terminology – "sustainability bonds" is a defined term. To distinguish this specific category of financing from the general category of sustainable bonds, the word "labeled" accompanies sustainability bonds.
[131] ICMA website; Sustainable Finance, Green, Social and Sustainability Bonds Database
[132] Climate Bonds Initiative (CBI); Post Issuance Reporting in the Green Bond Market; 2021. The study covers bonds issued from Q4 2017 through Q1 2019
[133] CBI; Bonds and Climate Change: The State of the Market 2018
[134] S&P Global; 2021 Sustainable Finance Outlook: Large Growth in Green, Social, Sustainable Labels as Municipal Market Embraces ESG; Feb 16, 2021

equate to the size of the underlying sustainable activities, and growth in the sustainable bond market does not necessarily mean growth in the underlying activities. As a result, there is some discussion as to how meaningful the labels are. Several factors suggest the labels are meaningful and useful:

- Bond purchasers find the labels useful to the extent that labeled bonds' transparency processes enable investors to align investments with specific preferences. In fact, the first specifically-named "green bonds," issued by the World Bank in 2008, were structured at the request of Swedish investors wanting to support climate solutions.[135]
- Many countries, particularly those with emerging markets, are newly able, with economic growth, to address sustainability matters at scale. Sustainable bond issuance in those countries therefore more closely tracks growth in sustainable activities.
- Labeled bond issues regularly attract more orders than other bonds. Some analyses show this additional demand resulting, in some cases, in slightly lower interest rates for sustainable bond issuers (a "greenium"), reducing the costs of sustainable activities[136] -- e.g., lower costs for water systems, affordable housing or renewable energy. Other studies have found no greenium.[137] It likely comes and goes depending ultimately on supply, demand and other fundamental market conditions. Issuers, who see the extra orders, tend to be great enthusiasts for labeled bonds. As one example of what they see in the capital markets, Verizon, in a September 2020 $1 billion green bond issue funding renewable energy projects, found a 14 basis point greenium relative to its other debt, resulting in $1.4 million in reduced annual interest costs.[138]

The success of the concept is demonstrated by the market's growth in volume, as well as its spread from green to broader concepts of sustainability. In 2020, labeled sustainable debt financing totaled $783 billion globally, a 38% increase over 2019, and over five times the 2016 figure. These figures include bonds and loans. Green uses are the core of the market, but most of the growth in 2020 came from social bonds, which grew eight-fold to $153 billion from 2019.[139] As discussed below, that growth continues in 2021.

A good deal of the growth in social bond issuance was European public funding to respond to COVID 19. For instance, the European Commission is issuing €100 billion (of which €40 billion was in 2020) under the EU's "Support to mitigate Unemployment Risks in an Emergency" (SURE) program.[140] Similarly, the French unemployment insurance system issued €8 billion within a social bond framework to raise funds for its programs.[141]

While there is no question that the COVID-related bond issues fill critical needs, the decision of European issuers to attach a "social" label is another spotlight on the vagaries of measuring sustainable activity by counting dollars. For instance, had the US attached a "social" label to the trillions in Treasury bonds funding its COVID relief efforts in 2020, we would have seen the sustainable debt market leap into the multiple trillions. For critical social needs, yes, but not a penny additional towards the climate and resilience matters the OECD had in mind in 2018 when it suggested an annual investment need of $6.9 trillion.

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[135] World Bank; Green Bonds
[136] CBI & Harrison, C., Green Bond Pricing in the Primary Market H2 2020, Climate Bonds Initiative, March 2021. Schuele, F. and Wessel, D.; Municipalities Could Benefit from Issuing More Green Bonds; Brookings; Jul 16, 2018
[137] Larker, D. & Watts, E.; Where's the Greenium?; Stanford University, Graduate School of Business; Oct 3, 2019. Gilbert, M.; The Explosion in Green Bonds Comes Without a Premium; Bloomberg; Oct 28, 2019
[138] Wirz, M.; Why Going Green Saves Bond Borrowers Money; Wall Street Journal; Dec 17, 2020
[139] As measured by Bloomberg and reported in Gillespie, T. & Ritchie, G.; Feb 28, 2021. Several organizations track sustainable debt market activity, including the Climate Bond Initiative and Environmental Finance, in addition to Bloomberg. Each has somewhat different numbers due to technical differences in categorizations and exclusions.
[140] European Commission website; Successful third issuance of EU SURE bonds by the European Commission; Nov 25, 2020
[141] Natixis website; Unédic Issued the Two Largest Social Bonds Ever in the Midst of the Covid-19 Crisis; Jun 12, 2020

Looking forward, there are at least three big trends in this market – continued growth in volume; an expanded agenda; and with it, a need for greater clarity on definitions:

- The market for GSS bonds just keeps growing. In the words of the Financial Times, GSS bonds continue to "soar past analysts' lofty expectations." GSS issuance for the first half of 2021 has already exceeded the 2020 total.[142] Adding in sustainability-linked loans puts volume on track to well exceed $1 trillion for the year. To put this in context of the entire market, first quarter GSS issuance was 9.4% of global debt issuance.[143] GSS volume was 1-2% of the total just a few years ago. Sustainability-linked financing is a particular area of growth, with 2021 volume in the US nearly quadruple the prior year, as companies are able to tie general corporate credit facilities to measurable and verifiable ESG goals, such as emissions reductions and health and safety goals.[144]

- The growth will be further fueled as the agenda for sustainable debt financing continues to move toward the full range of the UN's Sustainable Development Goals (SDGs), i.e., a fairly high percentage of all categories of human activity. Two key concepts -- transition and resilience – may define areas of new growth.

  The ICMA has created a Climate Transition Finance Handbook particularly designed to assist "hard to abate" sectors, but relevant to virtually any issuer. The intent is to provide transparency guidance so issuers can credibly use GSS bonds as they transition from brown towards green. The transition disclosures include a science-based, Paris-aligned strategy, with short, medium and long-term targets; a discussion of how the financed activities will materially advance the strategy; and disclosure of all actions taken to ensure a just transition for impacted employees and communities.[145]

  For resilience, CBI has created a set of Climate Resilience Principles for use in conjunction with the Green Bond Principles. The Resilience Principles are designed to help issuers and investors assess the adaptation and resilience benefits of financed projects with the overall goal of improving the ability of "assets and systems to persist, adapt and/or transform in the face of climate-related stresses and shocks…" That is, the issuer must demonstrate that they understand the climate risk they face, and that the financed project addresses those risks and creates resilience over and above the anticipated risks. In September 2019, the European Bank for Reconstruction and Development issued what it believes is the first dedicated resilience bond, for $700 million.[146]

- With the expanding list of eligible activities, it will be increasingly important to define what qualifies as a sustainable activity, as opposed to business as usual, and to monitor actual achievement. Both are critical if the labels are to retain meaning and the sustainable debt market to retain credibility. The Transition Handbook and the Resilience Principles are good examples of guides to an expanding universe of qualified activities, helping issuers and investors define the path to sustainability.

  Greenwashing, in the sense of funds being used contrary to claimed uses, is generally not considered a problem in the use-of-proceeds bond market, where so much information is disclosed. Greenwashing concerns are more likely to arise when they fund a particular green activity conducted by a fundamentally non-green actor. For instance, some investors objected to a green designation for eco-conscious renovations at the

[142] Tett, G., et. al.; Green Bonds Soar Past Analysts Lofty Expectations; Financial Times; Jul 7, 2021
[143] Moody's Investor Service; Moody's - Sustainable Bond Volumes Soar to Record $231 Billion in Q1; May 10, 2021
[144] Poh, J. & Seligson, P.; U.S. Sustainability-Linked Loans Are 292% More Than All of 2020; Bloomberg Green; May 24, 2021
[145] ICMA; Climate Transition Finance Handbook; Dec 2020
[146] CBI; Climate Resilience Principles; Sep 2019. European Bank for Reconstruction & Development; World's First Dedicated Climate Resilience Bond, for US$ 700m, is Issued by EBRD; Sep 20, 2019

Amsterdam airport. Similarly, some feel that the sustainability-linked concept opens up the market to abuse. But there is no path to 1.5° without brown industries getting to greener, and the Transition Principles, as well as the Sustainability-linked Principles with its key performance indicators, are specifically designed to guide those non-green activities towards best available practices.[147]

To date, the market has monitored itself, although the EU has been working on and moving closer to specific, regulated definitions of "green." For use of proceeds bonds, self-monitoring can work reasonably well, as bond issues are mostly publicly-issued with extensive documentation – everyone can see what's being done, and investors can decide if they agree with the label. And there is a self-regulating aspect, as issuers do not want to trigger a controversy at the very moment they are in the market trying to sell bonds.

Self-regulation, of course, has its limits, and as the agenda expands and the market grows -- and as the urgency for climate progress rises -- there is considerable pressure to move beyond simple disclosure and to require specific standards and definitions. This is particularly advanced for green bonds. The EU has created a green taxonomy building off science-based standards created by the Climate Bonds Initiative along with other contributors.[148]

Regulation, as well, has its limits. As the EU moves towards its green definitions, it is under a great deal of pressure to be less strict rather than more, and to include, for instance, natural gas uses. Some have argued for a "fifty shades of green" approach, accompanied by strict disclosure requirements, so as to side step arguments over "in or out" and let investors decide what level of green they are willing to finance. And even with a taxonomy, however strict or lax, issuers can simply decide to forgo the label and do what they want to do. Presumably there would be some kind of penalty in the market, but that remains to be seen.[149] And that penalty might be out of the hands of investors and more in the hands of those who make and enforce building codes and pollutions standards or decide insurance premiums.

Categories and Examples of Sustainable Debt. Debt financing for sustainable finance includes the standard categories of corporate/general obligation debt, repaid from any and all assets of a company, country, state or city, and debt where the repayment obligation is limited to a specific source. This includes securitizations (asset-backed and mortgage-backed securities), revenue bonds and project finance. Each of these is described below, with examples of uses for sustainable purposes.

Corporate/General Obligation Debt can be repaid, generally, by any and all assets of the borrower. Most debt is a general obligation of the issuer, issued with the expectation that it will be repaid from the operating cash flow of the borrowing entity. In the context of this discussion, this category of debt can include, generally, corporate bonds and loans, bonds sold by Multilateral Development Banks (MDBs), as well as municipal bonds, including general obligation debt of countries (sovereign debt), states and municipalities, and 501c3 bonds sold on behalf of nonprofit institutions.

Examples of corporate and general obligation debt include:

[147] Ritchie, G., et. al.; Bond Investor Revolt Brews Over Bogus Green Debt Flooding Market; Bloomberg Green; Mar 29, 2021
[148] European Commission; https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf
[149] Scriven, Guy; The Climate Issue; The Economist; Apr 19, 2021

- The World Bank has issued over $16 billion in green bonds since 2008 involving over 185 transactions in 32 countries supporting projects designed to mitigate climate change or help affected people adapt to it. Projects include renewable energy, energy efficiency, transport, water management, waste water and solid waste management, agricultural pollution control, forest restoration, and resilient infrastructure.[150]
- In the US, the Bank of America (B of A) has been a green and sustainable bond leader, with 5 green bonds totaling $6.4 billion since 2013, funding wind, solar and energy efficiency projects. B of A has also issued social and sustainability bonds totaling $3.5 billion to fund affordable housing, projects to advance financial empowerment in Black and Latino communities, and other uses.[151] Citibank has issued green bonds totaling $2.9 billion, with renewable energy predominating in uses to date. In 2020, Citi issued social bonds totaling $2.5 billion to fund affordable housing.[152] As discussed below, because lending is their business, banks are in a special category of sustainable finance, namely on all sides of it, and, by a wide margin, most of their carbon footprint is not in their operations, but in the activities they enable through their lending. Several initiatives are underway to account for that and to bring it into their net zero pledges in a meaningful way.
- Apple has raised $4.7 billion through four green bond issues since 2016 to fund solar and wind energy projects, enabling the company's conversion to 100% renewable energy and supporting progress towards its 2030 net zero pledge throughout its operations, supply chain and the life cycle of all products it sells. Apple reports that it now uses 100% renewable electricity at its stores, data centers and offices, and that it has reduced its overall carbon footprint by 35% since its 2015 peak. For its net zero pledge, Apple seeks a 75% carbon footprint reduction paired with offsets equal to its remaining 25% of emissions.[153]
- The City of Los Angeles issued $276 million in general obligation bonds in 2018, labeled social bonds, to fund programs, including housing construction, for homeless people.[154] As of the first half of 2021, the LA Mayor's Office reports 489 units complete and in service, and 6,816 units in various stages of development and construction towards a goal of 10,000 units.[155]
- In July 2019, the Low Income Investment Fund, a San Francisco-based Community Development Financial Institution (CDFI), issued a $100 million SDG-linked sustainability bond, described as the first sustainability bond specifically linked to the SDGs. The issue funds projects expanding the availability of affordable housing, healthy foods, community health care, education and child care, all serving low-income communities and all with green benefits in the form of LEED certifications, energy efficiency retrofitting, and/or transit-friendly locations (i.e., transit-oriented development). The issue received a second opinion from Sustainalytics and was 10 times oversubscribed. In the wake of the success of this issue, several more CDFIs have

[150] World Bank; Green Bonds; World Bank; Impact Report 2020 Green Bonds
[151] Bank of America website; Investor Relations; ESG-Themed Issuance
[152] Citigroup website; Citi Green Bond Report; Dec 2020. Mutua, D.C.; Citi Bolsters Social Bond Market with Biggest Housing Deal Ever; Bloomberg Green; Oct 30, 2020
[153] Apple website; Apple's $4.7 Billion Green Bond Spend is Helping to Create 1.2 Gigawatts of Clean Power; Mar 17, 2021. Apple website; Apple Environmental Progress Report; 2020
[154] Ghori, I.; With Proceeds Tackling Homelessness, Los Angeles Brings Social Bonds; The Bond Buyer; Jun 26, 2018
[155] Macias, M., Jr.; LA City Council Approves $300M for Homeless Housing; Courthouse News Service; Jun 6, 2018; Los Angeles, Office of the Mayor; Summary of HHH Pipeline; Jul 2021

issued social and sustainability bonds to fund affordable housing and other community development activities.[156]

- Many American universities have issued green bonds (often through a state-authorized intermediary issuer) for LEED-certified real estate development. New York University, in February 2019, backed $83 million in green bonds for sustainable construction projects in support of its twin goals of building to a LEED silver designation, at a minimum, in all new projects and to achieve carbon neutrality by 2040. Projects at various buildings include energy efficient windows, green roofs and vegetated terraces to reduce energy needs and mitigate the urban heat island effect. Other universities using green bonds include Columbia, Cornell, MIT, Virginia, Texas and Arizona State.[157]
- Through 2020, 22 countries have issued $98 billion in green, social and sustainability bonds. The issues are predominantly green bonds, with the Republic of France the lead issuer at $30.7 billion. Proceeds fund public projects to meet Paris commitments while also making an important leadership statement, signaling a country's commitment to climate change mitigation.[158]
- Sustainability-linked loans with interest rates indexed to sustainability criteria include a €2 billion credit facility for Danone and a €4 billion revolving facility for EDF, the French electric utility, and a $1 billion note for Pilgrim's Pride, a poultry company. For EDF, the interest rate is tied to its CO2 emissions, conversion to an electrified vehicle fleet, and its customers' use of online consumption monitoring tools. For Danone, the measures include growth in sales by Danone's B Corp subsidiaries, as Danone itself works towards becoming a certified B Corp. Pilgrim's Pride must meet certain sustainability targets or incur a 25-basis point interest rate increase.[159] As noted above, the sustainability-linked loan market has been particularly robust, as companies sign on to Paris-aligned agendas, and use this financing to help meet alignment targets. The sustainability-linked market is particularly interesting because it means that the lenders are viewing ESG as a matter of credit and risk, with the borrowers' financial prospects expected to improve with positive ESG performance. This view is consistent with that of the equity investors discussed above, but it is a new course to incorporate it directly into loan terms.

Banks are a special category of sustainable finance as they can be major suppliers of capital for sustainable purposes, while simultaneously financing the full spectrum of carbon-intensive industries, including all types of fossil fuels. A study based on data from Bloomberg Finance found $3.8 trillion of fossil fuel investment from the world's 60 largest commercial and investment banks in the 5 full years since the Paris Agreement (2016-2020), with variation by year, but an overall rising trend. JP Morgan Chase, Citi, Wells Fargo, and B of A were the leaders, in that order, collectively raising $976 billion for the companies.[160] At the same time, the banks can be sustainable finance leaders, with green and sustainable bonds just a fraction of their overall sustainability financings. Looking forward, B of A has pledged to provide $1.5 trillion towards activities consistent with the UN SDGs, including $1 trillion in climate-related finance by

[156] Low Income Investment Fund press release; Over-subscribed $100 Million Issuance by Low Income Investment Fund Signals High Institutional Investor Demand for Sustainable Bonds; Jul 31, 2019. Sustainalytics; LIIF Sustainability Bond Second-Party Opinion; June 28, 2019.
[157] Jordan, John; DASNY Issues $863M in Bonds for NYU Projects; GlobeSt.com; Mar 1, 2019. Columbia University website; Columbia University website; Columbia Issues First Green Bonds; 2016
[158] CBI; Sustainable Debt Global State of the Market 2020
[159] Avery, H.; The Growth of Green Credit; Euromoney; Apr 09, 2018. Gilbert, J.C.; Every CFO Should Know This: 'The Future of Banking' Ties Verified ESG Performance To Cheaper Capital; Forbes; Feb 20, 2018. EDF press release; EDF Announces the Successful Syndication of an Innovative ESG-Indexed Revolving Credit Facility; Nov 27, 2018. Poh, J. & Seligson, P.; May 24, 2021
[160] Rainforest Action Network; Banking on Climate Chaos: Fossil Fuel Finance Report 2021; Mar 24, 2021. Carothers, A.; Is Paris Burning? Why Banks Have Sunk $4 Trillion into Fossil Fuels Since Treaty; Climate & Capital Media; Mar 24, 2021

2030. Citi's pledge is $1 trillion consistent with the SDGs, including $500 million in climate-related investment by 2030.[161]

Many banks are working to understand and publicly report on the carbon footprint in their loan portfolios. Citi and B of A, for instance, are among 140 financial institutions around the world that have joined the Partnership for Carbon Accounting Financials (PCAF), which describes itself as an industry-led initiative to measure and disclose, under a consistent standard, GHG emissions financed by loans and investments. The disclosure is intended to "trigger changes in banks' and investors' portfolios which align with the goals of the Paris Agreement."[162] B of A, in announcing its net zero plan, committed to disclosing financed emissions by 2023.[163] As in so many aspects of the route to sustainability, the PCAF is joined by several similar efforts, including the Net Zero Banking Alliance, the Glasgow Financial Alliance for Net Zero, and the Climate Safe Lending Network. They, in turn, build on certain foundational efforts, such as the UN's Principles for Responsible Investment (PRI).

Securitizations (Asset-Backed Securities and Mortgage-Backed Securities) – The SEC defines asset-backed securities (ABS) as securities backed by a discrete pool of self-liquidating financial assets, and asset-backed securitization as a financing technique in which financial assets, in many cases themselves less liquid, are pooled and converted into instruments that may be offered and sold in the capital markets.[164] The pooled financial assets can include leases, loans, contracts, receivables or other non-real estate financial assets. Mortgage-backed securities (MBS) are essentially exactly like ABS, with payments flowing from pools of real estate mortgage loans. ABS and MBS succeed or fail based on the strength and quality of the financial assets backing the securities.

The securitization examples below include pools of car loans, solar leases, and energy efficiency projects. As buildings account for roughly 40% of US energy consumption, split roughly evenly between commercial and residential uses,[165] there is a very large potential market for energy efficiency retrofits, leading to the multiple benefits of reduced carbon emissions and water use, lower utility bills, and more clean energy jobs.

Green securitizations include:

- Hannon Armstrong, a financing firm specializing in renewable energy and energy efficiency projects, issued the first labeled green ABS in December 2013. The $100 million private placement was backed by wind, solar and energy efficiency projects at 20 properties.[166] Hannon Armstrong has issued a total of $5.3 billion in green bonds, of which $3.7 billion are ABS. Hannon Armstrong now manages $7.2 billion in energy efficiency and renewable projects and estimates that its investments result in 5.2 million tons of reduced CO2 emissions annually. In addition to standard financial metrics, Hannon Armstrong measures the efficiency of its investments in GHG reductions per dollar invested. [167]
- Fannie Mae, the US mortgage financing agency, has been the world's most prolific green bond issuer, with MBS issues exceeding $85 billion. To receive financing through

[161] Bank of America press release; Bank of America Increases Environmental Business Initiative Target to $1 Trillion by 2030; Apr 8, 2021. Citigroup press release; Citi Commits $1 Trillion to Sustainable Finance by 2030; Apr 15, 2021
[162] Partnership for Carbon Accounting website
[163] Bank of America press release; Bank of America Announces Actions to Achieve Net Zero Greenhouse Gas Emissions before 2050; Feb 11, 2021
[164] SEC; https://www.sec.gov/rules/final/33-8518.htm#P174_14586; Mar 8, 2005
[165] US Department of Energy; 2011 Buildings Energy Data Book; March 2012
[166] Trabish, H.; The $100 Million Green Bond from Hannon Armstrong; GreenTech Media; Dec 26, 2013
[167] Hannon Armstrong website; 2020 Annual Report. Hannon Armstrong website; CarbonCount

this program, residential building owners must commit to combined energy and water use reductions of 30%, including a minimum 15% energy use reduction. The loan proceeds fund the efficiency installations. Fannie Mae's program has received a Light Green second opinion from CICERO.[168]

- Toyota has issued green bonds totaling $6.1 billion through 2020, of which $5.5 billion were ABS used to fund purchase and lease contracts for Prius and other hybrid and low-emission vehicles. Toyota estimates that its February 2020 $750 million ABS will finance 25,000 vehicles that are 41% more fuel efficient than comparable vehicles, saving 65 million gallons of gas and reducing CO2 emissions by 692,000 tons over the vehicles' lifetime. Noting that Toyota's activities are "green-er," rather than specifically green, future Toyota issues might include the transition-related disclosures outlined above.[169]
- In November 2018, SunPower, in partnership with Hannon Armstrong, issued $440 million in securities backed by some 37,500 residential rooftop solar leases. 83% of the residential customers had FICO scores of 753 or better, and the issue was rated single-A.[170] This was one of seven solar ABS totaling $2.2 billion issued in 2018. Solar ABS can be backed by leases, Power Purchase Agreements (PPAs) and/or loans, and annual overall solar ABS volume has remained in the range of $2 to $3 billion over the last few years.[171]

The PPAs that are the building blocks of many green ABS are attractive for power purchasers because they can be used to lock in power prices at a reasonable and stable level (often at a discount to prevailing utility rates) over a long time period. In that way, PPAs can provide a hedge against volatile and rising energy costs. So, along with power, a PPA buys stability and predictability in an often volatile market. Volatile, however, means that sometimes prices drop, as they have been for solar and wind. So PPAs are like fixed-rate loans, which can be great or not, depending on whether your interest rate is above or below current rates.

Revenue bonds are municipal bonds often issued by a state or local authority and backed by a dedicated tax, user fee or other specific revenue. The repayment obligation for revenue bonds is limited to those dedicated sources, and the city, state or authority associated with the bonds does not have a legal obligation to make up any shortfalls. Should a shortfall occur, they might nonetheless choose to make it up so as to maintain fiscal stability, avoid disruptions in services, and protect their own credit rating and access to capital markets. Examples of green and social revenue bonds include:

- New York Metropolitan Transportation Authority (MTA) has issued a series of green revenue bond issues totaling over $11 billion from since 2016 for various projects in the public transit agency's capital plan. The bonds are repaid from MTA operating revenues, including subway, bus and train fares, along with NY State and City operating subsidies.[172]
- Central Puget Sound Regional Transit Authority issued $923 million in bonds in 2015 to expand the regional light rail system. The bonds will be repaid from sales tax revenue.[173]

[168] Fannie Mae website; Sustainable Bonds, Green Bonds; Fannie Mae Multifamily Green Bond Framework; July 2020
[169] Toyota Financial Services; Green Bond program. Toyota Financial Services; TMCC Green Bond Impact Report; Feb 2021
[170] Adams, M.; Hannon Armstrong Readies $440M Solar Lease ABS; Global Capital; Nov 5, 2018
SunStrong Capital Holdings LLC Successfully Completes 400 Million Asset-Backed Securitization; Sunpower.com; Nov 28, 2018
[171] S&P Global; Solar Securitizations Present Yield, ESG Play for Institutional investors; Dec 16, 2020

[172] CBI; Certification; New York Metropolitan Transportation Authority. Fitch Ratings website; Fitch Rates MTA, NY's Transportation Rev Bonds 'A-'; Outlook Negative; Feb 2, 2021
[173] Deshais, N.; Seattle Transit Joins Spokane with Green Bonds; The Spokesman-Review; Aug 11, 2015

- DC Water issued a $350 million green century bond in 2014 to be repaid from user fees. DC Water, like most water districts, has a monopoly on supply plus the authority to set rates at levels required to cover costs, including debt service costs.[174]
- As a part of its effort to address homelessness, California authorized $2 billion in revenue bonds to create permanent housing through its No Place Like Home program. For the program's most recent funding round, the state's Health Facilities Financing Authority issued $450 million in social bonds in November 2020. Counties receiving the funding must commit to providing mental health and other supportive services for the residents. The bonds will be repaid from a dedicated portion of a 1-percent state tax on income in excess of $1 million.[175]
- The Alabama Public School and College Authority issued $1.5 billion in social bonds in October 2020. The funds will be used for capital improvements at public schools, including colleges and universities throughout the state. The bonds will be repaid from various taxes pledged by state law into the state's Education Trust Fund.[176]

Project Finance is debt issued to create a specific project, with repayment of the debt generated solely from the cash flow of the financed project. Project finance is typically used for proven models, where the projected cash flow is considered predictable over the term of the financing, and it is a major form of financing for large-scale wind and solar projects. Moody's studies have found that projects with green uses had lower default rates than non-green projects.[177] The Frankfurt School of Finance & Management estimated worldwide project finance investment in renewables at $91 billion in 2017, down slightly from the 2016 level.[178]

Examples:

- A renewable natural gas project in Arizona, where methane from cow manure is captured, processed, piped and sold, was financed in 2018 with $61 million of tax-exempt industrial development bonds underwritten by Equilibrium Capital.[179]
- A series of Chinese projects in 2015, including an $856 million off-shore wind farm, a $420 million on-shore wind farm, and a $480 million solar project. China has been the leading location for renewables finance for the past several years.[180]
- A solar power plant in Chile, called the largest in Latin America, financed in 2014 by $47.3 million in project bonds underwritten by Bank of America Merrill Lynch and guaranteed by OPIC.[181]

Policy-Based Practices

This category is for investment mechanisms specifically created by public policy. In addition to traditional command and control environmental regulation ("you must do this; you may not do that"), accompanied by public spending, governments at all levels have increasingly experimented with market-based and incentive-oriented solutions.

[174] DC Water; DC Water Announces Successful Sale of $350 Million Green Century Bonds; Jul 10, 2014
[175] Our Weekly; Revenue Bonds Sold to Support No Place Like Home Program; Nov 5, 2020
[176] Alabama Public School and College Authority Official Statement; Oct 22, 2020
[177] Moody's Investors Service; Moody's: Project Finance Bank Loans for Green Use-Of-Proceeds Projects Demonstrate Lower Default Risk; Sept 18, 2018; Moody's Investor Service; Moody's: Sustainable Project Finance Bank Loans Demonstrate Lower Default Risk; Aug 17, 2020
[178] Frankfurt School of Finance & Management; Global Trends in Renewable Energy Investment 2018. Frankfurt School – UNEP/Bloomberg New Energy Finance
[179] Equilibrium Capital; Turning Livestock Waste into Renewable Fuel: Green Bond Case Study; presentation at Conservation Finance Investor Conference; Jan 9, 2019
[180] ibid
[181] Kidney, S.; Now Here's Something to Like; Climate Bonds Initiative website; Sept 25, 2014

Broadly speaking, the policies are designed to create financial value for desired activities and costs for undesirable activities. Such policies can "internalize externalities" by placing a cost on pollution, for example, and a value on conserving air, water, habitat and bio-diversity resources – and thereby trigger investment.

The strategies include traditional policy-based incentive programs such as tax credits for preferred activities, which is just a step away from direct public expenditures, as well as taxes on undesirable activities, plus guarantees and other credit supports such as cap and trade programs. It is important to note, as well, that even command and control environmental regulation, although not a financing mechanism, triggers a great deal of investment and economic activity. The whole industry of environmental services, for instance, is based on meeting environmental regulations.

There is widespread agreement that reaching the level of investment needed to address climate change and other critical sustainability challenges will require public policy support. As discussed above, McKinsey has found that 50% of the investment needed for the EU to reach net zero by 2050 is not currently profitable and will require an intervention such as a price on carbon. And the US CFTC report, in its call for "an economy-wide price on carbon…at a level that reflects the true social cost of those emissions," warned that "a world wracked by frequent and devastating shocks from climate change cannot sustain the fundamental conditions supporting our financial system."[182]

Carbon Pricing Initiatives include cap and trade programs as well as direct pricing systems, such as carbon taxes. Per World Bank data, 45 countries and 35 subnational jurisdictions have emissions trading or carbon taxes in place or fully approved and scheduled to be put in place as of April 2021. In 2020, these initiatives raised $53 billion (up from $33 billion in 2017) and collectively cover an estimated 21.7% of global GHG emissions.[183]

Despite the growth of these pricing initiatives, even where they exist, they tend to be well below the level the World Bank estimates is needed to meet Paris targets. While most nations and jurisdictions recognize the environmental value (two-thirds of countries' submitted NDCs include carbon pricing in some form),[184] they are reluctant to disrupt existing energy markets and jeopardize existing jobs. Moreover, they do not want to put themselves at an economic disadvantage relative to others who do not place a price on carbon. There are policies designed to address these concerns, often involving a very visible offset or rebate, but the immediate impact is disruption. And, with such examples in recent years as the Yellow Vest protesters in France and the voters of eco-friendly Washington State, who have now twice voted down a carbon tax, it is clear that there can be serious political hurdles to implementing higher levels of carbon pricing.

A Commission on Carbon Prices, convened by the World Bank, concluded that achieving the Paris temperature target would require carbon prices of US$40 to $80 per ton of CO2 by 2020 and $50 to $100 by 2030.[185] In contrast, nearly 80% of emissions are not currently covered by any price, and just 3.76% of covered emissions are priced at $40/ton or higher (as of April 2021).[186]

[182] e.g., ACTIAM, et al. The Paris Green Bonds Statement; Dec 2015. McKinsey; Dec. 3, 2020. CFTC, Climate-Related Market Risk Subcommittee; 2020.
[183] World Bank; Carbon Pricing Dashboard. World Bank; State and Trends of Carbon Pricing 2021.
[184] UNFCCC; About Carbon Pricing
[185] World Bank; Report of the High-Level Commission on Carbon Prices; 2017
[186] World Bank; State and Trends of Carbon Pricing 2021

Following is a high-level summary of cap & trade and direct pricing systems:

- **Cap & Trade** is a pollution control system that combines command and control regulation with market forces. Under cap and trade, a governmental jurisdiction places an absolute cap, declining over time, on a particular pollutant, and then divides that cap, via permit, among all companies emitting the pollutant. As the cap ratchets down, companies can meet their new, reduced cap by either reducing their emissions or purchasing emissions allowance from another firm. The firm that sells (i.e., trades) pollution allowance under its permit cannot exceed its now-reduced cap, but it has been able to turn its reduced emissions into a source of earned revenues.[187]

  A very successful federally-approved cap & trade program has been in place in the US since 1990 to control sulfur dioxide emissions – the gases responsible for acid rain.[188] Examples of CO2 cap and trade systems in place include:

  - Regional Greenhouse Gas Initiative (RGGI) -- a cap and trade program jointly administered by 11 Northeast and Mid-Atlantic US states under which CO2 pollution permits are auctioned to power producers, who may trade them with other power producers within the participating states. States have used the auction proceeds to support energy efficiency and related policy objectives.[189] Connecticut, for instance, uses a portion of its RGGI auction proceeds to capitalize the Connecticut Green Bank.[190]

    RGGI is the first mandatory GHG reduction program in the US, with its cap in place as of 2009. The system covers an estimated 23% of regional emissions,[191] and the years since RGGI's introduction have coincided with a rapid shift from high-carbon fuel sources (coal and petroleum) to lower cost and lower-carbon natural gas, with the result that emissions have fallen below the cap and may well have reached their current level without RGGI. As a result, the Congressional Research Service notes, the auctions have functioned more like a carbon tax. More recently, the states recalibrated the cap, starting from current actual levels, and the program is functioning more closely to the initial intension.[192] In RGGI's most recent auction (June 2021), bids received exceeded available emissions allowances by 2.3 times, and the median price was $7.89/ton.[193] Since the program began, power sector emissions have fallen by about 50% while the regional GDP has grown, also by about 50%. Both of these figures exceed national averages. Emissions caps are set to drop by another 30% through 2030.[194]

  - The European Union cap and trade system dates to 2005 and primarily covers the power sector and certain heavy industries, an estimated 40% of EU emissions. The EU is working towards expansions of the system, including more aggressive emissions reduction targets, as well as the addition of new economic sectors. The 2030 emissions target for covered sectors would move up from a 40% reduction to 55% as compared to a 1990 baseline. The additional sectors under consideration, most particularly land transport and buildings, are more consumer facing – impacting the cost of gas for cars and home heating fuel.

[187] Environmental Defense Fund website
[188] Conniff, R.; The Political History of Cap and Trade; Smithsonian Magazine; Aug 2009
[189] Regional Greenhouse Gas Initiative (RGGI) website
[190] Connecticut Dept. of Energy & Environmental Protection; Regional Greenhouse Gas Initiative; Nov 2018
[191] World Bank; State and Trends of Carbon Pricing 2021
[192] Ramseur, J.; The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress. Congressional Research Service; Apr 27, 2016
[193] RGGI website
[194] ibid. Acadia Center; The Regional Greenhouse Gas Initiative: 10 Years in Review; 2019

They therefore act as a de-facto regressive tax and are generating considerable debate prior to implementation.[195]

As with other cap and trade systems, the EU system has often acted more like a tax, with excessive permits and allowances rarely forcing companies against hard caps, but that is changing. Whereas the price of emissions allowances traded below €10 per ton of CO2 for many years prior to early 2018, most recently, they have spiked above €50. Many expect this general price level to hold, if not continue to rise, assuming the new 2030 emissions reduction target goes into effect, as it includes a 2.2% reduction in allowances per year.[196]

- China, which had previously introduced eight regional cap and trade pilots, launched a nationwide system at the beginning of 2021. The nationwide and regional systems will initially operate in tandem. China's system will be limited to the power sector, covering 30% of the country's GHG emissions. Trading of allowances began in the second half of 2021, and Citibank has estimated they will initially trade for about $4 per ton of CO2, gradually rising to about $25 by 2030. Actual emissions reductions attributable to the cap and trade system are likely to be modest in the near future.[197]

- **Direct Pricing Systems** – This category includes, most prominently, carbon taxes and other carbon pricing schemes that do not involve a swap. Ideally, the price reflects all external costs – to the environment, to health, etc. – flowing from the use of carbon-based fuels and resources.

  Carbon taxes are not necessarily, in and of themselves, sustainable financing mechanisms in that the funds raised can be used for any purpose. In the US, for instance, perhaps the most commonly proposed use of proceeds from a federal carbon tax is a direct repayment to individuals, a "carbon dividend," something other countries have implemented. Even still, by raising the price of carbon-based resources to levels that more accurately reflect their full costs, these tax and pricing systems can trigger substantial private investment in renewable and other reduced-carbon resources.

  Examples include:

  - Canada has carbon pricing systems in some provinces (which may be cap and trade or a carbon tax) with a national carbon tax imposed as a back-stop where provincial systems do not exist or do not meet federal minimum standards. Under Canada's plan, the price of allowances will rise from the current equivalent of US$24 per ton to US$135 in 2030 (at current exchange rates). The program includes rebates to households ("Climate Action Incentive Payments"). The government estimates that most households will receive more in rebates than they pay as a result of carbon taxes.[198]

  - Sweden's carbon tax, in place since 1991, is the world's highest, at $137 per ton. It was implemented as a "green tax-switch" under a broad-based tax reform generally designed to reduce the overall level of taxes. The carbon tax goes into Sweden's general fund and is not targeted towards any particular use. Sweden exempts many areas of industry and the tax covers about 40% of national

[195] The World Bank; State and Trends of Carbon Pricing 2021. International Carbon Action Partnership (ICAP); EU Emissions Trading System (EU ETS); Aug 9, 2021. Khan, M. & Fleming, S.; Poland Pushes Back Over Cost of EU's Climate Targets; Financial Times; May 25, 2021
[196] Nicholls, M.; Why European Carbon Prices Could be Higher for Good; Energy Monitor; Jun 7, 2021. ICAP; Aug 9, 2021.
[197] The World Bank; State and Trends of Carbon Pricing 2021. Nogrady, B.; China Launches World's Largest Carbon Market: But is it Ambitious Enough?; Nature; Jul 20, 2021. Murtaugh, D.; China's Carbon Market to Grow to $25 Billion by 2030, Citi Says; Bloomberg Green; Mar 8, 2021
[198] World Bank; State and Trends of Carbon Pricing 2021. Canada, Government of, Department of Finance Canada; Climate Action Incentive Payment Amounts for 2021l

emissions. Sweden's electric grid is largely powered by nuclear and hydropower, so the tax tends to cover transportation uses, including gas for cars, as well as heating for buildings.[199]

- Japan is perhaps more typical. It introduced its carbon tax in 2012 and uses its revenues for efforts to mitigate climate change, including subsidies for energy conservation projects. The tax is set at approximately $3 per ton of CO2.[200]

As countries design carbon pricing strategies to reduce emissions, they are justifiably concerned about unfair competition from industries based in countries with no or low carbon prices. It is for this reason that many countries have thus far exempted large parts of their economies from carbon taxes. The exemptions, of course, mean that those industries make little headway on carbon reductions. To address this issue, the EU is designing a tariff, a "Carbon Border Adjustment Mechanism," effectively placing a carbon tax on imports to maintain fair competition for domestic industries also subject to a carbon tax. Other countries are also considering such a border tax, and yet other countries are considering challenges to such a tax as a restraint of trade.[201]

Carbon taxes are, of course, public levies, but there are also many private carbon pricing systems in place. CDP, based on carbon reporting data from over 5,900 companies throughout the world, reports that 853 companies had internal carbon prices in place in 2020, nearly six times the number from 2014, with 1159 additional companies planning on having pricing systems in place within two years. These include 226 of the world's 500 largest companies, as measured by the market capitalization. The average reported internal carbon price was $25 per ton.[202]

Companies cite forward-looking reasons for voluntarily creating internal carbon prices, including:

- Driving efficiencies – Many companies use a carbon price to incentivize energy efficiencies and other savings strategies.
- Managing risk – Companies learn where their vulnerabilities are as they manage GHG regulations or prepare for the imposition of externally mandated carbon prices. Of the reporting companies, 1,113 are already subject to some form of carbon regulation and 717 more expect such regulation within the next three years.
- Discovering opportunities – The transition to a lower carbon economy will create many business opportunities, and companies can use internal pricing to help determine where it may have advantages and to begin developing and rolling out those strategies.[203]

Companies with internal carbon pricing come from a wide range of industrial sectors. As of 2020, over 50% of responding companies in the power, fossil fuel and financial services sectors report that they price or plan to price carbon within the next two years.[204]

[199] Jonsson, S., et. al.; Looking Back on 30 Years of Carbon Taxes in Sweden; Tax Foundation;
Sep 23, 2020. Johansson, B.; Economic Instruments in Practice 1: Carbon Tax in Sweden; OECD; undated, ca. 2000. IEA; Energy Policies of IEA Countries: Sweden 2019 Review; Apr 2019
[200] Japan For Sustainability website; Japan Introduces New Tax on Carbon Emissions; 2013. Timperley, J.; The Carbon Brief Profile: Japan; carbonbrief.org; Jun 25, 2018. World Bank; State and Trends of Carbon Pricing 2021
[201] ibid. Scriven, Guy; May 17, 2021
[202] CDP; Putting a Price on Carbon: The State of Internal Carbon Pricing by Corporates Globally; 2021
[203] ibid
[204] ibid

Tax credits – The US federal government provides tax credits for solar and wind renewable energy installations, as it does for a wide variety of other activities it seeks to encourage (including oil and gas production). The credits provide a direct deduction against investors' federal income taxes, triggering private investment by effectively lowering the cost and increasing the return on eligible activities. Tax credits in support of sustainable activities include:

- Wind and solar investment. Investment tax credits (ITCs) are a deduction against the cost of building a facility or project. The wind and solar ITCs were renewed by Congress at the end of 2020, as they have been renewed several times earlier. The solar ITC is currently set at 26% of the cost of projects commenced by the end of 2022, and 22% for projects commenced by 2023, stepping down to 10% for commercial and large-scale projects thereafter (and phased out altogether for home installations in 2024). The wind ITC is 30% of project costs for off-shore projects begun by 2025.[205]
- On-shore wind production. Production tax credits (PTCs) effectively reimburse producers for energy produced, thereby enabling energy to be sold to consumers at a lower price. Under current legislation, the PTC is up to 2.5 cents per kilowatt-hour of generated electricity for on-shore projects begun by the end of 2021.[206]
- Carbon capture. This tax credit, known as "45Q," is set at $50 per ton of CO2 that is captured and stored permanently, and $35 per ton of CO2 captured and reused. The National Petroleum Council estimates that 45Q can trigger carbon capture of 25 to 40 million tons per year, the equivalent of roughly 5 to 8 million cars off the road per year. Under current law, the credit is available for projects put into construction by January 1, 2024, and can be applied to carbon captured and stored during the 12-year period beginning on the date the project is placed into service.[207]
- Investment in low-income communities. The New Markets Tax Credit (NMTC) provides a credit totaling up to 39% of project costs for investment in low-income census tracts. The credits are awarded on a competitive basis, with a heavy emphasis on job creation and community benefit. The NMTC is used by Community Development Financial Institutions (CDFIs), commercial banks and others to effectively bring down the cost of investment. It is used for a range of uses, including the development of retail, office and manufacturing facilities, as well as community facilities, such as health centers and charter schools. Per the US Treasury Department, the NMTC program has generated $8 of private investment for every $1 of tax forgiveness.[208]
- Production of low-income housing. The Low-income Housing Tax Credit (LIHTC) can offset up to approximately 70% of the cost of a rental housing development. In return for receiving the credit, rents must be kept, for at least 15 years, at levels affordable to lower income households. There are differing formulas, but generally at least 40% of the tenants must have income upon occupancy at no more than 60% of the area median income. LIHTC has been the primary subsidy

[205] St. John, J.; Congress Passes Spending Bill with Solar, Wind Tax Credit Extensions and Energy R&D Package; Green Tech Media; Dec 22, 2020
[206] Ibid. US Environmental Protection Agency (EPA); Renewable Electricity Production Tax Credit Information
[207] National Law Review; Treasury Department Finalizes Regulations to Govern 45Q Tax Credits for Carbon Capture and Sequestration; Jan 27, 2021. EPA; Greenhouse Gas Emissions from a Typical Passenger Vehicle. Bomgardner, M.; 45Q, the tax credit that's luring US companies to capture CO2; Chemical & Engineering News; Feb 23, 2020
[208] Novogradac; New Markets Tax Credit Resource Center; Tax Policy Center; What is the New Markets Tax Credit, and How Does it Work?. US Department of the Treasury, CDFI Fund; New Markets Tax Credit Fact Sheet

for the production of affordable rental housing in the US since the 1990s, supporting the production of over two million units.[209]

Tax credit programs are often kept on rather short authorization leashes. Congress approves them with a sunset date, and tends to provide short-term renewals (such as 3 years), with industry interest groups lobbying for longer extensions and higher credit values. For the wind and solar programs, current proposals include 10-year extensions, as well as expansions of the credits to include domestic manufacturers in the supply chain for renewable energy equipment. The industry is now largely dependent on imported equipment.[210]

Guarantees & Loan Programs – The U.S. Department of Energy (DOE) has large-scale loan and loan guarantee programs, with a $30 billion portfolio and $40 billion in remaining authority. The DOE reports that the existing portfolio has created more than $50 billion in total investment in clean energy projects while generating $500 million in surplus revenues above program costs. Nonetheless, the program may have become most widely known through a controversial $535 million loss when it guaranteed a loan to Solyndra, a solar power firm that shuttered in 2011. Because of that controversy, the program has been essentially dormant since 2011, approving only a single loan and a single guarantee and largely limiting its activities to servicing the existing portfolio. Despite the Solyndra loss, the program reports overall losses at 3% of total volume, a reasonably low figure for a program of this type. DOE reported the program was generating surpluses by 2014.[211]

The Biden administration plans to revive the program, and the program's new director sees the it as "a bridge to bankability for technologies that can have a big impact," with the program serving "as a jumping off point for commercial lenders to come in…"[212]

A number of states have created Green Banks for investment in clean energy and similar projects. Green Banks often follow a public/private model, with public funds used to leverage larger amounts of private investment.[213] New York's Green Bank reports over $1.2 billion in clean energy investments.[214]

Water Quality and Habitat Preservation Trading Systems -- Regulatory structures can create markets by placing limits on pollutants and environmental damage while allowing flexibility on methods used to meet the limits. Cap and trade is the most prominent example of this, but the model has variants.

In each example, one party purchases credits conferring a right or license to alter or degrade an environment within limits, with the purchase price going to a second party which uses the funds to create an offsetting environmental benefit and receive a return. Each program intends to create no net environmental loss (or, ideally, a net environmental benefit), while creating economic benefits for participants.

Examples include:

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[209] Novogradac; Affordable Housing Resource Center, About the LIHTC; Tax Policy Center; What is the Low-Income Housing Tax Credit, and How Does it Work?. Legal Service of the Hudson Valley; What You Need to Know About Low Income Housing Tax Credits; LawHelpNY.org
[210] Hawkins, M. & Eckhouse, B.; U.S. Solar Manufacturers Would Get Tax Credit in Ossoff Bill; Bloomberg Green; Jun 21, 2021
[211] US Department of Energy Loan Programs Office website. Doom, J.; U.S. Expects $5 Billion From Program That Funded Solyndra; Bloomberg; Nov 12, 2014; Wolff, E.; DOE's First Task for Loan Guarantees: Calming Industry Nerves; Politico; Mar 17, 2021
[212] Wolff, E.; Mar 17, 2021. Henner, N.; How Could DOE's $40B Loans Program Fund Efficiency? The New Director has These Ideas; American Council for an Energy-Efficient Economy (ACEEE); May 11, 2021
[213] National Renewable Energy Laboratory; Green Banks; nrel.gov. Coalition for Green Capital website
[214] New York Green Bank website

- ***Mitigation banking and conservation banking*** – These programs are designed to restore, create and/or preserve habitat, with mitigation banking focused on wetlands and aquatic resources and conservation banking focused on habitat needs of endangered species. In each case, the "bank" refers to physical property protected from development and managed to preserve the intended environmental benefit. In return, the owner of the property receives credits which he or she can sell to a second party developing property elsewhere that has triggered a need for mitigation. The programs, therefore, create financial incentives for owners of substantial and environmentally significant properties to keep those properties intact.[215] The US Fish and Wildlife Service (FWS), which administers conservation banking credits, reports the establishment of more than 130 conservation banks conserving 142,000 acres of habitat protecting over 70 threatened or endangered species.[216]

  As compared to emissions cap and trade systems, which can scale essentially immediately, with known parties and directly measurable emissions, mitigation and conservation banking have a series of impediments to scale, including a lack of publicly available market data, variable levels of demand for credits and the inherent lack of certainty with regard to the scale of mitigation required. These create uncertainties with the timing of approval processes on both the development and mitigation sides of the transaction.[217]

- ***Stormwater credits*** – To reduce pollution of local rivers and streams and to protect the Chesapeake Bay Watershed, the District of Columbia (DC) in 2013 established a rule in which real estate development or redevelopment in excess of 5,000 square feet triggers stormwater retention requirements, at least 50% of which must be provided on-site. Owners can meet the remaining requirement by purchasing privately-traded Stormwater Retention Credits from other sites or paying a fee to the District Department of Energy and Environment. The District places the fees into a special fund used to build green infrastructure to retain runoff.[218]

  Though modest in size, the program is growing steadily. Through FY 2019, the Retention Credit trading program has approved 105 sites, many of which are still in various stages of development. The District reports that sites now in use have capacity to retain over 350,000 gallons per year. Although this is small relative to the estimated 2.5 billion gallons of untreated overflow, a Department spokesman estimated that new retention volume is increasing 10 times faster under the new program compared to historical volume growth.[219]

  To fuel the market for a Stormwater Retention Credit Trading Program, the Nature Conservancy (TNC), Encourage Capital and Prudential Financial created a $1.7 million fund to build green infrastructure to create credits that can then be sold to developers of sites that need credits to meet retention requirements.[220] Though modest in size, this program appears readily replicable in the growing number of jurisdictions creating stormwater retention programs as a strategy to clean local waterways and maintain clean water supplies. Grand Rapids, Michigan and Chattanooga, Tennessee are

[215] US Fish & Wildlife Service website, Conservation Banking, Incentives for Stewardship; US Environmental Protection Agency website, Mitigation Banking Factsheet
[216] US Fish & Wildlife Service website; Endangered Species; For Landowners, Conservation Banking
[217] Hook, P. & Shadle, S.; Navigating Wetland Mitigation Markets: A Study of Risks Facing Entrepreneurs and Regulators; Convention on Biological Diversity website; Dec 2013
[218] Branosky, E.; From Grey to Green: Stormwater Trading in Washington D.C. River Voices; The River Network; July 2015
[219] District Of Columbia, Department of Energy and Environment; Stormwater Retention Credit Program Fiscal Year 2019 Summary Report; February 10, 2021. Quantified Ventures website; DC Water: First Ever Environmental Impact Bond. Metropolitan Planning Council website; Stormwater Credit Trading: Lessons from Washington D.C.; Jan 23, 2019
[220] The Nature Conservancy; New Investment Model for Green Infrastructure to Help Protect Chesapeake Bay; Mar 7, 2016

developing similar programs.[221] TNC identifies stormwater runoff as the world's fastest growing source of water pollution.[222]

The model is also applicable to other types of pollution and demonstrates the kind of private market that can be created once a governing jurisdiction places a limit on a particular source or type of pollution. It can also be seen as a combination of cap & trade plus a pollution-related tax.

PACE - Property-assessed clean energy (PACE) programs provide financings for real property improvements to conserve energy and water. PACE financings, which require enabling state and/or local legislation, are secured by the property and repaid via an assessment added to the property tax bill. Should the owner sell the property, the assessment stays with the property and becomes the responsibility of the new owner. PACE programs are currently available in 26 states, plus the District of Columbia. In most states PACE is limited to commercial properties, though it is also approved for residential properties in California, Florida and Missouri. Enabling legislation to expand the practice is pending in other states.[223]

PACE programs are designed to overcome a particular and significant barrier to energy and water efficiency investment -- owners do not know if they will own a property long enough to recoup the costs of the efficiency installations. That is, energy and water cost savings should exceed the PACE-related property tax increment, and property owners should therefore realize immediate monthly savings. The full costs of the efficiency project, however, take some years to fully recoup. Under PACE, if the owner sells the property, any remaining project costs are transferred to the new owner. In this way, the new owner picks up right where the previous owner left off, benefiting from the continued energy cost savings, but shouldering the remaining project costs. It is important to note that the level of cost savings from efficiency installations is highly dependent on the quality of the installation. Homeowners seldom have experience with this kind of project and are sometimes victims of shoddy work, leaving them saddled with the cost of the project but inadequate energy savings to cover the cost. In 2020, Los Angeles County discontinued its residential PACE program, concluding that it "could not provide sufficient protection for all consumers." Similar problems are reported in the Florida and Missouri residential programs. These kinds of problems are not generally associated with commercial properties, which are professionally owned and managed.[224] The PACE trade association reports over $9 billion in efficiency investments in over 300,000 homes and 2,500 commercial properties.[225]

[221] Friedrich, K.; Stormwater Credits in D.C. Could Provide a Blueprint for Other Cities; Conservation Finance Network; Jun 6, 2016. Stormwater Currency; Establishing a Stormwater Volume Credit Trading Program; Sep 2019
[222] The Nature Conservancy; March 7, 2016
[223] PACE Nation website, the PACE trade association
[224] National Consumer Law Center; Los Angeles County Ends PACE Program Marred by Fraud, Abuse, and Unaffordable Loans; May 20, 2020. Jochim, V.; Are PACE Commercial Loans in Florida Risky or Worthwhile; Fiscal Rangers; Dec 18, 2020. Kohler, J. & Coryne, H.; State-Supported "Clean Energy" Loans Are Putting Borrowers at Risk of Losing Their Homes; Pro Publica; Apr 23, 2021
[225] PACE Nation website; PACE Market Data

Public/Private Partnerships

Public policy frames, in some respect, virtually all the financing activities described above. Regulations and limits are set, and private activity flows within the established framework. There are a number of areas, however, where the public and private sectors work much more directly in partnership to craft program initiatives that drive individual transactions.[226]

In these situations, the partnership typically includes the public sector working with the private non-profit and the private for-profit sectors. Often, the goal is to test and prove a model or framework that can be spun off and replicated at scale, with a reduced public sector role. Sometimes the nature of the problem is such that, even within a framework, the public sector retains a central role in each transaction.

The financing model generally places the public sector in the role of grantor or guarantor, taking the highest level of financial risk. The non-profit, which is often the advocating force behind the transaction, might provide a middle tier of funding, which could be on concessionary or market terms, and the private sector provides market rate financing in amounts appropriate to the carrying level of the project.

Examples of public/private partnerships include:

- ***Community Development Financial Institutions*** (CDFIs)[227] – CDFIs are investment organizations in the US that direct at least 60% of their investment, and often much more, into low-income communities. The investment is designed to trigger development without displacement, i.e., to improve communities for the benefit of the people living there. CDFIs are certified and monitored by the US Treasury Department. In addition to placing beneficial investments in low-income communities, CDFIs must have representatives of the communities they serve on their governing boards or an advisory board. Many CDFIs are non-profit entities.

  CDFIs use a blended finance, partnership model designed to combine private sector investment discipline while stretching limited public and philanthropic dollars. CDFIs' investment partners include foundations, commercial lenders, tax credit equity investors, municipal bond investors, public agencies, as well as other CDFIs. Bringing together these various partners, with their varying risk tolerances, enables CDFIs to address the different hurdles encountered at different stages in the life of the projects they finance.

  Affordable housing is a major focus of the CDFI sector. Additional areas of investment include small businesses, health care facilities, manufacturing and other areas that can create opportunity in communities that have long suffered from disinvestment.

  There are over 1,100 certified CDFIs, based in all 50 states, managing assets in excess of $220 billion. Individual CDFIs serve markets ranging from hyperlocal (a portion of a single city) to nationwide, with assets similarly ranging from the low six figures to several billion. CDFIs can also be important partners in developing policy. As one example, Enterprise, a Maryland-based CDFI with a national market, has developed "Green

[226] In contrast to public loan programs, where the public and private entities are often on opposite sides of each transaction, in partnerships they are typically working together, effectively on the same side of the transaction.
[227] The author has professional consulting engagements with multiple CDFIs.

Community Standards," which have been adopted by housing agencies in 27 states, plus DC, bringing green features to affordable housing.[228]

- **Debt for Nature Swaps** – Pursuant to the Tropical Forest Conservation Act (TFCA) of 1998, the US is able to forgive public debt, such as from the USAID, in exchange for conservation activities. Swaps can also be negotiated with the World Bank and other multilateral development banks, as well as with private lenders. An NGO is typically involved, often raising additional funds for the conservation efforts and assisting in establishing the governance and monitoring protocols for the conservancy area. Through mid-2013, when funding for the program ended, the US had concluded 20 agreements with 14 countries. The program was revived in 2019 as the Tropical Forest and Coral Reef Conservation Act, but lapsed again in 2020. Legislation to revive the program is before Congress.[229]

  The Nature Conservancy has negotiated a series of such swaps, and has recently built on the model using funds from impact investors, enabling more conservation activities. It has raised $15 million in impact capital loans plus $5 million in grants to retire Seychelles government debt. Seychelles is using the savings from its more manageable debt to protect marine areas from commercial fishing and oil exploration. The Seychelles sanctuary is about 158,000 square miles (roughly twice the size of Kansas), and comprise 30% of Seychelles' waters.[230]

- **Pay for Success Financing --** This is a type of performance-based contracting in which an investor funds an intervention to solve a costly problem, with return on the investment based on the degree of success (and cost reduction) achieved by the intervention. Pay for Success (PFS) financing is also referred to as Social Impact Bond (SIB) financing. Despite that name, this structure is generally not an actual "bond financing" as the term is understood in the financial sector.

  PFS is designed for situations where an entity, typically a public agency, is stuck in a cycle where it is obligated to direct substantial resources to pay for the high costs of some type of problem and may not have adequate resources for solutions. Often, as an agency or jurisdiction is allocating budget resources, which are always constrained, it is guided by the certainty of its obligation to pay for the consequences of the problem and the certainty of the costs of interventions versus the uncertainty as to when and to what degree a preventive intervention may be effective.

  PFS tries to break this cycle by bringing in private investors to fund the intervention. To the extent that the intervention is successful and yields savings, the agency pays the investor for the cost of the intervention, plus a return on the investment. Initial PFS contracts were clustered in social services, such as funding interventions to reduce criminal recidivism, improve job training, and provide early childhood supports to reduce the need for special education. Results have been mixed.[231] The model is now also being used for environmental sustainability-related transactions:

  - The Stormwater Retention Credit trading system discussed above is not the District of Columbia's only market-oriented pollution control experiment. In 2016, DC issued a $25 million Environmental Impact Bond (EIB), with a PFS design, to fund the construction of green infrastructure to reduce combined sewer overflows

[228] CDFI Friendly America website; Enterprise Community Partners; Green Communities
[229] USAID website. Financing Forest Conservation: An Overview of the Tropical Forest and Coral Reef Conservation Act. Sheikh, P. A.; Debt-for-Nature Initiatives and the Tropical Forest Conservation Act (TFCA): Status and Implementation; Congressional Research Service; Jul 24, 2018
[230] NatureVest website. Thande, George; Seychelles Preserves Swathes of Marie Territory in Debt-for-Nature Deal; Reuters; Feb 22, 2018. Williams, T.; Why Conservation Donors Get Behind Debt-For-Nature Deals; Inside Philanthropy; Feb 26, 2018. The Nature Conservancy website; Seychelles Hits 30% Marine Protection Target After Pioneering Debt Restructuring Deal; Mar 26, 2020
[231] Archer-Rosenthal, D.; Pay for Success: The First Generation; Nonprofit Finance Fund; Apr 2016

into Rock Creek. A successful green infrastructure program will enable the DC Water Authority to reduce the scope and cost of grey infrastructure tunneling and storage projects currently estimated at $2.6 billion.[232]

Under the EIB, return to investors depends on the degree to which the green infrastructure successfully meets design expectations and captures rainwater, thereby reducing runoff that is the main source of sewage overflows. The EIB evaluation was completed in May, 2021 and found that the infrastructure successfully retained runoff at expected levels. The investors' return is therefore at a normal market rate. Had the infrastructure performed outside the expected range, investors would have received a financial bonus or penalty.[233]

The concept has attracted several additional cities. The Atlanta Department of Watershed Management issued a similarly structured $14 million EIB in 2019, funding the construction of green infrastructure to reduce storm water runoff and protect water quality. In June 2021, The Buffalo, NY Sewer Authority issued a $54 million green infrastructure EIB, the largest such issue to date. Other cities that have recently closed or are working towards closing green infrastructure EIBs include Hampton, VA, Memphis and New Orleans. The EIBs tend to have a job creation component, as well, with a certain percentage of the workforce needed to build the green infrastructure going to local residents. [234]

- A second sustainability-related PFS structure, called a Forest Resilience Bond (FRB), is related to an agency that is too busy putting out fires, literally, to work on prevention – the US Forest Service, which is "trapped in a vicious cycle of paying for today's fires by borrowing funds intended to prevent tomorrow's."[235] The first FRB, for $4.6 million, closed in 2018. It is funding forest management services over 15,000 acres in the North Yuba River watershed in Tahoe National Forest designed to reduce burn severity and increase rainwater capture for local water districts. The return to investors is intended to come from savings from reduced fire-fighting costs and from increased revenues from water districts. Initial investors include an insurance company, along with NGOs and foundations. Repayment will come from the Yuba Water Agency and the California Department of Forestry and Fire Protection.[236]

  Participants have been pleased with the results, including improved water quality, and a second $25 million FRB is now in the works to fund management of adjoining California forest.[237]

Conservation Finance -- Whereas regulatory schemes are typically designed to put a price on pollution, the flip side is creating systems to recognize the value of healthy ecosystems in the first place. This would be conservation finance -- investing in ecosystems to conserve the ecosystems for the long-term[238] -- driving towards to a "nature-positive economy."

[232] Lisle, J.; DC Water Awarded Grant from Harvard University to Develop Innovative Green Infrastructure Financing Model; DC Water and Sewer Authority website; Mar 12, 2015
[233] Glazier, K.; D.C.'s Social Impact Bond Deal Will Fund Infrastructure; The Bond Buyer; Sept 2, 2016. Goldman Sachs, DC Water, Calvert Foundation; Fact Sheet: DC Water Environmental Impact Bond; 2016.
[234] Water Finance & Management; Atlanta DWM completes first publicly-issued Environmental Impact Bond; Mar 4, 2019. Quantified Ventures website; Buffalo Sewer Authority Issues Largest-Ever U.S. Environmental Impact Bond; Jun 22, 2021. Goldman Sachs website; Fact Sheet: DC Water Environmental Impact Bond. Thompson, A. Environmental Impact Bonds: Where are They Now?; University of North Carolina, School of Government, Environmental Finance Center; Jul 2, 2020. DC Water website; DC Water's Pioneering Environmental impact Bond a Success; May 27, 2021
[235] Madsbjerg, S.; Connaker, A.; Fighting Wildfire with Finance; The Rockefeller Foundation website; Oct 15, 2015
[236] Blue Forest Conservation & World Resources Institute; Forest Resilience Bond to Help Fund $4.6 Million Restoration Project to Mitigate Wildfire Risk in Tahoe National Forest; Nov 1, 2018
[237] Knight, Z.; Webinar Presentation to CDFI Climate Crisis Working Group; Jun 8, 2021
[238] Huwyler, F. et al.; Making Conservation Finance Investable; Stanford Social Innovation Review;

The University of Cambridge defines a nature-positive economy as one in which "public and private sector actors through choice and incentive take action at scale to reduce and remove the drivers and pressures fuelling the degradation of nature, actively improving the state of nature (natural capital) and the ecosystem services it provides." Natural capital is defined as the "stock of renewable and non-renewable resources (e.g. plants, animals, soils, minerals, ecosystems) that combine to yield a flow of benefits to people, referred to as ecosystem services." [239] Moody's notes that natural capital assets are "essential for human habitation and economic activity."[240]

The World Economic Forum (WEF) estimates that more than half of global GDP is highly or moderately dependent on nature. Meanwhile, an international network of scientists estimate that natural ecosystems have declined by 47% on average, and the global rate of species extinction is tens to hundreds of times higher than the average rate over the past 10 million years. Accordingly, the WEF categorizes biodiversity loss and ecosystem collapse as not only an "existential risk" in terms of potential impact, but also one of the highest global risks at this time, due the likelihood of high impact loss over the next five to ten years.[241]

A 2021 Moody's report brings this analysis to the level of individual companies, and finds that companies with $2.1 trillion in outstanding debt, including all extractive industries, face high or very high "natural capital risk." Additional sectors with $8.3 trillion in debt, such as homebuilding and apparel, face moderate exposure, which could increase to high exposure under more strict regulatory regimes designed to promote sustainability and conserve resources for future generations. Moody's analyzes natural capital risk based on companies' dependency on natural capital, as well as the companies' impact on natural capital, plus their exposure to reputational risk should they be perceived as, for instance, exploitative and/or contributing to biodiversity loss.[242]

Given the risks, a global consortium of NGOs, major financial institutions and technical experts have convened a Taskforce on Nature-related Financial Disclosures (TFND), created on the model of and coordinating with the Task Force on Climate-related Financial Disclosures (TCFD). The TFND is intended to enable companies to understand their impacts and dependencies on nature, and therefore their exposure to nature-related financial risks. The data will also inform other financial market actors, including regulators, lenders, and rating agencies. The Finance Ministers of the G7 have endorsed the TFND effort, which plans to launch a completed framework by 2023.[243]

Just as the TFND takes the TCFD as a model, so we can expect any movement towards a nature-positive economy to mirror efforts towards a zero-carbon, climate-positive economy. Specifically, many companies that profitably exploit natural resources without particular regard to future consequences will continue to do so as long as they are able. The TFND framework can nonetheless successfully guide capital towards more nature-positive uses if the framework and the data it produces are embraced by regulators, rating agencies, insurance companies, investors and responsible companies with a long-term outlook.

Jan 21, 2014

[239] Cambridge, University of; Institute for Sustainability Leadership; Handbook for nature-related financial risks: key concepts and a framework for identification; 2021. Capitals Coalition website; The Capitals Approach

[240] Moody's Investor Service; Moody's - $2.1 Trillion of Rated Debt Highly Exposed to Natural Capital Impact or Dependency; Jun 16, 2021

[241] World Economic Forum (WEF); Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy; Jan 2020. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; Global Assessment Report; 2019. WEF; The Global Risks Report; 2021.

[242] Moody's; Jun 16, 2021

[243] Taskforce on Nature-Related Financial Disclosures website.

Is such a paradigm shift possible? The WEF puts it succinctly: “Nature is declining at an unprecedented rate,” and “[t]here is no future for business as usual.”[244] And the WEF sees enormous opportunity in a nature-positive economy – the potential for $10 trillion in annual revenues and savings and 395 million jobs by 2030, as compared to business as usual. They estimate the investment need at $2.7 trillion.[245]

Nonetheless, business as usual has proven itself to be extremely resilient in setting after setting, and the kind of opportunity the WEF posits will only be possible within a regulatory framework that creates the boundaries, incentives and penalties needed to shift corporate behavior towards nature-positive growth. That is, the roadmap to a nature-positive economy includes the kinds of regulatory activity we have seen elsewhere. Specifically, legal caps are set at limits designed to enable sustainable use of resources, creating shortfalls in availability relative to unregulated use and thereby creating value that can attract investment and shift behavior and practices.

In the meantime, we have smaller-scale efforts, often within the context of a public/private partnership, such as the debt for nature swaps described above. The World Wildlife Fund (WWF) has catalogued a series of additional such mechanisms,[246] including:

- Payments for watershed services, with payments for water use used to maintain and restore water quality and watershed habitat. A locally prominent example is the substantial investments the City of New York, often working with private landowners, has made to maintain clean watersheds for its reservoirs and avoid far larger costs associated with after-the-fact clean up.
- Revenue from tourism and recreation, such as park entry fees and hunting licenses (eco-tourism).
- Bio-prospecting, where a corporation, such as a pharmaceutical company, makes payments to be able to search for and extract compounds from the flora of a given region. The payments are used to preserve the biodiversity of the region.
- Micro-finance, where WWF cites informal Village Savings and Loan Associations in Kenya and Tanzania, where members make loans to each other for projects promoting health, education and environmental sustainability.

REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is a prominent framework created under the UN in 2005 and designed to place a monetary value on carbon stored in forests and thereby create incentives for developing countries to protect forest systems. Countries and companies can purchase REDD credits to offset their carbon emissions, with the purchase price going towards forest conservation. The FAO reports 9 billion tons of CO2 emissions reductions in 13 countries via the REDD+ program from 2006 to 2018. 90% of those reductions are in Brazil.[247] As discussed above, whether net emissions reductions can accurately be attributed to this kind of program remains a matter of debate.[248]

Can conservation finance scale up to a level supporting a nature-positive economy? There is investment appetite, but the limiting constraint is a lack of investable projects with both

[244] WEF; The Future of Nature and Business; 2020
[245] ibid
[246] World Wildlife Fund; Guide to Conservation Finance; 2009
[247] NatureVest; EKO; Investing in Conservation; 2014. Food and Agriculture Organization of The United Nations (FAO); From reference levels to results reporting: REDD+ under the United Nations Framework Convention on Climate Change 2020 update; 2020.
[248] Yeung, P.; REDD+ Carbon and Deforestation Cuts in Amazon Overestimated: Study; Mongabay; Nov 2, 2020. Elgin, B.; A Top U.S. Seller of Carbon Offsets Starts Investigating Its Own Projects; Bloomberg Green; Apr 5, 2021

conservation benefits and clear risk-return profiles.[249] And as long as there is a clear financial return produced by exploiting natural resources, but no such clear return on the preservation of clean water and bio-diversity, huge obstacles to the development of nature-positive business opportunities will remain.

WWF et al. identify policy leadership as the key to unlocking conservation finance markets by using regulation to create value in otherwise "non-marketable" conservation benefits (as seen in cap and trade and posited for stormwater credits). "If both conservation and financial benefits are clear and cost-effectively measurable, the associated cash flows have the potential to be scaled up. With scale … risk can be pooled in a portfolio of projects across countries or across asset types." In the meantime, there is a continuing need for public and philanthropic investment, particularly as credit enhancement to induce private investment until the risks of this class of investment are better understood. [250]

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[249] This point was made repeatedly in #EcoFinanceChat reported in Grady, B. (May 16, 2016)
[250] Huwyler, F., et al.; Conservation Finance: Moving Beyond Donor Funding Toward an Investor-Driven Approach; Credit Suisse, World Wildlife Fund & McKinsey; 2014

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Amazon; The Climate Pledge Celebrates Surpassing 100 Signatories; Apr 21, 2021

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BP; 2020 Sustainability Report

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