



Center for
Sustainable
Business

Financing Mechanisms to Support Sustainable Practices

Tom Manning
Senior Research Scholar, NYU Stern
Center for Sustainable Business

September 2016

A Better World, Through Better Business

This paper is a survey/overview of financing mechanisms supporting sustainable practices, looking at current practice and the most promising new practices under development.

This paper is necessarily not deep on any one topic. It is intended as both an overview of the current state of play and foreseeable next steps, as well as a roadmap to a great deal of additional inquiry and research.

This paper divides the financing spectrum into two broad categories:

- Current & Prevalent Practices; and
- Emerging Practices

Current prevalent practices include all the standard categories of debt and equity, and policy-based practices (particularly, tax credits and cap and trade). The emerging practices section is organized differently, with a discussion of new applications of traditional mechanisms, followed by practices that put a price on pollution, those that place a value on conservation and finally, a public/private partnership category. The categories don't work perfectly, and dividing lines are necessarily subjective.

Summary of Findings

Direct investment to support sustainable practices is conducted at levels that measure in the hundreds of billions annually,¹ and examples can be found across the full spectrum of financing practices. Debt and equity financing for renewable energy, for instance, totaled \$286 billion in 2015, a figure that exceeded investment to further develop fossil fuels.²

Despite its prevalence, investment to support sustainable practices is often considered an emerging or niche field of finance, and perhaps it is, relative to the magnitude of investment needed to fully address environmental sustainability challenges, which the G20 have estimated at \$90 trillion by 2030.³

That rate of investment is at multiples of current levels, but private investors are indicating their interest in participating at much higher levels than currently. Environmental, social, governance (ESG) investing, primarily in the form of equity investments in the secondary market, i.e., purchasing shares of public companies through stock exchanges, is already in the trillions, as high ESG performers are proving to be high financial performers as well.

Reaching the yet higher levels of investment needed to address climate change and other critical environmental challenges will require public policy support, which investors have suggested in various forms.⁴ In addition to guarantees and other credit supports, regulation can help “internalize the externalities” – by placing a cost on pollution, for example, and a value on conserving air, water, habitat and bio-diversity resources thereby triggering investment.

Cap and trade is one successful government-driven investment model with a number of

¹ <http://www.institutionalinvestor.com/blogarticle/3580064/the-clean-energy-sector-is-no-longer-a-niche-business/banking-and-capital-markets-trading-and-technology.html>

² http://fs-unep-centre.org/sites/default/files/attachments/16008nef_smallversionkomp.pdf

³ http://www.climateactionprogramme.org/news/g20_commits_to_greening_90trn_of_investments_to_2030

⁴ e.g., ACTIAM, et. al. The Paris Green Bonds Statement; December 2015

variants. A cost is created by placing a limit (the cap) on a harmful resource or emission, and allowing flexibility in how that cap is achieved triggers an investment market. Direct costing, i.e., taxing undesirable activities, will trigger investment in preferred activities that are not subject to the tax. In either case, regulation unleashes substantial private investment, and without appropriate policy interventions, private investment is likely to be insufficient to meet sustainability goals.

Current & Prevalent Practices

This section includes a very brief description of each type of financing in current and widespread use; 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.

Debt Financing – labeled green and otherwise

Debt financing to support sustainable business, typically fixed-rate bonds of some variety, are increasingly known as green bonds, and increasingly specifically labeled as such. Labeled green bonds are designed to have an environmental benefit and typically follow published Green Bond Principles. An additional category is newly labeled as sustainability bonds, which are designed to have a mix of environmental and social benefits. Bloomberg reports that there have been 21 sustainability bond issues totaling \$4.6 billion as of May 2016.⁵ Through July 2016, labeled green bonds issued total approximately \$150 billion from over 700 issues, and the market is growing rapidly, with over half of the dollar total issued in 2015 and 2016.⁶ The Climate Bond Initiative puts total green debt, labeled and otherwise at nearly \$700 billion.⁷

Categories of debt financing used for sustainable finance include corporate and municipal debt, asset-backed securities and project finance. Each of these is described below, with examples of uses for sustainable purposes.

Full Recourse Debt is repaid by any and all assets of the borrower. The debt is typically issued with the expectation that it will be repaid from the operating cash flow of the borrowing entity. In the context of this discussion, full recourse debt includes corporate bonds and the bonds sold by Multilateral Development Banks (MDBs), as well as municipal bonds, including general obligation debt of states and municipalities and 501c3 bonds sold on behalf of nonprofit institutions.

Examples include:

- Starbucks – Issued \$500 million in sustainability bonds in May 2016. The proceeds will be used to purchase sustainably sourced coffee beans, as well as for initiatives to support farmers in coffee-producing regions.⁸
- Apple – issued \$1.5 billion in green bonds in February 2016 to fund the company’s conversion to its goal of 100% renewable energy, plus energy

⁵ Bloomberg; Starbucks Raises \$500 Million With Its First Sustainability Bond; by Emily Chasan; May 16, 2016

⁶ <https://www.climatebonds.net/2016/08/market-blog-breaking-green-abs-goldwind-greenko-8x-oversubscribed-nafin-announces-cecep>

⁷ Climate Bond Initiative – Bonds and Climate Change: State of the Market in 2016

⁸ ibid

efficiency conversions throughout its global operations and an increase in the company's use of biodegradable materials.⁹

- World Bank – issued the first labeled green bond in 2008 and has issued over \$9 billion in green bonds through over 120 transactions supporting projects designed to mitigate climate change or help affected people adapt to it.¹⁰
- Columbia University – issued \$50 million in green bonds in April 2016 for a new LEED-certified science center, joining such other universities as MIT, Virginia, Texas and Arizona State in using green bonds for LEED-certified development.¹¹

Asset-Backed Securities (ABS) – The SEC defines asset-backed securities as securities that are 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. ABS financing is often referred to as “securitization” or “asset-backed financing.”¹²

Examples include fixed income instruments created by purchasing and bundling a series of leases, loans, contracts, receivables or other non-real estate financial assets. ABS are essentially exactly like mortgage-backed securities (MBS), and like MBS, ABS succeed or fail based on the strength and quality of the assets backing the securities. To date, green ABS have performed as designed and expected.

Examples:

- 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. Hannon Armstrong estimates that it has issued approximately \$3 billion in ABS since 2000 for energy efficiency and renewable projects.¹³
- Securitized solar agreements: As of September 2015, five issues totaling \$560 million issued by Solar City, Sunrun and AES. The AES issue aggregates a portfolio of 15 projects totaling 43 megawatts of municipal, commercial and residential leases and Power Purchase Agreements (PPAs).¹⁴ Solar City has issued additional ABS in 2016.
- Toyota has issued three ABS, each over \$1 billion, through which it funds finance and lease contracts for Prius and other hybrid and low-emission vehicles.

It is worth noting that the Power Purchase Agreements (PPAs) that are the building blocks of many green ABS are attractive for power purchasers because they can be

⁹ <https://www.theguardian.com/sustainable-business/2016/mar/20/apple-green-bond-environment-energy-toyota-climate-change>

¹⁰ <http://treasury.worldbank.org/cmd/htm/WorldBankGreenBonds.html>

¹¹ <http://environment.columbia.edu/columbia-issues-first-green-bonds>

¹² https://www.sec.gov/rules/final/33-8518.htm#P174_14586

¹³ <http://www.greentechmedia.com/articles/read/The-100-Million-Green-Bond-From-Hannon-Armstrong>

¹⁴ Green Tech Media; AES Launches Asset-Backed Securities Based on Portfolio of Distributed Solar Generation; by Eric Wesoff; September 25, 2015

used to lock in power prices at a reasonable level over a long time period. In that way, PPAs can provide a hedge against volatile and rising energy costs.

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.

Examples:

- Central Puget Sound Regional Transit Authority - \$923 million in 2015 to expand the regional light rail system. Repaid from sales tax revenue. This is the largest municipal green bond to date.
- DC Water - \$350 million green century bond issued in 2014 and to be repaid from user fees, where 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.
- New York Metropolitan Transportation Authority (MTA) \$783 million in green revenue bonds issued in February 2016 for various projects in the public transit agency's capital plan.¹⁵

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. Bloomberg New Energy Finance estimated worldwide project finance investment in renewables at \$104 billion in 2015.¹⁶

Examples:

- 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.¹⁷
- 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.¹⁸

Equity

Initial Public Offerings (IPOs) – IPOs for green companies are often called green IPOs. Like green bonds, green IPOs are differentiated by their use of funds, not by their financial design or practices.

¹⁵ <http://www.climatebonds.net/2016/02/institutional-and-retail-investor-demand-mta-certified-green-bond-drives-upsizing-500m-7825m>

¹⁶ http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf

¹⁷ *ibid*

¹⁸ <https://www.climatebonds.net/2014/09/now-heres-something-opic-issues-473m-green-project-bond-guarantee-good-example-how-rich>

Yieldcos appear to be among the most common green IPOs. They are akin to an equity version of ABS and comparable to 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 company (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.

Although available for any number of uses, the yieldco structure is particularly associated with wind and solar projects because renewable energy is less established in the marketplace and other forms of financing may be more expensive or unavailable for them. Through 2015, yieldcos have raised approximately \$8 billion for solar power.¹⁹

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. To the extent that the yieldco is dependent on its parent company for new projects, the financial health of the yieldco can depend on the health of its parent. SunEdison, for instance, filed for Chapter 11 bankruptcy in April 2016, and it may be dragging its two spun-off yieldcos to a similar fate, as additionally described below.

Because yieldcos are, as the name implies, designed for yield, they are most attractive to investors when their regular dividend payments are attractive as compared to comparable instruments. When interest rates rise, particularly rates on ultra-safe US Treasury obligations, then yieldcos tend to lose value.²⁰

Examples:

- First Solar and SunPower Energy Corp jointly formed YieldCo 8point3 Energy Partners (8.3 being the time in minutes it takes for the sun's rays to travel to the earth).
- SunEdison has created two yieldcos, TerraForm Power and TerraForm Global. SunEdison fueled its growth through an "aggressive binge of debt-fueled acquisitions," as described by Reuters.²¹ Its two yieldcos are publicly-traded companies, but SunEdison owns a controlling interest. All three companies are highly leveraged, and litigation surrounding SunEdison's bankruptcy alleges that SunEdison structured transactions with the yieldcos to SunEdison's benefit and the yieldcos detriment. The stock prices of all three companies have severely underperformed energy sector stocks, even as the energy sector has significantly underperformed the market.
- Hannon Armstrong - In 2013, Hannon Armstrong launched the first US real estate investment trust (REIT) for renewables and energy efficiency infrastructure.

Secondary market equity investment – otherwise known as purchasing shares through the stock market, can be considered a sustainable financing mechanism for two

¹⁹ Zacks.com; Why Solar Energy Stocks are Forming YieldCos; by Madeleine Johnson; March 02, 2016

²⁰ <http://www.wsj.com/articles/ipos-bring-fresh-wind-for-green-investing-1430881499>

²¹ Reuters; Solar developer SunEdison in bankruptcy as aggressive growth plan unravels; by Tom Hals and Nichola Grooms; Apr 22, 2016

reasons, both of which flow from the fact that more and more investors care about sustainability issues and want to direct their investments towards companies supporting long-term sustainability:

- The growth of shareholder activism by major institutional investors, particularly public pension funds. One factor behind this kind of activism is that the pension funds' obligations are quite long-term, and they use their position as major shareholders to pressure companies to also adopt long-term thinking as reflected in the companies' ESG policies. There is also a political dimension here, with public pension funds directly or indirectly accountable to elected officials who choose both activism and ESG-directed investment as a means of reflecting policy preferences of their constituents.
- The rapid growth of ESG/SRI-directed investment funds, which is a direct statement of investor demand for shares of ESG/SRI-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/SRI-positive policies and for other companies to adopt these policies.

According to the Global Sustainable Investment Alliance (GSIA), the global ESG/SRI market grew from \$13.3 trillion at the outset of 2012 to \$21.4 trillion at the start of 2014, and from 21.5 percent to 30.2 percent of the professionally managed assets in Europe, the United States, Canada, Asia, Japan, Australasia and Africa.²² Per the Forum for Sustainable and Responsible Investment (US SIF Foundation), total US-domiciled assets under management using sustainability strategies grew from \$3.74 trillion in 2012 to \$6.57 trillion in 2014, representing more than one of every six dollars under professional management.²³ This growth in US investment is likely to continue with the Dept. of Labor's 2015 finding that incorporation of ESG-related factors into investment decision-making is compatible with fiduciary responsibility.

Examples:

- Hermes, a British asset management firm identified by McKinsey & Company as "at the forefront of the shareholder-activist movement,"²⁴ began using its shareholder rights in the 1990s to intervene in governance issues of underperforming companies in its portfolio. In 2002, it published the "Hermes Principles," which pre-figure the UN's Principles for Responsible Investment and call for management attention to long-term value, as well as "regard for the environment and society as a whole."²⁵ Hermes has £26 billion under management, as well as £189 billion under advice through its ESG-oriented stewardship services.²⁶
- In March 2016, CalPERS (the California Public Employees Retirement System),

²² 2014 Global Sustainable Investment Review; by the Global Sustainable Investment Alliance; 2015

²³ Report on US Sustainable, Responsible and Impact Investing Trends 2014; the US SIF Foundation

²⁴ <http://www.mckinsey.com/business-functions/organization/our-insights/agenda-of-a-shareholder-activist#0>

²⁵ *ibid*

²⁶ <https://www.hermes-investment.com/about-us/>

with \$288 billion under management, voted to require the companies it invests in to have board members with expertise in the risks associated with climate change. Rather than divesting all fossil fuel stocks, for instance, CalPERS has chosen to engage, maintaining a voice rather than severing ties.²⁷

- While the concept of ESG-oriented investment funds was pioneered by firms like Domini Social Investments, which launched in 1991 and currently has \$1.6 billion under management,²⁸ it has taken off in the past few years with the entrance of giants like BlackRock, the world's largest investment manager. In 2015, BlackRock created BlackRock Impact, and now manages over \$200 billion in various ESG-oriented funds.²⁹

Ernst & Young reports that environmental and social topics are the leading categories of shareholder proposals, and that they have, on average, received 28% support through the first half of 2016, compared to 7% support in 2011. They also report that two proposals on sustainability and emissions goals were approved and about one-third of proposals to report on sustainability and GHG emissions were withdrawn,³⁰ which is often a sign that shareholders reached an agreement with the company.

Private Equity refers to direct investment into firms that are not publicly listed. Private equity investors seek returns well above standard market levels and often purchase a controlling interest in a firm, or sufficient interest to have material input into the direction and management of the firm.

Examples of private equity investment for sustainable purposes include:

- KKR, which recently invested in a firm specializing in ecological restoration, has, with the Environmental Defense Fund, created a “Green Solutions Platform” to drive environmentally-oriented efficiency and innovation at companies in its portfolio.³¹
- Environmental Capital Partners (ECP), a private equity firm that provides capital and management support to companies providing services to prevent, limit, or correct environmental damage to water, air, soil, or human health. ECP investments include a firm that retires and recycles IT hardware of major corporations, following a “zero-landfill policy and thorough downstream diligence,” as well a firm providing drilling services for water and soil assessment, monitoring, and remediation.³²

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

²⁷ <http://www.governing.com/topics/finance/gov-climate-change-pension-calpers.html>

²⁸ <https://www.domini.com/why-domini/about-domini>

²⁹ <http://www.businesswire.com/news/home/20151013006790/en/BlackRock-Launches-Impact-Equity-Funds>

³⁰ [http://www.ey.com/Publication/vwLUAssets/EY-four-takeaways-from-proxy-season-2016/\\$FILE/EY-four-takeaways-from-proxy-season-2016.pdf](http://www.ey.com/Publication/vwLUAssets/EY-four-takeaways-from-proxy-season-2016/$FILE/EY-four-takeaways-from-proxy-season-2016.pdf)

³¹ <http://green.kkr.com/about>

³² <http://www.ecpcapital.com/index.html>

increasingly experimented with market-based and incentive-oriented solutions.

The strategies include traditional policy-based incentive programs such as tax credits and guarantees, which are just a step away from direct public expenditures, as well as the much newer and more innovative cap and trade programs. It is important to note, as well, that command and control environmental regulation, although it is not a financing mechanism, triggers a great deal of investment. It is not a coincidence, for instance, that each of the examples above of private equity investment is designed to support the expansion of businesses whose activities are based on meeting environmental regulations.

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.³³

In recent years, most public attention to cap & trade in the US has focused on Congressional refusal to approve its use to control carbon dioxide (CO₂) and other greenhouse gases (GHG). It is perhaps forgotten by much of the public that a very successful federally-approved cap & trade program has been in place since 1990 to control sulphur dioxide emissions – the gases responsible for acid rain.³⁴

Other examples of cap and trade in place include:

- **Regional Greenhouse Gas Initiative (RGGI)** – a cap and trade program jointly administered by nine states in the Northeast US under which CO₂ pollution permits are auctioned to power producers, who may trade them with other power producers within the nine participating states. States have used the auction proceeds to support energy efficiency and other policy objectives.³⁵ RGGI is the first mandatory GHG reduction program in the US, with its cap in place as of 2009. Interestingly, 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 they expect the program will function more closely as initially intended.³⁶
- Europe, California and Quebec have set GHG cap and trade systems, and China, which has experimented with a system in several cities, has announced a nationwide system, starting with coal-fired power plants in 2017. The California system was instituted as of 2013, and aims for a reduction of approximately 20%

³³ <https://www.edf.org/climate/how-cap-and-trade-works>

³⁴ <http://www.smithsonianmag.com/air/the-political-history-of-cap-and-trade-34711212/?no-ist>

³⁵ <https://www.rggi.org>

³⁶ <https://www.fas.org/sqp/crs/misc/R41836.pdf>

by 2020.³⁷ These systems are not without flaws and have been gamed at times as energy traders have taken advantage of lax enforcement and inexact measurement systems.³⁸

The World Bank estimates that governments worldwide raised about \$26 billion from carbon pricing initiatives in 2015, a 60% increase from 2015. This figure includes revenues from both emissions trading systems and from carbon taxes, but appears to be largely from trading systems. 40 countries and 23 subnational jurisdictions have emissions trading or carbon taxes in place or fully approved and scheduled to be put in place. The majority of these are trading systems, and they collectively cover an estimated 13% of global GHG emissions. Should China implement its national trading system, that figure will rise to 25% of global GHG emissions.³⁹

Tax credits – The federal government provides tax credits for solar and wind renewable energy installations. The credits were renewed at the end of 2015, with the solar credit set at 30% of the cost of a solar installation through 2019, and then stepping down to 10% in 2022 and thereafter. The wind credit is 2.3 cents per kilowatt-hour of generated electricity in 2016 and ramps down through 2020, when it expires. The credits apply to home installations as well as major commercial farms, and the Joint Committee on Taxation estimates that the solar tax credits will reduce federal revenues by approximately \$9.3 billion and the wind credit will cost \$14.5 billion in lost revenues.⁴⁰

Industry sources estimate that the credits will boost solar energy production by more than half over the next five years, to 72,000 megawatts, enough power for 12 million homes, while boosting solar industry employment to 340,000 jobs.⁴¹ Bloomberg New Energy Finance estimates that the tax credit extensions will generate \$73 billion in wind and solar investment over five years.⁴²

Guarantees – The US federal government provides clean energy incentive programs through 10 agencies.⁴³ The Department of Energy (DOE) has large-scale loan and loan guarantee programs, with a \$30 billion portfolio and \$40 billion in remaining authority.⁴⁴ The DOE reports that the existing portfolio has generated a more than \$50 billion in total investment in clean energy projects.⁴⁵ The guarantee program may have become most widely known through a highly publicized and highly politicized \$500+ million loss when it guaranteed a loan to Solyndra, a solar power firm that shuttered in 2011. Despite that

³⁷ http://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf

³⁸ <http://www.scientificamerican.com/article/china-will-start-the-world-s-largest-carbon-trading-market/>; <http://www.economist.com/blogs/freeexchange/2015/12/schr-dinger-s-emissions-trading-system>; <http://www.carbontax.org/dead-ends/offsets/>; <https://www.google.com/?client=safari#q=ten+ways+to+game+the+carbon+market>

³⁹ Carbon Pricing Watch 2016; The World Bank & ECOFYS; 2016

⁴⁰ <http://www.wsj.com/articles/wind-solar-companies-get-boost-from-tax-credit-extension-1450311501>

⁴¹ *ibid*

⁴² <https://about.bnef.com/white-papers/impact-of-tax-credit-extensions-for-wind-and-solar/>

⁴³ <http://energy.gov/sites/prod/files/2016/05/f32/Federal%20Financing%20Programs%20for%20Clean%20Energy.pdf>

⁴⁴ <http://energy.gov/lpo/about-us-home>

⁴⁵ *ibid*

loss, and others, the DOE reported the program was generating surpluses by 2014.⁴⁶

Emerging Practices

This category includes practices that are new, as well as practices that have existed for some time, but have yet to scale.

New applications for existing financing practices

- **Green bond indices** – In addition to enabling investors to track the performance of this asset class, the existence of indices will open the market and drive up demand for green bonds in a couple of ways: 1) certain sets of institutional investors, who are constrained to solely invest in indexed classes, can now invest in green bonds; and 2) the indices enable the creation of green bond ETFs, which will diversify risk across the asset class and attract new and more investment demand.

It will be interesting to observe, over time, whether a green bond index enables meaningful investment choices. As an aggregation of bonds issued by otherwise unrelated corporations in a variety of industries, it is not immediately clear how one would analyze its performance.

- **Asset-backed securities (ABS) for single-family residential energy efficiency financing** – Buildings account for roughly 40% of US energy consumption, split roughly evenly between commercial and residential uses,⁴⁷ creating a large market for energy efficiency retrofits leading to the triple benefits of reduced carbon emissions and water use, lower utility bills, and more clean energy jobs. ABS financing for large commercial retrofits is a fairly established practice, as in the Hannon-Armstrong example above where projects in 20 buildings were aggregated into a \$100 million issue. ABS for residential projects typically require the aggregation of thousands of financings and is a more recent innovation.

Examples include:

- Citibank and Renew Financial, in June 2015, issued \$12.5 million in ABS backed by unsecured consumer energy efficiency loans, the first such issue. The entire issue was placed with Calvert Investments, one of the oldest ESG-oriented investment management firms. Under this program, Renew makes consumer loans of up to \$20,000 to individual homeowners for energy efficiencies, using a Citi warehouse facility until there is sufficient loan volume to issue ABS.⁴⁸

⁴⁶ <http://www.bloomberg.com/news/articles/2014-11-12/u-s-expects-5-billion-from-program-that-funded-solyndra>

⁴⁷ US Department of Energy; 2011 Building Energy Data Book

⁴⁸ <https://www.environmental-finance.com/content/deals-of-the-year/energy-efficiency-2016-wheel.html>; <http://www.citigroup.com/citi/news/2015/150615a.htm>

- Renovate America has, since March 2014, issued 7 labeled green ABS backed by property-assessed clean energy (PACE) financings totaling \$1.35 billion.⁴⁹ The most recent, in June 2016, totaled \$305 million and included financings for 13,432 homes.⁵⁰ PACE programs provide home improvement financings, with the improvements conserving energy and water. PACE financings, which require enabling legislation, are secured by the property and repaid via an assessment added to the property tax bill. In the event of a sale, the assessment stays with the property. PACE, itself, could be classified as an emerging sustainable financing practice. Residential PACE programs are currently available in California, Florida and Missouri, with PACE for commercial buildings available in additional states and enabling legislation to expand the practice pending in yet more states.⁵¹
- **Stock exchange initiatives** – This includes the UN's Sustainable Stock Exchanges (SSE) initiative, as well as the concept of a social stock exchange.

The SSE initiative is a peer-to-peer program designed to encourage stock exchanges to adopt practices that promote improved ESG disclosure and performance by companies listed on each exchange. Participants include major exchanges in over 50 countries, including the Nasdaq and NY Stock Exchange in the US.⁵²

The idea of a social stock exchange is to create an investment marketplace to support impact investing. Although there are such exchanges in several countries, it appears they function more as information clearinghouses, and sometimes as brokers, and that none are literal stock exchanges at the moment.

The Social Stock Exchange (SSE), based in London, is itself a certified B corporation, and it lists 36 corporate “members,” which include not-for-profits, as well as publicly traded for-profits. Each entity is vetted for social impact prior to achieving membership. The publicly traded for-profits are listed on a small cap British public exchange with which SSE has a partnership. Impact investors, therefore, can use SSE to find the companies they are interested in, while the actual investment is conducted via the public exchange.⁵³

Other similar “exchanges” include BRiiX, Brazil's impact exchange, the Social Venture Connexion, in Canada, and the Impact Exchange, based in Singapore and aligned with the Stock Exchange of Mauritius, and SASIX, the South African Social Investment Exchange.⁵⁴ In the US, Mission Markets provides similar services, though it describes itself as a “financial technology” firm, operating “an integrated capital marketplace and community network making it easier for investors to learn about, discuss and, if they choose, make investments that improve society and protect the environment.”⁵⁵

⁴⁹ <http://pacenation.us/largest-pace-bond-securitization-completed/>

⁵⁰ *ibid*

⁵¹ <http://pacenation.us>

⁵² <http://www.sseinitiative.org/about/>

⁵³ <http://socialstockexchange.com/about-ssx/us/>

⁵⁴ http://ssir.org/articles/entry/the_rise_of_social_stock_exchanges

⁵⁵ <http://www.missionmarkets.com/#!faq/c1r2k>

Putting a Price on Pollution

Trading Systems – Regulatory structures can create markets by placing limits on pollutants and environmental damage while allowing flexibility on ways 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 pollute or degrade an environment within limits, with the purchase price going to a second party who uses the funds to create an offsetting environmental benefit and receive a return. Each program intends to create either no net environmental loss or net benefits while creating economic benefits for participants. The business surrounding these activities is referred to as ecosystem services.

Examples include:

- **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.⁵⁶ The US Fish and Wildlife Service (FWS), which administers conservation banking credits, reports the establishment of more than 130 conservation banks conserving 160,000 acres of habitat protecting over 70 threatened or endangered species.⁵⁷

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 variable levels of demand for credits, the inherent lack of certainty with regard to the scale of mitigation required, leading to uncertainties associated with timing of approval processes on both the development and mitigation sides of the transaction, and a lack of publicly available market data.⁵⁸

- **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 the Environment. The District places the fees into a special fund used to build green infrastructure to retain runoff.⁵⁹

⁵⁶ https://www.fws.gov/endangered/esa-library/pdf/conservation_banking.pdf;
<https://www.epa.gov/cwa-404/mitigation-banking-factsheet>

⁵⁷ <https://www.fws.gov/endangered/landowners/conservation-banking.html>

⁵⁸ Navigating Wetland Mitigation Markets: A Study Of Risks Facing Entrepreneurs; by Patrick W. Hook & Spenser T. Shadle; December 2013

⁵⁹ River Voices; From Grey to Green: Stormwater Trading in Washington D.C.; by Evan Branosky; July 2015

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.⁶⁰ The fund was announced in March 2016.

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.⁶¹ TNC identifies stormwater runoff as the world's fastest growing source of water pollution.⁶²

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.

Direct Payment 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 and pricing schemes 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 to reduce income taxes. Nonetheless, by raising the price of carbon resources to levels that more accurately reflect the full costs of those resources, these tax and pricing systems can trigger substantial private investment in renewable and other reduced-carbon resources. As of 2015, 18 countries and one subnational jurisdiction (British Columbia) have a carbon tax in place or approved and scheduled for implementation. All but 4 of these also have trading systems.⁶³

Carbon taxes are, of course, public levies, but there are also many private carbon pricing systems in place. CDP reports that 435 companies had internal carbon prices in place, nearly triple the number from 2014, and that nearly 600 additional companies planned on having pricing systems in place within two years.⁶⁴

Examples of carbon taxes and private pricing systems include:

- Japan, which introduced a carbon tax in 2012, placed on all fossil fuels in proportion to the levels of CO₂ emissions. Japan is using its carbon tax revenue exclusively for efforts to mitigate climate change, including subsidies for energy conservation projects.⁶⁵
- Such major corporations as General Motors, Mazda, Colgate-Palmolive, Stanley

⁶⁰ The Nature Conservancy; New Investment Model for Green Infrastructure to Help Protect Chesapeake Bay; March 7, 2016

⁶¹ Conservation Finance Network; Stormwater Credits in D.C. Could Provide a Blueprint for Other Cities; By Kat Friedrich; June 06, 2016

⁶² The Nature Conservancy; New Investment Model for Green Infrastructure to Help Protect Chesapeake Bay; March 7, 2016

⁶³ Carbon Pricing Watch 2016; The World Bank & ECOFYS; 2016

⁶⁴ Putting a Price On Risk: Carbon Pricing in the Corporate World; CDP; 2015

⁶⁵ http://www.japanfs.org/en/news/archives/news_id032490.html

Black & Decker, and TD Bank.⁶⁶ Reasons for internal pricing include responding to current or anticipated regulatory requirements, aligning climate change risks with other financial risks and market opportunities, and responding to investor and customer preferences.⁶⁷

Putting a Value on Conservation

The flip side of putting a price on pollution is creating systems to recognize the economic value of healthy ecosystems in the first place.

- **Conservation Finance** – The World Wildlife Fund, Credit Suisse and McKinsey have collaborated to create a framework to mobilize private capital to conserve healthy ecosystems and sustainably conserve clean air, fresh water and species diversity.⁶⁸ Their approach is summarized below.

The authors define conservation finance as a set of mechanisms for investing in ecosystems to conserve the ecosystems for the long-term. In the context of this survey of financing mechanisms, therefore, it is important to note that conservation finance itself is not a financing mechanism. Instead, it is an environmental goal supported by a series of financing tools.

The authors estimate an additional investment need of \$200 to \$300 billion per year over current levels to sustainably conserve the earth's natural capital. Attracting this level of capital – an investor-driven approach to conservation – will require projects that produce long-term cash flows to support both the conservation strategy and a return to investors.

Current conservation finance investment is about \$52 billion per year, 80% of which is from public sources. The roughly \$10 billion per year in private investment is via green commodities, such as sustainable forestry and fisheries, ecotourism, and such mechanisms as carbon offsets and ecosystem fees.

The authors believe that there is investment appetite to meet the need, but the limiting constraint is a lack of investable projects with both conservation benefits and clear risk-return profiles.⁶⁹ Obstacles to the development of conservation business opportunities include:

- No monetary value is placed on the clean air and water produced and bio-diversity supported by undeveloped lands;
- The significant short-term advantages of exploiting natural resources, such as clearing bio-diverse rain forests for the lumber and/or for monoculture agricultural purposes, such as palm oil plantations; and
- The investable opportunities that do exist tend to be small-scale.

They identify policy leadership as the key to unlocking these markets by using regulation to create value in otherwise “non-marketable” conservation benefits

⁶⁶ Putting a Price On Risk: Carbon Pricing in the Corporate World; CDP; 2015

⁶⁷ Executive Guide to Global Pricing Leadership; UN Global Compact & World Resources Institute; 2015

⁶⁸ This information is taken from Stanford Social Innovation Review; Making Conservation Finance Investable; Huwyler, et. al.; January 21, 2014; and Credit Suisse & McKinsey; Conservation Finance - From Niche to Mainstream: The Building of an Institutional Asset Class; Huwyler, et. al.; 2016

⁶⁹ This point was made repeatedly in the 5/12/16 #EcoFinance Twitter conversation.

(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.”

The authors see three categories of investment:

- Land purchases to conserve ecosystems and preserve capital. The land can presumably be sold at a later date to liquefy the investment, and may well have appreciated in value, creating a positive return.
- Investments in the infrastructure and management of ecosystems to achieve financial returns, which might include lodges for ecotourism; as well as investments in sustainable forestry, agriculture and aquaculture. It could include watershed protection, where the financial return could be payments from the water district whose filtration and purification costs are reduced.
- Investments in ecosystem market and regulatory systems. This, in the first instance, is an investment of political capital to support the creation of regulatory systems, such as cap and trade and offset programs.

The authors see 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.

The World Wildlife Fund (WWF) has catalogued a series of conservation financing mechanisms,⁷⁰ 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 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, make 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.

The REDD+ framework (Reducing Emissions from Deforestation and Forest Degradation) was established in 2005, placing a monetary value on carbon stored in forests and creating 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. To

⁷⁰ Guide to Conservation Finance; World Wildlife Fund; 2009

date, most purchases have been essentially grants, but there are efforts, such as by the California GHG cap and trade system, to incorporate the sale of REDD+ credits into other carbon markets.⁷¹

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/private partnership is much more direct, with the sectors working together to craft individual transactions.

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:

- **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. Through mid-2013, the US had concluded 19 agreements with 14 countries.⁷² 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 forest conservation efforts, and assisting in establishing the governance and monitoring protocols for the conservancy area.

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 will use the savings from its more manageable debt to fund climate change adaptation activities.⁷³

- **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 widely referred to as Social Impact Bond (SIB) financing. Despite that name, this structure is not actually a “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

⁷¹ Investing in Conservation; by NatureVest and EKO; 2014

⁷² <https://www.usaid.gov/biodiversity/TFCA>

⁷³ <http://www.naturevestnc.org/business-lines/debt-restructuring/seychelles-debt-restructuring/>

costs of some type of problem and may not have adequate resources for solutions. Often times, 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 the 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. PFS contracts in place are clustered in three areas -- funding interventions to reduce criminal recidivism, to reduce healthcare and social service costs associated with homeless individuals, and to provide early childhood supports to reduce the need for high-cost special education and other social services.⁷⁴

The first PFS contract began in 2010 (a recidivism intervention in Britain), and per Finance for Good, a Canada-based NGO that tracks PFS contracts globally, there have been 57 such contracts to date, including 12 in the United States, totaling approximately \$250 million. With the exception of a project in India to increase education for girls, all are in developed economies, with the majority in the UK and the US. None currently in place are directed towards environmental sustainability solutions.⁷⁵

Although PFS is too new to have a proven track record, the Finance for Good “SIB Tracker” reports that of those few with initial results, all but one are meeting impact targets.⁷⁶ That one is the first US PFS intervention, which was designed to reduce recidivism in New York City, but judged ineffective and halted.

Examples of sustainability-related PFS transactions in development include:

- The District of Columbia has designed a PFS structure to fund the construction of green infrastructure to reduce combined sewer overflows into the Potomac River and Rock Creek. The District is mandated to substantially reduce the roughly two billion gallons of untreated overflows that currently go into DC waterways annually, and 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.⁷⁷ The PFS financing is projected at \$20 to \$30 million, and return to investors will depend on the degree to which the green infrastructure successfully meets design expectations and captures rainwater that would otherwise flow to the sewage system.⁷⁸
- A second sustainability-related PFS under consideration is related to an agency that is too busy putting out fires, literally, to work on prevention – the US Forest Service (USFS), which is “trapped in a vicious cycle of

⁷⁴ Nonprofit Finance Fund; Pay for Success: the First Generation; by Dana Archer-Rosenthal; April 2016

⁷⁵ <http://financeforgood.ca/social-impact-bond-resources/sib-tracker/>

⁷⁶ *ibid*

⁷⁷ https://www.dewater.com/site_archive/news/press_release711.cfm

⁷⁸ <http://www.bondbuyer.com/news/regionalnews/dcs-social-impact-bond-deal-will-fund-infrastructure-1112664-1.html>

paying for today's fires by borrowing funds intended to prevent tomorrow's."⁷⁹ The Rockefeller Foundation, along with Blue Forest Conservation, Private Capital for Public Good and Encourage Capital, are putting together what they call a Forest Resilience Impact Bond. They intend to fund forest management services designed to reduce burn severity and increase rain water capture for local water districts. The return to investors is intended to come from USFS savings from reduced fire-fighting costs and from increased revenues from water districts.

* * *

⁷⁹ <https://www.rockefellerfoundation.org/blog/fighting-wildfire-with-finance/>

Additional Sources:

<http://www.bloomberg.com/news/articles/2015-10-21/sustainable-investing-is-booming-is-it-smart->

<http://www.bloomberg.com/news/articles/2015-10-12/blackrock-tries-do-good-investing-after-millennials-convince-fink>

Green Tech Media; AES Launches Asset-Backed Securities Based on Portfolio of Distributed Solar Generation; by Eric Wesoff; September 25, 2015

<http://www.greentechmedia.com/articles/read/AES-Launches-Asset-Backed-Securities-Based-on-Portfolio-of-Distributed-Sola>

Europe's World; Green bonds: How to grow the market; by Sean Kidney and Beate Sonerud; Published on February 19 2015

<http://europesworld.org/2015/02/19/green-bonds-grow-market/#.V1cwklc0esM>

<http://www.forbes.com/sites/jimhenry/2014/03/31/toyota-financial-services-claims-the-industrys-first-green-bond/#f298d5e4dd68>

<http://corporatenews.pressroom.toyota.com/releases/tfs+expand+green+bond.htm>

<http://corporatenews.pressroom.toyota.com/releases/tfs-environmental-green-bond-expansion-may13.htm>

http://www.chadbourne.com/Yield_Cos_Compared_12_13_projectfinance

<http://www.fa-mag.com/news/the-short--strange-trip-of-yieldcos-26017.html>

<https://www.pwc.com/us/en/power-and-utilities/publications/assets/independent-yieldco-business-delivery-pwc.pdf>

<http://www.forbes.com/sites/greatspeculations/2014/06/17/understanding-solar-yieldcos/#798429c464f5>

Zacks.com; Why Solar Energy Stocks are Forming YieldCos; by Madeleine Johnson; March 02, 2016 <https://www.zacks.com/stock/news/209286/why-solar-energy-stocks-are-forming-yieldcos>

The Motley Fool; Why 8Point3 Energy Partners Is the Polar Opposite of SunEdison's Disastrous Yieldcos; by Adam Galas; Apr 18, 2016

<http://www.fool.com/investing/general/2016/04/18/8point3-energy-partners-just-proved-why-its-the-ex.aspx>

http://www.altenergystocks.com/archives/2015/07/cafd_dont_let_the_joke_be_on_you.html

<http://www.renewablechoice.com/blog-environmental-impact-ppas/>

<http://www.fool.com/investing/general/2016/03/26/is-the-yieldco-business-model-dead.aspx>

<http://www.asreport.com/news/abs/moodys-yieldcos-loss-could-be-abss-gain-259217-1.html>

Reuters; Solar developer SunEdison in bankruptcy as aggressive growth plan unravels; by Tom Hals and Nichola Grooms; Apr 22, 2016; <http://www.reuters.com/article/us-sunedison-inc-bankruptcy-idUSKCN0XI1TC>

<https://www.hsbcnet.com/gbm/attachments/products-services/financing/project-finance.pdf>

Bloomberg; Starbucks Raises \$500 Million With Its First Sustainability Bond; by Emily Chasan; May 16, 2016

<http://www.bloomberg.com/news/articles/2016-05-16/starbucks-raises-500-million-with-its-first-sustainability-bond>

HSBC.com; Social and sustainability bonds; 27 July 2015 <http://www.hsbc.com/news-and-insight/2015/social-and-sustainability-bonds>

<https://www.rabobank.com/en/press/search/2015/20150720-credit-agricole-cib-hsbc-and-rabobank-propose-an-appendix-to-the-green-bonds-principles-for-social-and-sustainability-bonds.html>

Conservation Finance Network; Stormwater Credits in D.C. Could Provide a Blueprint for Other Cities; By Kat Friedrich; June 06, 2016

Natural Resources Defense Council; Creating Clean Water Cash Flows; by Alisa Valderrama, et. al.; January 2013

River Voices; From Grey to Green: Stormwater Trading in Washington D.C.; by Evan Branosky; July 2015

<http://www.nature.org/newsfeatures/pressreleases/new-investment-model-for-green-infrastructure-to-help-protect-chesapeake-bay.xml>

<https://www.rockefellerfoundation.org/blog/fighting-wildfire-with-finance/>

<https://www.renovateamerica.com/hero-program>

<http://www.prnewswire.com/news-releases/renovate-america-issues-first-ever-green-bonds-securitizing-property-assessed-clean-energy-bonds-300184627.html>

http://ssir.org/up_for_debate/article/the_payoff_of_pay_for_success

<http://financeforgood.ca/social-impact-bond-resources/sib-tracker/>

Nonprofit Finance Fund; Pay for Success: the First Generation; by Dana Archer-

Rosenthal; April 2016

The Rockefeller Foundation; Building a Healthy & Sustainable Social Impact Bond Market: The Investor Landscape; by Steven Godeke and Lyel Resner; undated, circa 2013

http://ssir.org/articles/entry/bringing_social_impact_bonds_to_the_environment

<https://www.climatebonds.net/2014/09/now-heres-something-opic-issues-473m-green-project-bond-guarantee-good-example-how-rich>

Stanford Social Innovation Review; Making Conservation Finance Investable; Huwyler, et. al.; January 21, 2014

Credit Suisse & McKinsey; Conservation Finance - From Niche to Mainstream: The Building of an Institutional Asset Class; Huyler, et. al.; 2016

<http://www.smithsonianmag.com/air/the-political-history-of-cap-and-trade-34711212/?no-ist>

http://media.kkr.com/media/media_releasedetail.cfm?ReleaseID=977110

<http://www.bloomberg.com/gadfly/articles/2016-04-04/can-calpers-live-with-responsible-investment-returns>

<http://www.renewableenergyworld.com/articles/2015/12/making-sense-of-the-itc-extension-for-wind-solar-and-bioenergy-too.html>

<http://www.greentechmedia.com/articles/read/breaking-house-passes-1.1-trillion-spending-bill-with-renewable-energy-tax>

<http://www.fool.com/investing/general/2014/10/05/why-warren-buffett-is-betting-30-billion-on-solar.aspx>

<http://europesworld.org/2015/02/19/green-bonds-grow-market#.V1cwklc0esM>

<http://fortune.com/2015/11/02/goldman-sachs-clean-energy/>

Fannie Mae Green Financing Initiative 10 bp advantage -

<https://www.fanniemae.com/multifamily/green-initiative-financing>

<http://www.forbes.com/sites/ashoka/2014/03/25/stock-exchanges-for-social-enterprises-heres-why-we-need-them/#63fd0aaf7b8d>

<http://www.forbes.com/sites/ashoka/2014/03/27/stock-exchanges-for-social-enterprises-heres-where-you-can-find-them/#4f5f2335d5c7>

<http://theconversation.com/social-stock-exchanges-do-we-need-them-35898>

<https://www.greenbiz.com/blog/2011/11/01/6-ways-fund-energy-efficiency-retrofits>

<http://www.prnewswire.com/news-releases/renovate-america-issues-first-ever-green-bonds-securitizing-property-assessed-clean-energy-bonds-300184627.html>

<https://www.renovateamerica.com/hero-program>

http://www.bloomberg.com/news/articles/2016-07-15/canada-to-introduce-national-carbon-price-in-2016-minister-says?utm_source=climatenexus&utm_medium=referral

<https://www.weforum.org/agenda/2016/08/does-adding-a-carbon-price-make-good-business-sense/>

<http://www.institutionalinvestor.com/article/3523286/asset-management-macro/debt-swap-gives-seychelles-the-cash-to-fight-climate-change.html#.V7tjPVc0esM>

<http://globalislandnews.com/glispa-inspiring-a-sustainable-and-resilient-future/>

<http://www.ecosystemmarketplace.com/articles/new-report-finds-companies-pricing-carbon-offsetting-emissions-creative-ways/>

<https://about.bnef.com/press-releases/global-trends-in-renewable-energy-investment-2016/>

<https://sustainabledevelopment.un.org/content/documents/2096Chapter%201-global%20investment%20requirement%20estimates.pdf>

For comments or questions please contact sustainablebusiness@stern.nyu.edu