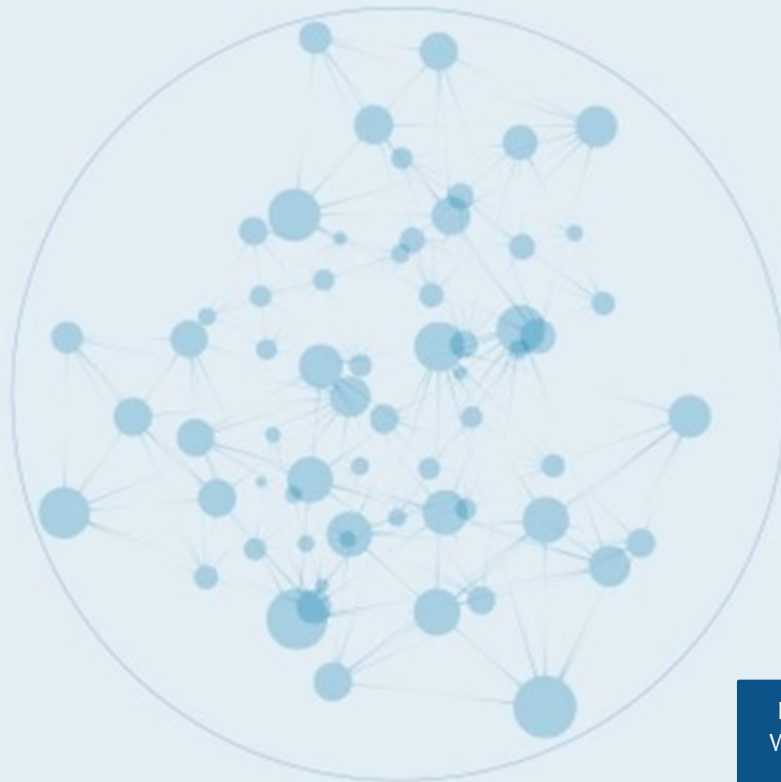




# ALIGNING THE FINANCIAL SYSTEM WITH SUSTAINABLE DEVELOPMENT IN THE UNITED STATES OF AMERICA



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## The UNEP Inquiry

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, it published its final report, *The Financial System We Need*, in October 2015.

More information on the Inquiry is at: [www.unep.org/inquiry](http://www.unep.org/inquiry) and [www.unepinquiry.org](http://www.unepinquiry.org) or from: Ms. Mahenau Agha, Director of Outreach [mahenau.gha@unep.org](mailto:mahenau.gha@unep.org).

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## Introduction

Sustainable development is largely a matter of time — a set of milestone dates for changes to the physical superstructure of the economy. These milestones are established to assure sustainability of our societies, particularly with regard to the climate and economic inclusiveness. Missed milestones have geometrically compounding consequences, the costs of which exceed the cost of meeting the milestones. Significant changes to the climate and to inclusiveness can threaten the quality or even the existence of fundamental physical supports for the society (food, water, health and economic well-being) and the integrity of the political economy needed to support social systems. The time scales involved are likely to be measured in years and sometimes decades, but the consequences are a function of today's investment of resources.

Many changes to the climate and inclusiveness of both the US and the world have occurred already and can be directly observed. Others can be projected or forecast. The overarching goal is to have levels of investment of resources to address sustainability that are sufficient to meet the sustainability milestones and to avoid both additional costs that could accrue specifically as a result of delay and, even more importantly, avoid the occurrence of an inflection point at which consequences to the society of changes to the climate or to inclusiveness become much greater.

The task here is to examine the decision process embedded in the US financial markets that determines what endeavours are funded by capital investment. This will lead us to understand the relationship between the process and the current and future levels of investment in the context of time horizons so that the milestones described above can be met and the costs and inflection points avoided.

In summary, two countervailing forces are significant to the relationship between the US financial market and sustainability:

- The US financial system benefits from large pools of investment capital that can be deployed efficiently because of the highly developed ability to capture and process information that is relevant to the valuation of investment opportunities. Investors are increasingly able to make their views known to management. Capital intermediaries are sophisticated and well capitalized and their ability to create innovative investment vehicles is unsurpassed.
- Because of the increased efficiency of information flows and sophistication of intermediaries, investors have grown to view the investment process differently. They are less inclined to see themselves as acquiring an investment that they will hold until they realize actual returns, and are more inclined to hold an investment for a period during which they continuously decide whether to sell or replace it. Investors rely on the ability to realize predictable value for expected returns by accessing a market for the investment. The transformation of information into price occurs not only at the time an investment is acquired, but also continuously as a consequence of technology- and capital-rich markets. In response to shareholder preferences, the management of companies performs its role to align with shareholder views, prioritizing short-term market price of shares over long-term value.

These two forces are critical to sustainability and inclusiveness outcomes in the US financial system. The problem-solving capacity in the US system is great. Its innovativeness and flexibility are great assets. The application of this capacity to the challenges of sustainability would be of immense benefit to US and world society. However, if the system's strengths are going to be deployed to address the need for sustainable investment, the valuation of investments needs to capture these social benefits. Therefore,

the compatibility of a system based on continuous assessment of price by investors with the financial system's ability to fund investments that meet the sustainability milestones needs to be considered.

Timescales relating to capital investment decisions in the US financial system are perhaps the shortest of all marketplaces. Thus, the inquiry into the US system promises to be enlightening both intrinsically and as an outlier case for comparison with other systems.

Much has been written about short-termism of both investors and managers in economies with highly developed financial systems, and in particular in the United States. It is often asserted that this short-termism is an impediment to private sector investment in sustainability.<sup>1</sup> Moreover, the emerging structure of sophisticated financial systems, often referred to as “financialization,”<sup>2</sup> has been linked to unsustainable social inequities in terms of income, employment and human development.<sup>3</sup> This paper weaves these observations together in the following way:

- Short-termism is seen as related to financialization. Financialization shortens timescales during which the significance of information declines in the process of pricing investments. This means that information related to time periods nearer the pricing decision is relatively more important as financialization increases, which is to say short-termism increases.
- Increasing short-termism decreases the competitiveness of categories of investments, including many of those which decrease inequality as well as those which increase sustainability. Generally, investments for which returns are realized later in the investment's practical life cycle<sup>4</sup> are less competitive.

Thus, in considering the alignment of the financial system with sustainability, both in the aspect of climate and of social issues such as underinclusiveness and inequality, the structure and practices of the financial system are significant to the competitiveness of sustainable investment in the financial marketplace. In the context of the US financial system, financialization and consequential short-termism are important factors in determining whether the full potential of the US financial system to assure sustainability is realized.

#### *Capital Investment Decision Structure*

In the US financial system, the investment process is particularly quantitative- and technology-driven. An investment decision always involves a comparison between the instant opportunity and at least one alternative (competing investment opportunity, or, in the extreme case, the alternative of not investing, which can be seen as a baseline). Evaluating an opportunity and an alternative involves a risk-weighting of the net benefits of each (assigning probabilities of good and bad outcomes, risks and rewards) projected out over time.

Time is an important factor in risk-weighting for two reasons.

- First, outcomes that are to occur later are more uncertain and inherently riskier. Therefore, the value of assumed projected or forecasted benefits is lower (that is to say, the values are discounted more) if their occurrence is further in the future. Therefore, such net benefits should be discounted for the higher uncertainty. This is the time-based discount of fundamental investment value. We will refer to it as “fundamental value convexity.”<sup>5</sup> It is notable that most valuation models are biased toward measurement of risk of diminished value and ignore the risk that the projected or forecast value may be understated. This may be particularly significant in pricing sustainability investments in which the magnitude of consequence of non-investment is

asymmetrically high: models used to reflect time-based uncertainty may not proportionately reflect the potential for higher value of an investment.

- Second, time is important to the fact that an investor may need or desire to convert the investment to cash prior to the realization of valuable benefits. The investor may need to increase liquidity for reasons unrelated to the fundamentals of the investment or may desire to do so because they believe they have superior knowledge about the investment that is best converted to realized price before the knowledge spreads. Therefore, time is important because the investor may want to truncate their holding period for the investment. The ability to do so reliably and at a discernible and predictable price is the investment's "liquidity," which is valued in determining price.

Adjustment of net benefits for time is also a function of the cost of applying cash to acquisition the investment and valuing the future receipt of cash returns. Cash is a limited commodity and its use and receipt always have value. For an investor who raises money from other investment sources to invest further, the cost may be viewed as the rental cost of the cash, meaning the cost to borrow over the time required to realize the return on the investment. For an investor whose cash is in hand, the cost is the opportunity cost of investing the cash without risk. If the investor has debt outstanding that can be repaid from the cash, the interest cost of this debt is the opportunity cost. If the investor has no debt that can be repaid, the opportunity cost is equivalent to the treasury rate over the time period until the benefit is realized. In either case, the basic principle is that a lower investment and a higher risk-weighted expected net cash return is better than the alternative and how much better is a function of the cost of the cash invested (either opportunity cost or cost of capital) to the investor.

In summary, time affects the fundamental value of an investment – the cost of the investment and the expected net benefits projected or forecasted to be received by the investor – and the investment decision among investment alternatives in three ways:

- Fundamental value convexity.
- The liquidity of the investment.
- The cost of cash.

#### *Governmental and Private Sector Investment Decisions*

Each of the foregoing principles is applicable to investment decisions by both governments and the private sector. The differences between governmental (meaning central governmental) and private investment are two. The government can rent cash at the riskless rate so it never has the increased cost of having to borrow beyond that which is strictly time-based. Additionally, the benefits included in the government's assessment are those realized by the public, which are real even if often difficult to value quantitatively. Therefore, compared with governments, private investors have the following characteristics:

- Because of adjustment for time value, nearer term realization of benefits is of higher value relative to longer term realization of benefits, which can affect the outcome of comparing one investment alternative (with earlier realized benefits) against another (with later-realized benefits). For example, a private investor may prefer one set of net benefits over another more than a government would because the government discounts later-realized benefits less.

- Private investors generally measure benefits based on their discrete and narrow interests, devoid of conceptual altruism or public benefits. This is especially true for investors that pool the money of others in order to achieve economies of scale in investing.<sup>6</sup> Unless the providers of the pooled funds do so under agreed terms that value public benefits, or unless the government requires investment based on such valuation as a condition of engaging in the pooled investment activity, an agent who is responsible for managing the pooled funds is bound to act in the interest of its principals expressed as quality of risk-weighted return. Of course, a public benefit can also be a benefit to a private investor. This can occur under two conditions:
  - The investment can be in an enterprise that provides a public benefit for which it is compensated by the government or for which it receives revenue from another source (e.g., the government gives the investor access to user fees).
  - The investor can benefit as a member of the public. For example, if a condition that adversely affects the entire economy also adversely affects the investment portfolio of the investor, an avoidance of the condition has value to the investor. This logic imposes two complications on the investment decision.
    - The benefit of the investment to the investor may be much different than the benefit to other investors or to the public at large. For example, the benefit to the public at large can be large relative to the investment, but the benefit to the investor is much smaller.
    - The investor will realize the benefit without ever having to expend the initial cash if another investor or the government makes the investment. As a result, assuming no government investment, the investment decision is a manifestation of the prisoners' dilemma: the optimal result for investors collectively is that each invests pro rata based on public benefits from activities funded; and the optimal result for an individual investor is that one or more other investors makes those investments. For most institutional pooled investors, this dilemma is avoided and they measure their performance by comparison with the direct financial results of other investors, meaning that they can freeload on other investors and no other investors can freeload on them. It also means that no investment in public benefits will be made.

Below, we will identify the implications of time for investment in sustainability for both the public and the private sectors. Within the private sector, we will discuss two separate issues, reflecting the characteristics described above:

- Investment in activities that promote the investment in sustainability within such time horizons, and
- Disinvestment in activities that impair the investment in sustainability within useful time horizons.

We will also explore the issue of the interplay between public benefits and investment decisions in terms of forms of governmental incentives favoured in the United States.

## *US Investment Decision Structure and Sustainability*

The predominance of these quantitative characteristics is both good and bad for the alignment of the financial system with sustainability investment in the US. The system includes diverse and large classes of investment. This is particularly conducive to investing in innovation and to aggregating smaller investment opportunities to achieve economies of scale. On the other hand, the relatively high sensitivity of investment decisions in the US to duration prior to realization of returns – *i.e.*, liquidity – does not fit return patterns for many sustainability investments. Fundamental value convexity is therefore very high. Nonetheless, the US financial system is particularly flexible so that it can adopt structures that bridge these gaps if the incentives are definable and measurable.

Measured by quantity, investment in sustainability in the US is currently inadequate to meet the need by a large measure. As described below, the estimated annual investment gap for clean energy, assuming a 40% reduction of fossil fuel use over the next 20 years, is US\$152 billion and the estimated annual gap for investment in other infrastructure just to maintain current levels of quality is another US\$246 billion. Simply stated, in the current US financial system, investment in sustainability as a class is not sufficiently competitive with other investment opportunities to generate the volume and types of investments needed to meet sustainability goals in terms of climate and social issues. Barring a reduction of the demand for sustainable development, investment volumes are not likely to meet reasonable goals related to climate change over the decades ahead or to reverse the declining inclusiveness in the economy.

The unique strengths of the US financial system – its sophistication, flexibility, diversity and size – could help bridge this gap, but standards, processes and behaviours need to be adjusted. There are two non-exclusive approaches to rebalance relative competitiveness in favour of sustainability, each with subordinate tactical pathways that could alter the competitive balance.

- Investments that compete with sustainability, and in particular investments that diminish sustainability, could be made less competitive.
  - The fundamental return on these investments could be reduced by requiring them to bear the cost of externalities. For example, carbon consumption could be taxed. In this approach, the businesses that compete with sustainable development and their owners pay the cost of rebalancing competitiveness directly.
  - The valuation of these investments relative to sustainability investments could be changed by adjustments to the US capital intermediation system. There are two primary ways that this could be accomplished:
    - The methodology for investor valuation could be altered by fundamental changes to the process by which capital is allocated. Functional characteristics of the capital intermediation process influence investor decision-making to the detriment of sustainability investment. Specifically, the US investors and the US financial sector highly value liquidity. Changes that would diminish the value of liquidity would favour investor valuation of sustainability because they would alter the perceived performance of competing investments by investors. This might diminish the size and profitability of the financial sector, although it might also substantially reduce the financial sector risk profile (and therefore systemic risk).



- As discussed herein, entities can use financing techniques to increase the apparent value of their equity. In particular, the indirect leverage provided by derivatives is such a technique. The use of derivatives for this purpose is very difficult for most sustainability enterprises, meaning they are disadvantaged in competing for capital investment. Changes to banking, credit rating and accounting rules could diminish this disadvantage by more transparently identifying the cost of derivatives to users and perhaps by limiting their use.

In short, capital would be transferred from relatively risky second-tier intermediation activities (securities and commodities trading and/or derivatives) to long-term risk reduction through sustainability investment. While some capital transfer might be an indirect result of prudential government regulation that increases levels of capital required to be held by banks to back trading activities, this is much weaker than directly addressing the issue.

- The incentives and subsidies provided by government to encourage sustainability investment could be made more efficient and reliable by government policy. The incentives and subsidies could be converted from inefficient and uncertain forms (such as tax benefits) to direct subsidies, and they could target specific mismatches between investor requirements and sustainability (such as duration, convexity of realization of returns and liquidity). They could also be increased. Under the current political environment, this could only be accomplished if the public benefits associated with sustainability can be fairly and accurately measured to reduce the scope of potential political discourse over the policy. While the ability of political institutions is beyond the capacity of this paper to consider, the measurement of public benefits over time is a critical precursor that can be envisioned.
- The required investment could be reduced by technological or organizational breakthroughs. For example, large-scale energy storage technologies could change the value proposition for large-scale clean energy production. From the perspective of organizational developments, local organizations and governments and systems for communication or barter trafficking in distributed and diverse sustainability enhancements could emerge based on collective decision-making and activism. This would circumvent existing financial, business and political systems to fulfil collective perceptions of self-interest without involvement of these institutions as agents of change.

Optimally, to achieve a financial system that is aligned with sustainability, all of these would be deployed. Unsurprisingly, the most difficult to accomplish involve political institutions – improving incentives and subsidies for sustainability investment and altering the functioning of the capital intermediation system. These are also the most easily scalable approaches. The potential for distributed organizational approaches and for technological breakthroughs are more likely, but involve scalability issues.

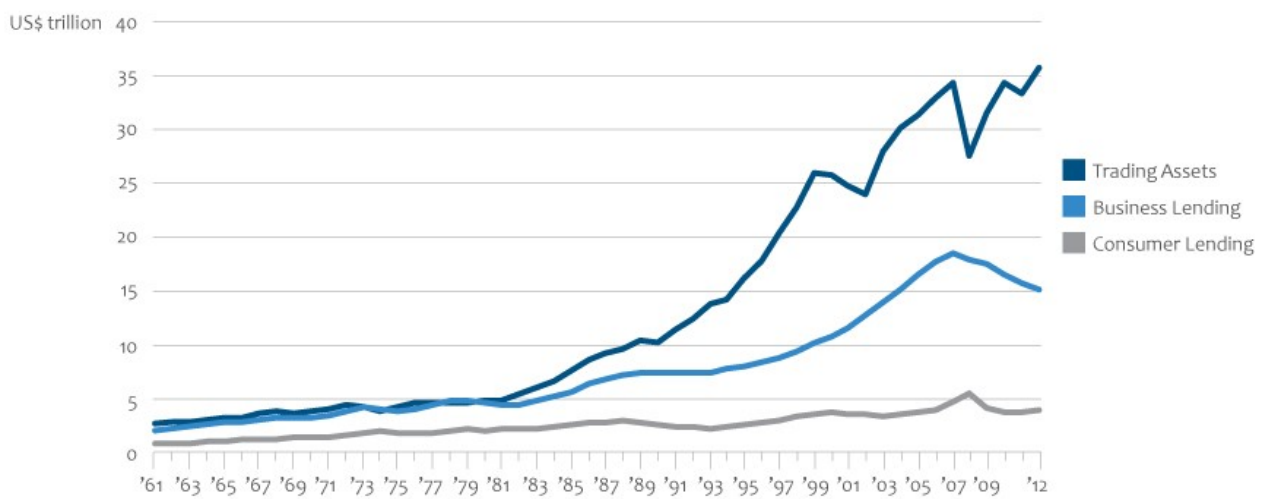
# 1 The US Financial System and Investment Structure

Increasingly in the US, investment funds are allocated among various investment options largely, but not exclusively, based on short time horizon returns. While capital allocation based on shorter-term horizons has grown throughout the world, it first arose in the US and these practices have become more prevalent within the US in the last 30 years. This phenomenon will shape the tasks required for aligning the financial system to sustainable development in the US.

## 1.1 Private Sector

By far the largest portion of private sector capital in the US is allocated *via* the traded markets. The growth in traded market capital allocation is illustrated by the growing percentage of trading assets held by US banks.

**Figure 1: Trading Assets, Business Lending and Consumer Lending, 1960-2012**



Source: Author’s calculations, Federal Reserve, *Financial Accounts of the United States*

Traded capital is raised in the “primary markets”. These are the markets in which new debt and equity are issued and placed in the hands of long- and short-term investors through the intermediation of the financial sector. The ability to access the primary markets in order to raise capital, and the cost of this capital if the markets are a viable alternative, is in large measure a function of two factors:

- the fundamental value of the debt or equity, meaning the risk-weighted expectation of the value of the investors’ claim on cash generated by the issuer; and
- liquidity, or the secondary market expectations (will there be parties willing to buy and sell at easily discernible and predictable prices in the future?) associated with the debt or equity expressed in terms of market price.

The secondary market is the marketplace for the purchase and sale of the previously issued instruments representing the debt or equity that provides liquidity to investors. Expectations involve the anticipated ability of an investor to sell or purchase the instruments at a continuously discernible and predictable price. From a societal perspective, the secondary market is important because it provides price signals to investors and a source of liquidity if they wish to act on those signals, and less so as a place where intermediaries and investors can turn a profit from effective trading. If a particular investment that is offered in the primary market is likely to be accessible in the secondary market (*i.e.*, it is relatively liquid),

its value to the investor will be higher and the cost to the business, government or household of raising capital will be lower. And if one class of investment is more liquid than another class, the more liquid class will have an advantage in competing for investors.

Disclosure of material facts is important to the fundamental value in the primary market; continuing disclosure informs views of the fundamental value for investors and prospective investors in the secondary market. Credit ratings by independent ratings agencies and by financial sector analysts are significant to disclosure for assessing the fundamental value but, more importantly, their continuous existence is important to liquidity. Ratings provide a third party view that is constantly available and can inform an investor or trader on the availability and price demands of a potential buyer or a seller.

### 1.1.1 Short time horizons and liquidity

The predominance of the trading markets means that most investors are less likely to value an investment exclusively or predominantly as a long-term position. Even if the investor in fact holds the investment for a period of time, so long as the investment is liquid the investor is making a continuous decision to hold or to sell, unconstrained by time.<sup>7</sup> This option to sell at a discernible price is valuable, so a liquid investment is more valuable than an alternative with a similar fundamental value that is not liquid. Therefore, relative investment value in liquid markets is heavily affected by returns actually received or realizable because of access to liquidity over a very short time horizon. A short timescale translates into certainty since near-in expectations are more likely to be fulfilled than long timescale expectations. There is less fundamental value convexity so that the effect on price of near-in expectations is greater.

- For equities, the expression of this is the generally expected current quarterly earnings over assets, or short-term return on assets. Therefore, the price consequence of short-term return on assets will be higher than the price consequence of longer-term return on assets, taking into consideration discounted value for the cost of funds.
- For debt, the expression is short-term (or floating) interest rates. Interest rates exist along a duration-based curve so that the relation to the curve determines the value of the given instrument. But instruments with short term and floating interest rates are more liquid because the interest to be received in the future is not subject to the risk of shifts in the curve, among other things. (Note that investors still invest in long-term, fixed-rate bonds, but often mitigate the yield curve risk by using derivatives. The cost of the derivatives is an ancillary cost to investing in the fixed-rate bonds and will affect the yield required by investors.)

Thus, liquidity is an enormously important factor in the deployment of investment capital in the US. Liquidity requires a continuous and meaningful marketplace for investments that have already been deployed in the primary market. Because liquidity, by definition, involves continuous pricing, it is measured by near-term marketability at discernible prices. Therefore, adding liquidity to the valuation of a given investment means that the size and reliability of returns received in short timescales is even more significant to investors than would be suggested by the time value of cash. In contrast, investment in sustainability, whether in infrastructure or in research and development or otherwise, is characterized by returns measured by benefits to the public that are received along longer time horizons than other investments.

Therefore, the ability to track continuously an executable price is the great preference for investors in the US. Historically, for a substantial portion of investments in sustainability, it is difficult for the long-term value of a sustainability investment to be reflected in current market prices. This is an obstacle that

needs to be overcome in order to align the financial system with sustainability investment in terms of new capital for sustainability-specific undertakings. Either these values need to be better reflected in current prices or investors need to alter valuation methodologies.

Financiers have responded to the huge problem of relative liquidity in energy finance with a technique referred to as the “yieldco”. A yieldco is an investment vehicle that acquires pooled assets backed by renewable energy projects at the time that they are put into service post construction completion and beyond the risky period of implementation. For example, power generation projects can produce relatively stable long-term cash flows once they go into service. In addition, the US government provides significant tax reduction benefits to the owner of the asset at the time of completion (most often defined for generation projects as the time the turbine synchronizes with the power grid). Such benefits can be passed along to the investors. This combination of upfront tax subsidies and steady cash returns can be attractive to investors. The basic structure, dividing the construction and operation periods for purposes of financing, has been used for decades. The real breakthrough with yieldcos is that the pool of projects can be replenished as long as they meet standards and the yieldco can bring in additional investment capital if it is warranted. Yieldcos will undoubtedly increase investment in certain categories of sustainability investment. Time will tell how far the pool of investors will carry the growth of yieldcos. One important constraint is the importance of tax benefit subsidies to the success of the yieldco structure. Large pools of investment capital, in particular pension funds and retirement accounts, are not subject to current income taxation and would not value these benefits highly.

### 1.1.2 Derivatives

Any discussion of US capital markets is incomplete without considerations of derivatives. Almost half of the US\$120 trillion per year (global notional amount) derivatives market is in the US. As they relate to the alignment of the US financial system with sustainability and inclusiveness, derivatives should be examined as components of the modern system of capital allocation. Generally, in order to optimize capital raising, risks that traditionally were borne by investors are transferred to derivatives counterparties (mostly banks) in exchange for the mirror image reward associated with that risk (for example, the risk that oil prices will go down exchanged for the mirror image reward if they go up). This is generally a debt optimization or maximization device because debt investors, unlike equity investors, have no interest in upside reward and therefore highly value trading reward for downside risk. It also is a credit rating improvement device, since ratings are based on risk of default, not profitability.

Sponsors of project-based sustainable development, which is the largest segment of project development in the US in key areas such as electricity generation, generally have cash flow constraints that make it difficult to use this approach without, at a minimum, relatively onerous terms. Unfortunately, just for this reason, derivatives are often particularly useful for sustainability project finance. As a result, a substantial amount of sustainability investment in the US is competitively disadvantaged.

Derivatives are fundamentally different from equity and debt securities (and indeed from commodities). They are contracts between two parties that require performance in the future. A market participant does not buy or sell a derivative. If the participant enters into a derivatives contract, they cannot shed the obligation unless the other party agrees. Instead, the participant enters into an offsetting mirror image contract with some other market participant. Thus, the risk of non-performance becomes a daisy chain and the market relationships become very complex.

In a derivative, the parties exchange an obligation equal to today's price for a referenced security, commodity or conceptual value (as an extreme, if relevant, example the implied value of temperature on a date in the future in a specified city) for the price of that same referenced item on the date of performance under the derivatives contract. If the price goes up, one of the parties pays the net difference (the price on the date of performance, less today's price) and if it goes down the other party pays the net difference (today's price, less the price on the date of performance). The contractual relationship can have a floor or a cap price beyond which performance is excused (or beyond which performance is required). This is achieved through an option contract. As one might imagine, the terms can be almost infinitely complex in reality so that the categories of derivatives contracts on a given referenced price are nearly limitless.

Derivatives are often characterized as risk transfer or risk management devices, but this is far too simplistic. They are fundamentally distinct from insurance.<sup>8</sup> They conditionally transfer consequences of price change over time from one party to another, subject to the ability to perform. The contract does two things simultaneously: it exchanges the value of an adverse price change to a counterparty for a credit exposure to that counterparty until actual performance occurs, and it exchanges the value of an equally probable beneficial price change in exchange for an extension of credit from the counterparty until actual performance.

Derivatives can be thought of as an element of a deconstructed capital investment. For example, an electricity generating company is exposed to power price changes, meaning that, all other factors being equal, it will have higher profits if the price goes up and lower profits if the price goes down. Lenders to, and equity investors in, the generator are then exposed to the same price change. But if the generator enters into a swap on the power price, this exposure is carved out and price change consequences are transferred to the swap counterparty, typically a bank (assuming, of course, that the bank performs under the contract). This has a number of consequences in terms of capital financing. One example is that the generator can increase its leveraging and reduce the equity component of the capital structure. Thus, the generator will have more direct debt from investors relative to equity, and equity value will go up. It also takes on either (a) more derivatives-based debt to the swap counterparty if the price goes up since the counterparty is at risk for future performance by the generator based on current prices, or (b) an asset represented by a mirror image credit extension to the swap counterparty if the price goes down. So long as the cost of debt (interest rate) is lower than the cost of equity (required equity expected return), the value offered to equity investors is higher.

This points up the fact that derivatives are a form of hidden leverage in the economy: the increased direct leverage of the company "hedging" a risk plus either the increased company leverage under the swap or the increased counterpart leverage, depending on the price outcome.

However, in terms of investment in sustainability, the general use of derivatives is particularly problematic. Sustainable development involves particular kinds of risk taking – it may require research and development or it may require a change in asset or operation configuration with longer lead times before returns are realized. By far the largest form of clean energy investment in the US is "project financing".<sup>9</sup> In this form, a special purpose company is created and its revenues are limited to the project being developed. As a result, cash demands at any point in time can only be met from the resources of the specific project.

A financial system that relies on super-leveraged capital structures will deter that type of sustainability investment because the demands on current performance are less forgiving than a capital structure with

low leverage. Leverage requires the ability to respond to short-swing cash flow changes and derivatives that cover price changes far out into the future bring forward long-term cash consequences to today. For example, a price change applicable to five future years of fuel supply can trigger a major increase in the credit exposure of a project financing generation company, in this case to a swap counterparty, often resulting in a call for cash collateral that cannot be met. Nonetheless, to compete successfully with other investment opportunities, sustainability projects and enterprises would need to meet the capital structure efficiency of these other alternative opportunities.

Thus, the highly structured, complex capital investment system of the US poses obstacles for sustainability finance. It is simply difficult for sustainability companies to lever up using sophisticated techniques such as derivatives in order to achieve equity returns that are competitive. Financial innovation is thought of as a positive factor for sustainability financing, and it doubtless can be. But it is also problematic.

### 1.1.3 The Role of Technology

Technology has massively changed the capital intermediation system in the US. The greatest effect has been in secondary markets, where optimal “round trip” times, from the decision to trade to completion, have fallen to as low as 25 milliseconds. This level of speed is largely in the realm of “information traders” (often referred to as High Frequency Traders or HFTs) who speculate based on superior information based on access (such as news feeds or monitoring of Twitter), market intelligence (pattern recognition software), and deployment (connection with trading venues such as exchanges). The biggest changes have to do with market intelligence and deployment, which have nothing to do with the fundamental value of investments.

Moreover, the timescale involved makes most of the information transfer completely irrelevant to investors who are not incentivized to enable themselves to act at such high speeds. Investors are more concerned with defensive measures to avoid being targeted by high speed traders that are running games to front run, pick off or entrap investors. Investors might employ anti-HFT software, which is very costly. They might also choose to execute trades on venues known as “dark pools” because their activities are hidden from HFTs using pattern recognition tactics.

HFTs have been linked repeatedly to market disruptions such as the Flash Crash of 2010. It is clear that they increase the probability of such disruptive events, especially since they operate in all markets, not just the stock markets. For example, the US Commodity Futures Exchange Commission reports that more than 95% of all derivatives trades on exchanges occur without human intervention at any level.

Perhaps the greatest significance of the HFT phenomenon for our purposes is that value derived from the marketplace itself in very short time increments is increasingly a driving force for investors. This suggests that the resistance of the financial system to fully fund the investments needed to secure sustainability is a function of market structure.

### 1.1.4 Who are the Investors?

Capital investments, increasingly in the form of tradable instruments, are largely held either by institutions or on behalf of individuals and managed by agents whose aggregate funds under management behave like institutions. The largest pools of money are retirement funds and managed endowments, totalling approximately US\$19 trillion.

**Table 1: US Retirement Fund and Endowment Holdings**

	Size of Fund (Current Market Value)	Share of Investment in Equities	Share of Investment in Bonds	Assets allocated to Other Asset Classes
<b>Pension Funds</b>	US\$5.9 trillion	34%	20%	46%*
<b>Managed Retirement Accounts**</b>	US\$13.1 trillion	46.4%***	11.8%	41.8%****
<b>Endowments</b>	US\$449 billion	34%	13%	53%*

\* Mostly comprised of private equity, hedge funds, and real estate.

\*\* As of Q4 2013; approximately 60% of the assets in direct contribution accounts and 45% of the assets in employer funded accounts are invested via mutual funds, shares in aggregate funds that are managed.<sup>10</sup>

\*\*\* Includes 7.2% directly in company stock and most of the balance in equity-based mutual funds).

\*\*\*\* This includes a host of different investment categories, including 22.1% in mixed mutual funds that are mostly stock (target date funds, balanced funds), and 9.6% in guaranteed investment contracts/stable value funds.

Source: Demos

As of end 2013, US insurance companies held about US\$5.5 trillion in investments, over 67% of which are bonds and over 12% of which are equities.<sup>11</sup> In contrast, US banks hold about US\$1.7 trillion of commercial and industrial loans and US\$751 billion of non-mortgage related, non-governmental securities as investments (i.e., not in trading accounts).<sup>12</sup> Another source of investment capital is venture capital funds. The top 100 venture capital funds hold approximately US\$15 billion of investments.<sup>13</sup>

For convenience, the relative size of these investment sources is set forth below.

**Table 2: Estimated Investments (in US\$ billion)**

	Equities	Bonds	Total Securities	Business Loans
<b>Pension Funds</b>	1,258	740	1,998	
<b>Retirement Accounts</b>	6,078	717	6,796	
<b>Endowments</b>	153	58	211	
<b>Insurance Companies</b>	660	3,685	4,345	
<b>Banks</b>			751	1,700
<b>Venture Capital Funds</b>	15		15	

Mutual funds are aggregators of shareholder funds that are further invested in securities, commodities, derivatives, real estate and other investments. Pension funds, retirement accounts, endowments, banks and insurance companies are all investors in mutual funds, as are wealthy individuals and corporate treasuries. Mutual funds are often actively managed. Approximately US\$17 trillion is held in mutual funds.<sup>14</sup> About US\$2.6 trillion is invested in highly liquid money market funds, a category of mutual funds that caters to companies, institutions and individuals with the need for highly liquid access to funds.<sup>15</sup> These may or may not be investments in that they operate much like a demand deposit in a bank that bears interest.

As mentioned above, a large portion of funds invested in retirement accounts is placed in mutual funds, approximately US\$6.5 trillion. The remaining US\$8 trillion of mutual fund money is from other sources,

including individuals, companies and governments, and some mutual fund money is actually sourced from other mutual funds.

Approximately US\$715 billion is invested in hedge funds that acquire and hold securities. A significant portion of institutional investment is in hedge funds. Thus, institutional investors invest indirectly in securities through hedge funds.

One must conclude that investors in managed pools, pension funds, retirement accounts and insurance companies, are the major determinants of investment flows, including investment flows into sustainable development. Potentially, these decisions are driven by the principals: policymakers and corporate boards at the pension funds, retirees and the insurance companies. However, investment managers are crucial and often determinative. They are external to the principals and operate under contract. They are often closely associated with the capital intermediation portion of the financial sector. Though at one level they are agents of the pension funds, retirees and insurance companies, their direct relationship with the markets as well as their superior analytics dilute the control that the principals can exert. Because the managers are agents under contract, their performance is evaluated regularly, but the clearest evaluation mechanism is quarterly and annual performance compared with market indices. As the basic form of evaluation, this is what the managers cultivate and are incentivized to prefer.

For pension funds, a large portion, but not all, of the funds are invested through managers. The funds have a duty to generate returns on cash deposited by employers that provide a cash flow sufficient to fund their liabilities for payment of retirement benefits as they accrue over time. Their funding level (or “unfunded liability”) is measured against extremely long-term pension benefit cash outflows and similarly long-term cash inflows from contributions and investment earnings. The horizons are typically 30 years. In recent years, notably for public employees, employer contributions have often been deferred because of budget constraints imposed by the Great Recession and Federal policy. Expected returns have also been weaker than forecast largely because of losses suffered in the 2008 market crash that take a long time to recoup and because of low interest rates. Thus, many pension funds and their sponsors are under pressure to address unfunded pension liabilities. Under these conditions, returns over the short term are particularly sought after in order to close the unfunded pension liability gap.

Retirement accounts are almost exclusively invested by advisors or by pooled fund managers. Similar, though less formalized dynamics pertain to these accounts.

From the perspective of sustainability investments, institutional investors and especially pension funds have the ability to direct investment according to factors important to their stewardship and not be bound exclusively by quantitatively measured returns. However, the single largest pool of investment, retirement accounts managed by third parties, lacks such a structure. Individual account holders are less equipped for such directed activity. However, the managers can be encouraged to structure sustainability options and market them more actively than they have in the past. There is likely scope for government and civil society to generate demand for these types of investment opportunities by simply informing the public that it can further sustainability by choosing investment vehicles with that purpose.

## **1.2 Public Sector**

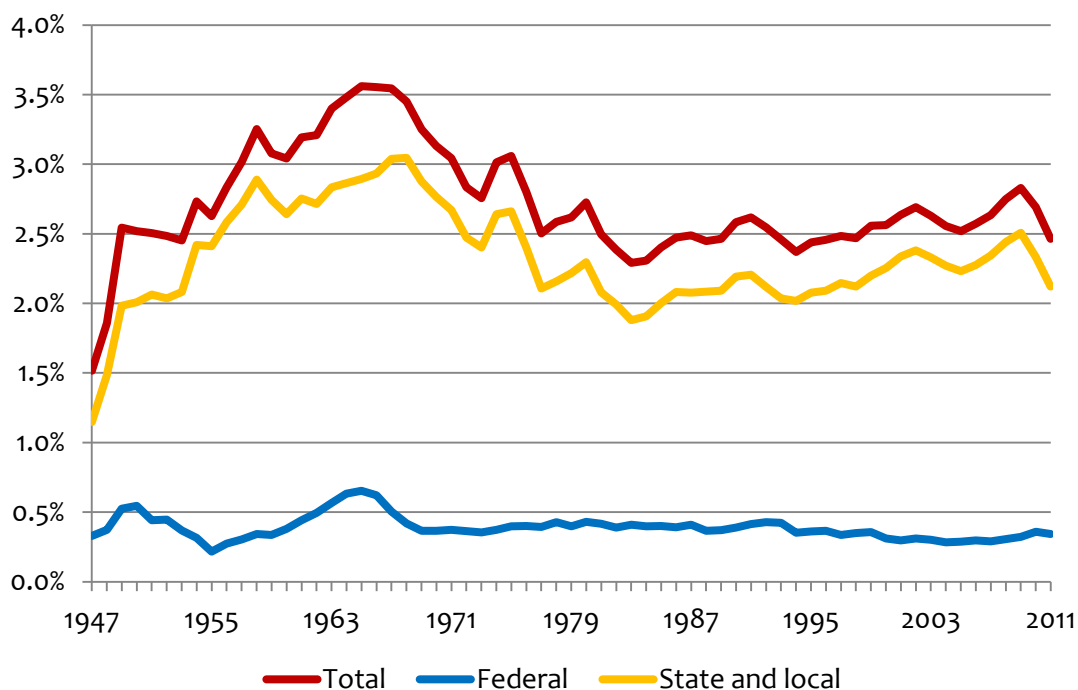
Although the UNEP Inquiry is focused on the private capital financial system, the public sector funding of sustainability, and especially its trajectory, is very important. Though it is politically and institutionally impractical, the US government could simply fund investment in sustainability if it chose to do so at a low cost of capital (though perhaps inefficiently for other reasons). The limits of governmental funding



define the scope of the demand for private sector financing. The efficacy of the private sector finance system should be viewed as how well it fulfils the need for financing sustainability and need, in part, is defined by what the government does not fund. Thus, if the government is funding less investment, the need is greater; and if it funds more, the need is lower.

A large portion of US private investment capital is in public sector entities and enterprises other than the sovereign. This is very different from practices in other countries. A large portion of public sector investment in general infrastructure is made by state and local governments, as illustrated in the following chart. The funding source for this investment is primarily securities sold into traded markets.

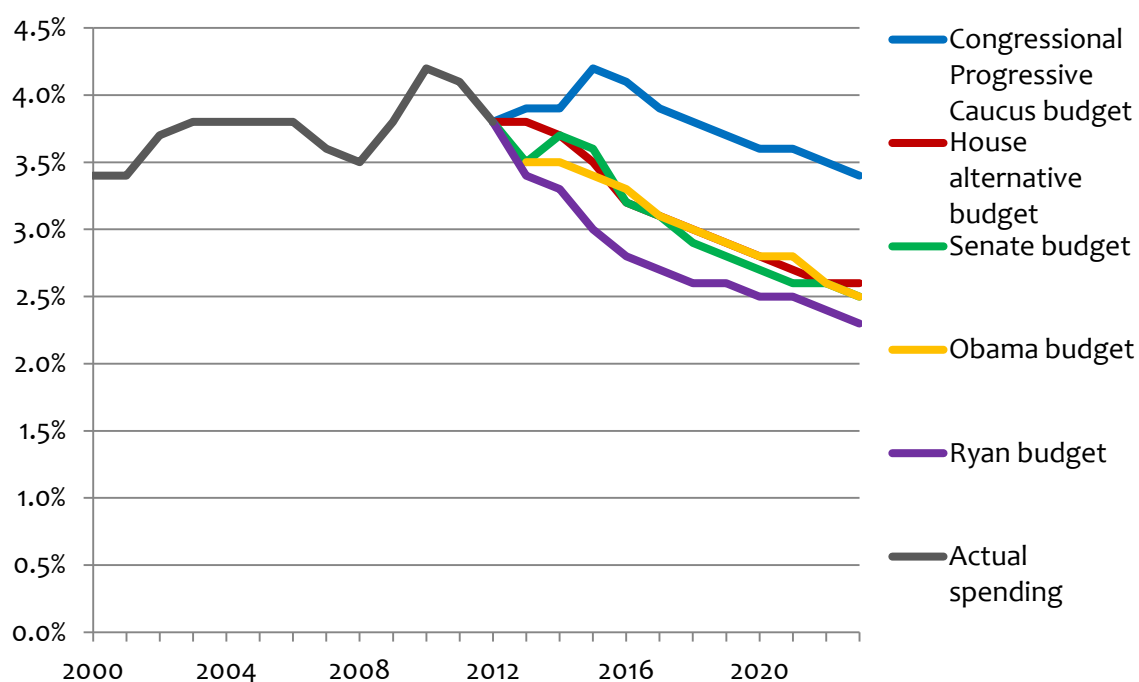
**Figure 2: Gross US Nondefense Public Investment as Share of GDP**



Source: Bivens, J. (2013). *Why the Bipartisan Commitment to Public Investment Should Go Beyond Mere Rhetoric*

These data also indicate that the US investment in infrastructure has been declining over a long period. Current budget projections indicate that this decline will accelerate over the foreseeable future.

**Figure 3: Nondefense Public Investment as a Share of GDP (Actual and Proposed)**



Source: Bivens, J. (2013). *Why the Bipartisan Commitment to Public Investment Should Go Beyond Mere Rhetoric*

### 1.2.1 State and Local Financings

State and local investment is funded largely by issuance of bonds. Generally, interest paid on bonds issued by state and local governments and their agencies and instrumentalities is exempt from federal income taxation. This is a subsidy to state and local governments in the form of a tax expenditure generated by the federal government foregoing taxation. More than US\$300 billion of tax-exempt bonds are issued each year and less than half of this debt is issued to fund new capital, the balance being issued to refinance existing debt.

**Table 3: Tax-Exempt Bond Issuance (in US\$ billion)**

	New Capital	Refinancing	Total
2013	143.9	164.1	308.0
2014 (Through November)	130.7	165.1	295.8

Source: Securities Industry and Financial Markets Association available at <http://www.sifma.org/research/statistics.aspx>

There are two types of tax-exempt bonds. General obligation bonds are backed by the credit of state or local governments. Most general obligation bonds are issued to fund capital projects that do not generate revenue. Revenue bonds are almost all issued to fund capital projects and are backed by the revenues of specified enterprises that are a part of the state or local government. Of all tax-exempt bonds issued, about 60% are revenue bonds.<sup>16</sup>

Municipal bonds are largely issued to fund capital for infrastructure. The average interest rate for the most typical 20-year bonds over the last 10 years is approximately 4.35%. The tax foregone on this interest on all bonds outstanding is approximately US\$84 billion per year. This is a reasonable estimate of the

subsidy provided by the federal government through the tax expenditure of the exclusion from taxation of interest on state and local debt. The level of subsidy is approximately 12.5% of the total state and local public investment.

### 1.2.2 Investors in State and Local Bonds

Because of the tax exemption of interest on state and local bonds, the investors are very different from those who invest in private debt and equity or federal government securities. The value of the tax exemption can only be realized by investors who are certain to pay income taxes on a current basis. Pension funds and holders of retirement accounts do not pay income tax on investment earnings. Moreover, depository institutions are prohibited from deducting most carrying costs for tax-exempt bond holdings when calculating income for income tax purposes. As a consequence, these entities do not invest significantly in tax-exempt bonds. Tax-exempt bond investors are mostly individuals or mutual funds that pass the tax exemption through to individual shareholders, as illustrated in Table 4.

**Table 4: Holders of US Municipal Securities (in US\$ billion)**

	Individuals	Mutual Funds <sup>1</sup>	Banking Institutions <sup>2</sup>	Insurance Companies <sup>3</sup>	Other <sup>4</sup>	Total
1996	493.0	416.9	107.2	188.7	55.9	<b>1,261.6</b>
1997	497.6	446.2	112.0	208.3	54.5	<b>1,318.5</b>
1998	498.4	496.4	120.5	226.5	61.0	<b>1,402.7</b>
1999	526.9	520.6	125.7	219.1	64.8	<b>1,457.1</b>
2000	531.5	540.3	128.6	203.2	77.0	<b>1,480.7</b>
2001	587.9	597.1	144.0	192.5	81.8	<b>1,603.4</b>
2002	671.5	648.6	148.5	202.9	91.4	<b>1,762.8</b>
2003	687.2	687.8	164.2	250.3	110.9	<b>1,900.4</b>
2004	1,522.9	705.3	180.1	297.9	115.0	<b>2,821.2</b>
2005	1,600.6	749.6	209.5	345.7	113.9	<b>3,019.3</b>
2006	1,635.7	825.2	242.3	371.8	114.3	<b>3,189.3</b>
2007	1,673.5	960.1	254.1	412.7	124.4	<b>3,424.8</b>
2008	1,720.8	979.0	263.2	429.0	125.2	<b>3,517.2</b>
2009	1,827.9	1,005.9	263.2	442.5	132.9	<b>3,672.5</b>
2010	1,871.5	1,001.4	297.2	460.7	141.4	<b>3,772.1</b>
2011	1,805.9	989.6	334.8	452.8	136.2	<b>3,719.4</b>
2012	1,662.1	1,062.2	398.5	459.6	132.0	<b>3,714.4</b>
2013	1,618.2	1,018.0	445.6	467.4	122.0	<b>3,671.2</b>

1 Includes mutual funds, money market funds, close-end funds and exchange traded funds. The shareholders of these mutual funds are in very large part individuals.

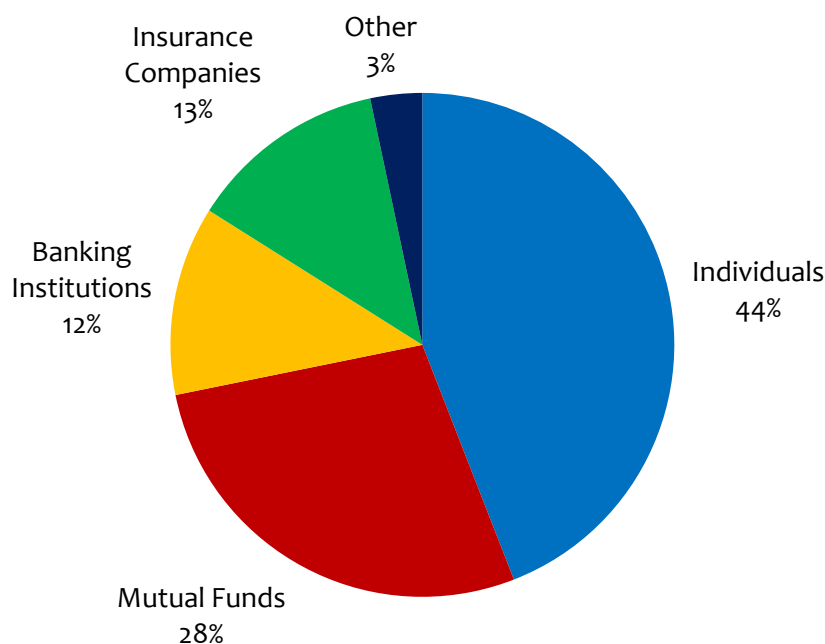
2 Includes U.S. chartered depository institutions, foreign banking offices in the U.S., banks in U.S. affiliated areas, credit unions, and broker dealers.

3 Includes property-casualty and life insurance companies.

4 Includes nonfinancial corporate business, non-financial non-corporate business, state and local governments and retirement funds, government-sponsored enterprises and foreign holders.

Source: Federal Reserve System as reported by Securities Industry and Financial Markets Association, available at <http://www.sifma.org/research/statistics.aspx>

**Figure 4: Holders of Municipal Bonds (2013)**



As a consequence, the investment criteria are set by different investors than those that dominate private sector investment. Individual investors are far more influential. Those that invest directly are likely to value certainty of repayment highly but liquidity less. However, identifying impediments to sustainability investment by individuals is likely to be more difficult than with highly concentrated institutional investors. Those individuals that invest through mutual funds are similarly less interested in liquidity. Nonetheless, because mutual fund performance is most often measured against performance compared with current markets, liquidity is a factor in the ability of many mutual funds to attract individual investors.

In summary, two conclusions can be drawn with respect to the role of government in funding sustainability investment:

- The role of direct investment has been steadily declining and will likely continue to do so.
- Private capital investment in state and local securities that fund a significant amount of sustainability investment is generally stable and unchanging over time. This is in part a consequence of the relatively inefficient form of subsidy provided by the federal government in the form of the exemption from income taxation of interest on state and local government debt that narrows the range of potential investors.

It is clear that the role of government in funding investment in sustainability is likely to decline over time and is much less likely to grow. Therefore, the need for investment in sustainability will have to be fulfilled by private capital sources and this will likely increase over time.

## 2 Current Levels of Sustainability Financing of Clean Energy

Recent year investment in clean energy has varied widely, ranging from US\$16.7 billion in 2005 to US\$65.2 billion in 2011, though 2005 was the only year of the past ten in which investment was less than US\$30 billion. Average annual investment over the last 10 years was US\$43.73 billion.

While energy market forces are a factor, annual differences in investment are largely related to the availability of tax incentives provided by the federal government. The economic feasibility of many undertakings depends on government subsidies. The federal government has elected to provide subsidies almost exclusively in the form of tax benefits (or tax expenditures, from the government point of view). The subsidies generally come in three forms:

- **Investment Tax Credits** — amounts (calculated as a percentage of the capital cost of the asset) that the owner of the asset can apply against income tax liability in the year the asset is placed into commercial service, generally with a carry forward if the owner's tax liability is not sufficient to consume the credit. The percentages are either 30%, for solar, small wind and fuel cells, or 10% for geothermal. Because it is a tax credit, its value is equal to the credit in the year that it reduces tax liability, so long as the owner's tax liability is sufficient to absorb it.
- **Accelerated Depreciation Deduction** — an acceleration of the asset's annual depreciation expense that can be deducted from gross income when computing income tax liabilities. For example, depreciation deductions from income for wind, solar and geothermal assets are spread over the first five years after they go into service rather than over their useful lives, as is the general rule. Therefore, early year tax liability for the asset owner is lower and later year liability is greater. The value is the discounted net present value of tax liabilities.
- **Production Tax Credits** — a credit against tax liability equal to a sum per unit produced for a defined period. For example, qualifying wind facilities receive US\$22 income tax credit for each MWh produced for the first 10 years of operation. As with other tax credits, its value is equal to the credit in the year that it reduces tax liability, as long as the owner's tax liability is sufficient to absorb it. Thus, if the credit can be fully used, and if the current wholesale price for power at Palo Verde in California is US\$25 per MWh, the effective price received by a wind generator is US\$47 per MWh.

Subsidies via tax expenditure such as these have two important inefficiencies. First, in order to realize the subsidy, the owner of the facility must have net taxable income (in the case of accelerated depreciation) or tax liabilities (in the case of tax credits) sufficient to absorb the subsidy, optimally without delay as delay reduces value. As a result, facilities are often owned by companies with high tax burdens and leased to operators for less than the useful life of the assets and subject to a fair market value option to purchase for the lessee operator. This allows the owner (whose real interest is predominantly financial) to realize the tax benefits and gives the lessee operator as much control as it can have. These complex arrangements substantially reduce the value of the subsidy.

In addition, the tax subsidies are typically subject to expiration and renewal with different terms. Generally, the rules apply based on the date that construction starts. If the subsidy is determinative of feasibility, the project planning and development phase is subject to great uncertainty. In addition, projects can be rushed into construction to secure an expiring subsidy, as occurred in 2011 when certain subsidies expired.

Partly because of the tax-based subsidies, asset-based financing dominates US financing of new clean energy capacity. The business complexity, unusual risks and longer time scale rewards also suggest asset-based financing. Use of liquid, traded capital markets in asset-based financing is particularly challenging because the debt tends to be complex and subject to idiosyncratic terms and conditions. Over the last 10 years, the average amount of asset financing of clean energy has been US\$23.4 billion, with a peak of US\$46.0 billion in 2011 and a 2014 amount of US\$18.0 billion.

Over that period, public market financing of clean energy has grown unevenly and modestly. The peak year was 2014 with US\$10.6 billion of financing. But the prior peak year was 2007, when US\$6.8 billion was issued. The next largest year was 2013 (US\$6.3 billion), but 2012 was very small (US\$1.5 billion). To the extent that the form of subsidy makes asset-based financing outside of the public traded markets more likely, the subsidy's value is diminished.

Small distributed capacity, largely rooftop technologies have more steadily grown. In 2014, US\$12.9 billion of financing was raised for these assets.

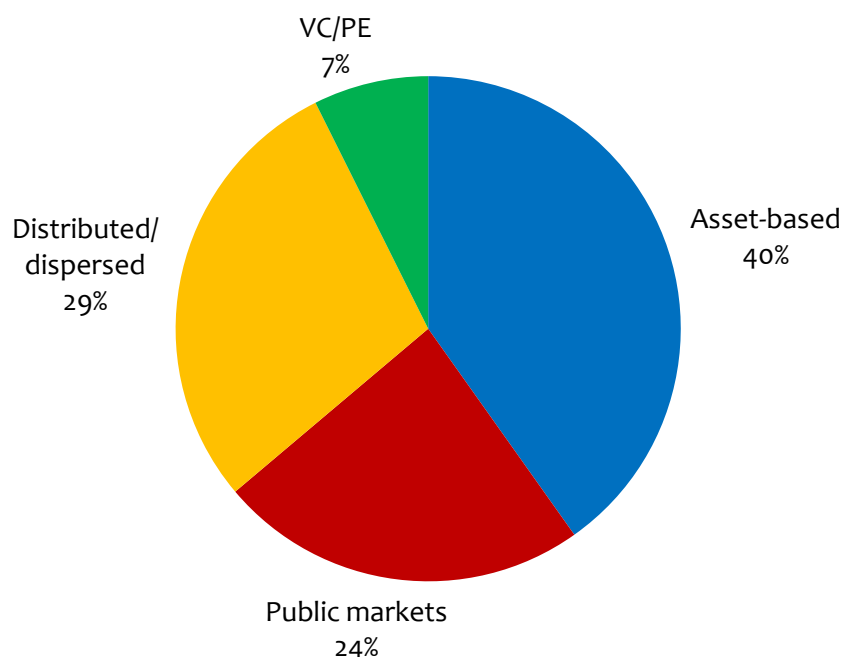
One method for increasing the scale of these investments is to allow the effective use of a financing structure commonly employed to attract outside investors that can effectively buy tax benefit subsidies and to pool projects for the purposes of financing. These are called “master limited partnerships” (MLPs) and they can be used effectively for non-renewable energy finance. MLPs can be used to convert prospective subsidies in the form of tax reduction benefits into cash for the sponsors of projects. Individual sponsors may not be able to use the subsidies effectively because they do not have enough near-in income to generate tax liabilities that can be offset. If “ownership” (as defined in tax law) is held in an MLP, the MLP investors can pay for the tax benefits. Of course, the price paid is discounted for various risks, like construction and operation failures or delays, failure to comply with tax laws and change of tax rates or the law itself. Unfortunately, legal interpretations have been an impediment to the use of MLPs.

Ironically, there is no such impediment to the use of MLPs for undertakings that diminish sustainability, such as carbon-based fuel extraction. One could envision a complete reversal of federal policy to eliminate the benefits of MLPs for non-renewable energy (which functions something like a negative carbon tax now) and provides the stable tax benefits for renewable energy that are required to allow MLPs to be used for it.

Venture capital and private equity are often seen as a particular strength of the US markets. These sources have provided relatively little capital for clean energy. The largest annual amount was US\$6.9 billion in 2008. In 2014, the amount of VC/PE financing for clean energy was US\$3.3 billion.

The 2014 breakdown is illustrated in Figure 5.

**Figure 5: Clean Energy Financing in 2014**



## 2.1 Green Bonds

The advent of “green bonds” as a definable class of security is a potentially significant development. The green bond classification is based on a defined non-exclusive list of uses of the proceeds of the bonds agreed to by large financial institutions:<sup>17</sup>

*Renewable energy*

*Energy efficiency (including efficient buildings)*

*Sustainable waste management*

*Sustainable land use (including sustainable forestry and agriculture)*

*Biodiversity conservation*

*Clean transportation*

*Clean water and/or drinking water*

*Acquisition of a pool of assets of one or more of the foregoing types*

The bonds might be issued by a development agency like the World Bank and the proceeds redeployed to a qualifying green bond purpose. Alternatively, they could be issued by a company or business. The bonds may be backed by the issuer or they may be backed by a defined stream of revenues (e.g., from taxes or fees) that may or may not be related to the use of proceeds.

Of the ten top bank underwriters of green bonds, 5 are US-based banks.<sup>18</sup> It has been estimated that the worldwide issuance of green bonds in 2015 was almost US\$42 billion, up from US\$37 billion in 2014 and just over US\$11 billion in 2013.<sup>19</sup> While growing, the issuance volume is clearly subject to variation.

The significance of the designation to an investor is, at one level, an independent assurance that the proceeds of its investment are going to a cause that meets standards. If the designation becomes commonplace, it will provide a useful tool to determine changing levels of investment in green

undertakings. Ultimately, to the extent that investors ascribe discernible and significant value to the green use of proceeds, such as an assessment that the green activities have greater fundamental upside and less fundamental downside than other alternatives, designation of the investment will carry independent price consequences.

In the US, the green bond designation has not experienced a rapid growth as in the rest of the world. This may well be a function of the complexity of the market, including the separation of the tax-exempt state and local and taxable corporate bond markets. If the investor community starts to rely more heavily on the green bond designation, the practice will likely be adopted more widely.

## 2.2 Disclosure and Credit Ratings

The US financial system is heavily dependent on widespread access to information. Traditional securities laws (pre-Dodd-Frank Act) centre on disclosure and market fairness to create a market structure.

Disclosure to the public of material information regarding the effects of climate change on businesses and governments that have issued securities has always been required. However, the primary market regulator — the Securities Exchange Commission — has become far more emphatic about the need to do so. The hallmark of this changed position is its 2010 Climate Disclosure Release, an interpretation of the legal disclosure requirements related to climate and sustainability generally.<sup>20</sup> Highlights of this Release include four possible sources of climate change impacts that may require disclosure by companies and governments with publicly traded securities:

1. Existing and pending legislation and regulation in the United States, such as the costs of carbon usage or for facility improvements to reduce emissions;
2. International climate change accords and agreements;
3. The indirect consequences of climate change regulation and resulting business trends, such as decreased consumer demand for carbon-intensive goods or the impact on the reputation of an entity having disclosure obligations; and
4. The physical consequences of climate change, such as the direct impacts on the facilities of an entity having disclosure obligations, for example, on coastal sites as a result of rising sea levels; and the indirect operational and financial impacts on its operations, for example, as a result of drought and shifts in weather patterns.

There is a strong relationship between SEC disclosure requirements and accounting standards. The Climate Disclosure Release interacts with the work of the Financial Accounting Standards Board (FASB) and the Sustainability Accounting Standards Board (SASB) in establishing standards under which sustainability is a core element of the data presented to underpin the fundamental valuation of investment in companies and governments and ultimately market prices for these investments.

As described above, an important element of disclosure in markets that are highly responsive to data and powered by technology is credit rating. Credit rating agencies process information and express a view as to the probability of default of debt and equity issues. While the focus on default probability distinguishes credit ratings from audits and SEC disclosure requirements, credit ratings are often used by investors as a primary source of analysis of investments, largely because it is convenient to do so and the rating is reflective of a broader, less idiosyncratic analysis of a major element of fundamental value.

Standard & Poor's has been a leader in incorporating sustainability issues into ratings. For example, S&P published a report<sup>21</sup> that addresses the resilience of corporate creditworthiness in the context of natural



catastrophes arising from climate change. In addition, it has been at the forefront of assessing the relationship of sovereign creditworthiness to climate change, having published a report on the subject in 2014.<sup>22</sup>

As a practical matter, this significant increase in data will be effective if it increases the market's valuation of sustainability investment or decreases the valuation of investment that competes with sustainable development, particularly investment that has negative sustainability consequences.

- The effect of information on sustainability investment from a fundamental perspective will be difficult to estimate until more data are available. It is logically certain, however, that information will have an immediate effect on investors who seek to invest in sustainability for reasons additional to fundamental value, similar to the first level effect of green bonds described above.
- The effect on corporate activities that are detrimental to sustainability may also be more immediately discernible. Activist shareholders will be better informed (see Section 5). Corporate behaviour may be affected even without direct actions by activists to the extent that companies are sensitive to public perceptions.

### 3 Size and Prioritization of Capital Demand

The US underinvests in sustainability, as illustrated by Table 5. For each category of infrastructure shown other than electricity generation, the figure represents amounts in excess of current investment needed to maintain current conditions or to serve current needs, taking into account population growth, as estimated by the American Society of Civil Engineers. Thus, the level of infrastructure is unsustainable to accommodate the current population and economy without this level of investment. Investment in infrastructure to address conditions that have evolved and will evolve as the climate changes is not included. This means that the underinvestment in basic infrastructure is significantly understated. For example, New York City alone expects to spend almost US\$20 billion in response to climate change,<sup>23</sup> approximately 12% of the average annual household pre-tax income in New York City.

The figure for electricity generation is different. It includes the costs of new, clean energy generation and demand management so as to reduce greenhouse gas emissions by 40% by reducing the use of fossil fuels over 20 years as estimated by the Political Economy Research Institute and the Center for American Progress. The investment that is estimated is to be made from private companies and households rather than by government. It is assumed that governments of all levels continue to support the use of clean energy through tax and regulatory policies. This calculation does not take into consideration the cost of retirement of generating assets prior to the end of their commercially useful lives. This is a significant understatement of the electricity generation cost associated with the emission goal.

**Table 5: Annual Investment Shortfall in US Infrastructure (in US\$ billion)**

<b>Class of Infrastructure</b>	<b>Annual Investment Shortfall<sup>24</sup></b>
Water	40.00
Wastewater	16.60
Dams	2.85
Levees	10.00
Hazardous Waste	7.00
Roads	79.00
Air Transport	4.30
Bridges	7.70
Inland Waterways	0.60
Mass Transit	25.00
Parks	0.18
Schools	16.00
Electricity Transmission	37.00
Electricity Generation	152.00
<b>Total</b>	<b>398.23</b>

Even the understated shortfall described above is problematic. The current average annual investment in clean energy (US\$44 billion) is less than 10% of the estimated annual required investment (US\$442 billion or the estimated annual investment plus the shortfall). If the actual investment increased by 10% each year and started at the average investment over the past 10 years, the total invested over the next 20 years would still fall more than US\$1.14 trillion, or about 30%, short of the amount estimated as required to reduce greenhouse gases by 40% (a 13% annual increase would be required). Even worse news is that a reduction greater than 40% would be required to achieve the same overall outcome because of the slow pace of conversion.

## 4 Subsidies to Activities that Diminish Sustainability

Undoubtedly, increasing the amount and efficiency of subsidies to sustainable investment would have a positive effect on private investment amounts. However, sustainable capital-raising does not exist in a vacuum. It must compete with other forms of investment. In particular, it must compete with investment that funds activities that are less sustainable alternatives to the activities funded with sustainable investment. If these less sustainable alternatives are subsidized by government, sustainable investment is less able to compete successfully for private investment funds.

The most obvious example is energy. Energy investment is highly subsidized in the US, for reasons that include national security and externalities. To the extent that these subsidies enhance the attractiveness of investment in carbon-based energy, investments in sustainability are competitively harmed.

In the US system, subsidies are often delivered *via* tax expenditures, or reduction of taxes that would otherwise be paid on the income of enterprises to be subsidized. As an example, the oil and gas industry receives approximately US\$9.3 billion each year in such subsidies.<sup>25</sup> These include acceleration of the depletion deduction from income (similar to depreciation) for reserves on oil and gas; the ability to include exploration costs in current expenses that are deductible from current income, rather than treating them as a capital cost that can be depreciated over time; and other targeted tax expenditures.

Subsidies for coal are also significant. Coal companies benefit from approximately US\$1.55 billion of tax expenditures each year.<sup>26</sup>

Other indirect forms of subsidy exist. One example from the energy sector is the practice of granting monopolistic franchises for distributors and retailers of electricity and gas with guaranteed recovery of capital and wholesale purchased energy costs. The power grid is for the most part owned by these utilities. Originally, the system was designed to assure investment in generation and distribution assets by reducing risk. While the system has been adjusted to encourage sustainable investment, it still exists and serves to protect assets from de-commissioning, a form of subsidy.

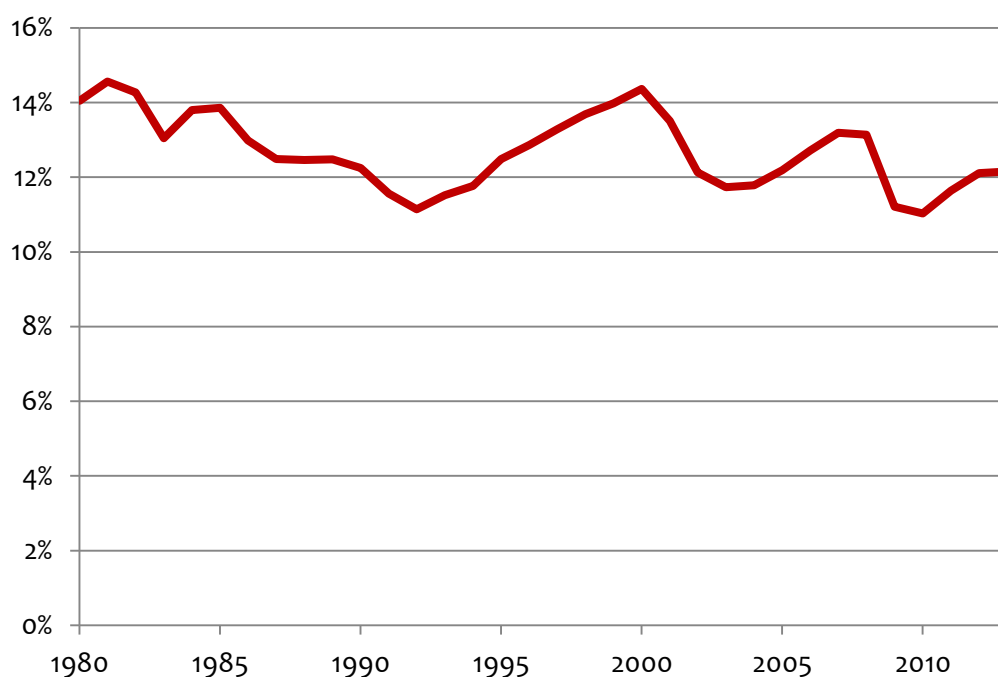
These types of subsidy can be seen as a subsidy to anti-sustainability. As such, any reduction or an elimination of these subsidies is likely to have a positive effect on investment in sustainability, at least insofar as the reduction or elimination levels the playing field or tilts it in favour of sustainability.

## 5 Disinvestment/Investment by Corporate Entities

The divestment by US corporate entities of assets and enterprises that diminish sustainability is difficult to quantify. To some extent, this process will occur as sustainable investments replace others because of commercial considerations and returns.

Oil prices have fallen to a range between US\$50-50 per barrel from US\$112 in 2011 and US\$140 in 2008, and inventories remain high. Natural gas prices have also declined as supply has increased, falling to US\$2.8/MMBtu from US\$4.3 in 2011 and US\$13 in 2008.<sup>27</sup> These price shifts will affect the relative commercial competitiveness of alternative energy sources. In particular, it can be expected that natural gas-fired power generation will grow relative to renewables, improving emissions marginally but growing a fleet of new generating assets that are sub-optimal in terms of emissions.<sup>28</sup>

**Figure 6: Private Investment in Equipment, Structures and Intellectual Property, as a share of GDP, 1980-2013**



Source: BEA, 2014

Perhaps more troubling is the long-term decline of corporate investment in research and development and other forms of expansion. As shown in Figure 6, US corporate investment has declined significantly since 1980. The only exceptions have been in the years of the dot-com and housing bubbles. Market investment in innovation, and particularly in invention, is uneven and concentrated in the bubble phase of the business cycle, suggesting irrational and inefficient allocation of capital based on the misvaluation of opportunities during times of apparently irrational growth.<sup>29</sup>

This has been linked to a distinct preference of senior management at many large firms to avoid activities that involve longer-term reward and shorter-term risk. Surveys have shown that CEOs will overwhelmingly eschew investments that may reduce short-term return on assets (and therefore potentially affecting short-term stock price) even if the risk-weighted value over the long term is substantially positive

One cause of this phenomenon is reported to have been the rise of shareholder activists, hedge funds and large investors that are able to cause corporations to buy back shares in lieu of investing profits in R&D and expansion or even divesting operations with low short-term returns.<sup>30</sup> The strength of these activists has had a significant influence on management discouraging investments and activities that do not generate an immediate return.

Whether management short-termism is a function of shareholder pressure or not, it certainly affects adversely two important activities: expansion of business through R&D and internal growth that could improve incomes and employment and investment in sustainability that pays off over the long term.

Some major institutional investors (notably CalPERS, the California Public Employee Retirement System) have pushed back against this phenomenon. To date, activist shareholders pushing for immediate returns on investment have been a far more powerful force. However, some significant developments suggest substantial increase in shareholder activism in support of sustainability in the future.

### **Investor-Based Sustainability**

Shareholder activism can also be an impetus to corporations in favour of sustainability. The ability of investors to influence corporate behaviour is hampered by the structures described above. Institutional investors are often constrained by their duty to manage investment in order to improve results relative to the markets and other institutional investors.

Ceres, an organization of more than 130 investors and companies that seek to be socially responsible, is able to take some positions *vis à vis* corporations in which they are shareholders as a collective action rather than individually. This diminishes the dilemma discussed above often built into the US financial system, specifically the conflict between measured current returns in a diverse and liquid portfolio of investment and longer-term social benefits.

Other proposals that are in very early stages can be even more effective. Individual shareholders (either direct or through intermediaries that pool funds for investment) can be empowered to express their views on broader social issues. This can eliminate the conflict for institutional investors (for instance a pension fund or a manager of retirement accounts can simply pass on the views of individual beneficiaries to corporate managers, or even represent constituents' views through more active efforts).

Organizations like Ceres and individual institutional investors like CalPERS have undoubtedly had a positive effect. Nevertheless, more work is needed to generate the scale of change required.

In particular, the managers of individual retirement accounts are a powerful force. As discussed above, they represent the single largest pool of invested funds. The most important breakthrough could be the successful marketing to individual retirement investors of funds that actively support the goals of sustainability. This could have great appeal for individuals who want to express themselves regarding sustainability, and are frustrated by the apparent inability of government to do act on the issue.

In practical terms, the largest issue centres on proxy access. Generally, management of public corporations has significant control over shareholder voting, including voting for board members, because it has exclusive access to the solicitation and voting apparatus. The SEC promulgated proxy access rules that allowed a shareholder group of 3% or better to obtain access, but it was struck down by the courts for failure to adequately consider costs and benefits as required by general laws governing regulatory authorities. The possibility of challenge would be enough to influence management to pay greater heed to shareholder groups.

At the core of the issue is the process for selecting board members and passing resolutions at annual meetings of shareholders. Generally, management solicits voting proxies from shareholders by means of mass mailings and sometimes electronic communications. Management has access to shareholder rolls and has the financial resources to implement the solicitation. As a result, management has great influence over the process and the slate of directors and resolutions put forward by management wins the vote almost all of the time.

Activist shareholders generally seek access to the shareholder rolls and the implements of proxy solicitation in order to put forward competing director slates and resolutions. Although the SEC rule that required corporations to provide access to shareholder groups representing 3% or more of total shareholders was struck down, activist shareholders largely interested in sustainability have successfully negotiated agreements with corporations that would reflect the basic structures of the SEC rule. At the forefront of this effort have been public employee pension funds in California and New York. To date the following companies have agreed to proxy access for 3% shareholder groups: General Electric, Citigroup, Yum Brands, Whiting Petroleum, Big Lots, McKesson Corp., Staples and Abercrombie & Fitch.

Access to the process does not mean that it will be used by shareholder groups or that those favouring sustainability issues would prevail. However, the relationship between management and shareholders that seek to alter corporate activities that can affect sustainability has changed.

## 6 New Public/Private Initiatives

Public/private collaboration can be an effective way to attract investment from private sources, particularly where there are both cash returns and public benefits. There is some history of this structure in the US. One structural issue with regard to public/private partnerships is the federal subsidy in the form of tax exemption of interest on state and local debt, described above. This subsidy favours the purely public endeavours by lowering the capital cost. For this reason, state and local entities are somewhat more likely to use limited borrowing capacity to back subsidized public undertakings rather than those involving private entities.

Major efforts toward public/private initiatives for sustainability are under way but have yet to generate practical results. California, Oregon, Washington and British Columbia have formed the Pacific Coast Collaborative, a joint agency of that has been set up to facilitate regional sustainability infrastructure in public/private partnerships. New agencies are planned based on this model for the mid-Atlantic and Great Lake States. Notably, financing remains the most elusive part of this effort.

In addition, President Obama's recent budget proposal includes incentives for public/private infrastructure investments. The budget eliminates restrictions on the issuance of tax-exempt municipal bonds for qualifying projects. The subsidy is in the form of tax expenditure. This provision would allow the subsidy from tax exemption of interest to be used in mixed, public private undertakings. It is estimated that the incentive could support about US\$16 billion of infrastructure investment.

## 7 New Economy

### 7.1 Dispersed Development

Sustainability has a number of community-based financing opportunities. However, they have yet to be deployed in scale. One reason is that resistance points are built into the system that have nothing to do with finance directly. These include local rules and customs that can be addressed in order to allow finance to flow.

The Natural Resources Defense Council (NRDC) is widely known for its participation in litigation associated with the environment and sustainability. It has recently taken on a set of tasks designed to remove obstacles to improving the stock of commercial and single-family and multi-family residential properties.

For commercial properties, the NRDC has worked to point out the improved risk profile for bank lenders of more energy-efficient tenants. This can be put into effect at the time of lease renewals and the obligation to do so can be inserted in lending documents with landlords. In this way, the interest of all the interested parties, lenders, landlords and tenants, can be aligned at a single point in time.

For single-family homes, the impediments are largely organizational. The decision to improve the energy efficiency of a home is hampered by the uncertainty of the time required to organize necessary elements of the task. Part of the NRDC program is to assemble the necessary service providers so that a home owner can price out a set of services that suits their needs more effectively. This, of course, has application for more modest commercial properties and multi-family housing owners as well.

Currently, the pilot program is being implemented in Kansas City, Missouri, a city with a population of 467,000. Once the organizational impediments are eliminated, adding pooled finance is a natural second step.

### 7.2 Peer-to-Peer Lending Investment

One of the growing internet-based phenomena is peer-to-peer lending. Several of the largest peer-to-peer businesses are located in the US. The business is designed to match sources of capital with uses without the traditional forms of intermediation. To date, it has primarily been used for consumer and small business funding.

Goldman Sachs announced that it was in the early stages of development of a peer-to-peer lending business focused primarily on consumer loans.<sup>31</sup> If Goldman implements this plan, it would establish the business in an organization with enormous access to capital.

This type of financing is far from the complex area of large project sustainability financing. However, as a stand-alone or adjunct business, peer-to-peer financing techniques may well be very useful for disbursed sustainability investment, perhaps targeting single or multi-family residential and small commercial real estate improvement programs. The US market is well positioned to take advantage of this.



## Conclusion

The US financial system is undoubtedly among the largest, most innovative and most sophisticated in the world. It is also clear that this is both a benefit and an impediment to non-governmental investment in sustainability and inclusiveness.

To date, the actual investment in infrastructure and sustainability does not meet current needs, especially those related to maintaining climate change to within manageable bounds. It is estimated that current annual investment in clean energy is about 25% of the annual costs of new, clean energy generation and demand management so as to cut greenhouse gas emissions by 40% by reducing the use of fossil fuel over the next 20 years. Nevertheless, the pools of capital and the multiple forms of investment exist to achieve these goals. Several things can be addressed to improve results.

- Large pools of capital can be brought to bear on the problem, in particular funds invested in retirement accounts and pension funds and held by insurance companies. In particular, steps can be taken that improve the liquidity of investment securities so that these large investor institutions can participate more readily. Future policy interventions should focus specifically on the issue of liquidity.
- Increased transparency and disclosure could increase the available pools of capital. These are essential to liquidity. Credit rating agencies are critical to this as are rules of federal agencies such as the Securities Exchange Commission, which regulates disclosure.
- Subsidies designed to assist sustainable investment by reflecting the value of externalities could be made more effective. In particular, subsidies delivered via the tax code (tax expenditures) could be improved in the following ways without increasing their cost to government:
  - They could be converted from tax expenditures to actual expenditures that would not require complex financing structures in order for the recipient to realize the value.
  - The subsidies could be made more certain and predictable, at least for projects that are in stages of significant planning so that the risk of the lapse of subsidy would be diminished.
  - An alternative to the particular subsidy through the exemption of the interest on state and local debt could be found. Structurally, the exemption is of little use to large segments of investors, specifically investment accounts, pension funds and banks because of tax law. Therefore, the field of potential investors is narrow. In addition, the involvement of governments in collaboration with private entities is discouraged.
  - Subsidies could be crafted to open up the vast pools of institutional capital to sustainable development by targeting the actual impediments to investment. In particular, the obstacle of relative liquidity should be addressed by increasing the liquidity of sustainability investments, reducing the investors' need to prioritize liquidity or compensating investors for lesser liquidity, providing them the funds to manage liquidity needs.
- Reasonable proxy access rules could democratize corporate behaviour and modify corporate policy on sustainability and inclusiveness.
- Ultimately, the complexity of the US financial system is a problem for sustainability and inclusiveness investment, largely because this kind of investment cannot take advantage of certain financial products and strategies that others who compete for investment can. This is a broader question of policy that is not yet fully understood in the US economy.

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<sup>1</sup> See for example Barton, D. and Wiseman, M. (2014), “Focusing Capital on the Long Term,” Harvard Business Review, available at <https://hbr.org/2014/01/focusing-capital-on-the-long-term>; and Generation Investment Management LLP (2012), “Sustainable Capitalism”, available at <https://www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf>

<sup>2</sup> While defined in different ways in the literature, financialization is used herein to mean the increase in financial market activity that does not improve, and may impair, the efficiency and effectiveness (i.e, net cost to the economy) of capital intermediation provided by the financial sector.

<sup>3</sup> See for example, Sayer, M. (2015), “Financialisation, Financial Structures, Economic Performance and Employment,” FESSUD Working Paper, available at <http://fessud.eu/wp-content/uploads/2015/01/financialization-economic-performance-working-paper-93.pdf>; and Turbeville, W. (2015), “Financialization and Equal Opportunity,” available at <http://www.demos.org/publication/financialization-equal-opportunity>.

<sup>4</sup> An investment’s practical life cycle is the period during which the discounted present value maintains significance. For example, a return equal to 10% of the original amount of the investment that occurs 30 years after the investment has a present value at a 15% per annum discount rate of only 0.63% and thus may be of little practical significance to the investment decision.

<sup>5</sup> This is not the specific usage of convexity that is common in finance, but it is an accurate usage and is descriptive.

<sup>6</sup> Sometimes also incentivized by tax policy or other government incentive.

<sup>7</sup> Of course, “continuous decision” and “unconstrained by time” are not ontologically absolute because idealized continuity and absence of time constraints cannot exist in this context.

<sup>8</sup> Insurance is “A contract in which one party agrees to indemnify another against a predefined category of risks in exchange for a premium.” (Legal Information Institute, Cornell University Law School, available at <https://www.law.cornell.edu/wex/insurance>.) A derivative has not quantifiable premium but is an exchange of future consequences relative to a current condition.

<sup>9</sup> Bloomberg New Energy Finance (2014), Sustainable Energy in America 2014 Factbook, available at <http://www.bcse.org/wp-content/uploads/2014SustainableEnergyinAmericaFactbook1.pdf>

<sup>10</sup> Investment Company Institute Factbook, available at [http://www.icifactbook.org/fb\\_ch1.html#investment](http://www.icifactbook.org/fb_ch1.html#investment).

<sup>11</sup> National Association of Insurance Commissioners, “Capital Markets Report,” available at [http://www.naic.org/capital\\_markets\\_archive/140506.htm](http://www.naic.org/capital_markets_archive/140506.htm).

<sup>12</sup> Federal Reserve Board of Governors (2014), “Financial Accounts of the United States”, available at <http://www.federalreserve.gov/releases/z1/current/z1.pdf>.

<sup>13</sup> Entrepreneur Magazine, “Top 100 Venture Capital Firms – 2013”, available at <http://www.entrepreneur.com/vc100>

<sup>14</sup> Investment Company Institute Factbook, available at [http://www.icifactbook.org/fb\\_ch1.html#investment](http://www.icifactbook.org/fb_ch1.html#investment).

<sup>15</sup> The Investment Company Institute, Money Market Fund Assets, 24 July 2014, available at <http://www.ici.org/research/stats/mm/mf/mm>.

<sup>16</sup> Securities Industry and Financial markets Association, “US Municipal Bond Issuance,” available at <http://www.sifma.org/research/statistics.aspx>

<sup>17</sup> Ceres (2014), “Green Bond Principles 2014 – Voluntary Process Guidelines for Issuing Green Bonds”, available at <http://www.ceres.org/resources/reports/green-bond-principles-2014-voluntary-process-guidelines-for-issuing-green-bonds/view>.

<sup>18</sup> Climate Bonds Initiative, 2014 League Tables, available at <http://www.climatebonds.net/resources/league-table>.

<sup>19</sup> Climate Bonds Initiative, Year 2015 Green Bonds Final Report, available at <http://www.climatebonds.net/year-2015-green-bonds-final-report>.

<sup>20</sup> Securities and Exchange Commission, Commission Guidance Regarding Disclosure Related to Climate Change, Release Nos. 33-9106, 34-61469, 75 Fed. Reg. 6290 (Feb. 8, 2010), <http://www.sec.gov/rules/interp/2010/33-9106.pdf>

<sup>21</sup> Standard & Poor’s Corporation (2015), “Climate Change Will Likely Test the Resilience of Corporates’ Creditworthiness To Natural Catastrophes”, available at [http://www.actuarialpost.co.uk/downloads/cat\\_1/SP\\_Climate%20Change%20Impact%20On%20Corporates\\_Apr212014.pdf](http://www.actuarialpost.co.uk/downloads/cat_1/SP_Climate%20Change%20Impact%20On%20Corporates_Apr212014.pdf).

<sup>22</sup> Standard & Poor’s Corporation (2014), “Climate Change is a Global Mega-Trend for Sovereign Risk”, available at [https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1318252&SctArtId=236925&from=CM&nsl\\_code=LIME&sourceObjectId=8606813&sourceRevId=1&fee\\_ind=N&exp\\_date=20240514-20:34:43](https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1318252&SctArtId=236925&from=CM&nsl_code=LIME&sourceObjectId=8606813&sourceRevId=1&fee_ind=N&exp_date=20240514-20:34:43)

<sup>23</sup> New York City (2013), “A Stronger More Resilient New York”, available at <http://www.nyc.gov/html/sirr/html/report/report.shtml>

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<sup>24</sup> The source of all data except for Electricity Generation is the American Society of Civil Engineers, “2013 Report Card for Americas Infrastructure,” available at <http://www.infrastructurereportcard.org>. The sources of data for Electricity Generation are: Bloomberg New Energy Finance, “Sustainable Energy Finance: 2015 Factbook,” available at <http://about.bnef.com/white-papers/sustainable-energy-america-2015-factbook/>; and Pollin, R., Garrett-Portier, H., Heintz, J. and Hendricks, B. (2014), “Green Growth: A US Program for Controlling Climate Change and Expanding Opportunities”, Center for American Progress/Political Economy Research Institute at the University of Massachusetts, Amherst, available at [http://www.peri.umass.edu/fileadmin/pdf/Green\\_Growth\\_2014/GreenGrowthReport-PERI-Sept2014.pdf](http://www.peri.umass.edu/fileadmin/pdf/Green_Growth_2014/GreenGrowthReport-PERI-Sept2014.pdf)

<sup>25</sup> Metcalf, G., “Using Tax Expenditures to Achieve Energy Policy Goals,” National Bureau of Economic Research, January 2008, available at <http://www.nber.org/papers/w13753.pdf>.

<sup>26</sup> *Id.*

<sup>27</sup> Energy prices as per NASDAQ, available at <http://www.nasdaq.com/markets/commodities.aspx>.

<sup>28</sup> See US Energy Information Administration, “Annual Energy Outlook 2015,” available at [http://www.eia.gov/forecasts/aeo/electricity\\_generation.cfm](http://www.eia.gov/forecasts/aeo/electricity_generation.cfm).

<sup>29</sup> Mazzucato, M. (2010), *Bubbles and Investment Behaviour*, Plagrave McMillan

<sup>30</sup> The Economist (2015), “An Investor Calls,” available at <http://www.economist.com/news/briefing/21642175-sometimes-ill-mannered-speculative-and-wrong-activists-are-rampant-they-will-change-american>

<sup>31</sup> Corkery, M. and Popper, N. (2015), “Goldman Sachs Plans to Offer Consumer Loans Online, Adopting Start-Ups’ Tactics,” The New York Times, available at <http://www.nytimes.com/2015/06/16/business/dealbook/goldman-to-move-into-online-consumer-lending.html>.



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