CLIMATE POLICY INITIATIVE

The Landscape of Climate Exposure for Investors

August 2015

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A CPI Report

Descriptors

Sector	Finance
Regions	Global
Keywords	Climate Exposure; Climate Risk; Environmental, Social, and Governance (ESG) Investing; Impact Investing; Socially Responsible Investing (SRI); Green Bonds; YieldCos

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About CPI

Climate Policy Initiative is a team of analysts and advisors that works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organization supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States.

Our work helps nations grow while addressing increasingly scarce resources and climate risk. This is a complex challenge in which policy plays a crucial role.

Acknowledgements

The authors of this publication would like to thank our partners at the Steyer-Taylor Center for Energy Policy and Finance at Stanford University – Alicia Seiger, Nicole Schuetz, Donna Bebb, and Stefan Heck. Their thoughtful guidance and collaboration have been invaluable throughout this project.

We thank the following professionals for their collaboration and input: David Hood and Will Morgan (Sonen Capital); Barbara Pomfret and Lee O'Dwyer (Bloomberg); James Hulse (Carbon Disclosure Project (CDP)); Doug Cogan and Tom Kuh (MSCI); Rob Day (Black Coral Capital); Gabriel Thoumi (Calvert Investments); Bob Litterman (Kepos Capital and World Wildlife Fund); Jenna Nicholas (Divest-Invest); Divya Mankikar (TruCost); Curtis Probst (Rocky Mountain Institute (RMI)); Jane Ambachtsheer and Jillian Reid (Mercer); Michelle Edkins (BlackRock); Colin le Duc (Generation Investment Management); Katie Schmitz Eulitt (Sustainability Accounting Standards Board (SASB)); Mark Fulton (Energy Transition Advisors); Sarah Stein (Hall Capital); Nancy White (TomKat Charitable Trust); Ashby Monk (Stanford Global Projects Center and University of California Office of the Chief Investment Officer); Danyelle Guyatt (the 2° Investing Initiative (2DII)); and Chris Fox, Lindsey White, and Monika Freyman (Ceres).

We extend our sincere thanks to fellow CPI collaborators Jessica Brown, Donovan Escalante, Gianleo Frisari, and Padraig Oliver for their expertise and tremendous hard work in support of this project.

Finally, we thank our communications team – Ruby Barclay, Maggie Young, Elysha Rom-Povolo, and Tim Varga – for their helpful feedback, graphics, and thoughtful insights.

Executive Summary

Climate change has financial implications for investors – presenting significant portfolio risks as well as new market opportunities. However, this landscape of climate exposure for investors is often not well-understood, and its consequences are rarely reflected in how we assess the performance of companies and funds. The lack of common definitions and common taxonomies used to describe and orient climate-relevant concepts in the investment landscape often adds to the confusion. It can also be challenging to differentiate climate-related investment choices that are significant, from those that are marketed as "green" but lack substance.

This is problematic for two major reasons: First, investors and others are exposed to significant financial risks associated with climate change that are not being properly assessed or managed. These unaddressed risks can hurt investment portfolios as well as our overall financial system, and often mean that markets are not properly recognizing the cleanest or most efficient companies.

Second, much of the world's long-term capital that is needed to put the world on a low-carbon, climate-resilient pathway has not been allocated to these types of investments. This means that investors are not able to take advantage of many opportunities associated with climate exposure that would also allocate significant capital towards the fight against climate change.

Climate change presents both significant portfolio risks and new market opportunities to investors.

Environmental, social, and governance (ESG) data contains essential information to enable investors to manage climate-related risks, and a number of data tools and financial products have emerged that seek to help investors utilize it.

However, there are some inherent challenges. ESG data is often voluntarily disclosed through a patchwork of different organizations and actors. It varies significantly in the quality, quantity, and rigor of disclosed information. This variation in ESG data between companies in the same industry, across industries, and throughout the capital stack can make it difficult for investors to account for climate exposure across entire portfolios.

This paper explores the landscape of climate exposure and examines the strengths as well as some of the current limitations of ESG data, tools, and financial products.

ESG data tools aggregate ESG data, research, and analysis for investors, allowing them to identify climate exposure in their portfolios today. However, these tools emphasize climate risks over climate opportunities, and are limited by the quality of the underlying ESG data. Nonetheless, these tools represent an important start.

ESG index products help investors actually manage these risks or pursue opportunities; however, these have their own challenges. Exclusionary (or "divestment") indexes are often more effective as political or moral statements than as a means of managing complex climate risk or attempting to influence the cost of capital for fossil fuels. Non-exclusionary indexes (which underweight low-ESG performers) and thematic indexes (which emphasize "green" investments) may be slightly more nuanced tools. However, they often don't provide the levels of transparency needed for investors who are serious about either managing climate risk or pursuing opportunities in areas like renewable energy or alternative fuels.

Emerging **green financial products** like green bonds and YieldCos have the potential to be important vehicles for climate-related investments in the future. However, green bonds today lack a universal definition of "green" criteria and aren't necessarily raising new financing for climate action. Current YieldCos, in turn, are often focused on growth and may not meet the needs of institutional investors.

A growing spectrum of ESG data, tools, and financial products can help manage climate exposure, but there are some limitations.

The landscape of climate exposure consists of a number of actors, ranging from companies and investors to regulators, disclosure advocates, ESG tool providers and others. All will continue to play important roles in improving this space. To achieve improvement, we suggest the following:

- **Standard-setting organizations, disclosure initiatives, and investors can lead the way on greater disclosure from companies.** Ultimately, standardized ESG disclosure within corporate reporting processes needs to become a necessary underpinning for standard investment analysis. Mandatory disclosure for public companies – through financial regulators, exchanges, or intermediaries, and covering a range of asset classes – would afford investors more comprehensive information and greater comparability across industries, improving the added value of tools and products to manage climate exposure.
- **Investors and regulators can continue mainstreaming ESG investment.** Integrating ESG metrics into investment decisions can add portfolio value today, while also helping the ESG investment sphere to grow and mature.
- **Financial product and service providers can work with investors to create new financial vehicles for green investments and improve existing ones.** ESG-inclined indexes, green bonds, and YieldCos remain a promising start, and all are increasing in their sophistication, disclosure, and investment oversight. Nonetheless, additional green investment vehicles that improve upon current limitations are likely to be important assets for investors managing increasingly complex climate-related risks and pursuing greater climate opportunities, over time.
- **Investors can share best practices for minimizing climate risks and maximizing climate opportunities.** Effective management of climate exposure will require knowledge-sharing on the best ways to minimize climate risks and maximize climate-related opportunities, across asset classes, investors, and geographies. A dialogue of like-minded investors who are willing to engage in an interactive process of evaluating portfolios on a regular basis could provide an important start.

Contents

1. Introduction

Climate change has financial implications for investors – presenting significant portfolio risks as well as new market opportunities. However, these implications aren't universally well-understood. Assessing and managing climate-related risks and opportunities – or climate exposure – is complex and often is not incorporated into traditional financial analysis.

Tools and financial products designed to help investors account for climate exposure are proliferating, and are increasing in sophistication. Environmental, social, and governance (ESG) data underlie these tools, providing investors with information on companies' performance across environmental and other metrics relevant to climate change.

This publication gives an overview of the landscape of climate exposure. It provides the foundational information needed to begin developing strategies for managing climate exposure, including:

1. A working definition of climate exposure
2. An understanding of the underlying ESG data for measuring and managing climate exposure, as well as the actors involved
3. Examples of the ESG tools and financial products available for managing these risks, and an assessment of their strengths and current limitations

With generous assistance from the Steyer-Taylor Center for Energy Policy and Finance at Stanford, we aggregated climate exposure information through:

1. Twenty-two interviews with ESG investment and industry professionals[1]
2. First-hand experience using four ESG tool suites (from Bloomberg, TruCost, MSCI, and Sustainalytics)
3. Explorations of existing ESG- and climate-relevant financial products
4. An extensive literature review

The paper is structured as follows. **Section 2** explores what climate exposure is, why it matters, why it's challenging to manage, who the relevant actors are, and where ESG data comes from. **Section 3** explores ESG tools and data that are available to investors for managing climate exposure, and **Section 4** explores financial products for managing climate exposure. **Section 5** provides emerging insights into how investors and other actors can continue to improve the ESG investing space while managing climate exposure most effectively. The Appendix provides additional detail on specific tools, financial products, and ESG disclosure actors for further inquiry.

1 Interviews included impact investors, asset managers, advisors, consultants, ESG tool providers, family offices, philanthropies, endowments, disclosure advocates, standard-setting organizations, research organizations, and others.

2. Climate Exposure

Climate exposure is defined as the potential gains or losses in an investor's portfolio due to climate change. It encapsulates both climate-related financial risks as well as opportunities. Though climate exposure has many components, it can be divided into three broad subcategories:

- **Policy and legal exposure:** The financial effects of policies designed to mitigate climate change (e.g., carbon pricing schemes) or policies designed to adapt to it (e.g., water management infrastructure and rationing) (Burton, Diringer, and Smith 2006); or litigation or adjudication related to climate change (*Massachusetts v. Environmental Protection Agency* 2007; Guyatt et al. 2011).
- **Physical and ecological exposure:** The financial implications of changes to earth's ecosystems. For example: the costs of shorter and warmer winters on the ski industry (Bebb 2015); the financial impacts of hotter weather on agricultural yields; or the economic consequences of severe weather/climatic events (e.g., Hurricane Sandy) that disrupt human economic activity.
- **Market and economic exposure:** Human responses to the aforementioned policy and ecological changes that will reshape businesses, industries, economies, and markets (e.g., growth in clean energy technologies that threaten the fossil fuel industry) (Guyatt et al. 2011).

These three types of exposure are not mutually exclusive and can influence one another.

2.1 Financial implications of climate exposure for investors

Investors face climate exposure throughout their portfolios. Climate change will have widespread effects on the value of financial assets (Guyatt et al. 2011). For example:

- **Compliance costs** associated with particular laws or policies related to climate mitigation or adaptation efforts, such as higher Corporate Average Fuel Economy (CAFE) standards in the United States
- Potentially **higher energy prices** associated with pricing carbon or constraining use of fossil fuels in the future
- Risk of **stranded assets** from policy and energy price changes – for example, coal mines or oil sands that become impractical for development under a future carbon pricing regime
- **Changing agriculture and commodity prices** as a result of changes in weather, growing seasons, and ecosystems.
- **Scarcity of essential resources** which could threaten many existing businesses and industries – for example, beverage companies that are vulnerable to water scarcity
- **Disruptions in existing supply chains** as a result of changing weather patterns or resource scarcity – for example, warmer and more acidic oceans decreasing global fish production
- Potential **damage to infrastructure and other assets** from severe weather and sea level rise

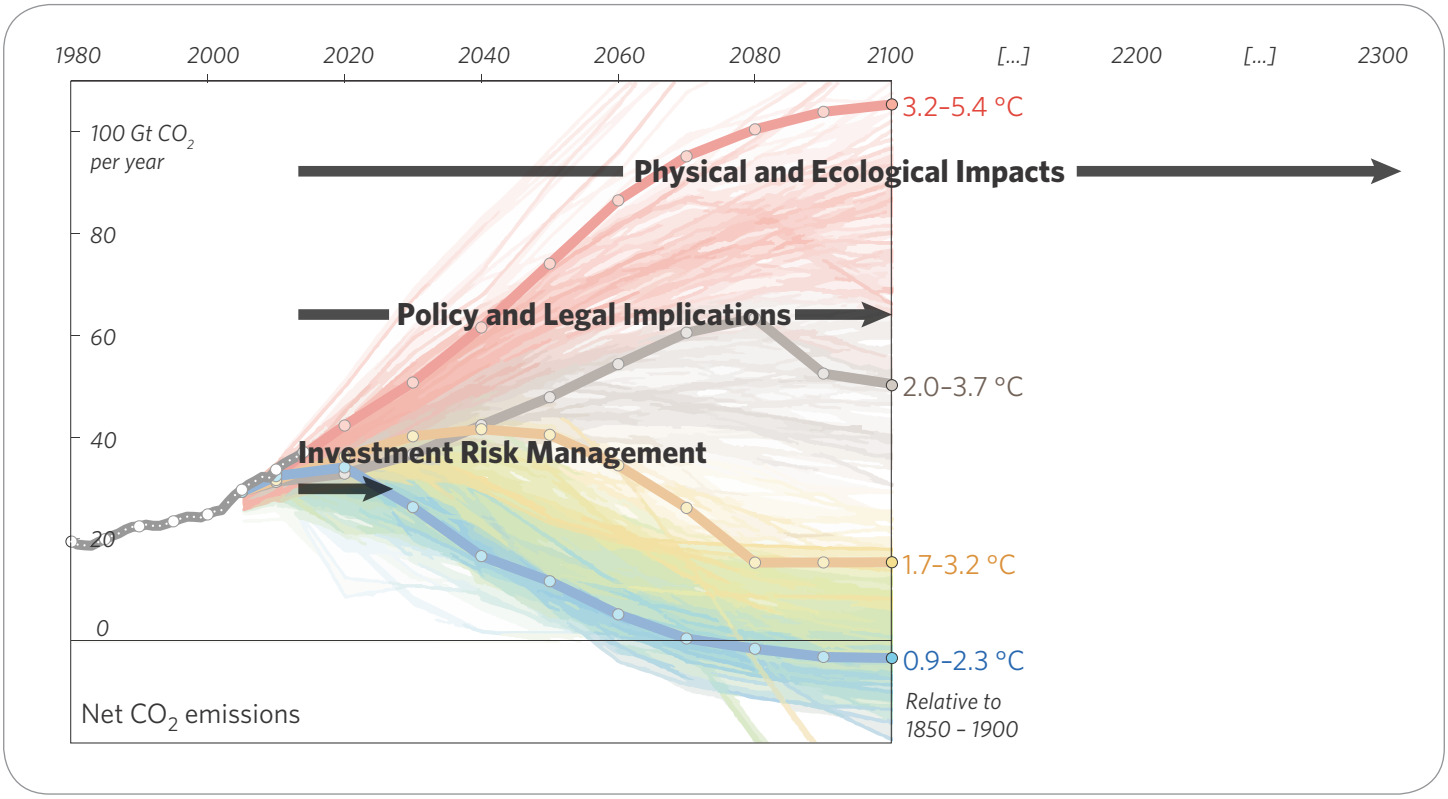
2.2 Challenges of managing climate exposure

Despite significant financial implications for investors, climate exposure is often not incorporated into financial analysis because of challenges in assessing and managing it.

One key challenge is that timelines for mitigating risk are misaligned between financial markets and climate change. Investors are often more concerned with short-term risks. In our interviews with industry stakeholders, many interviewees said that the longest period over which typical investors manage risks is about three to five years.

Longer-term risks are occasionally taken into account, but they are generally less of a concern – particularly with relatively liquid investments – whereas the risks associated with climate change will continue to emerge over many decades and even centuries. **Figure 1** illustrates this profound misalignment, which can make climate exposure particularly difficult to manage.

Figure 1: Emissions pathways and global temperature scenarios overlaid with physical and ecological impacts, policy and legal mitigation efforts, and investment risk management horizons



Adapted from Fuss et al. (2014)

Our interviews also revealed a number of other important reasons why managing climate exposure can be challenging:

- It is a "definitionally-challenged, metric-challenged space" where terminology isn't universal and metrics seem preliminary.
- Lots of attention is paid to the risks of high-carbon assets and energy intensive or extractive industries, but other types of climate exposure, such as ESG thematic indexes and green bonds, are less understood and are given less scrutiny.
- Within emerging "green" asset classes, it's difficult to parse which investments significantly contribute to climate change mitigation or adaptation, and which ones do not.

These factors add to the perception that climate exposure is challenging to manage. Nonetheless, there are ways to begin developing strategies for managing it.

2.3 Framework for managing climate exposure

An ideal framework for managing climate exposure involves both assessing and minimizing climate risk from traditional high-carbon, or "brown," investments exposed to policy, physical, and economic risks, **while also pursuing climate-related opportunities** through investments aimed at mitigating climate change (renewable energy, energy efficiency, carbon capture and sequestration, etc.) or aimed at adapting to it (infrastructure improvements, agricultural engineering, etc.).

Figure 2 below helps conceptualize such a framework. The influencing mechanism refers to the vehicle through which investors can influence company or fund behavior as it relates to climate exposure.

ESG data underlies this framework for managing climate exposure, and is the primary source of information that can help investors. There is substantial research suggesting that companies and funds that score higher

across ESG metrics have better long-term financial performance than their average- and low-ESG-scoring peers (Fulton, Kahn, and Sharples 2012).

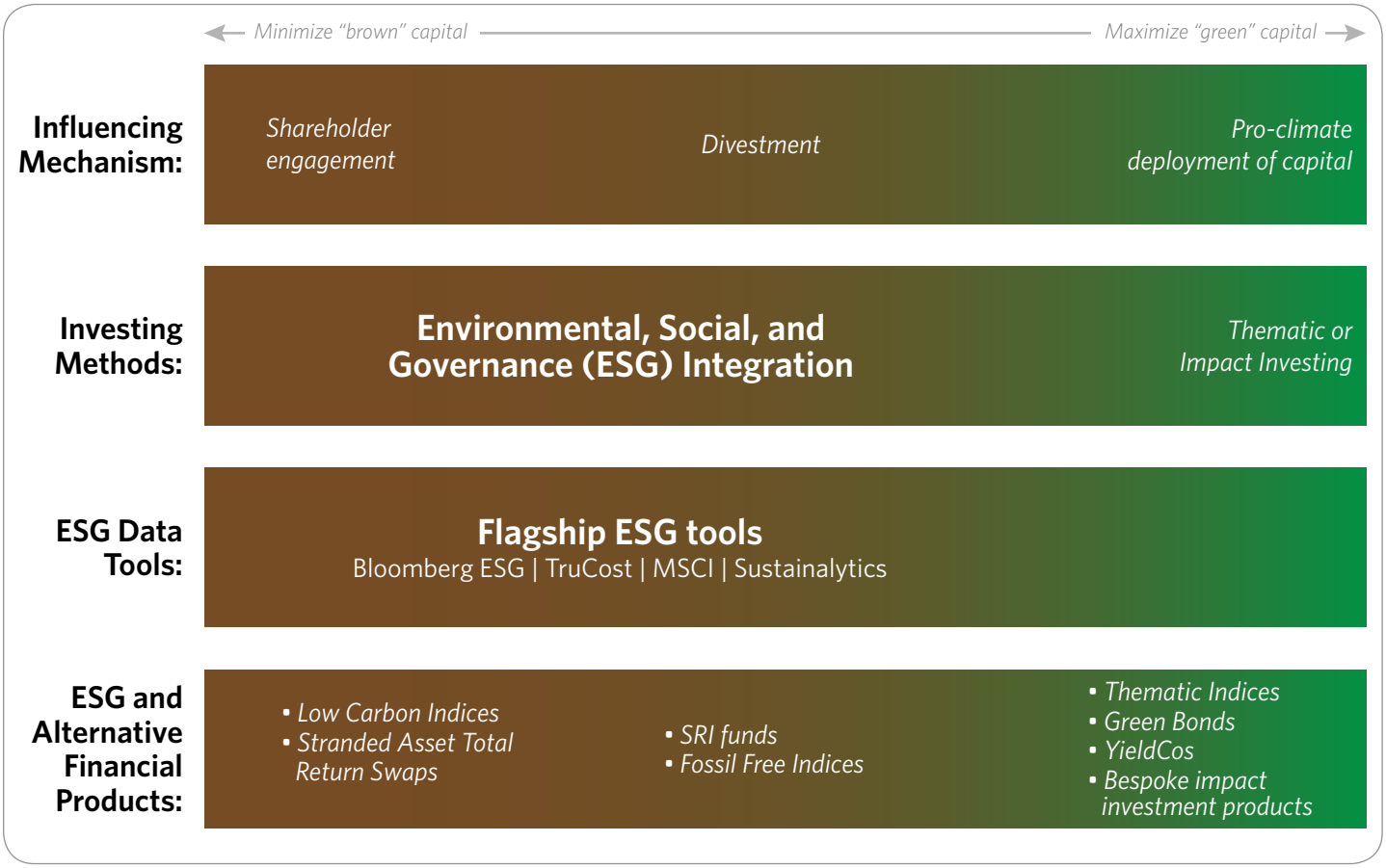
There is substantial research suggesting that companies and funds that score higher across ESG metrics have better long-term financial performance.

However, **current ESG data skews towards assessing and managing portfolio risks**, more than it facilitates investments into renewable energy and agricultural resiliency.

Many investing methods that take climate exposure into account fall under the broad category of **ESG integration**, where ESG factors are considered throughout the investment process. **ESG data tools** allow investors to aggregate and compare lots of different ESG information at the company, fund, or portfolio level in a single place and often against a variety of different benchmarks. **ESG financial products** incorporate external analysis of ESG factors into traditional financial products like indexes and bonds.

Section 3 takes a closer look at current sources of ESG data and actors involved in its disclosure and dissemination. It also explores ESG tools and assesses their strengths and current limitations.

Figure 2: Framework for managing climate risks and opportunities



3. Managing Climate Exposure through ESG Data and Tools

3.1 ESG data and investment decisions

Environmental, social, and governance (ESG) data is the primary source of information for investors seeking to assess and manage potential climate exposure in the context of a given company, investment, or portfolio. It covers environmental, social, and governance factors that can be used to inform investment decisions. Instead of being one particular type or source of data, it's a mix of many different kinds of data, disclosed through several different channels, to different institutions.

ESG data is the primary source of information for investors seeking to manage climate exposure.

The environmental ('E') metrics within ESG are an enormous subgroup in and of themselves, covering environmental factors including:

- **Disclosure:** evaluating companies on the detail, breadth, and veracity of their disclosed environmental data
- **Emissions:** by type of greenhouse gas, by source, by greenhouse gas protocol reporting standard, per unit of revenue, emissions trading activity, amount of emissions reductions, etc.
- **Energy:** total amount of energy consumed, amounts of particular fuels consumed, energy per unit of revenue, renewable energy used, etc.
- **Waste:** amount generated, amount recycled, and amount of hazardous waste
- **Water:** amount consumed, percent reused, total discharged, etc.
- **External initiatives:** participation in sustainability initiatives (e.g., UN Global Compact, GRI, PRI, etc.)
- **Fines and litigation:** number and cost of environmental fines and/or ongoing environmental litigation
- **Operational policies:** related to energy efficiency, renewable energy, waste reduction, emissions, green buildings, packaging, etc.

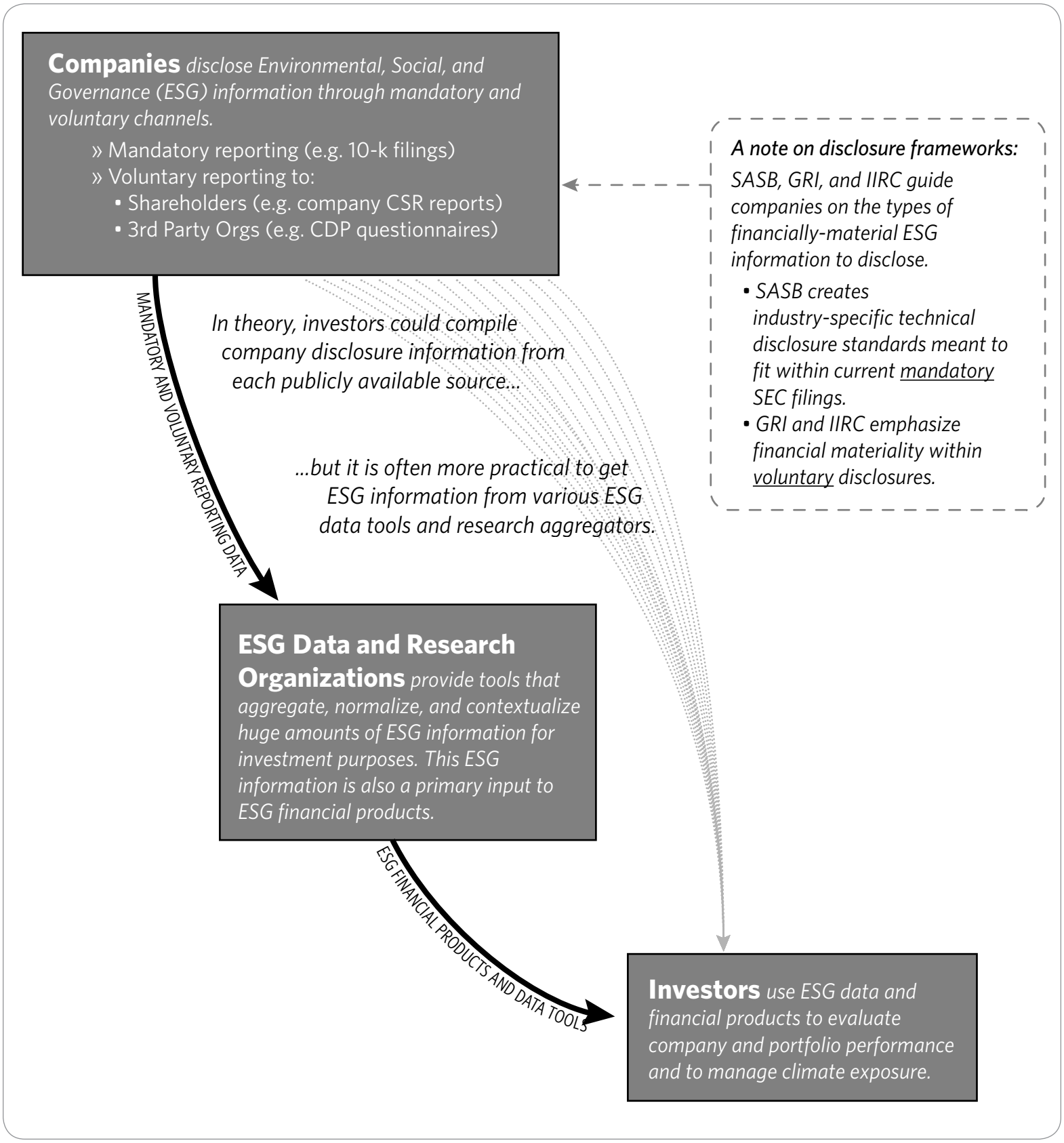
Table 1 shows some areas of climate exposure and climate opportunity, and maps it to specific metrics that can be used by investors to inform investment decisions.

3.2 ESG data sources and actors

ESG data comes primarily from voluntary disclosures by companies, but also from mandatory financial disclosures to regulators. Figure 3 provides an overview of the sources of ESG data and the actors involved.

Throughout our interviews, investors and stakeholders reiterated that ESG data adds insight into company performance and is a financially salient input into investment decisions being made today. But this incorporation of ESG metrics as an input into investment decisions – called ESG investing – is still evolving and maturing. Current ESG methodology has not been used in traditional financial analysis for very long (Fulton, Kahn, and Sharples 2012) and ESG investing is only in the early stages of being incorporated into standard CFA curricula and training processes (CFA Institute 2015; Orsagh 2011).

Figure 3: The path of ESG data from companies to investors



See Appendix 7.1 - ESG tools and tool providers: additional information and Appendix 7.2 - ESG disclosure and standard-setting organizations; matrix of actors for additional information.

Table 1: Examples of climate risks and opportunities and potential data needs

	CLIMATE EXPOSURE	EXAMPLES OF ANALYTICAL QUESTIONS FOR ASSESSING INVESTMENTS	EXAMPLES OF DATA NEEDS
CLIMATE RISKS	STRANDED ASSETS / OIL PRICE SHOCKS	What are additional costs that Exxon Mobile might have if emissions are taxed?	• Emissions: amount of total emissions, by type of greenhouse gas, by source, per unit of revenue, emissions trading activity, amount of emissions reductions, etc.
	DROUGHT	How will the drought in California impact costs for a nut producer?	• Water: amount consumed, percent reused, total discharged, water reserves and rights, etc.
	WARMER WINTERS	How will warmer winters and water scarcity impact the valuation of Vail Resorts? (Bebb 2015)	• Water: amount consumed for snowmaking, amount used for operations, availability of alternative water sources, etc. • Energy use: for snowmaking, for operations, etc.
CLIMATE OPPORTUNITIES	SOLAR POWER	What is the growth in demand for solar cells if a feed-in tariff is introduced?	• Energy prices: changes in the levelized cost of electricity (LCOE) and USD/KwH costs of competing energy sources
	FUEL-EFFICIENT AUTOMOBILES	What are expected increases in demand for Tesla vehicles if gasoline prices remain above $4.00 per gallon?	• Expected market growth of electric and/or low-carbon vehicles over the next 35 years • Policy incentives available to customers purchasing an electric vehicle • Changing consumer opinions of electric vehicles, willingness to buy, etc.

Bloomberg currently tracks 370 different 'E'-related metrics[2] (out of approximately 766 'E,' 'S,' and 'G' metrics total) and provides access to this information via its ESG data tools. However, because ESG data comes from numerous different voluntary and occasionally mandatory disclosures,[3] there is tremendous variation across:

- which companies in a given industry actually agree to voluntarily disclose their performance on ESG criteria
- which ESG factors a company chooses to disclose about, and to which disclosure organizations (e.g., a company might fill out CDP's climate change questionnaire, but choose not to respond to the UN Global Compact's water disclosure request)
- the quantity of disclosure data from respondents (e.g., how much of the questionnaire a company answers)
- the quality and rigor of disclosed data (i.e., there is a lack of regulatory oversight for voluntarily disclosed data – companies can voluntarily choose to have their disclosures audited by a third party to signal its veracity, but many do not opt to do so)

This patchwork of voluntarily disclosed ESG data makes the task of aggregating, assessing, and using relevant ESG inputs to inform investment decisions a very significant challenge.

2 As of December 23, 2014.

3 The Sustainability Accounting Standards Board (SASB) is attempting to increase mandatory disclosure by creating industry-specific sustainability reporting standards for US publicly-listed companies, which are designed to fit within current mandatory financial filings such as 10-K and 20-F forms (SASB 2015a; Baraka 2014; BrownFlynn 2014)

3.3 ESG data tools

ESG data tools can help investors tackle many of the challenges associated with the patchwork of available ESG data, which can vary in quantity and quality across industries, ESG environmental factors, and individual 'E' metrics. As opposed to ESG index-based financial products (discussed in Section 3.4) that rely exclusively on third-party analysis, ESG data tools afford investors direct insight into the risks they face related to climate exposure.[4]

ESG data tools can help investors tackle many of the challenges associated with the patchwork of available ESG data.

ESG data tools enable investors to aggregate and compare lots of different ESG information at the company, fund, or portfolio level, in a single place and often against a variety of different benchmarks.

There are numerous ESG data tool providers. The market for ESG services is dynamic and rapidly changing, but broadly, ESG data tool providers offer several common features:

- **Data aggregation:** aggregating all of the different types and forms of publicly available ESG data on a given investment into a single location and platform. These generally also involve standardizing or normalizing units for ease of comparison.
- **ESG company research:** proprietary analysis of company performance on material ESG factors (e.g., white papers, analyst reports, market assessments, etc.).
- **Industry/portfolio analysis:** functionality that allows users to select particular ESG criteria and metrics of interest, and compare ESG performance across companies, portfolios, indexes, and other benchmarks.

4 See Appendix 7.1 - ESG tools and tool providers: additional information.

These core features are extremely valuable for investors seeking to manage climate exposure. Data aggregation is necessary given the enormous volume of ESG data available[5] and the huge variation within it; ESG research contextualizes the data in industry and market trends; and portfolio analysis allows investors to dig more deeply into this information and use it to inform trading decisions.

Some ESG tools have features tailored to identifying certain types of climate-related risks. For example, Bloomberg's Carbon Risks Valuation Tool allows investors to model a variety of different asset stranding oil price scenarios on the earnings and valuations of the world's largest fossil fuel companies (BNEF 2013).

However, current ESG data tools emphasize minimizing climate risk, and are limited in providing information on climate-related opportunities.

Existing ESG data tools are limited by the underlying ESG data that they rely upon. Due to the nature of company disclosures today, which are primarily voluntary, and because of huge differences in market size between climate risks and opportunities, much more ESG data supports understanding climate risk exposure rather than exploring potential opportunities.[6]

Currently, more ESG data supports understanding climate risk rather than exploring potential opportunities.

Current data emphasizes greenhouse gas emissions, water usage, waste, and other disclosure areas that allow investors to reduce climate risk and portfolio volatility, but typically don't help investors seeking significant market outperformance from emerging green technologies.

5 For example, more than 12,000 corporations and other organizations have issued ESG reports (Lydenberg 2014; CorporateRegister.com Ltd 2015); and TruCost estimates that its ESG data covers companies representing over 93% of publicly-traded global market capitalization.

6 Referring specifically to long climate opportunities only.

For example, a future green equivalent to Bloomberg's Carbon Risks Valuation Tool could reflect the correlation (or lack thereof) between green companies' valuations and volatile fossil fuel prices. But for the most part, the data needed to model these types of opportunity scenarios is not part of conventional ESG disclosure.

ESG indexes provide accessible solutions for investors who want to incorporate ESG principles into their investment choices.

Table 2: Three categories of ESG indexes

ESG INDEX TYPE	DESCRIPTION	EXAMPLES
EXCLUSIONARY	• Excludes fossil fuel companies, or particular subsectors like coal or tar sands, from index holdings; often referred to as divestment indexes	• Fossil Free Indexes US • MSCI Global Fossil Fuels Exclusion Indexes • FTSE Group, Blackrock, and NRDC ex-Fossil Fuels Index Series
NON-EXCLUSIONARY	• Does not exclude fossil fuels, but often overweights high-ESG performers and underweights low-ESG performers	• MSCI ACWI Low Carbon Target Index • STOXX Global ESG Leaders • SXI Switzerland Sustainability 25 Index • iShares MSCI ACWI Low Carbon Target ETF
THEMATIC	• Emphasizes economic, social, environmental, and other trends to inform investment strategies • Often emphasizes investment in companies focused on climate change mitigation and adaptation	• MSCI Global Climate Index • S&P/TSX Energy and Clean Technology Index • MSCI Global Environment Index

Sources: SSGA 2014; BlackRock 2015; SMI Indices 2014; STOXX 2014; MSCI 2014

4. Financial Products

ESG tools help investors examine many different dimensions of climate exposure at the portfolio-level. However, financial products help to actually *manage* these risks.

4.1 ESG financial products: Indexes

ESG financial products incorporate external analysis of ESG factors into traditional financial products like indexes and bonds.

There are a number of ESG and environment-themed indexes available to investors, with varying methodologies, component companies, geographic and sector emphases, and past performances. While the origins of ethical investing trace back many centuries, and exclusionary socially responsible investing (SRI) has existed similarly to its current form for several decades, performance-based ESG investing has only existed since the early 2000s (Fulton, Kahn, and Sharples 2012).

ESG indexes provide accessible solutions for investors who often want to incorporate ESG principles into their investment choices, but don't necessarily wish to conduct ESG analysis in-house or across their entire portfolios.

Many ESG indexes are quite new (less than five years old), and many of the most prominent are managed by some of the largest mainstream index providers such as MSCI, STOXX, and State Street (MSCI 2015; SSGA 2014). Much of the data underlying these indexes' ESG evaluations comes from the same voluntary disclosures that drive ESG data tools.

In the context of public equities, there are three main categories of indexes for ESG investors to manage climate exposure: exclusionary, non-exclusionary, and thematic. Table 2 provides definitions and examples for each type. Each type of index offers a different approach to implementing ESG principles, from minimizing climate risk exposure to maximizing exposure to climate-related opportunities. However, **all three major types of indexes have accompanying limitations that must be understood in order to manage climate exposure as effectively as possible.**

4.1.1 EXCLUSIONARY INDEXES

Exclusionary indexes trace their lineage to early socially responsible investing (SRI), which excluded certain companies and sectors seen as profiting from vice and/or other ethically-fraught activities like alcohol, tobacco, or arms manufacturing (Fulton, Kahn, and Sharples 2012).

In the context of climate exposure, exclusionary indexes are often associated with the divestment movement (e.g., Stanford University endowment, 350.org, Rockefeller Brothers Fund, etc.) in that they tend to exclude fossil fuel companies, or particular subsectors like coal or tar sands, from their holdings. They are often desired as a political statement on the morality of holding fossil fuels and/or out of a desire to change the cost of capital for fossil fuel companies.

Fossil Free Indexes US (FFIUS) provides an example of how a simple exclusionary index works. Launched in June 2014, the index is based on the benchmark S&P 500 but excludes Carbon Underground 200 companies – the 200 largest coal, oil, and gas companies in the world – in order to capture the returns of the S&P 500 without direct fossil fuel exposure (Fossil Free Indexes 2014).

However, FFIUS also exemplifies how an index's stated intent and execution can be different. Only 28 of the world's 200 largest coal, oil, and gas companies are actually listed in the S&P 500[7] and screened out of the FFIUS – four have coal operations, and 25 have oil and gas operations.[8] The FFIUS has performed comparably to the S&P 500 since its inception because the two indexes are, in fact, very similar. The amount of divestment is relatively trivial – the screened companies account for only 6.3% of the total carbon emissions of the Carbon Underground 200. Subsequent developed and emerging market variants of the Fossil Free Indexes products might involve more significant reductions in direct fossil exposure for investors, given the larger number of coal, oil, and gas companies that would be excluded from those indexes (Fossil Free Indexes 2015).

7 As of May 2015.

8 Consol Energy has both coal and oil and gas operations that are each among the 100 largest in the world, and therefore it is listed twice in the Carbon Underground 200.

Exclusionary indexes can be an important solution for investors who wish to divest of fossil fuel companies as a political or ethical statement, but they represent a fairly blunt instrument for managing climate exposure.

Exclusionary indexes don't allow investors who are concerned about fossil fuel volatility to protect against downstream or supply chain impacts of oil fluctuations or policy changes, and they often only focus on a single type of climate risk. In addition, for "double-bottom line" or activist investors concerned with both financial performance and making an environmental impact, divestment is very unlikely to have a direct financial effect on oil companies, or to significantly increase the cost of capital for fossil fuels. There are two primary reasons for this – first, because fossil companies have lots of access to global capital markets, and second, because most of the world's fossil assets at risk of stranding are held by governments and not by corporations or investors (NCE 2014).

4.1.2 NON-EXCLUSIONARY INDEXES

Non-exclusionary environmental ESG indexes – sometimes known as tilted or weighted indexes – do not exclude particular industries or types of companies. Instead, **non-exclusionary indexes are optimized towards cleaner, more sustainably managed companies regardless of sector, and based on their scores across a variety of either solely environmental criteria, or combined environmental, social, and governance criteria.** These indexes are sometimes called low-carbon indexes, or colloquially as "picking the cleanest players in a dirty space."

A basic example of this type of low-carbon index is the SPDR MSCI ACWI Low Carbon Target Index, managed by State Street. It is based on the traditional MSCI ACWI Index but reduces the weighting of carbon intensive companies without completely divesting from them (SSGA 2014).

The Low Carbon Index still includes fossil fuel companies, but significantly underweights them relative to the benchmark. For example, the original MSCI ACWI Index weights Exxon Mobil at 0.96% of the index – the second largest weight in the index. The SPDR Low Carbon Index, on the other hand, weights Exxon at less than 0.11% – a plummet to 249th (SSGA 2014; MSCI 2015b).

A number of non-exclusionary, environmentally-inclined ESG indexes specifically focus on minimizing carbon exposure.[9] Investors looking to hedge against other non-carbon risks associated with climate exposure can utilize non-exclusionary indexes that emphasize water, waste, and other relevant variables.

Non-exclusionary indexes may be a more pragmatic solution when divestment is not practical. Rather than emphasizing the importance of cutting direct financial ties to climate-exposed investments, non-exclusionary indexes reward companies that manage climate exposure better – whether that means by using natural resources more efficiently than industry peers, by adopting policies encouraging stronger oversight of upstream suppliers, or any number of other tactics.

Rewarding companies that perform better on ESG metrics can resonate significantly throughout supply chains. It's possible that this can help manage downstream or second-order climate exposure (e.g., non-fossil industries that are vulnerable to fuel price volatility).

4.1.3 THEMATIC INDEXES

"Green" thematic indexes emphasize companies focused on climate change mitigation and adaptation.

The MSCI Global Climate Index is an equal-weighted basket of 100 companies that operate in three key environmental areas: renewable energy, clean technology and efficiency, and future fuels (MSCI 2015). The index targets companies that are judged as leaders in mitigating immediate and long-term factors that contribute to climate change and that may benefit from the decarbonization of the economy.

Since its inception in July 2005, the MSCI Global Climate Index has performed comparably to MSCI's non-thematic, flagship benchmark MSCI World.

9 Other examples of non-exclusionary indexes include MSCI Global Low Carbon Target Indexes, STOXX Global ESG Leaders, SXI Switzerland Sustainability 25 Index, and iShares MSCI ACWI Low Carbon Target ETF.

It is not always clear how "green" an ESG index is.

However, it is not always clear how "green" a given thematic index actually is.

In the case of the MSCI Global Climate Index, only about 12% of constituent companies are disclosed in the index fact sheet at any given time.[10] Company selection is based on data from MSCI ESG Research, and the criteria for company inclusion are fairly broad – leaving space for interpretation as to how "green" this index is:

- Renewable Energy: refers to companies "whose products or practices involve renewable energy sources"
- Clean Technology and Efficiency: refers to "companies (other than renewable energy companies) whose products or practices reduce greenhouse gas"
- Future Fuels: refers to "companies that develop, promote, or use any energy alternatives to coal, crude oil, and gasoline" (not already among renewable energy or clean technology and efficiency companies) (MSCI Research 2011)

Green thematic indexes, including MSCI's offerings, are powerful tools for investors. But their value is not as 'pure-play' green strategies.[11] Rather, they offer variations on mainstream market trends that capture small structural movements towards renewable energy and other pro-climate investments.

4.2 Financial products: Alternative investments

In addition to the incorporation of ESG metrics into traditional financial products like indexes, there are alternative asset classes that have recently emerged, like green bonds and YieldCos, which facilitate "green" fixed income and equity investments. Derivatives (e.g., swaps) are also being used as vehicles for hedging against various types of climate exposure.[12]

Alternative asset classes have recently emerged, like green bonds and YieldCos, which facilitate "green" fixed income and equity investments.

4.2.1 GREEN BONDS

Green bonds are fixed income securities in which the proceeds of the bond are linked to "green" activities. These activities often align with deployment of climate change mitigation and adaptation solutions and, as such, green bonds can be vehicles for helping investors achieve a certain green mandate.

The green bond market exploded in 2014. Nearly $40 billion in green bonds were issued last year, almost tripling the previous year's $15 billion mark (BNEF, 2015).[13] According to the Climate Bonds Initiative, 35 organizations participated in green bond issuance in 2014 – three times as many as the year prior (Climate Bonds Initiative 2014a) – with the top ten underwriters brokering nearly 190 deals (BNEF 2015).

10 See Appendix 7.3 - Thematic Indexes: additional information for MSCI Global Climate Index constituents.

11 Investments in companies whose products or services are purely centered around "green" activities.

12 One prominent example of this is World Wildlife Fund's use of a "stranded assets total return swap" to hedge against risks from coal and tar sands companies in its portfolio. See Appendix 7.4 – Stranded Asset Total Return Swap for additional information.

13 This is under BNEF's narrow universe, which consists of market-labeled green bonds and BEEF-labeled green bonds.

Green bonds lack a universal definition of "green" criteria.

Labeled bonds are designated green by issuers, who are mostly supranational institutions, municipalities, or corporate companies. However, issuers' definitions of eligible project types vary and while the environmental quality of some bonds is independently reviewed by Second Opinion Providers such as CICERO, DNV, Vigeo, KPMG or Oekom, others are not.

In spite of enormous market appetite for green bonds, there is no universally accepted definition of what meets "green" criteria. The Green Bond Principles point to voluntary disclosure and transparency guidelines for issuers to follow (ICMA 2015), but they provide no common standardized definitions for what makes a given project "green."

39% of green bonds issued in 2013 and 2014 (by value) were issued without an independent review of their "green" labels (Climate Bonds Initiative 2014b). Of the remaining 61%, emphasis in reviews can vary significantly between identifying climate impacts of a given bond, assessing the social impacts of a particular project, or in some cases examining cash-flow accounting of bond proceeds.

There isn't a single universe of green bonds that are all evaluated against the same criteria with respect to climate exposure. Because of this information gap, it can be hard for investors to use green bonds, either to minimize existing climate risk or to pursue outperformance strategically.[14]

Investors hoping to gain fixed income exposure to climate opportunities have several routes. One is to invest outright in individual green bonds that most appropriately align with the investor's strategy or hedge against specific portfolio climate risks (e.g., a renewable energy project bond that's expected to increase in value from a fossil price shock and offset existing fossil exposure; or a green bond supporting a desalination plant that might serve as a hedge against existing water risk).

Another alternative is to invest in green bond indexes (e.g., Calvert Green Bond Fund, S&P Green Bonds Index), which provide an easy way for investors to access the rapidly growing green bond market while achieving levels of diversification that would otherwise be prohibitively expensive for smaller investors. Given the lack of consistent definitions, these index issuers often use their own standards to determine which green bonds to include – some of which may be unlabeled bonds from pure-play green issuers such as renewable energy manufacturers or projects.

The universe of "unlabeled green bonds" has even fewer constraints: issuers simply issue a normal bond. Service providers (e.g., MSCI, S&P, and BNEF) and some investors who want to decide on their own what is "green" (e.g., Calvert Green Bond Fund) determine what their particular unlabeled green bond universe should look like. For example, BNEF's only requirement is that issuers derive 50% of their value from BNEF's clean energy exposure criteria (BNEF 2015), while Calvert includes bonds from Google that are designated for renewable energy projects.

At face value, the green bond market offers a fixed income opportunity for investors looking to capitalize on green investments. However, investors should be aware of several key points when considering green bond investments today:

- The current green bond market is still relatively small and illiquid (PIMCO, 2014).
- There is potential for mispricing (which could present both risks and opportunities for investors) given the complexities of research and due diligence in the absence of broadly accepted standards for green projects and investments.
- Green bonds generally offer relatively low risk premiums.

14 The Climate Bonds Initiative (CBI) intends to provide industry-specific standards for green bond issuances (analogous to SASB's industry-specific standards for company sustainability disclosures) that will give investors the assurance that a given bond will be supporting projects that are consistent with IPCC's 2 degree Celsius climate scenarios. However, in the interim CBI has created a temporary taxonomy of green bonds that is less specific (CBI 2015).

Finally, the more fundamental question is whether green bonds raise new financing for climate action or just repackage existing financial products. In this initial stage of the market, most green bonds are used as a refinancing tool, repackaging projects that could have been financed through a standard bond. Nonetheless, if the underlying projects are low-carbon, then this could increase investor confidence in the market and eventually lead to an increased number of new green projects that could be targeted with green bond financing (CBI 2014b).

4.2.2 YIELDCOS

Renewable assets have very different risk profiles from their fossil fuel counterparts, and holding them separately can lead to lower costs of capital while expanding opportunities to invest in renewable energy. YieldCos are publicly traded spin-offs of energy companies that hold long-term, yield-oriented assets like renewable energy and infrastructure.[15] Once built, renewables tend to have very predictable maintenance costs and revenue streams and are significantly less volatile than fossil fuel power generation assets. YieldCos allow investors to price risk more appropriately and lower the cost of capital for renewables, while opening up energy investments to investors with green mandates, or those who wish to completely divest from fossil fuel power generation assets.

YieldCos aim to provide investors with steadily increasing dividends. The parent company "drops down" a pipeline of assets to the YieldCo,[16] which replaces expiring contracts of existing portfolio holdings to provide a stable cash flow.

Over the past few years, YieldCos have grown rapidly into a more than $20 billion global market of publicly traded instruments spun-off by independent development companies and existing independent power producers like NRG and NextEra (CPI, 2015 (forthcoming)). Like the more established REITs and MLPs, they offer steadily increasing dividends per share to investors as well as some (but not all) of their tax advantages. They also allow utilities to get more value out of their current renewable energy projects.

However, current YieldCos are focused on growth and may not meet the needs of institutional investors.

Because YieldCos are publicly traded equities, smaller investors can access them as easily as they would any other listed equity. For large institutional investors with significant liabilities, however, YieldCos have some drawbacks. The enormous growth of YieldCos is in some ways ill-suited to these investors who require truer "yield" instruments than the current crop of YieldCos can offer.

Pension funds in particular often seek more stable growth over time at lower rates, while using regular dividends in order to cover their ongoing liabilities to current and future retirees. There is ongoing innovation to create new financial vehicles that are better-suited for these purposes, which could allow institutional investors to hold portfolios of renewable energy assets directly in closed-end funds, where their value would come solely from stable revenues generated by the underlying renewable energy assets.

Similar to green bonds, YieldCos are a relatively new financial instrument with an uncertain future. Marketed as a yield instrument, YieldCos behave very much like an equity play: investors today are betting not on the relatively predictable future revenues of current assets, but on the parent companies' commitment to continue dropping down more renewable assets.

This pipeline of assets is critical to maintaining cash flow for the YieldCo's investors. Investors are currently seeing 10-15% annual increases in dividends per share – a rate that isn't likely to be sustainable in the medium- to long-term.[17]

15 The issues summarized in this section are discussed in detail in Part 2 of CPI (2014) "Roadmap to a Low Carbon Electricity System in the U.S. and Europe."

16 For example, "dropping down" or moving solar power plants from NextEra's conventional portfolio ("NextEra Energy, Inc." (NYSE: NEE)) to the NextEra YieldCo ("NextEra Energy Partners L.P." (NYSE: NEP)).

17 These conclusions are based on unpublished CPI Energy Finance analysis, expected to be released in 2015.

5. Conclusions and Recommendations

Climate change has serious financial implications for investors, both posing risks and offering opportunities. But the risks and opportunities aren't universally well-understood, and are perceived to be challenging to manage. The lack of common definitions and metrics, and a misalignment of timelines for mitigating risks between financial markets and climate change, exacerbate these challenges.

ESG data and tools, financial products, and other green financial vehicles, can help investors navigate and manage climate exposure. This paper explores the landscape of climate exposure and examines the strengths as well as some of the current limitations of ESG data, tools, and financial products.

Key Findings

Data on performance across ESG factors at the company, investment, and portfolio levels can inform investment decisions. ESG data has value to investors today, and has proliferated widely.

An enormous number of global publicly-listed companies disclose on at least some ESG factors. However, while an important start, today's available data is imperfect. It's an amalgam of many different kinds of data, disclosed through several different channels, to different institutions, with different levels of oversight. ESG analysts and experts attempt to fill in many of the information gaps and these efforts are laudable.

Nonetheless, the patchwork of information available today varies in quality across asset classes, industries, and geographic regions. For investors seeking diversification across all of these variables, such limitations can make it challenging to incorporate ESG inputs to inform investment decisions throughout an entire portfolio.

There is a spectrum of ESG tools and financial products for climate exposure management that can significantly improve investors' and asset managers' ability to organize and parse ESG information in ways that allow them to assess and manage risks, and to some extent explore opportunities.

However, existing ESG data tools are limited by the underlying data that they rely upon. Due to the nature of disclosures today and differences in market size, much more ESG data – and consequently, more ESG tool functionality – emphasizes minimizing climate risk exposure rather than exploring potential climate-related opportunities.

Recommendations

To keep improving this space we suggest the following:

Standard-setting organizations, disclosure initiatives, and investors can lead the way on greater disclosure from companies.

Standardization of ESG disclosure within corporate reporting processes needs to continue, and gain greater emphasis as a necessary underpinning for standard investment analysis.

Mandatory disclosure for public companies – through financial regulators, through exchanges, or potentially through intermediaries, and covering a range of asset classes – would afford investors more comprehensive information and greater comparability across industries, which in turn would improve the added value of tools and products to manage climate exposure.

However, absent that, an intermediate step in this direction involves continuous pressure from standard-setting organizations, disclosure initiatives, and most importantly, from investors, on companies to disclose on a greater number of financially material ESG factors. In parallel, gathering data on physical and ecological impacts of climate change on businesses needs to continue, allowing for a more comprehensive set of 'E'- metrics that reflect the enormous complexity and nuance of climate-related risks.

Investors and regulators can continue mainstreaming ESG investment.

Investors should work to integrate ESG metrics into their investment decisions, because they add demonstrated value today, both as inputs for managing risk, and to a lesser extent, for pursuing green opportunities. In addition, investors who have integrated and operationalized ESG factors as inputs into day-to-day

investment decisions will be best positioned to capture additional value, as ESG data continues to grow in sophistication and prevalence.

Financial product and service providers can create new financial vehicles for green investments and improve existing ones.

ESG-inclined indexes, green bonds, and YieldCos remain a promising start, and all are increasing in their sophistication, disclosure, and investment oversight. Nonetheless, most of the world's long-term, institutional capital is not in green investments.

Additional green investment vehicles that improve upon current limitations are likely to be important assets for investors managing increasingly complex climate-related risks and pursuing greater climate opportunities, over time. This diversification across asset classes is also crucial to meeting the world's needs for investment in climate change mitigation and resiliency – making green investments accessible to investors throughout the capital stack, and with vastly different appetites for risk, return, yield, and time horizon.

Investors can share best practices for minimizing climate risks and maximizing climate opportunities.

Effective management of climate exposure will require knowledge-sharing on the best ways of minimizing climate risks and maximizing climate-related opportunities across asset classes, investors, and geographies. Such a knowledge base is limited and needs to be grown, ideally benefiting from a dialogue of like-minded investors who are willing to engage in an interactive process of evaluating portfolios on a regular basis.

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7. Appendix

7.1 ESG tools and tool providers: additional information

We explored four of the largest and most recognized tool providers in the space: Bloomberg, MSCI, Sustainalytics, and TruCost, through trial access to the tools and underlying data. These trials helped us gain first-hand experience of prominent ESG tools and enhanced our understanding of the landscape of climate exposure and current tools and functionality available to investors today.

7.1.1 BLOOMBERG'S ESG TOOLKIT

Bloomberg's financial products provide information for investors and portfolio managers. This also includes a suite of ESG functionality, ranging from ESG rankings and assessments to ESG data integrated into traditional Bloomberg Professional ("Bloomberg Terminal") functions and downloadable Excel models of particular ESG factors. Below is a selection of offerings.

- *Using ESG fields integrated into Bloomberg Professional ("Bloomberg Terminal"):*
  - » The **PORT** function assesses existing portfolios using ESG metrics and benchmarks sourced through Bloomberg's data.
  - » The **Equity Screening Tool** determines a universe of equities based on desired ESG parameters, such as total greenhouse gas emissions per MBOE, or water usage.
- *Downloadable Excel tools:*
  - » The **ESG Risk Scorecard** scores companies on how much ESG disclosure data they provide relative to how much was desired. This is among Bloomberg's most popular ESG tools, and it measures the magnitude and level of disclosure – when available.
  - » The **ESG Valuation Tool** assigns costs to future ESG performance using measurable, priced metrics.
  - » The **Equity Relative Valuation Tool** provides historical context to valuation multiples.
  - » The **Carbon Risk Valuation Tool** attempts to illustrate the potential impact on earnings and share price of oil companies, under a variety of different oil price scenarios.
- *Leveraging Bloomberg's research:*
  - » **Bloomberg Intelligence** is Bloomberg's research group, which provides in-house analysis and data on a variety of different ESG topics.
  - » **Bloomberg New Energy Finance (BNEF)** provides clean-energy specific research and analysis. The product includes project-level data on renewable energy investments globally, including entities involved, financing terms, technology used, news coverage, and other relevant project-level information.
  - » The **Bloomberg Portfolio & Risk Analytics** platform helps users analyze a portfolio's carbon footprint and compare it with a given benchmark. Portfolio tools include optimization models to analyze the reallocations necessary to transition to low and zero carbon investment portfolios, as well as the corresponding costs, risks, and performance attributes.
- *Bloomberg App Portal:* Bloomberg allows third party software producers to create tools and products.
  - » An example of one of these apps is the **South Pole Carbon Portfolio Screener**. The screener allows an investor to approximate the greenhouse gas footprint for any listed company.

While we can't comment on the breadth or depth of their ESG data coverage, we know that the data is built both from Bloomberg's ESG data and research as well as from third-party ESG analyses from sources like Sustainalytics and TruCost. Links from the data fields allow the user to access the original source of each data point. We do not know, however, if Bloomberg has any tool like TruCost's Environmentally Extended Input Output (EEIO) model to deal with missing data (see more on EEIO in the TruCost section below). To access these tools, however, investors need Bloomberg Terminal access — a subscription that costs at least $20,000 per year, which may be a prohibitively expensive for investors with less capital to allocate to analytical resources.

7.1.2 MSCI'S ESG MANAGER

MSCI offers its ESG Manager for investors interested in ESG data and related insights. It allows investors to conduct industry best-in-class comparisons, and provides risk intensity scores by sector. Its base is four integrated components:

- The **ESG Intangible Value Assessment,** which analyzes companies' financially material risks and opportunities arising from ESG factors. The IVA differentiates companies on medium- to long-term value or non-financial risks, and rates and ranks each company against its peers.
- The **ESG Impact Monitor** tracks instances where companies are involved in controversies or have breached global standards (which may be environment or sustainability related), and are scored accordingly.
- The **ESG Business Involvement Screening Research** provides the total company revenue derived from involvement in the majority of the 17 business activities covered. Users can screen against companies which exceed a certain revenue threshold.
- The **MSCI ESG Government Ratings** assess country-level exposure to ESG risk factors.

MSCI also uses data from ESG Manager to create their ESG and environmental indexes.

7.1.3 TRUCOST'S EBOARD

TruCost focuses helping clients by understanding the economic consequences of natural capital dependency across companies, products, supply chains, and investments. TruCost's EBoard has five core components:

- The **Screening Tool** is used to describe the universe of data for the user.
- **Company Analysis** is used to assess the natural capital risk and opportunity across different metrics (geography, sector, etc.)
- Investors use **Portfolio Analysis** to import their portfolios and assess their risk against TruCost's natural capital data.
- The **Company Briefing Search** provides company documents.
- The **Calculator Tool** calculates the valuation or cost of a natural resource, and models it under different scenarios. For instance, a user can place a value on the average global cost of environmental damage caused by a tonne of greenhouse gas emissions.

Data from TruCost's proprietary Environmental Register underlies the EBoard. The Register includes metrics pertaining to natural capital (including emissions, water, and waste data) and greenhouse gas protocol scope coverage. TruCost estimates that its data covers roughly 93% of the global public equity market capitalization. TruCost also fills holes in natural capital disclosures with values generated by their Environmentally Extended Input Output (EEIO) model.

7.1.4 SUSTAINALYTICS

Similar to TruCost, Sustainalytics focuses on providing ESG and sustainability research and analysis to clients. For investors, they provide insights into markets, industries, and financial products (e.g. indexes), emphasizing relative comparisons and rankings of companies against peers and top ESG performers. Delivered to clients in clear, concise reports, the calculation for these scores can be manually adjusted by users to fit specific portfolio requirements.

7.2 ESG disclosure and standard-setting organizations: matrix of actors

Appendix Table 1: Matrix of ESG actors

ORGANIZATION	FOUNDED/ BEGAN	PARENT / ORIGINATING ORGANIZATION	DESCRIPTION	GEO	SCOPE	TARGET DISCLOSURE OR ACTION	TARGET REPORTERS	TARGET AUDIENCE	TYPE OF ORG
Sustainability Accounting Standards Board (SASB)	July 2011	Initiative for Responsible Investment (IRI) at Harvard University	Industry-specific technical standards for sustainability financial disclosures within traditional financial reporting (e.g., 10-K, 20-F)	U.S.	Industry specific	Mandatory sustainability financial filing	Public companies traded on US exchanges	Investors	501(c)3
Carbon Disclosure Project (CDP)	2000	N/A	Frameworks/ questionnaires for corporations to disclose emissions, water use, and other environmental metrics of performance	Int'l	Industry- and program-specific	Voluntary company carbon/ water/ resource questionnaires	Public and private companies	All stakeholders	NGO
Global Reporting Initiative (GRI)	1997	Ceres	Reporting guidelines for corporate sustainability reporting; the most adopted framework for sustainability reporting.	Int'l	General	Voluntary comprehensive sustainability report	Public and private companies	All stakeholders	NGO
Principles for Responsible Investment (UNPRI)	2005	United Nations	Guidelines for investors to adopt to build a more sustainable financial system	Int'l	General	Voluntary investor network	Investors	All stakeholders	International Initiative
International Integrated Reporting Council (IIRC)	August 2010	Prince of Wales' Accounting for Sustainability Project, the Global Reporting Initiative (GRI), and the International Federation of Accountants	Integrated financial and sustainability reporting framework, often used incorporate annual reports	Int'l	General	Voluntary integrated financial and sustainability report	Public companies traded on international exchanges	Investors	NGO
Investor Network on Climate Risk (INCR)	2003	Ceres	Network for institutional investors committed to addressing climate risks	Int'l	General	Voluntary investor network	Public and private companies	All stakeholders	501(c)3

Sources: SASB 2015a; Baraka 2014; Cohen 2014a; Baraka 2013; Eulitt and Mackey 2013; BrownFlynn 2014; Cohen 2014b; Ceres 2015; SASB 2015b; GRI 2015.

7.3 Thematic indexes: Additional information

Appendix Table 2: Top 10 Constituents of the MSCI Global Climate Index (as of March 31, 2015)

COMPANY	COUNTRY	INDEX WEIGHT	SECTOR
Ormat Technologies	USA	1.25%	Utilities
First Solar	USA	1.21%	IT
Kyocera Corporation	Japan	1.14%	IT
Gamesa Corporación Tecnológica	Spain	1.14%	Industrials
Panasonic Corporation	Japan	1.12%	Consumer Discretionary
Sunpower Corporation	USA	1.10%	IT
Peugeot SA	France	1.09%	Consumer Discretionary
Kaneka Corporation	Japan	1.09%	Materials
Owens Corning	USA	1.09%	Industrials
Swiss RE	Switzerland	1.08%	Financials

Source: MSCI 2015

7.4 Stranded asset total return swap

Financial products like ESG indexes, green bonds, and YieldCos can help investors manage climate exposure and derive benefits from green opportunities, but they take time and resources to properly manage. Derivative instruments can also be an option for investors who want to reduce their exposure to particular types of climate risks (e.g., fossil fuel volatility), but do not want to actually change their underlying holdings permanently due to some other constraint.

The World Wildlife Fund (WWF) provides a good example of how derivatives can be used to manage exposure. In January 2014, WWF entered into a total return swap agreement with Deutsche Bank to reduce its exposure to fossil fuel risk. In this arrangement, WWF pays Deutsche Bank the total return from its coal and tar sands holdings,[18] and in return receives the total return on the S&P 500.[19] Deutsche Bank receives a small commission for its services, as well as interest rate payments (Litterman 2013; Litterman 2015; BDO USA 2014).[20]

While this doesn't divest WWF's portfolio of fossil fuels, the swap does achieve some facsimile of this by hedging the organization's fossil fuel exposure. By substituting the fossil fuel index with the S&P 500, WWF is betting that coal assets will underperform the equity market – at least in the short run. The swap is a temporary solution to better align WWF's returns with its mission, while reducing its risk associated with a particular type of climate exposure.

18 This fossil fuel index is composed of 25 equities (12 coal and 13 tar sands), and its value is roughly 3/4 coal and 1/4 tar sands.

19 This is settled quarterly.

20 According to WWF's financial reports, the swaps are recognized on the statements of financial position at fair value and are recorded as interest rate liability. WWF recorded $7,229 in realized loss for these swaps – the fair market value of these swaps was $148 at the year ended June 30, 2014.