

MEASURING PROGRESS ON GREENING FINANCIAL MARKETS

BRIEFING NOTE FOR POLICYMAKERS



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EXECUTIVE SUMMARY

Measuring green finance across asset classes





-  Green finance estimates are possible across asset classes and geographies, albeit with some uncertainty around precise figures.
-  Data for tracking current and planned climate-related investment and financing exists for key sectors and technologies (e.g. power, oil & gas).
-  2°C investing climate benchmarks exist for some sectors in the listed equities space and are being developed for corporate bonds, and project finance. They are also being explored for lending.
-  Many estimates actually measure exposure to companies rather than investment. In addition, finance indicators aren't linked to green 'impact'.
-  Some key data points, in particular related to RD&D, as well as non-climate related green aspects (e.g. biodiversity), are poorly developed.
-  Climate benchmarks are possible only because of the global economic importance of energy systems, which in turn drive detailed data and modeling infrastructure. Broader 'science' or policy-based benchmarks are still lacking.

Best practice for green finance benchmarks



From measuring progress to driving policy actions



-  Policymakers can contribute to **improving green finance data quality & availability** through disclosure requirements and frameworks, as well as by addressing barriers to data aggregation.
-  Policymakers can support research on **benchmarks & targets** related to investment and financing in key green technologies, building on existing "science-based" benchmarks under development in the climate finance space.
-  Policymakers can **monitor green finance levels vs. benchmarks at national level** to track potential capital misallocation (for policy and risk reasons) and to inform environmental and financial policy decisions.
-  Policymakers can **monitor green finance levels vs. benchmarks at international level** to assess potential systemic risk and global green objectives (e.g. climate goals agreed to in the December 2015 Paris Agreement).
-  Policymakers in some geographies may explore **developing finance sector incentives** to respond to potential financing gaps. Options include green bond guidelines, tax incentives, labeling schemes, and monetary policy.

1. STATE OF TRACKING “GREEN FINANCE”

1.1. OVERVIEW

In the context of the G20 Green Finance Study Group, one of the key questions focuses on the challenge of measuring progress around mobilizing capital for ‘green’ investments and shifting capital out of ‘brown’ investments.

This briefing note provides a state-of-the-art review on measuring progress on green finance, with a particular emphasis on ‘climate-friendly’ finance. This section briefly reviews what we know about ‘green’ finance across asset classes, with a particular emphasis on questions around high-carbon and low-carbon finance. The next section maps the current options for benchmarking climate finance, as one aspect of the green finance space, to public policy objectives. The note concludes with mapping options for actions for policymakers and international agencies, notably the G20.




There are various types of metrics used to measure green finance (Fig. 1.1):

- **Cross-sector / technology green / brown share** indicators define a share of ‘green’ in relation to some non-physical denominator (e.g. revenues, market capitalization, assets under management, etc.). The use of these indicators is frequently limited to estimates of products and services as opposed to actual investment and financing, in particular for estimates in capital markets. They are thus technically not green finance indicators. Percentage share metrics rely on a taxonomy to classify ‘green’ activities. These metrics are provided commercially a by a few data providers (see next page).
- **Sector / technology specific green / brown metrics** are becoming more prominent and are starting to be mapped directly to investment and finance flows. Green activities share metrics are similar to these metrics but apply across sectors in order to aggregate different types of activities into broad categories (“green”, etc.). While the data quality tends to be high for these indicators, they are currently only used to a limited extent.
- **GHG emissions (‘carbon footprint’) & sustainability indicators** are either intensity or absolute indicators attempting to measure a sustainability impact. The most prominent example is GHG emissions data. Here too, data currently does not capture investment or financing (Portfolio Carbon Initiative 2015). Moreover, these indicators are very difficult to track in practice (e.g. GHG emissions accounting requires a range of estimation techniques).

Financial risk metrics related to sustainability can also sometimes be found in this list. These do not directly measure sustainability issues and in fact may not be correlated with sustainability issues (2°ii 2015b). The need to include non-sustainability related indicators in risk assessment (e.g. location, cost-pass through capacity, regulatory exposure, etc.) implies that risk metrics are not always useful for measuring sustainability.

The following section will review green finance measurement across asset classes.

FIG. 1.1: OVERVIEW OF GREEN FINANCE METRICS (SOURCE: 2°II, PORTFOLIO CARBON INITIATIVE 2015)

	Pros	Cons
 Cross-sector / technology green / brown share % green of revenues	<ul style="list-style-type: none"> • Can be aggregated across sustainability issues; • Can be used to estimate orders of magnitude of exposure / trends 	<ul style="list-style-type: none"> • In many cases, doesn’t capture investment • Aggregate ‘green’ indicators cannot be benchmarked to policy objectives • Misleading when comparing across asset classes
 Sector / technology specific green / brown metrics Oil capital expenditure, renewable power exposure	<ul style="list-style-type: none"> • Used to track investment (e.g. Carbon Tracker Initiative, 2°Investing Initiative) • Most closely linked to capital misallocation / risk considerations • Used in ‘green’ taxonomies 	<ul style="list-style-type: none"> • Can only be applied to some sectors and asset classes • Cannot currently be aggregated to provide overall indicator
 GHG emissions & related sustainability indicators Carbon footprint of portfolios	<ul style="list-style-type: none"> • Directly linked to sustainability issue (e.g. emissions impacting climate change) • Communicated by many market actors 	<ul style="list-style-type: none"> • Doesn’t currently capture investment • Cannot be benchmarked to policy objectives • Challenges around data estimation • May be misleading at company level

1.2. LISTED EQUITY

Stock markets are a limited source of direct financing for ‘green’ activities. Attempts to measure ‘green’ finance have thus been largely limited to measuring indirect ‘green’ exposure to products and activities.

A number of commercial data providers have developed methodologies to estimate the ‘green’ share of companies (e.g. MSCI, Trucost, FTSE). These are usually measured in % of revenues of listed companies that can be attributed to ‘green’ activities, based on proprietary taxonomies. According to MSCI, roughly 8% of companies in the MSCI ACWI offer some type of ‘green’ solution – a number that fluctuates significantly in terms of type of green (Fig. 1.2). Measured in terms of revenues, however, ‘only’ an estimated 1-2% of revenues in the MSCI ACWI are classified as ‘green’. This can fluctuate across regional or national stock markets, at least in part as a function of the structure of local economies, the role of stock markets in them, and listing idiosyncrasies.

Metrics related to green products and services are also used in stock markets. Thus, it is possible to estimate the ‘renewable’ power share in stock markets relative to the real economy (Fig. 1.3.) or the share of hybrid / electric vehicles in car production. It should be noted that such analysis is calculated on the basis of physical units and thus fundamentally different to exposure indicators calculated in \$ terms.

‘Green’ share estimates are point-in-time snapshots and don’t track companies’ investments. An alternative approach measures forward-looking indicators.

Listed companies generally don’t provide a breakdown of their investments by technology, creating a barrier to estimating green investment and finance. However, in many cases asset-level databases allow users of data to overcome this challenge. Such databases track bottom-up investment by companies in key infrastructure assets.

The 2° Investing Initiative has developed a methodology on the basis of this data tracking current and planned investments in different technologies across stock markets for key industries (e.g. oil & gas, automobile, electric power, etc.). Such estimates allow for a tracking of green investment in stock markets and benchmarking this investment to public policy objectives (Fig. 1.4). Over 60 investors have started measuring the 2°C alignment of their portfolios / funds (p. 9). Such estimates are limited to investment, however, and don’t measure the ‘financing’ footprint of listed equity portfolios.

FIG 1.2: WEIGHT OF COMPANIES OFFERING ‘GREEN’ SOLUTIONS IN MSCI ACWI
(SOURCE: MSCI 2015)

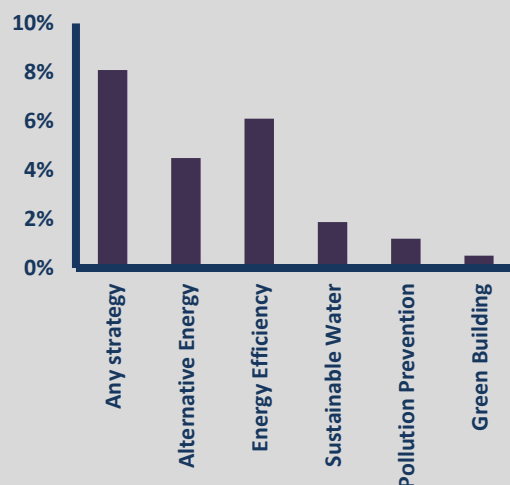


FIG 1.3: SHARE OF NON-HYDRO RENEWABLE POWER IN ECONOMY AND STOCK MARKET BY REGION IN 2015
(SOURCE: ZII, BASED ON IEA 2015 AND GLOBALDATA)

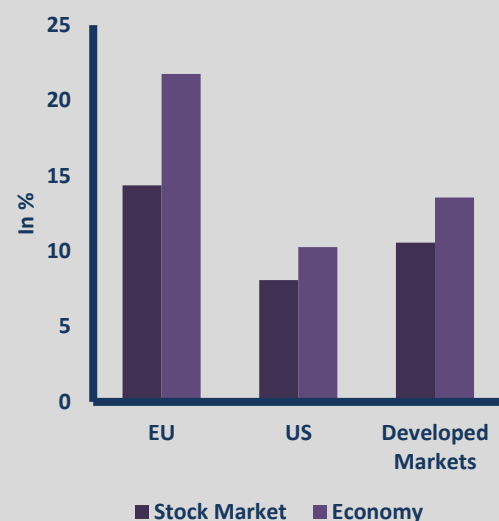
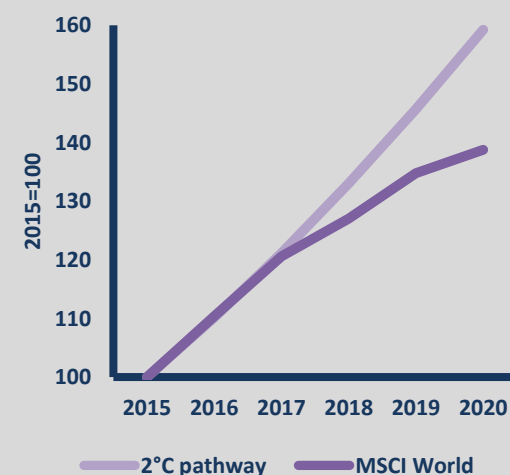


FIG 1.4: THE ESTIMATED EVOLUTION OF RENEWABLE POWER CAPACITY IN THE MSCI WORLD RELATIVE TO THE 2°C BENCHMARK
(SOURCE: ZII, BASED ON GLOBALDATA)



1.3. BONDS

Bonds are a diverse asset class. Meaningful estimates of the ‘green’ share of the bond universe can only meaningfully be applied to corporate, project, municipal, and project bonds.

The Climate Bonds Initiative estimates the potential ‘green’ bond market at \$600 billion – an estimated 0.5% of the ~\$100 trillion global bond market. Out of this number, around 10% (\$66 billion) are directly labeled as green bonds (Fig. 1.5). The majority of the ‘unlabeled’ bond market relates to sovereign bonds which, while in some ad-hoc cases may lend themselves to labeling, are unlikely to be a meaningful asset class for green bonds. When taking sovereign bonds out of the equation, the ‘green’ financing share looks roughly similar to listed equity markets, at around 1-2% (\$66B of \$6T) of corporate, supranational, and municipal bonds.

Similar to listed equities, the key question here is what the level *should* be. The 2° Investing Initiative, in partnership with the Climate Bonds Initiative, Frankfurt School of Finance, and WWF, is currently developing a methodology to develop climate benchmarks for corporate bond markets.

1.4. PRIVATE EQUITY

There are no meaningful estimates around the share of ‘green’ in private equity, given the lack of transparency within the asset class more generally. Estimates are largely limited to the venture capital space.

Following a ‘cleantech’ boom in 2010-2011, cleantech venture capital levels have decreased significantly (Fig. 1.6). Venture capital markets tend to be quite local and idiosyncratic to different regions. Thus, venture capital plays a large role in the United States and in the United Kingdom, whereas it tends to be limited in continental Europe. One cleantech database had 87% of all cleantech venture capital in 2015 in the United States and the United Kingdom (Fig. 1.7).

The assessment of venture capital’s ‘green’ share is an interesting case in point on the problem of averages. A review of over 12,000 cleantech deals thus suggests that whereas there appears to be significant investment in venture capital associated with renewable technologies and efficiency, there is little to no investment in immature, breakthrough zero-carbon technologies in other sectors (e.g. zero carbon aviation, materials, etc.) – a prerequisite to decarbonization according to the IEA.

FIG 1.5: LABELLED AND UNLABELLED CLIMATE BOND UNIVERSE IN \$ BILLION
(SOURCE: CLIMATE BONDS INITIATIVE 2016)

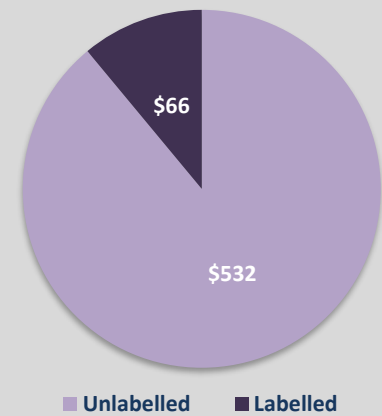
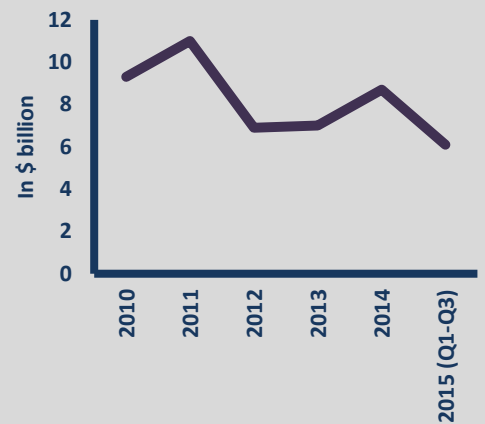
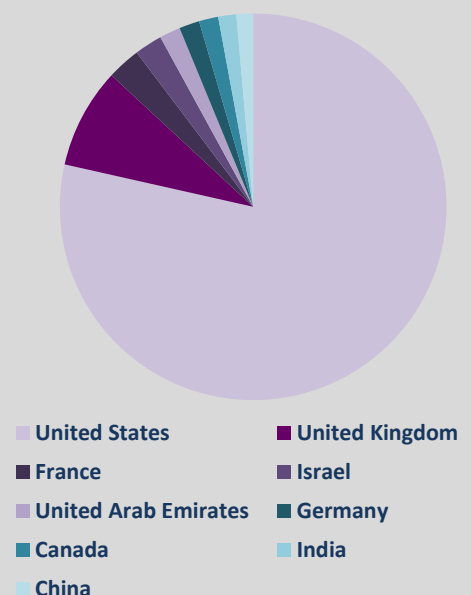


FIG 1.6: TOTAL CLEANTECH VENTURE CAPITAL 2011-2015* (SOURCE: I3 2016)



* Excluding mobility. 2015 Q1-Q3 only.

FIG 1.7: SHARE OF CLEANTECH VENTURE CAPITAL BY REGION IN 2015 ACCORDING TO I3 DATABASE (SOURCE: ZII, BASED ON I3 DATABASE)



1.5. GREEN LENDING

Similar to private equity, there is no meaningful, comprehensive review of green finance for lending. Exceptions are estimates in some developing countries (notably China) and some development bank reporting.

The Chinese Banking and Regulatory Commission (CBRC) requires Chinese banks to report on their 'green' lending and estimates a 5-10% green share. However, these estimates suffer from inconsistent definitions across banks. For example, some banks in the past have labelled their entire agriculture-related lending green.

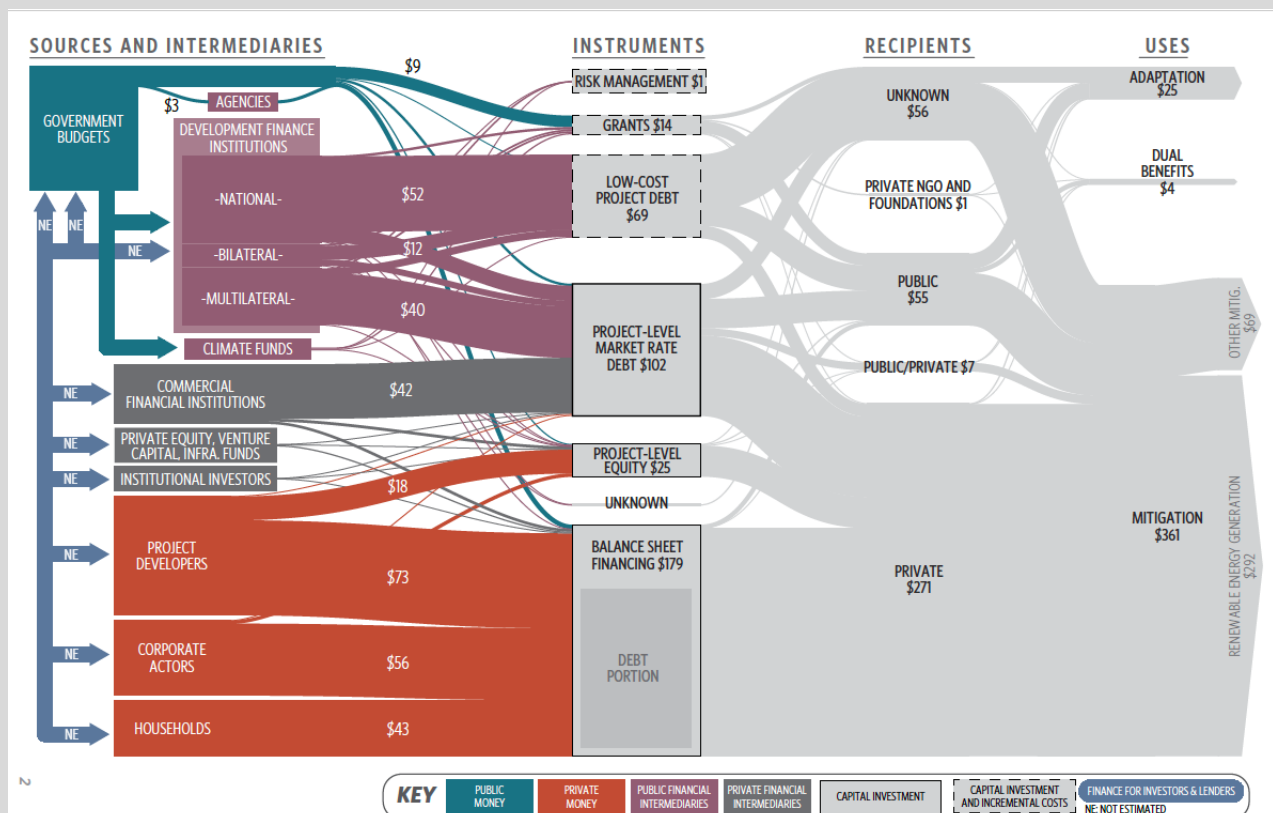
Beyond China, green lending estimates exist for multilateral development banks (mainly project and asset finance, cf. section below) thanks to the work of the Climate Policy Initiative (CPI). While these estimates may not cover all types of activities (e.g. lending to green SMEs), they suggest development finance institutions accounted for over \$100 billion in climate-related finance alone (excluding other types of green finance) in 2014 (CPI 2015). This type of lending tracked by CPI frequently relates to project finance.

1.6. PROJECT FINANCE / REAL ESTATE

Project finance is tracked both by organizations like the Climate Policy Initiative and industry project finance databases (e.g. Infrastructure Journal, BNEF, etc.). The key is distinguishing finance and investment levels. The Equator Principles, while a prominent standard, do not actually track financing levels.

Fig. 1.8 shows an overview of project finance by CPI with an estimated \$196 billion in project finance in 2014. This compares to around \$179 billion in balance sheet auto-financing. In this space, definitions are a key challenge and green finance will differ significantly across regions (e.g. due to varying debt/equity ratios). Using Infrastructure Journal data, 'green' project finance is anywhere between 10-25% of total transaction value across infrastructure investments (based on a review of 2014 data). For real estate and infrastructure, a few initiatives to develop standards and track progress exist, notably the Green Real Estate Sustainability Board (GRESB) and the Climate Bonds Initiative (CBI).

FIG 1.8: CLIMATE FINANCE BY SOURCE, INTERMEDIARIES, INSTRUMENTS, RECIPIENTS AND USES (SOURCE: CLIMATE POLICY INITIATIVE 2015)



1.7. CONCLUSION / CAVEATS

The results can be used to estimate ‘green finance’ exposure of institutional investors subject to their asset allocation strategy. Previous estimates using the methodology described above suggest institutional investors have an overall exposure to green finance of 1-2%, depending on asset allocation strategies and sector exposure (Fig. 1.9). There are a number of key challenges in the current landscape around measuring progress (Fig. 1.11).

- 1) *Mixing investment and financing:* The discussion frequently mixes ‘finance’ and ‘investment’ and ‘exposure’. For example, the carbon footprint of financial portfolios is labeled ‘financed emissions’ even though it refers to the footprint of company’s activities and not investment.
- 2) *Defining green:* There is no standard around how to classify ‘green’. Even if a taxonomy existed, it would have to evolve to reflect changes in technology maturity and stakeholder concerns.
- 3) *Aggregating finance:* A single indicator aggregating across technologies may be less meaningful, as it may hide ‘sufficient’ financing for one technology and lack of financing for another.
- 4) *Lack of a benchmark:* Green finance needs will be significantly different across geographies, asset classes, etc. The same is true for high-carbon or ‘brown’ investments or finance. Tracking progress on green finance thus requires meaningful science-based benchmarks to measure “how much is enough”.

Different exposure to ‘green’ in different asset classes implies higher or lower figures will have very different meaning. For instance, financing may decrease because costs decreased. Thus, global solar investment levels have more or less stagnated since 2010, but annual solar PV capacity deployment has doubled (Fig. 1.10). Similarly, overall green finance levels can increase while some types of green finance (e.g. venture capital in immature, zero carbon technologies) may decrease. *The objective of the next section is to explore options for benchmarking investment and financing to policy objectives in order to measure progress.*

FIG 1.9: BREAKDOWN OF A REPRESENTATIVE PENSION FUND PORTFOLIO (SOURCE: FINANCING THE FUTURE 2014)

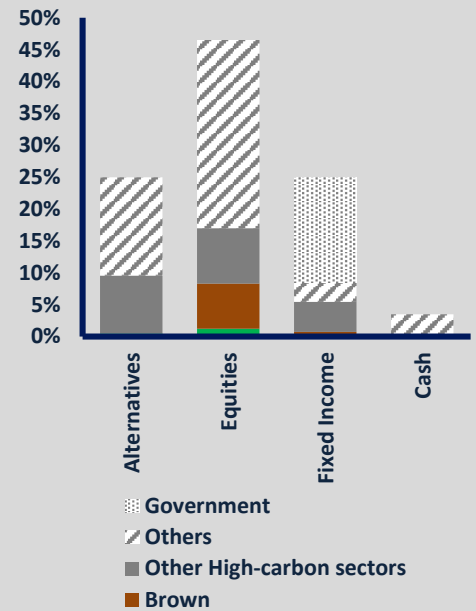


FIG 1.10: CORRELATION BETWEEN SOLAR PV INVESTMENT LEVELS AND CAPACITY ADDITIONS 2004-2015 (SOURCE: 2II, BASED ON UNEP 2016 AND GLOBALDATA)

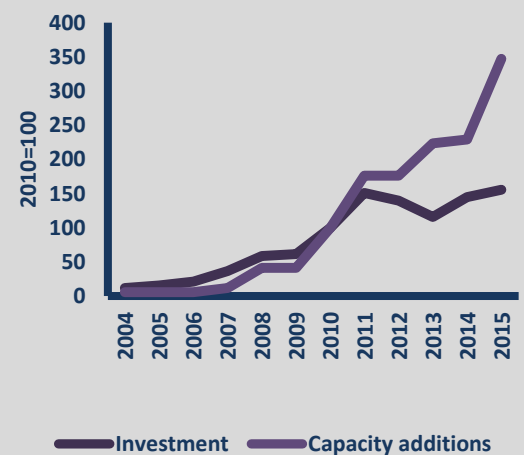
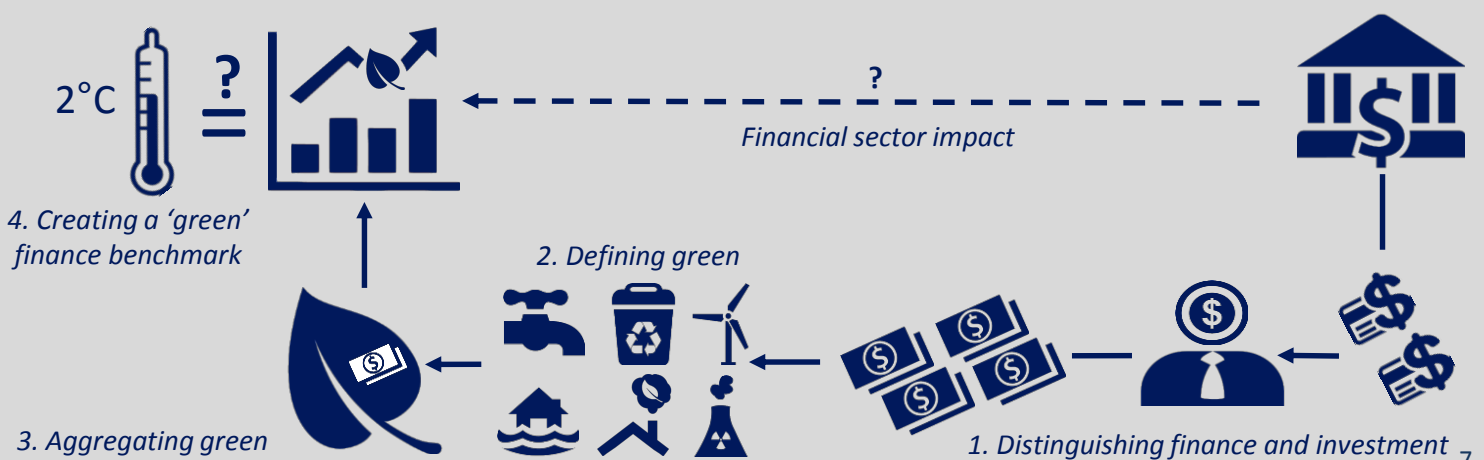


FIG. 1.11: CHALLENGES TO MEASURING GREEN FINANCE (SOURCE: 2°II)



2. OPTIONS FOR BENCHMARKING PROGRESS

2.1. PRINCIPLES OF GREEN FINANCE BENCHMARKS

This section explores options for developing a benchmark to measure progress on green finance in a meaningful way. The technical challenge relates in particular to the issues described in the previous section. As outlined above, comparing aggregate green finance or investment figures with historical levels or across geographies does not provide a meaningful indicator. Developing a meaningful indicator to measure progress thus will need to be designed on the basis of four basic principles:



Geography-specific: Benchmarks should be designed specific to each geography, measured in terms of the location of the investment, the capital market, and the issuer. Geography-specific benchmarks are important to reflect the different financing and investment challenges of different regions. For example, the 2°C compatible fractions of coal and renewables investment will be starkly different in China and the EU given different development levels and incumbent technology. Even within the EU, geographical contexts vary considerably (e.g. Poland vs. Denmark). Metrics must thus be specific to geographies of physical activity (e.g. power plant location) and financial activity (e.g. country of listing).



Impact & technology focused: Investment and financing levels should be tracked in relation to physical indicators by technology. This is necessary to understand whether changes in investment and financing levels are a function of changes in costs (financing or capital) of the investment or actual increased investment / financing (i.e. increased physical deployment). Currently, green or climate finance tracking emphasizes aggregate spending. This risks hiding both potential over- and under-investment. Benchmarks thus need to be specific to technology or energy services that need to be 'greened' or 'decarbonized'. This also may include looking at different levels of the finance chain, including cleantech innovation. For example, \$20 million financing of R&D on electric cars is a fundamentally different type of investment / financing than investing \$20 million in a factory building electric cars, even though both would fall under the same technology category.



Asset class specific: Finance benchmarks need to be specific to each asset class. Different financing sources for different technologies imply that some asset classes will be more exposed to one or the other type of green finance. The extreme differences in exposure outlined in the previous section speak to that effect. This is particularly important for financial institutions that may seek to use these benchmarks to inform investment decisions. Asset class specific benchmarks will in many cases require the development of "financing roadmaps" in addition to "investment roadmaps" (IEA 2014). "Financing roadmaps" can inform on the needed *financing* associated with the current *investment* in markets (e.g. financing needs associated with solar PV investments).



'Science-based': Progress should be tracked relative to science-based (e.g. 2°C climate goal) or national and international policy objectives (e.g. national decarbonization plans). Most green finance initiatives currently use market average indicators as benchmarks. By extension, information is missing on "how much is good enough". This is true in the project finance space (e.g. avoided GHG emissions by public development banks relative to 'business-as-usual') or low-carbon index products in the listed equity space (e.g. GHG emissions reduction relative to market index). Meaningful benchmarks from a policymaker's perspective need to be linked to policy-related or science-based objectives.

2.2. CHALLENGES & CURRENT OPTIONS

The following briefly summarizes some of the key challenges around implementing the principles highlighted above:

- Data:** Data for key climate technologies is frequently quite high, but currently not used by financial market actors. Thus, industry databases allow for tracking of current and planned oil & gas capital expenditure by company and oil field for over 25,000 oil fields (Fig. 2.1). Similar data exists for power (Fig. 2.2), automobile, aviation, shipping, and other sectors. The key challenge currently is aggregating this data across industry asset-level databases to allow for a comprehensive picture. Despite this high quality data for some sectors, data for other sectors is frequently missing, notably financing of immature technologies, household investments, and investments related to non-energy related green sectors (e.g. agriculture & forestry). Nevertheless, for key energy-related and energy-intensive sectors, data gaps are currently not a significant issue.
- Economic roadmaps:** Building science-based benchmarks requires economic, scientific, and/or policy-based roadmaps. To date, these roadmaps are relatively well-developed related to climate, but even here lack granularity for some technologies (e.g. immature technologies). Roadmaps for other sustainability issues (e.g. biodiversity, etc.) tend to be much less developed.
- Financing roadmaps / targets:** Beyond the existence of economic roadmaps, the translation of these roadmaps into implications for financial markets is still limited, with only a few initiatives working on this topic (see discussion below).
- Asset classes:** Developing meaningful green finance benchmarks are unlikely to be feasible for some asset classes, notably sovereign bonds. Moreover, in other asset classes disclosure issues around use of proceeds, notably for bonds, may inhibit the application of benchmarks.

2.3. CURRENT OPTIONS

Green finance benchmarks currently are developed or under development in the following areas.

- 2°C benchmarks for listed equity and corporate bonds (currently under development by the SEI metrics Initiative, see box on side);
- 2°C benchmarks for project finance and real estate (currently under development by the Climate Bonds Initiative, Global Real Estate Sustainability Board, etc.).

Beta versions can already be applied or will be ready for testing this year. Other initiatives and benchmarks are similarly under progress (e.g. CDP Science-based targets, Portfolio Carbon Initiative), but don't specifically relate to financing or 'science-based' benchmarks.

FIG 2.1: FORECASTED OIL & GAS CAPITAL EXPENDITURE (SOURCE: ZII, BASED ON GLOBALDATA)

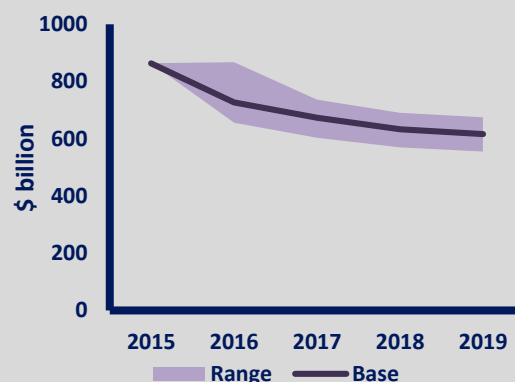
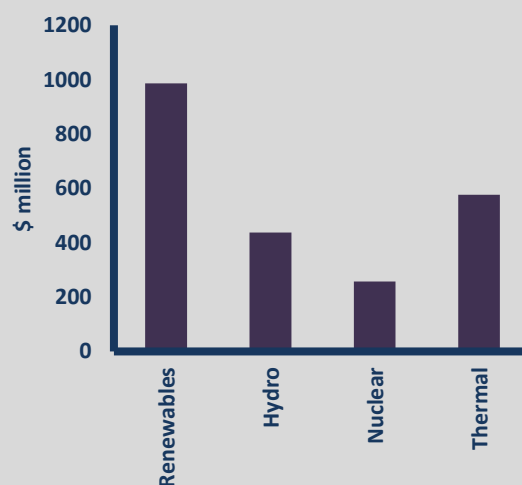


FIG 2.2: FORECASTED POWER INVESTMENTS BY TECHNOLOGY 2016-2020 (SOURCE: ZII, BASED ON GLOBALDATA)



FOCUS: SEI METRICS PROJECT

The SEI metrics project was launched in March 2015 to develop science-based benchmarks and targets for financial institutions related to the global climate objective of limiting global warming well below 2°C. The project involves the 2°Investing Initiative, the Climate Bonds Initiative, CDP, Frankfurt School of Finance, Kepler-Cheuvreux, WWF Germany, WWF European Policy office, Cired and the University of Zurich. Key outputs for this year include a 2°C benchmark for listed equity markets and corporate bonds markets.

The listed equity methodology has already been developed for four key sectors (oil & gas, power, automobile, coal mining) and is already being applied by over 60 investors worldwide in the first three months following the launch. The methodology can thus already be used as part of a capital misallocation and green finance tracking. In the course of the next two years, the project seeks to expand the methodology to a broader set of sectors.

3. RECOMMENDATIONS

The following summarizes the 5 key take-aways and potential action points for policymakers.



IMPROVE DATA QUALITY & AVAILABILITY

Policymakers can contribute to improving the quality and tracking of data. Corporate reporting, as currently being reviewed in the context of the FSB Task Force on Climate-Related Disclosure (TCFD) is part of that story. Equally, companies directly account for only a minority of financial assets (2°ii 2016). Similarly, corporate investor reporting through annual reports is only a part of corporate reporting practices. Companies in the power sector for example will have reporting requirements to the national electricity markets regulator. As a result, a significant body of data is collected that would be key to financial institution decision-making, but that is currently not easily available (see previous page).



SUPPORT RESEARCH ON SCIENCE-BASED BENCHMARKS AND TARGETS

A number of institutions have started developing research on science-based benchmarks, including the European SEI metrics consortium and the Science-Based Targets Initiative involving CDP, WWF, and WRI. Improving the measurement of progress on green finance requires investments in developing the right kind of benchmarks. Policymakers can support these research initiatives, which to date are limited to the most prominent asset classes, regions, and technologies. Moreover, these benchmarks are largely limited to the climate space and don't address other areas of green finance.



TRACKING AND RESPONDING TO INVESTMENT & FINANCING GAPS AT NATIONAL LEVEL

Finance and investment can act as the "canary in the coal mine" in terms of achieving long-term green and climate objectives. Governments can thus track these quantities at national level to measure alignment with national policy objectives and potential under- / over- investments. The identification of these gaps can then help inform policy. It can also de-mystify associated debates around financial risk and 'green' investment gaps.



SETTING UP AN INTERNATIONAL CLIMATE CAPITAL MONITOR

As outlined above, finance benchmarks linking climate-related policy objectives (e.g. the well-below 2°C climate goal) to private and public financing streams are well developed. This is also the area where currently available data is arguably of the best quality. Climate change is also the issue that has received the most attention from a financial risk perspective. To map global alignment of financial markets with climate-related objectives, the set-up of "Climate Capital Monitor" can track both current and planned climate-related finance flows cross-country and measure potential investment / financing gaps (or 'over-investment'). A Climate Capital Monitor can also help to track potential systemic risk related to climate change more generally. A Climate Capital Monitor can sit under the auspice of the Financial Stability Board, the IMF, or even as independent entity open to non-G20 countries.



TAKING ACTION AT NATIONAL LEVEL

Policymakers can respond to potential capital misallocation by introducing, where appropriate, policy incentives. These will depend on the potential country-specific investment and financing gaps (to the extent that these may exist), the structure of financial markets, and existing policy incentives. For example, in some jurisdictions, mandates around public development banks or pension funds may be an appropriate tool – including for example 2°C climate mandates. In other geographies, tax incentives may play an important role. Market regulation (e.g. around the green bond market) may also be an appropriate tool. Crucially, these note has not reviewed the relative merits of different policy incentives, but highlights this policy step in the context of measuring progress on green finance.

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