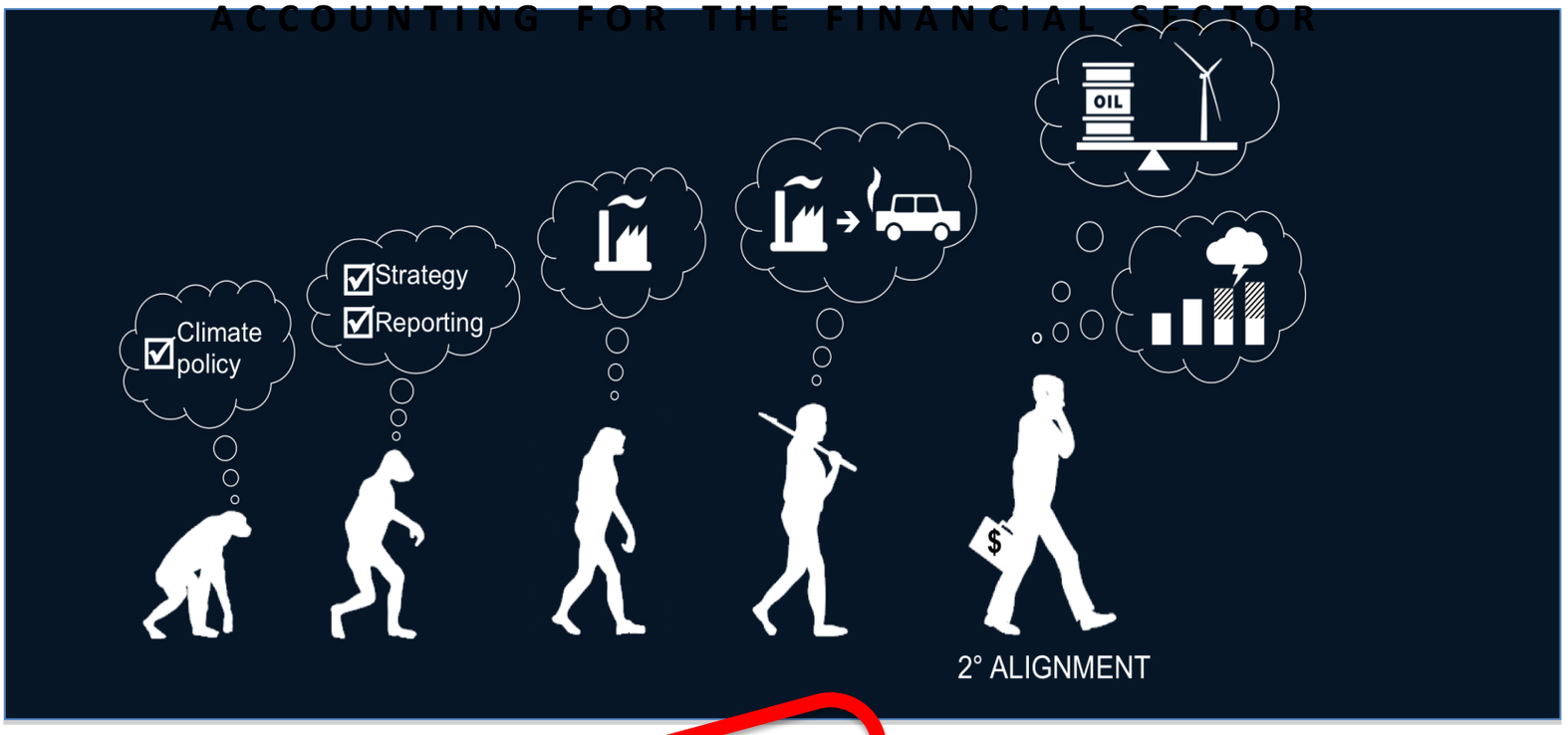
FROM FINANCED EMISSIONS TO LONG-TERM INVESTING METRICS

STATE-OF-THE-ART REVIEW OF GHG EMISSIONS ACCOUNTING FOR THE FINANCIAL SECTOR



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- addition of sources & bibliography,
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In partnership with:

ADEME

Caisse des Dépôts

AFD Agence Française de Développement

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ABC Association Bilan Carbone

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This report has been produced by the 2° Investing Initiative (2°ii) in partnership with ADEME, Caisse des Dépôts*, and CGDD (French Ministry of Ecology and Energy). Additional support has been provided by UNEP-FI and the Association Bilan Carbone* (ABC).

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** Member of the 2° Investing Initiative*

*** S. Dupré and A. Rose both contributed to the development of assessment methodologies featured in this document (Cross-Asset Footprint and P9XCA respectively).*

REVIEW COMMITTEE

The report has been improved and reviewed by a committee chaired by CDC Climat Research, composed of experts and practitioners.

TO BE COMPLETED

The views expressed in this report are the sole responsibility of the authors and do not necessarily reflect those of the 2° Investing Initiative members nor those of the review committee members. The authors are solely responsible for any errors.

FOREWORD

Dear Reader,

The 2° Investing Initiative is a multi-stakeholder think tank bringing together financial institutions, policy makers, research institutes, experts and environmental NGOs. Dedicated to research and awareness raising to promote the integration of climate goals in financial institutions' investment strategies and financial regulation, 2°ii organizes sharing and diffusion of knowledge, and coordinates research projects.

The 2° Investing Initiative has been created in 2012. Its work is funded by the Caisse des Dépôts, the AFD, the ADEME (French Agency for the Environment and Energy Management) and the French Ministry of Ecology and Energy. The members include 60 organizations and professionals from the financial sector from 6 countries, including most 'financed emissions' practitioners.

The name of the initiative relates to the objective of connecting the dots between the +2°C climate goal, risk and performance assessment of investment portfolios, and financial regulatory frameworks. This report builds on our previous study that describes the 2° investing framework based on three pillars:

1. Measurement of investment portfolios' carbon risk exposure and performance;
2. Disclosure of carbon risks and performance by non-financial companies and investors;
3. Incentives targeting investors (e.g. tax incentives), in order to channel capitals toward financing the energy transition.

This second report, dedicated to the first 'measurement' pillar provides the basis for our future work plan. Over the coming three years, we will develop a cross-asset, impact-based climate performance indicator for investment portfolios and banks. This undertaking will be flanked by quarterly publications covering a range of issues involving the interplay of climate change and finance, conferences and workshops with experts from the field, and participation in consultations organized by different stakeholders.

This study has profited immensely from the input of the practitioners of the analysed methodologies and the review process involving experts and practitioners; we are very grateful for their contribution to our work.

On behalf of the 2°ii team, we hope you enjoy reading the report.
Sincerely,

QUI ?

Executive Summary

Overview. This report presents the results of the *2° Investing Initiative* review of GHG emissions accounting for the financial sector. Part I of the report establishes the case for developing financed emissions methodologies. Part II provides a state-of-the-art review of a dozen of 'financed emissions' methodologies developed to assess equity portfolios, corporate loan books and banks. The study concludes with an outlook as to the future potential of financed emissions methodologies to help in aligning the financial sector with 2° climate scenarios and the associated implications for policy-makers.

Part I . Long-term investing requires cross-asset, impact-based metrics.

• **Capital misallocation.** The global economy faces a substantial shortfall in long-term and climate finance relative to projected capital demand and climate targets. Climate-specific finance reached about $360 bn in 2010-11, flows that still fall far short of the $500 bn of annual additional investment that according to the IEA needs to be mobilized over the next decade. Besides, overinvestment in fossil-fuel reserves and equipment lead to locked-in emissions that widen the carbon budget deficit. The carbon content of existing reserves today is already 3 to 6 times higher than the maximum amount of carbon we can release in the atmosphere in order to keep global warming under 2°C.

• **Reorienting the financial sector.** The financial sector is increasingly exposed to carbon risk, manifesting itself in the form of policy risks in the short-term and the threat of 'stranded assets' and possible climate litigation in the medium to long-term. This suggests that tracking 'financed emissions' and carbon exposure will increasingly be in the interest of profit-maximizing financial institutions and investors, as well as policy-makers concerned with financial stability. However, the lack of price signal on carbon and the short investment horizons of most long-term investors keep point-in-time carbon risks off the radar screen. Reorienting the finance sector will therefore require incentives directly targeting investors that bridge the climate and long-term finance gap, mobilize the assets of long-term investors and reduce excessive investment in fossil fuels.

• **The chance for new metrics.** Aligning the finance sector with 2° climate scenarios and the associated climate performance and carbon risk challenges will require new cross-asset, impact-based methodologies and incentives to not only move assets towards 'green' investment but also away from fossil fuels, in addition to allowing for technology-neutral market mechanisms with a focus on impact. For the past seven years SRI and 'green' investors have started to refocus their approach towards impact-based criteria and begun to develop new 'financed emissions' methodologies.

Part II . Existing methods and tools allow investors to track their financed emissions

• **Landscape of practices.** We identified a dozen methodologies developed for equity managers, banks and environmental NGOs. They cover together most asset classes including private and listed equities, corporate, financial and sovereign bonds, corporate loans, project finance, mortgages and consumer credit. Several financed emission data providers offer calculation tools and direct access to databases covering major stock indices components.

• **Gaps in GHG reporting**. Despite progress, corporate reporting only covers 50% of total market capitalization for GHG emissions. Gaps remain for supply-chain and sold products emissions, small companies, and all other investees (governments, households, etc.).

• **Use of modeling techniques**. To fill the gaps carbon data providers estimate GHG emissions with models (Environmentally Extended Input Output matrix, regression models, life-cycle data, etc.). A combination of reported carbon data and modeling techniques allows for an assessment of financed emissions with a level of certainty sufficient to inform investment decisions when combined with qualitative analysis. On a macroeconomic level, financed emissions metrics are generally more precise than most economic data based on national accounts currently used to inform policy-makers.

• **Need for a broad coverage**. A pronounced diversity of practices exists regarding the integration of supply-chain and sold product emissions of investees, the coverage of non-corporate assets (sovereign bonds, mortgages, etc.) and off-balance sheet items (underwriting, retailing of UCITS, etc.). Our analysis calls for the coverage of a broad scope, methodologically already achievable, when assessing an investment portfolio in order to avoid basing investment decisions on misleading data.

• **Insignificant cost**. Data providers have developed datasets and calculation tools allowing bulk processing of data, the use of average emission factors to apply top-down assessment approaches, and scale economies in the analysis of investees. On this basis, our estimates suggest that implementation costs of financed emissions methodologies are relatively marginal for financial institution.

Part III. Need for standardization, further research and regulation

• **Lack of performance indicator**. The report concludes that, given the current status of the 'financed emissions' methodologies landscape, the evolution toward genuine climate performance and carbon risk metrics will require further methodological development:

- To date, most models focus on *annual* emissions, whereas *cumulated emissions* (the sum of all emissions associated with the investment) and *locked-in emissions* (the level of emissions pre-determined over the lifetime of an asset) seem more material in terms of informing investment decision-making. Gaps also remain for covering complex assets such as derivatives. Finally investments horizons are not appropriately taken into account in existing methodologies.
- More importantly, current methodologies are largely missing the layers of sophistication allowing to benchmark an investment portfolio's carbon impact against 2° investment road maps (such as those published by the International Energy Agency).

• **Standardization and research underway.** Several initiatives are starting to standardize methodologies. Notably initiatives include the GHG Protocol/UNEP-FI and national initiatives in France and Germany, which all aim at introducing a standard by 2014-15. While the development of carbon accounting standards for the financial sector will likely boost reporting practice and increase transparency, the standards are likely to leave certain issues unresolved, notably the lack of genuine performance indicators and 'benchmarks' to track the alignment of investment strategies with climate scenarios. The research program of the 2° Investing Initiative aims at bridging this gap by developing a 'model' to assess the contribution of investors toward financing the transition to a low carbon economy and realizing long-term economic targets. The project started in 2012 and aims at publishing a 2° investing model in 2015-16.

• **Regulation required now**. Parallel to the research push, governments should act now to support the drive towards improving accounting and reporting standards and incentivizing transparency. This report recommends the following measures:

- Finance the development of methodologies and test them on a large scale e.g. via public banks;
- Immediately improve mandatory disclosure by the private sector to increase the availability and quality of raw data from non-financial companies;
- Introduce mandatory disclosure for the financial sector to create reporting channels and boost innovation from data, indices and services providers;
- Plan the introduction of incentives based on 2°/long-term investing metrics, notably regarding tax incentives on savings interests, which are one of the main driver of asset allocation by private investors.

List of Acronomys	
ADB	Asian Development Bank
ADEME	Agence de l'environnement et de la maîtrise de l'énergie, French Environmental Agency
AFD	Agence Française de Développement
AODP	Asset Owner Disclosure Project
ASN	ASN Bank
BofA ML	Bank of America Merrilll Lynch
CAF	Cross-Asset Footprint
CDC	Caisse des Dépôts
CDP	Carbon Disclosure Project
ERBD	European Bank for Reconstruction and Development
ESG	Environmental, Socal, Governmental
GHG	Greenhouse Gases
IABD	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Finance Corporation
KfW	Kreditanstalt für Wiederaufbau, German Development Bank
NEFCO	Nordic Environment Finance Corporation
SRI	Socially-responsible investor/investing
UNEP-FI	United Nations Environment Programme Finance Initiative
VfU	Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten e.v., Association for Environmental Management and Sustainability in Financial Institutions

TBC

PART I. WHY DO FINANCED EMISSIONS MATTER?

1. THE CASE FOR ASSESSING PORTFOLIOS' ALIGNMENT WITH CLIMATE SCENARIOS

FIG1. CARBON PRICE IN €/t
Source:

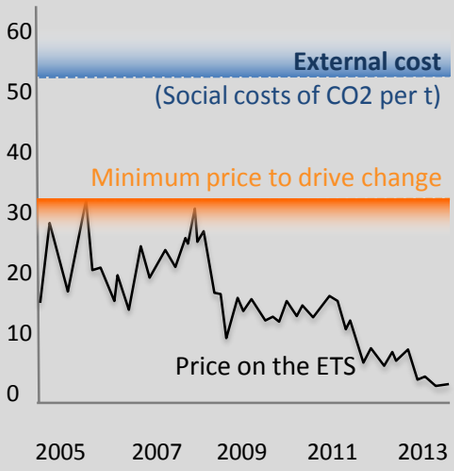
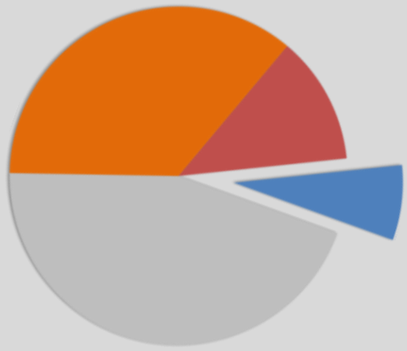


FIG2. ALLOCATION STRATEGY OF LONG-TERM INVESTORS
Source: WEF (2011).



- Liquid due to the structure of liabilities
- Liquid due to investment processes
- Potentially illiquid.. but liquid
- Actually illiquid

Long term investors include Pension funds, insurers, SWF and endowments. Total of $27 tn.

The feasibility of realizing the transition to a low-carbon economy will fundamentally hinge on the alignment of financial sector portfolios with 2° climate scenarios. The challenges of this transition facing the global economy over the next decades imply both the need to channel investments towards long-term and low-carbon investments and to contain the rising exposure of financial institutions to carbon risk. Addressing both climate performance and carbon risk in turn requires a regulatory and corporate environment that goes beyond the current climate policies. The assessment of financial portfolios' alignment with climate scenarios and the associated toolbox of metrics and methodologies measuring 'financed emissions' are integral in achieving such an environment. This chapter makes the case for the need to assess the alignment of financial portfolios with 2° climate scenarios by looking at the need to channel investments, the growing exposure to carbon risk and the opportunity for new metrics to provide a comprehensive and quantitative measure of 'financed emissions'.

1.1 THE NEED TO CHANNEL INVESTMENTS

1.1.1. Lack of price signal

Current climate policies have not been and will not be able to drive the shift to a low carbon economy alone. The first - and well documented - reason is the failure of governments to agree on an ambitious and binding framework at international level. Even when impulsion does exist (e.g. the EU "20-20-20" objective), it is not tangible enough to drastically reorient the industry and drive investments. The materiality of physical and macroeconomic risks related to climate change is mainly long term (2030-2050 and beyond), even if some recent catastrophic events (e.g. hurricane Sandy) returned the question of impact to the fore. Climate policies (caps, taxes, standards and norms) introduce tangible short term signals, essentially via a price on GHG emissions. Given the lack of visibility regarding future regulation and the low price of carbon to date, they have been unsuccessful in significantly impacting industrial strategies. Consequently, policy risks are not material enough, and probably will not be for the next 5 to 10 years, to drive capital allocation in line with climate scenarios.

1.1.2. Long term stakes off the radar screen

A second obstacle - less documented - lies in the functioning of financial markets. Setting a price on carbon that could create a policy risk for investors, takes for granted that financial markets will anticipate risks and opportunities by adjusting their asset allocation strategy, thus financing the transition. Unfortunately this, as Nicholas Stern stressed in his *Economics of Climate Change Review*, only works on paper. In the real world, even if policy makers finally agree on a framework, time horizons of investors are far too short to capture any long term policy risk (cf. page §).

- **Risk analysis**. Traditional financial analysis, either for credit risk or equity research, does perform forward modeling up to 3-5 years for specific activities. Beyond that however, analysis is limited to trend extrapolation. As a consequence, no long term signal, even if credible and possibly radical, is included in risk - and opportunity - analyses. Financial analysis therefore mainly aligns recommendations with business as usual scenarios (e.g. no policy change, no climate impact), which are the only scenarios that have a 100% probability of not happening.

• **Investment processes.** As recently noted by the OECD, institutional investors are in theory able to take into account climate policy risks and climate change expected impacts, given their long term liabilities (households savings and rights in pension funds). However, in practice the investment horizon of most institutional investors is shorter relative to what a rational client-oriented approach of risk-adjusted returns would require (cf. fig 2 and page §). The main reasons for this apparent disconnect include mark-to-market accounting and the lack of risk metrics, but also principal-agent concerns, the impact of capital requirements, and behavioral bias.

• **Information on risk**. Finally, the information provided to individual investors is usually limited to the volatility of portfolios over the last 12 months, without any forward looking information.

1.1.3 Long-term finance gap & unbalanced investments

• **Climate finance gap**. Climate finance can be considered a toolset (climate bonds, funds, guaranties, etc.) towards bridging the gap between business-as-usual investment trends and investment scenarios coherent with +2° C climate goals. According to the Climate Policy Initiative, climate-specific finance (defined as capital flows targeting low-carbon and climate resilient development) reached about $360 bn in 2010-11. More specifically, clean energy investments dropped to $225 bn in 2012 after peaking at $257 bn in 2011. These amounts seem relatively small given the $500 bn of annual additional investment that needs to be mobilized over the next decade and the $1,000 bn annual average until 2050 (IEA ETP 2012).

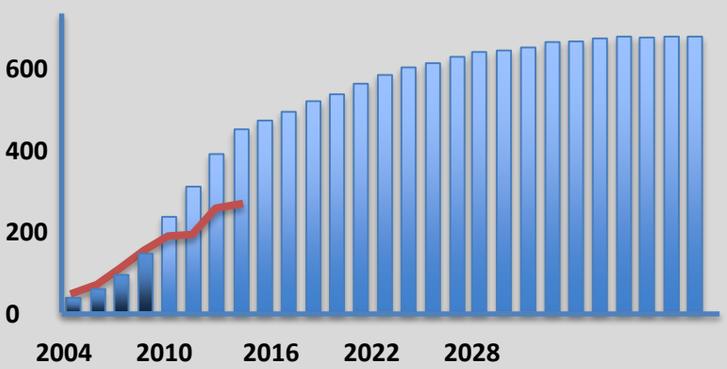
• **The role of long term investors**. The IEA therefore identifies the mobilization of long-term investors' assets as one of the key challenges of the energy transition. Beyond the broader policy measures designed to improve the ability of the green economy to attract capital (carbon taxes, subsidies, etc.), this challenge requires overcoming the obstacles specific to the finance sector and finding new vehicles and policies to channel investments toward green assets. The need to channel financial investments in line with long-term forecasted financing needs is not limited to climate challenge reasons: given the trends in asset allocation, various economists from the OECD, the WEF or the Group of Thirty stress the increasing gap between future needs and the future flows of financing delivered by the financial sector and financial markets;

• **Too much investment in fossil-fuels assets**. The energy transition is not only a question of additional investments. Based on IEA data, limiting global warming to +2° C over pre-industrial levels requires a massive shift in investments from fossil-fuel sectors (coal-fired power plants, oil extraction) to clean technologies. The economic case of their 2° scenario (ETP 2012) is based on average fuel savings estimated at $2.5 Tn per year until 2050. The associated reduction of coal and oil consumption suggests that a major part of existing reserves will become stranded. For financial markets, this requires a sharp investment drop in fossil-fuels industries. This stark reality currently stands in contrast with the following trends:

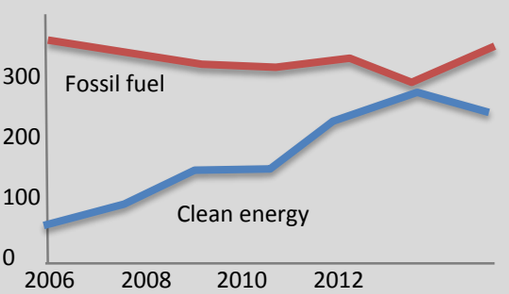
- The carbon content of fossil-fuels reserves is already 3 to 6 times higher than what we can release in the atmosphere until 2050 in order to meet the 2° C target (see page §). This situation challenges the macroeconomic case of investing $600 to 700 bn each year in oil & gas exploration and production.
- On the other side of the energy supply chain, the locked-in emissions of existing fossil-fuel powered equipment (power-plants, factories, cars, buildings, etc.) will exceed our 'carbon budget' in 5 to 7 years. Even if carbon capture and storage delivers, unlikely before 2030, these devices will have to be replaced before the end of their planned lifetime. Despite this, $300 bn are still invested each year in new thermal power capacities.

From an investor's perspective, the energy transition requires a reallocation of investments and diversification of portfolios' exposure

INVESTMENT IN CLEAN ENERGY Source: BNEF



INVESTMENT 2006 – 2012 ($ bn) Source: BNEF, EIA



Note: Clean energy total excl. large hydro.
Fossil fuel investmn on coal and gas capacitz.
Capacitz retirement of 3.3%/yr for coal and 4%/gas

FOCUS. EXAMPLES OF 2° INVESTMENT ROAD MAPS

2° INVESTMENT IN CEMENT

Cement is used as a binding material to produce concrete. Its production emits 2.3 GT of CO2 per year. 2° investors can finance new capacities or retrofitting programs based on best-available-technologies: switching to dry-process kilns, away from coal to waste fuels and biomass, and adding low-carbon binding materials (e.g. fly-ash) in the product. All together, this can cut emissions by 30% in 2050 compared to a baseline scenario. But alignment with 2° scenarios requires almost zero emissions from cement plants in the long term and to triple the emission reductions by 2050.

Given the lifetime of a cement plant (40-50 years), a 2° investor needs to invest now in:

- advanced concrete helping to improve buildings energy performance (e.g. insulation);
- construction services and materials based on low-carbon alternatives to concrete (e.g. wood for individual dwellings);
- R&D in low-carbon alternatives to cement (e.g. copying the chemical process producing eggshell or coral reef at industrial scale) and/or carbon-capture and storage to allow low-carbon concrete in the future. An additional, more complementary element is the opportunity for off-setting (accounted for i.a. by South Pole Carbon. From an investor perspective, this investment roadmap involves a selection of best-in-class cement manufacturers. However, no listed cement group currently invests massively in breakthrough technologies. A diversification to other industry groups and other asset classes such as climate bonds (financing retrofitting programs), private equity and venture capital (R&D and CCS) is therefore needed.

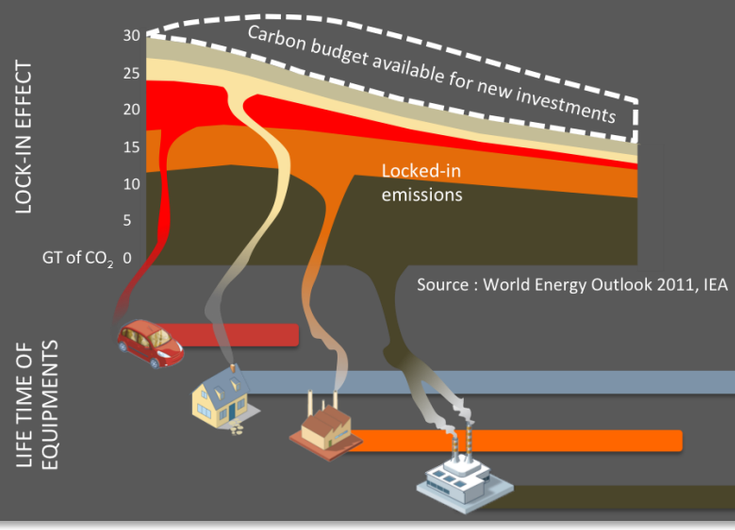
2° INVESTMENT IN ROAD TRANSPORTATION

Road transportation emits 6 GT of CO2 annually. Listed companies contribute to future emissions via investments in fuels ($350 bn/year), automobile ($180 bn/year), and road construction ($30 bn/year). In addition, about $2tn are invested each year in new cars, partly financed by bank loans, and $x Bn by governments in paved roads. The locked-in effect is high for roads (40+ years), refineries (25-30 years) and oil reserves (10-15 years). The lifetime of a car ranges from 7 to 20 years, but car design (2-3 years) and the upstream R&D should be taken into account when assessing the inertia of investment decisions. Climate scenarios disagree on which technologies to prioritize and the magnitude of modal shift. Overall, a 2° investor should finance:

- The development of existing low-carbon engines (hybrids, flex-fuel, electric, natural gas, efficient gasoline/diesel) and massive R&D in breakthrough technologies (fuel-cells, new batteries, etc.), in the automotive sector;
- R&D in the next generation of clean fuels including production, transformation and distribution, leading to investments in agriculture, refining, and distribution.
- The modal shift, involving investment in rail companies, and smart multimodal transportation projects.

The current level of diversification of R&D and capital expenditures among large capitalizations in the automotive and oil sectors prevents such an investment strategy. A 2° investor will need to broaden his or her universe to small caps and private companies, and increase its exposure to rail companies and climate bonds.

LOCKED-IN EMISSIONS



The locked-in effect of new investments plays a key role in the type of investment that need to be prioritize in a 2° investing strategy. The IEA consider that the carbon budget available for new investments is very limited given the locked-in emissions of existing equipment and infrastructure.

FOCUS. EXAMPLES OF 2° INVESTMENT ROAD MAPS

FOSSIL-FUEL DIVESTMENT

Divesting from fossil-fuels is an integral piece to aligning the financial sector with 2° C climate scenarios. Until 2035, the IEA estimates in their 450 scenario a necessary reduction in total fossil-fuel supply investment of $4.9 tn vis-à-vis 'New Policies Scenario' (~26% of total estimated investment), and additional divestment away from power transmission and distribution of $1.2 tn (~7%).

One of the main challenges to fossil-fuel divestment has been the perceived danger that, given the size of the sector (conventional energy constitutes roughly 9-12% in most broad market indices), excluding fossil-fuels limits the investment universe and thus leads to underperformance. This fear has been underpinned by studies commissioned by the American Petroleum Institute highlighting the extent to which the energy sector has historically outperformed broad stock market indices. Recent studies by Mercer, Deutsche Bank and others however show that the relationship between integrating ESG factors into investment decision-making and financial performance is generally either neutral or positive. Figure § shows that a renewable equity index has in fact outperformed oil equities between 2003-2011 66% of the time.

A recent study by J. Humphreys titled "Institutional Pathways to Fossil-Free Investing" provides a framework for investors to move out of fossil-fuel investments and lists a number of 'best-practice' examples following this route. The Humphreys' report argues that fossil-fuel divestment should be realized in three steps, accompanied by a parallel move towards sustainable reinvestment (figure §).

- Freeze all new fossil fuel investments (using Carbon Tracker 200 no-buy list as guideline);
- Divest all direct holdings (immediate sale depending on exposure or gradually over set time frame);
- Unwind commingled holdings (instruct external managers to sell positions gradually and reallocate mandate to be able to execute fossil-free strategy).

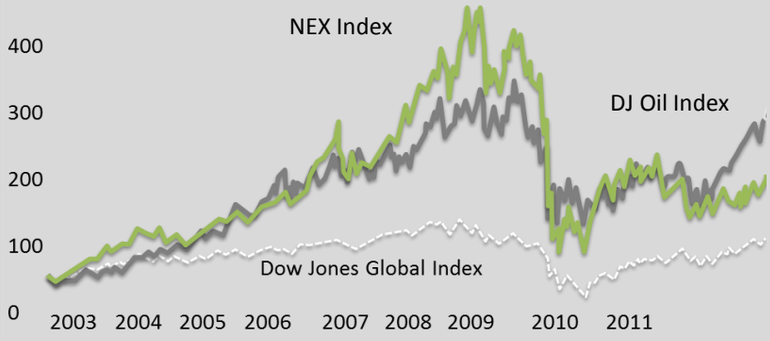
While the Humphrey's report is one of the more elaborate publications outlining divestment strategies, the IEA and CarbonTracker have both recently highlighted divestment as possible corporate mitigation strategies in recent reports.

A role model in this regard has been The Wallace Global Fund, which has targeted a five-percent re-allocation to cleantech investments, in both public and private equity, and a divestment all direct holdings in fossil-fuel companies, including commingled funds, by 2014. Additionally, the Fund has widely incorporated ESG criteria across an additional 88 percent of its portfolio. While still early, the fund's investments outperformed their portfolio benchmark in 2012 (its first full year), earning 11.8 percent against an unscreened custom index earning 10.6 percent.

Portfolio 21 provides a more long-term example of success, having run a fossil-free global equity strategy that has outperformed its unscreened benchmark, the MSCI World Equity Index, by 212 basis points since its inception in 1999 (on an annualized basis net of fees) (Figure §).

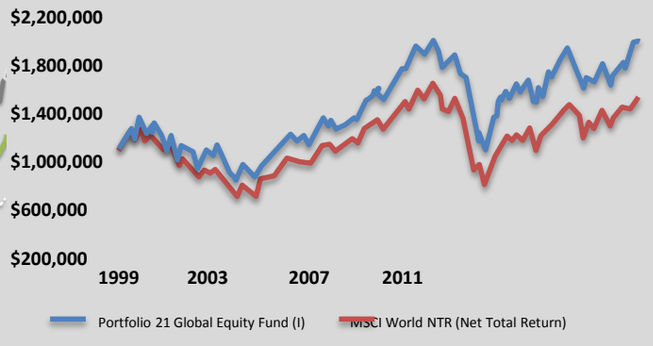
While these examples do not prove that fossil-free investments will always 'beat the market', they do underline the feasibility of divesting out of fossil-fuels along the lines of a 2° C scenario.

Performance of renewables and oil stocks (2003-2013)



Source: Bloomberg (DJ Oil index, Nex Index)

Performance of $1 million investment in Portfolio Global Equity Fund (institutional) vs. MSCI World Index since strategy inception (net of fees)

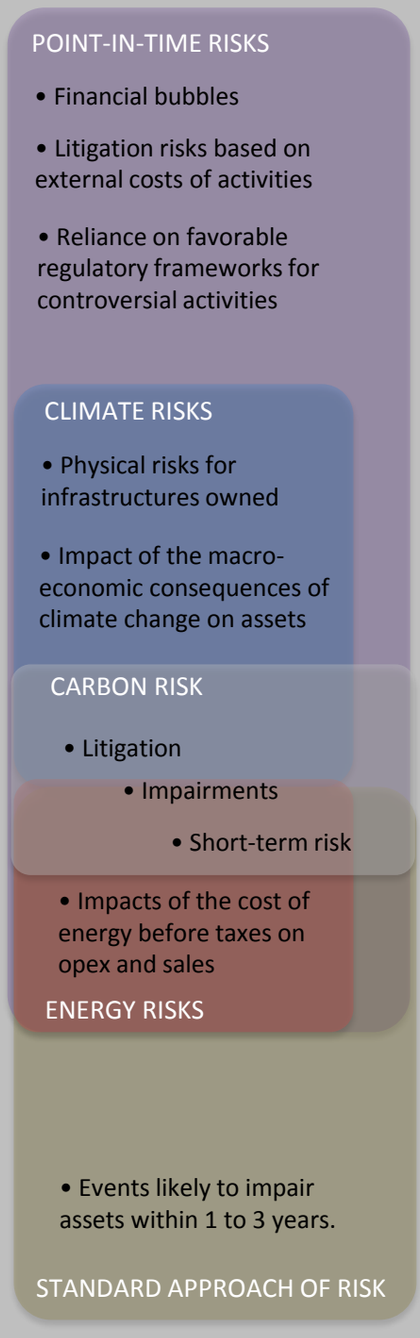


Sources: *Humphreys*

DEFINING CARBON RISK

For the purpose of this study, carbon risk for investors is defined as the financial risk correlated with the GHG emissions allocated to its investees, excluding all sorts of climate change-related physical and macroeconomic risks, but including policy and energy price risk. It includes both short-term and point-in-time policy and litigation risks.

RISK FACTORS FOR INVESTORS



1.2. PUTTING CARBON RISK ON THE RADAR SCREEN

1.2.1. The sources of carbon risks

• **Climate-policies.** Defining climate risks as the family of risks related to climate change (an extended definition can include risks related to present climate i.e. weather), we must distinguish 'physical risks' and 'carbon risks'. Physical risks result from the effects of climate change such as variations in temperature and precipitation, the increase of sea levels, etc. Carbon risks are linked with the mitigation of climate change, via the efforts to reduce the emissions of greenhouse gases (GHG), ranging from standards and regulation to tax schemes, market prices and changes in consumption patterns.

• **Correlation with other risks**. Carbon emissions are correlated with other impacts such as resources depletion, local air-pollution, local environmental impact of extractive activities, water consumption and pollution, etc. Carbon intensity can therefore be used as a proxy for risk exposure to other environmental and energy efficiency policies (e.g. air quality standards for cars), contested operation licenses (e.g. for fracking), and increasing market prices (e.g. energy).

1.2.3. Nature of carbon risks

Carbon risks can materialize in three distinct but potentially mutually reinforcing ways:

• **Short-term risk.** This is the short and medium-term risk related to the evolution of the carbon price on regulated markets, the increase in energy prices, the introduction of new taxes and standards energy-efficiency standards (e.g. for cars, appliances, real estate, etc.). The exposure to short-term risk is primarily a function of year-to-year emission levels. The 2010 Global Investor Survey on Climate Change suggests this type of the risk is the 'main worry' for investors.

• **Impairment.** Some long-lifetime physical assets owned by the investee, such as power-plants and coal reserves, may become 'stranded' at one point in time, due to the implementation of more stringent policies or changes in consumption patterns. The risk extends to long-term, capital intensive R&D programs in carbon intensive technologies, the automotive sector is a prominent example. Impairment is correlated with locked-in emissions and not limited to direct emissions.

• **Litigation.** This is the long-term risk that lawsuits targeting companies with high cumulated past emissions create liabilities, based on the company's share of responsibility in the cost of global warming. It is not limited to direct emissions and likely to occur in countries where extra-territorial jurisdiction and class action lawsuits exist. The tort cost could include adaptation costs at local level (invested by anticipation), thus shortening the time horizon of risk for the years 2050-2100 to today.

To date, the integration of these risks in assessment frameworks is limited to short-term risks. Impairments and litigation that could be assessed through stress tests are not even mentioned as risk factors in the dedicated sections of the companies' 10K documents.

1.2.4 The influence of climate change

While finance continues to largely turn a blind eye to more medium- and long-term impairment and litigation, climate-change specific risks are increasingly being considered by the financial sector in their analysis. According to the 2011 Global Investor Survey on Climate Change, more than 83% of asset owners and 77% of asset managers view climate change issues as a material investment risk across the entire investment portfolio. It is unclear to what degree this feeds into investment decisions as only 31% of asset owners try to quantify these risks. Moreover, the results of the 2° Investing Initiative workshops suggest these risks does not materially inform investment decisions except for utilities and are generally viewed in terms of a very short time-horizon. A recent study by Ceres on the insurance industry confirms this result. Only 23 of the 184 surveyed insurance companies have a 'comprehensive climate change strategy'.

A number of climate change factors carry a particular risk for fossil-fuel assets. In China, the coal sector has the largest share of industrial water use. Already ten Chinese provinces suffer from water scarcity per capita and increased scarcity may affect coal-plant operations. Water scarcity may also affect shale gas development in the future. In the United States, the share of weather-related shocks to electricity distribution has increased dramatically. This trend is likely to continue over the next decades. A 1° C increased temperature in the summer in the 2040s is estimated to reduce available (thermal) electric capacity by 16% in the United States and 19% in Europe. Moreover, 60% of coal-fired power plants in the United States are vulnerable to water demand supply concerns. In India, around 70% of planned thermal power capacity is located in water-stressed or water-scarce areas.

While thermal power plants may be retrofitted to better respond to extreme weather events and reduce resource consumption, these measures are associated with costs. Closed-loop cooling systems can cost between $100-$1,000 per kilowatt (BNEF 2012). Iraq's "Common Seawater Supply Facility" treating seawater to use for maintaining reservoir pressure in oil fields is expected to cost $10 bn.

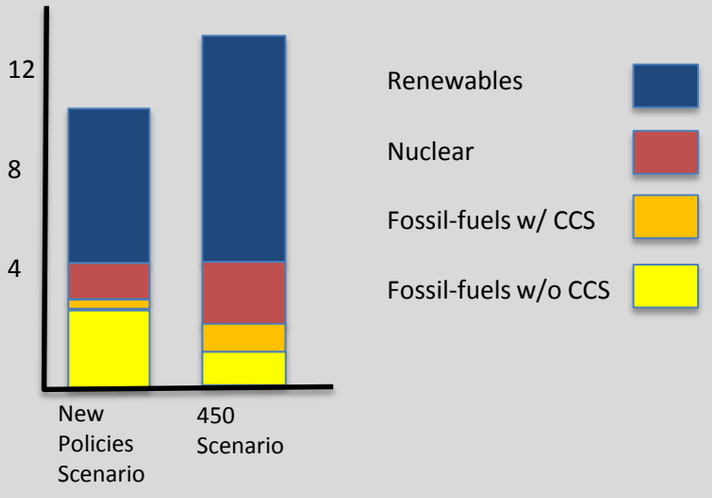
FOCUS. THE MATERIALITY OF CARBON RISKS

SHORT-TERM CARBON RISKS

Short-term risks include the price of carbon allowances in cap-and-trade systems, such as the European Trading Scheme (EU-ETS, impacting direct emissions from fixed-sources and aircrafts), energy-efficiency taxes on vehicles and buildings, and taxes on fuels and fertilizers, but also energy-efficiency standards, and energy prices. UNEP-FI classifies these different types of risks as either *external* or *internal,* external factors arising out of exogenous policy or economic changes and internal risks intrinsic to the balance-sheet of the respective company.

These short term risks impact the operational expenses of the companies and their sales. This risk is highly correlated with the geographic location of the facilities and sales. Carbon pricing systems are increasingly being developed across the globe, with nearly twenty cap & trade or carbon tax systems in place or under development, most recently as a pilot-project in China.

Net revenues after accounting for depreciation and investments for new power plants by scenario (in 2011 $tn), 2012-2035



The effects of the implementation of these systems suggest short term risks are already manifesting themselves across different countries and regions.

The impact on investors has been assessed by equity research analysts in the context of industry-specific ad hoc papers following the debate over or introduction of related regulation (e.g. ETS and new energy-efficiency standards on cars). In the most exposed industries (electric utilities), they forecasted an impact ranging from -10 to +10% on the share price.

Based on the conclusion of our workshop with equity analysts, these risks are limited in the foreseeable future (3 to 5 years) and already integrated by mainstream analysts in their valuation models for electric utilities, cement, steel and automotive.

FOCUS. THE MATERIALITY OF CARBON RISKS

IMPAIRMENTS

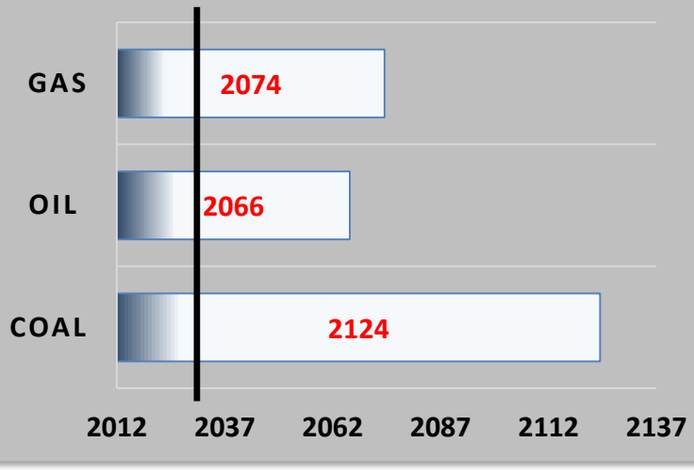
Impairment risks may arise due to some form of political, social or economic constraint on carbon consumption that may lead to some fossil-fuel or associated industry assets to become stranded. For an investor, impairment risks become material either in the form of valuation adjustments to equities or actual stakes in 'stranded assets'. Companies with long-term energy-related assets with long payback periods (e.g. electric utilites, heavy industries, fossil fuel extraction, etc.).

The scope of potential impairment is substantial. The Carbon Tracker 'Unburnable Carbon' report (2013) suggests that 60-80% of publicly listed companies' reserves are at risk of becoming stranded under a 2° scenario. The top 200 listed oil, gas and coal companies analyzed by Carbon Tracker have a total market capitalization of $4 trillion and debt outstanding of $1.27 trillion. The the value of plants, equipment and properties of listed companies in industries highly exposed to the locked-in effect is worth about $10 trillion

The IEA estimates that current energy infrastructure 'locks-in' about 80% of the carbon budget of the 450 scenario, with another 10% projected to be locked-in by 2015 and the entire budget locked-in by 2017 (figure below) Estimated annual investment over the next decade in fossil-fuel assets of $6 tn suggests the risk is substantial.

In 2012, HSBC research on the energy sector concluded that the impact of a carbon bubble burst on stock prices can reach up to 40-60% for oil companies and 4-15% for diversified mining companies. The Carbon Tracker Report suggests a similar scope of 'impairment risk.

The IEA in turn projects a more benign 450 scenario in terms of impairment, with an additional 5% of proven oil reserves and 6% of proven gas reserves vis-à-vis their 'New Policies Scenario, with risk for coal similarly low. Given that only about exploration costs are only about 15%, this outlook seems benign. However, it also hinges on optimistic nuclear and CCS assumption and similar levels of undeveloped assets. Company's current investment levels suggest however that instead of new policies, 'business as usual' projections drives investment decisions and thus also aggravates impairment risk.



CLIMATE LITIGATION

For about a decade, towns and states (e.g. Connecticut, California) impacted by climate change have started to sue oil companies, electric utilities and automakers in US courts, on the basis of their GHG emissions. To date all these cases have been dismissed. However, a closer look shows that massive tort cost can occur after 40 years of dismissed claims (e.g. tobacco litigation) and that not all options have been explored to date: in the US but also in other countries with extraterritorial jurisdiction and class action systems or with 'activist courts' (e.g. India, New Zealand, Australia, Brazil, etc.). In addition, under the no-harm rule, international law allows countries to sue each other for cross-border damages, even if the pollution comes from private companies. Finally, recent academic research shows that progress in modeling will soon make it possible to attribute extreme weather costs to climate change. Thus, while climate litigation is not a major risk in the short term, it can turn into a material risk for large, carbon-intensive companies listed in exposed countries if a ground-breaking judgment by superior court occurs. Finally, an unknown variable in this regard is the role of 'illegal emissions'. Overall the cumulated and locked-in energy-related CO2 emissions between the first IPCC report in 1990 and 2035, represent an external cost of *$90* trillion*. According to our very raw estimates about X% can be attributed to listed oil companies, electric utilities and automakers. In the future, a major technical obstacle will be to determine the threshold between an acceptable and harmful emission level.

*Cumulated emissions of 515GT (Podsdam Institute), locked-in emissions of 590GT (IEA) and external cost of $85/t (Trucost/UNEPF-Fi: calculation based on the present day value of the cost of climate change estimated in the Stern Review)

1.3. THE CHANCE FOR NEW METRICS

1.3.1. To channel investments (carbon performance)

As outlined above, current investing trends are inconsistent with climate goals. If governments continue to commit to these objectives, complementary 'top down' approaches will need to be applied. One of these approaches could include assigning climate finance targets to public banks. Integrating climate goals as such in the policy frameworks that directly or indirectly drive private capital allocation (e.g. tax incentives on savings interests) will then become a key policy tool. In both cases, targets and incentives will have to rely on precise cross-assets metrics.

In a recent Green Paper, the European Commission acknowledged the issues related to the long term financing gap and the misallocation of capital by financial markets. The paper notably stressed the lack of relevant metrics and benchmarks for 'long-term investing'.

1.3.2. To manage carbon exposure (carbon risks)

If governments finally turn climate goals into stringent regulations, the impairment risk will materialize. If they do not, litigation will increase with the cumulated cost of adaptation. In either case, given the magnitude of risks, it is worth stress-testing the impact on companies and long-term financial assets

- At company level to inform risk factors and strategy;
- At portfolio level, for long-term investors with buy and hold strategies;
- At macro-economic level, in order to assess systemic risks.

1.3.3. To assess the impact of green/responsible vehicles

- **SRI investing**. Socially responsible investors (SRI) have been the backbone of the movement to drive finance towards addressing social needs and aims. This category of investment has gained momentum and now represents about 1% of equities under management and up to 4% of shareholding in certain industries. The SRI feature of financial products can be (and increasingly will be) labeled (e.g. Novethic Label in France). This paves the way for the development of incentives that would potentially give an advantage, fiscal or other, to SRI products, assuming their efficiency can be proven. As a result, policy makers will need metrics and indicators to ensure the soundness of these approaches.

However, the initial objective of SRI approaches was not to address overarching goals such as financing the energy transition. This limits their role today. In addition, most SRI investors rely on ESG (environmental, social, governmental) rating of companies. These rating systems, designed to cope with the lack of non-financial data, are essentially based on management system-scoring rather than quantitative impact metrics. Therefore, such ratings are generally not cross-asset and lack comparability. They cannot be used to measure effective impacts of investments nor the efficiency of the approach towards economic or long-term objectives. In the SRI field, 'best-in-class' approaches are dominant and are essentially replicating industry allocation of standard investment benchmarks (e.g. S&P500, MSCI World, DJ, Stoxx600). As a result, these approaches inhibit capital from financing the energy transition, which is partly based on reallocation of investments between industries (Cf. page§). Nevertheless, some practitioners try to address these challenges and do modify industry allocation, sometimes using financed emissions to inform weighting (cf. §, + Novethic 2013).

DEFINING AND MEASURING GREEN INVESTMENTS

"Whether a broad or a narrow definition is needed for green investment will depend upon the policy goal. There could be two main reasons for an "official" definition of green investment:

- first "passive" monitoring of green initiatives (e.g. to check delivery of political commitments and environmental performance);
- second, "active" consumer protection regulation to avoid "mis-selling" green investments to investors.

Financial regulators will need to consider these goals and weigh the implications they have for next steps in moving forward guidance and action on next steps to support green investing. As this paper shows, the definition and measurement of green investments is an evolving topic which clearly deserves further analysis. The OECD hopes to create a dialogue between the institutional investor community, and financial regulators to develop further understanding on this and broader long-term investing and green growth issues. "

Extract from OECD working paper N°24 (2012)

UNEP-FI DEFINITION OF CARBON RISK

"The carbon risk exposure of an investment portfolio can be interpreted as the weighted mean of the carbon risk exposures of the single positions within the portfolio. In the case of equity or corporate debt portfolios, this is the weighted mean of the carbon risk exposures of the investee companies in the portfolio. Each company's carbon risk exposure, in turn, is a function, as described above, of the external factors that each company faces and the company's own carbon footprint (on a relative basis and in a dynamic context)."

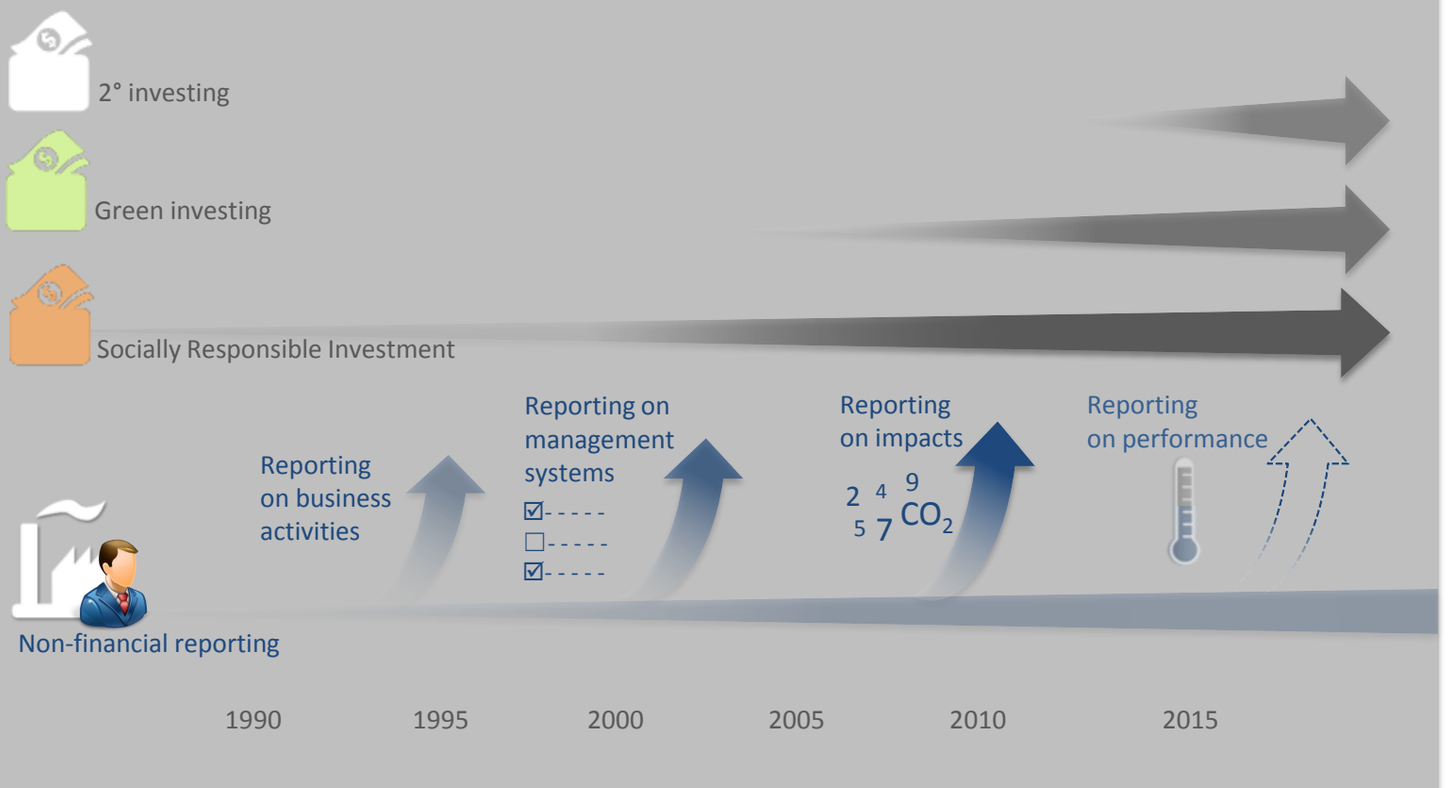
DEFINING FINANCED EMISSIONS

The term 'financed emissions' relates to the indirect GHG emissions of an investor through its lending and trading activities. It also possibly includes underwriting, advising, etc.
The term has been coined by NGOs to highlight the relatively low 'operational' GHG emissions of the finance sector in comparison with its potential high emission level resulting from its role in financing the economy. Other terms also refer to the same concept such as 'investment related scope 3 emissions' (GHG Protocol/UNEP-FI) or 'assets carbon footprint'. The purpose of the study is to define the boundaries of financed emissions.

- **'Green' funds and bonds.** The mainstream policy and investing framework generally determines additional financing needs associated with specific parts of the economy (infrastructures, clean energy, SMEs, etc.) and then develops targeted incentives and investment vehicles e.g. green bonds, green funds, etc. In this context, the challenge of climate change has given rise to a wave of new 'green investing' initiatives and been met with a growing interest from investors and policy makers (cf. Climate Bonds Initiative 2013). The Climate Bonds Initiative initiated in 2009 aims at establishing a climate effectiveness standard providing the basis for labelling climate investments. To date green bonds mostly cover industries such as rail and renewable energy. However, the initiative aims at expending the issuance of climate bonds in industries such as buildings, industry, forestry where greenness is more difficult to assess. The initiative differentiates 'fully' and 'partly' aligned bonds based on the share of 'green' assets in the issuer's activity mix. The existing green equity funds adopt more or less the same logic.

In order to grow and cover new industries, 'green finance' will sooner or later have to measure its impact. Indeed, depending on the ambition of the underlying climate scenario, incremental technologies in carbon-intensive sectors can be considered as low-carbon or not (e.g. advanced internal-combustion engines for cars, energy-efficient cement plants, energy-efficient buildings, etc.). In most cases, the conceptual framework used by policy-makers to develop incentives is based on best available technologies and emission reduction projects, leading to a support of technologies that are 'low-carbon' compared to a baseline scenario, but not necessarily aligned with a +2°C scenario. Having a relevant metric that would measure the alignment with 'green goals' could overcome the difficulty of defining 'green asset classes'.

EVOLUTION OF CORPORATE NON-FINANCIAL REPORTING & THEMED INVESTING



1.3.4. Need for impact-based, cross-asset incentives

Given the current perception of carbon risks and opportunities by financial markets, the reallocation of capital toward financing the energy transition requires incentives from governments targeted at investors, such as tax incentives, mandates from public investors, and in the long run the adjustment of risk-weights in capital requirements' calculation rules in order to take point-in-time risks into account. Tax incentives, mandates from public investors and in the long-run the adjustment of risk-weights in capital requirements calculation rules need to reflect some sort of insight into the appropriate alignment of the financial sector with climate targets. This suggests incentives that need to be both cross-asset and impact-baseds.

• **Cross-asset incentives**. As exemplified on page §, the reallocation of investments should occur at company level (technology switch in capital expenditures and R&D) but also portfolio level (reallocation between industries involving creative destruction) and strategic asset allocation level (e.g. reinforcement of venture capital, private equity and SME lending to foster innovation). This landscape requires cross-asset incentives and disincentives rather than only support measures targeting green investment vehicles, for two reasons:

- Carbon-intensive companies and investors need to be incentivized to phase-out from fossil-assets, not only to invest in green assets;
- Specific green vehicles are not necessarily adapted for responding to diffuse stakes. Green investment vehicles are very powerful when associated with large-scale projects, notably smart grids and railroads, but may be less adapted to addressing the broader (diffuse) challenges associated with financing the energy transition (e.g. breakthrough R&D investments in carbon-intensive industries). Indeed, this approach requires analyzing each eligible project twice (by the company and the investor), thus doubling the origination cost, already a major barrier for small-scale projects' financing. Asset finance and small bank loans will therefore remain the dominant way to invest in low-carbon projects, thus calling for incentives targeting established players.

• **Impact-based incentives.** In many areas, low-carbon technologies are controversial (e.g. carbon capture and storage, nuclear power, biofuels), immature (e.g. marine energy), or still to be invented (e.g. low carbon alternatives to cement and steel). In this context, where the role of subsidies is major on both high/low carbon, the technological risk is high for both investors and policy-makers. The various climate scenarios, even from the environmental movement, are based on different bets, and the future will certainly be a mix of solutions. Policy-makers therefore need to rely on assessment frameworks that can, at the same time, allow them to strongly incentivize investors to align their investment on +2°C pathways and let them free to bet on alternative technologies. In other words, investors need a touch of planning regarding the expected outcomes, while remaining in a market economy. Achieving both goals requires an impact-based indicator.

➔ **The present report explores the potential of financed emissions methodologies to assess portfolio's carbon performance and/or risk exposure. It then looks at how these methodologies should be defined and calibrated in order to realize their potential.**

GREEN PAPER ON LONG-TERM FINANCING (Extracts)

There is no single, universally-accepted definition of long-term financing. In broad terms, long-term financing can be considered as the process by which the financial system provides the funding to pay for investments that stretch over an extended time period. This definition focuses on the range of features associated with long-term finance. (…) Benchmarks and credit ratings may focus also on annual or short horizons. The Commission has proposed tightening the rules to reduce reliance on traditional ratings and political agreement was reached on several legislative reforms in November 2012.

The development of metrics and ratings that balance fostering a long-term perspective with short-term accountability could provide a useful tool to assist long-term investors.

Questions:

• To what extent can increased integration of financial and non-financial information help provide a clearer overview of a company's long-term performance, and contribute to better investment decision-making?

• Is there a need to develop specific long-term benchmarks?

Source: European Commission, DG Mark (2013)

1.4. CONCLUSION

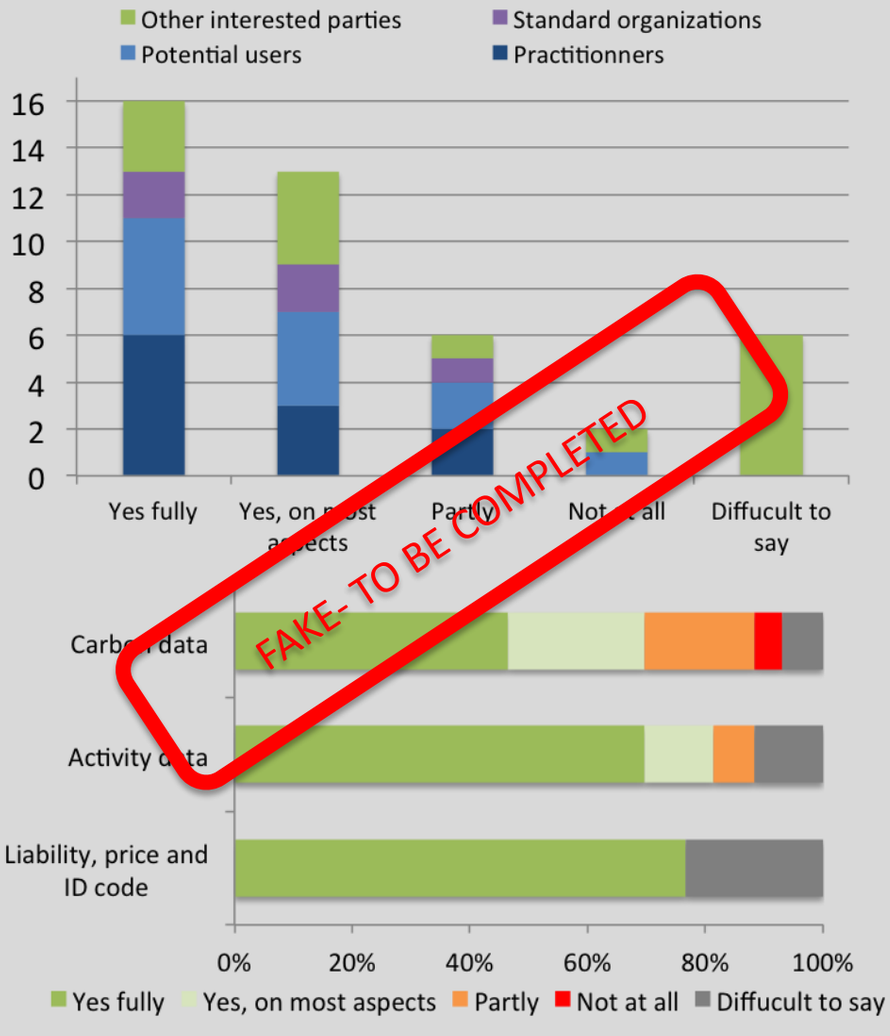
Decarbonizing the economy depends on a finance industry that manages both its carbon risks and climate performance in order to channel capital towards a 2°C scenario pathway. This is coupled with the need for investors and governments to measure long-term investing and to manage long-term risk, especially in the context of the energy transition.

In addition to driving capital towards addressing climate performance and carbon risk, a new focus on impact in the area of SRI and 'green' investing will require more sophisticated metrics to capture effects. Metrics need to be able to define what is 'green', establish cross-assets incentives and ensure technology neutrality.

Sophisticated financed-emissions metrics will allow the finance sector to measure performance and provide a tool for policy-makers to align the financial system with climate goals and long-term economic objectives.

REVIEW PANEL VIEWS

Summary Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation



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2. THE SHORT HISTORY OF FINANCED EMISSIONS

BANKS RANKINGS BY PROFUNDO

Short description by Profundo

EQUITY FUNDS RANKINGS: FOCUS ON TRUCOST WORK OVERVIEW OF RANKINGS

Short description by Trucost

2.1 CONTEXTUALIZING FINANCED EMISSIONS

2.1.1. Carbon-intensive projects' footprints

'Climate performance' assessment and 'climate risk' assessment (as defined p. §) both require an inventory of GHG emissions associated with the investment portfolio or the balance sheet of a bank. In the past ten years, about twenty different calculation methodologies have been developed to assess GHG emissions related to investments. Most approaches rely on the application of classic carbon footprint assessment methodologies (based on the GHG Protocol/UNEP-FI) to carbon-intensive projects (power-plants, oil & gas projects, etc.). Many development banks such as the IFC, the EIB or the AFD (the French development bank) have started to assess new loans based on 'financed emissions' methodologies.

2.1.2. Equity portfolios, loans books and banks' footprints

The extension at 'portfolio level' is more recent and originates from three largely parallel trends:

- **Reaction to NGOs pressure.** In the mid-2000s, environmental NGOs such as WWF and Platform developed assessment methodologies to consolidate projects' footprints as part of their campaign against 'dirty' projects. Some banks responded by implementing their own assessment framework based on the same 'bottom-up' approach. The consultancy *Profundo* has extended this approach since 2007 to various types of financing based on publicly available data in order to rank banks based on their level of involvement in the 'financing of climate change'. NGOs (e.g. Friends of the Earth, Rainforest Action Network and Greenpeace, and their international network BankTrack) have commissioned studies. More recently the Carbon Tracker Initiative developed a similar bottom-up approach focused on the ownership of fossil-fuel reserves. To date, no bank has tried to apply these approaches to its loan book or balance sheet.

- **Innovation from equity managers.** At the same time, two equity managers (Hendersen Global Investor and Pictet AM) commissioned *Trucost* and *Inrate* to estimate the footprint of equity funds for research and marketing purposes. At this time the Carbon Disclosure Project (CDP) was still at its infancy. Given this lack of standardized reporting and their aim to include supply chain emissions, they developed 'top-down' approaches, mostly based on input/output macro-economic models. Over the years their data has been used by other equity managers to develop green funds, by index providers (e.g. NYSE-Euronext), and consultants publishing funds rankings. More recently, in 2010 and 2013, new players, namely South Pole Carbon and Bank of America Merrill Lynch, used mathematical models to extrapolate the carbon emissions reported by listed companies to estimate the footprint of a broader spectrum. Financed emissions data is now available on Bloomberg terminals (*South Pole Carbon*), Factset (*Trucost*) and Reuters (*Asset 4*).

- **Broader application.** Over the years, commercial and development banks also started developing portfolio-level approaches, in addition to project-per-project footprinting, in order to cover corporate loan books: in 2004 Bank of America began accounting and setting reduction targets. Since 2011, Bank Julius Baer (Switzerland) offers every private client a portfolio carbon footprinting report through South Pole Carbon for its utility

portfolio and in 2010 RBS published the footprint of its energy portfolio. This approach has also been extended to multi-industry loan books (Rabobank 2008) and the whole balance sheet of banks (corporate loans and bonds, sovereign bonds, mortgages): in 2007, the French bank Caisse d'Epargne commissioned *Inrate* and *Utopies* to assess the footprint of savings products, current accounts and the bank. It has lead to the publication of a copyrights-free, cross-asset methodology tested by a few other banks and insurers and endorsed by the French Environmental Agency (ADEME). The key accounting rules have then been taken up by *Inrate* and *Money Footprint* in 2012 to develop a banks' pilot-footprinting tool for the AFD (cf. page §), and Ecofys in 2013 to assess ASN Bank's balance sheet (NL). In addition, Credit Agricole Corporate Investment Bank developed an alternative methodology exclusively based on a top-down approach in collaboration with Paris-Dauphine university (cf page §).

2.1.3. Emerging market

We estimate that the 'financed emissions' data market is still in its infancy with 2-3M€ of global revenues, about 10-20 times smaller than the global market for ESG ratings. However financed emissions assessment now receives a growing interest from standard setters: the GHG Protocol and the UNEP Financial Initiative plan to publish an accounting standard by 2014. At national level, similar initiatives are planned in France and Germany. So far all these initiatives have been mainly driven by reputation concerns, with the goal of getting risk departments and portfolio managers involved. However once accounting standards will be published, they can easily be turned into mandatory disclosure requirements for banks and institutional investors. Indeed, regulations in several countries including France and the UK, oblige listed companies to report on their direct and electricity-related GHG emissions. Moreover, progress in reporting practices in recent years paves the way for an expansion of reporting to indirect emissions. Another potential driver is the reinforcement of reporting requirements regarding the use of ESG criteria in funds management, debated in France and at European level.

CROSS-ASSET METHODOLOGY AND LABELING SCHEME (France)

In 2007, a few months before the financial crisis, the CEO of Group Caisse d'Epargne announced the objectives of applying a sustainability label to all savings products and reporting the financed emissions of the bank, based on a copyrights-free assessment methodology developed in partnership with a stakeholder panel. For nearly a year, Caisse d'Epargne and the consultancy Utopies worked in partnership with the French Environment Agency (ADEME), two environmental NGOs (Friends of the Earth and the WWF), and a consumer organization. In 2008, the methodology was endorsed by the panel: the bank applied the label on the leaflets of all savings products, and posted detailed fact sheets on the website. The score for each product was reported in the annual report and assured by auditors. A year later, savings products integrated the short list of product categories eligible for mandatory carbon labeling and two insurers joined the project, sponsored by the ADEME. However, the combined effect of the French government retreat on carbon labeling and the merger of the bank with a competitor stopped the project.

GHG Protocol/UNEP-FI

In its scope 3 standard, the GHG Protocol/UNEP-FI addresses financed emissions. In 2012 they partnered with the UNEP Financial Initiative to further develop guidance in this area. The guidelines and conclusions of the first workshops they conducted are analyzed throughout the present report.

ISO 14069

Similarly, the ISO standard for corporate carbon footprinting (2013) has an investment category. To date the guidance for the financial sector is very limited (3 pages) and aligned with the GHG Protocol.

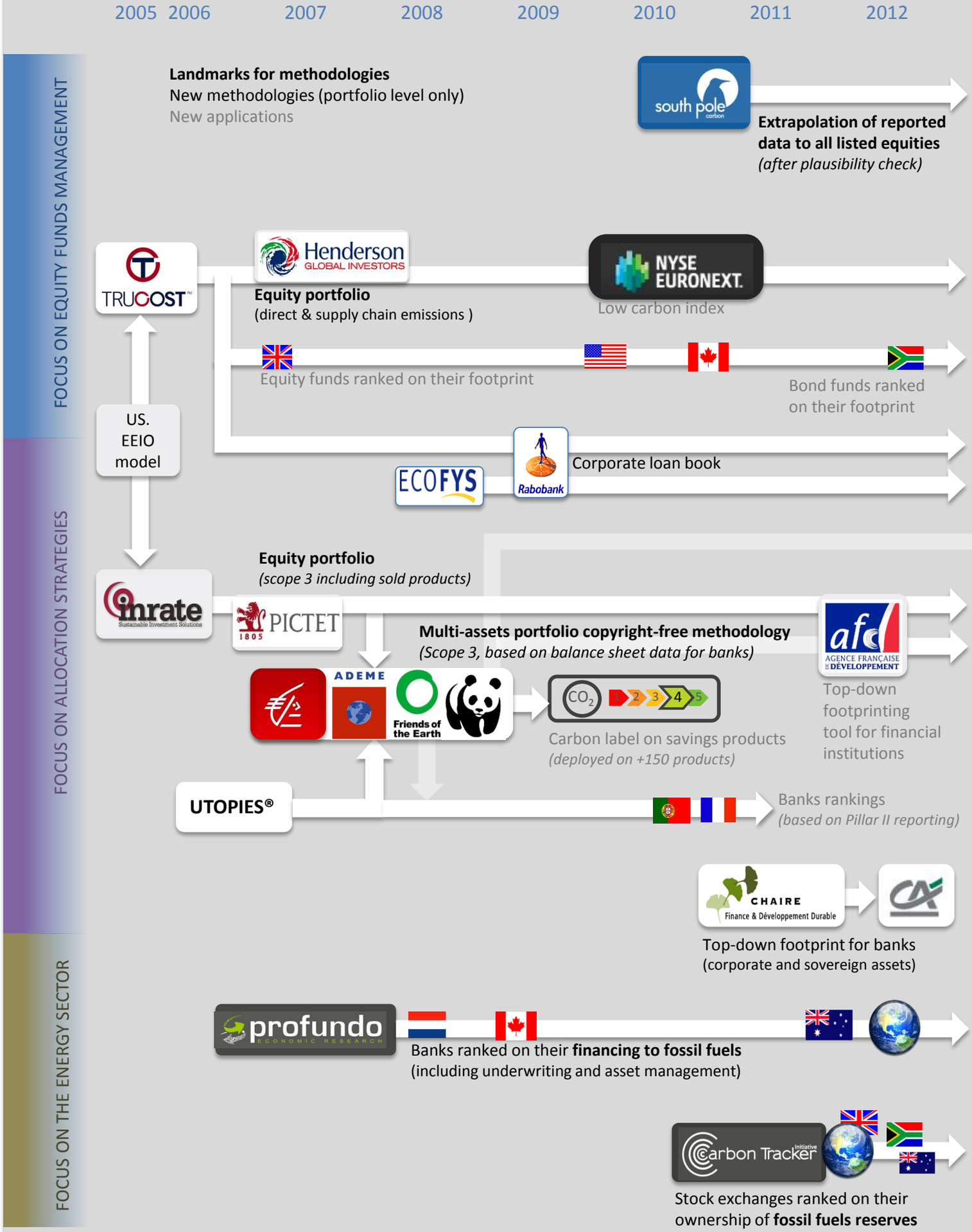
PROJECT FINANCE FRAMEWORK

Nine development banks ((ADB, AFD, EBRD, EIB, IDB, IFC, KFW, Nefco and the World Bank) committed to accounting and reporting emissions in 2012. Most banks perform 'standard' carbon footprinting on a project-per-project basis using detailed process-based data.

GRASSROOTS FOSSIL-FUEL DIVESTMENT MOVEMENT

The United States in particular has seen a strong grassroots movement driven by 350.org to pressure major investors in divesting from fossil fuels. Indeed, a growing number of institutional investors, notably U.S. college funds, religious funds and other endowed and non-profit organization are beginning to divest from fossil fuels. Major U.S. municipalities (e.g. Seattle and San Francisco) have also announced divestment decisions.

2.2. SEVEN YEARS OF DEVELOPMENT AND PILOT-TESTING



2012 2013 2014

Data available on Bloomberg terminals

New extrapolation model

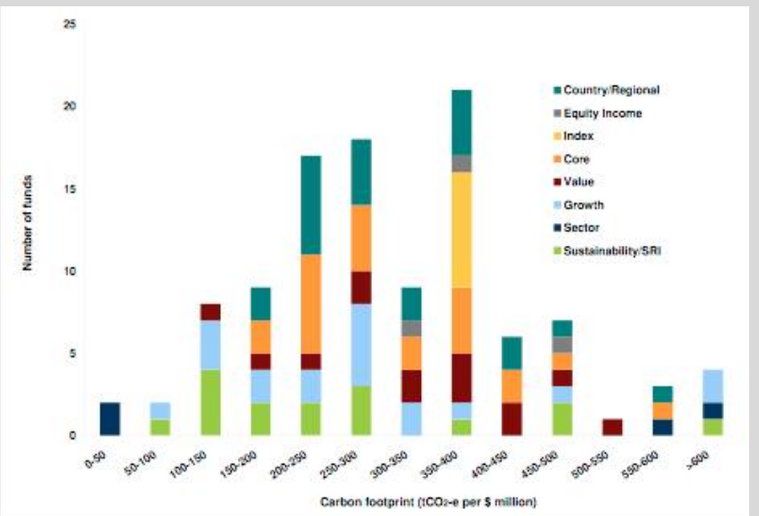
Infrastructure Portfolio footprint

Bank cross-asset methodology (work in progress)

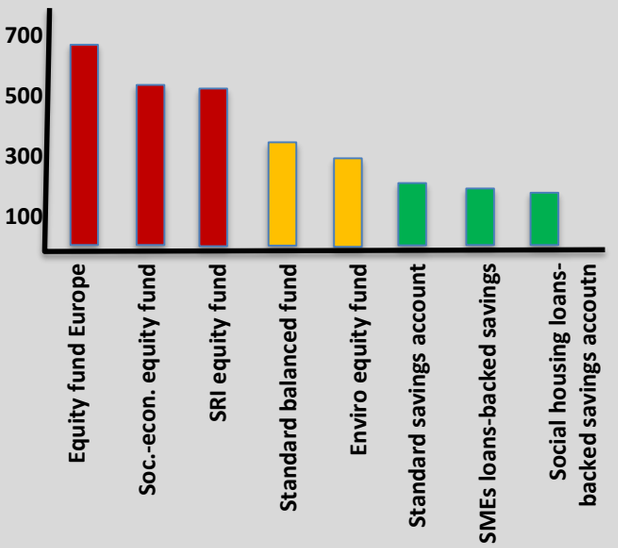
Cross-asset top-down + bottom up tool for banks
(covering all listed companies, all asset types)

EXTRACTS FROM PUBLICATIONS

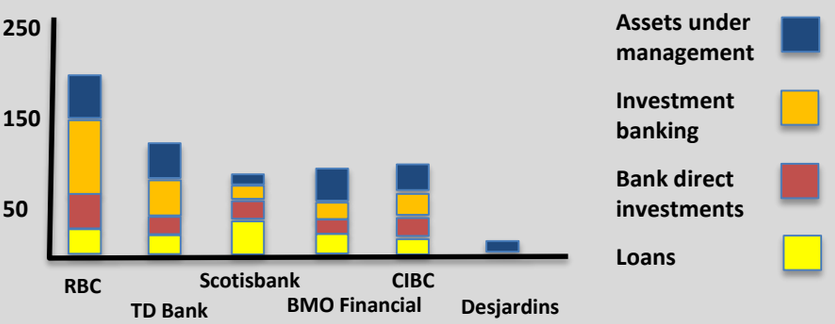
Equity funds footprints (Trucost, 2009)



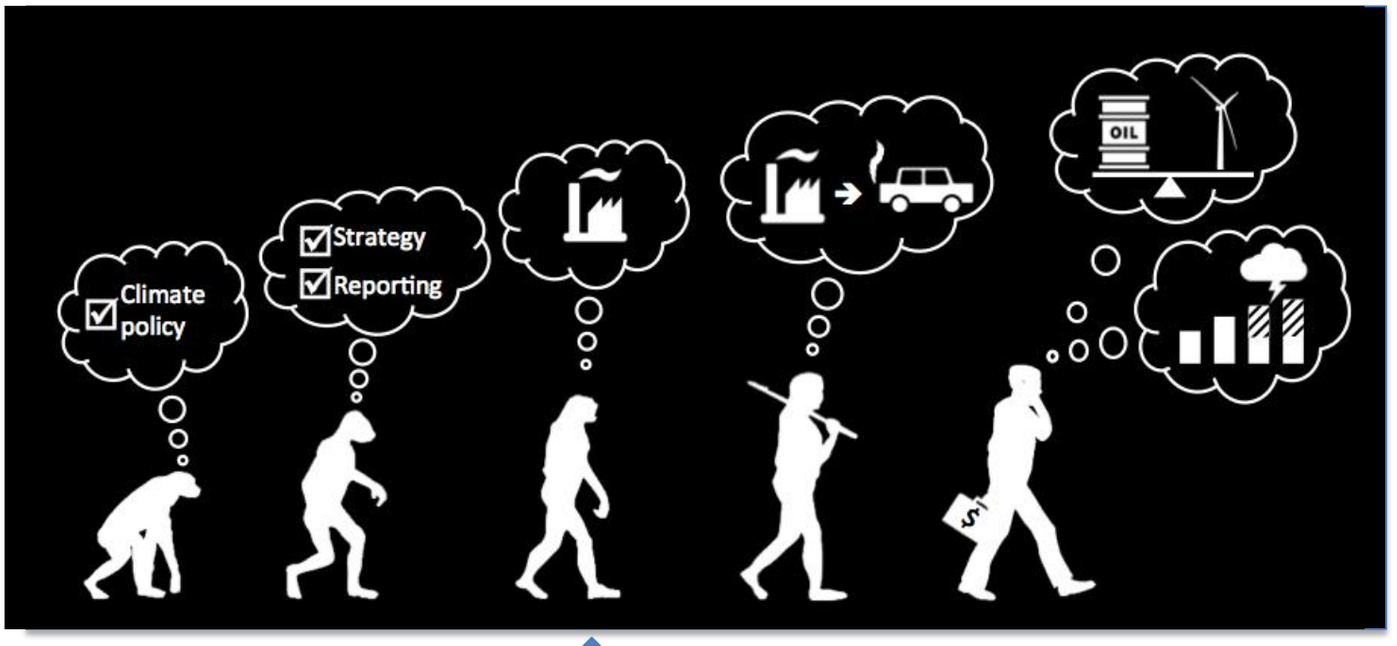
Carbon intensity of Caiss d'Epargne savings products in metroc tons of CO2/million €/year (Caisse d'Epargne, 2009)



CO2 emissions from financed fossil fuels in million tonnes CO2 (Profundo / RAN, 2008)



PART II. STATE-OF-THE-ART REVIEW



WE ARE HERE

1. THE LANDSCAPE OF ASSESSMENT METHODOLOGIES

We list here the organizations that developed a methodology or model at portfolio level and still use it (for internal or commercial purpose). One-shot attempts and approaches limited to project or company levels have not been included in the review. The related projects are briefly discussed in the box “out of scope”.

1.1. TRUCOST’S MODEL

Trucost conducted its first carbon footprint for an equity portfolio with Henderson Global Investors in 2006. *Trucost* has about 35 people dedicated to footprinting in the UK and the US. The activity generates a £2M income, of which 50% is dedicated to investor activities. From a commercial perspective it is the market leader. The model is based on carbon data reported by companies. Emissions for non-reporting companies are estimated based on the US statistical model (environmentally extended input-output) to extend coverage to +4,500 listed companies for cradle-to-gate emissions (direct, electricity + third tier suppliers). Trucost data are available to clients via proprietary online tools allowing to screen companies, access company briefing and perform portfolio analysis, as well as in Factset’s terminals. Trucost also uses its data to publish funds rankings, company rankings, and research papers.

1.2. ENV’IMPACT® MODEL (INRATE)

Inrate is an ESG rating agency established in 1990. They developed the env’Impact® model for Pictet AM equity portfolios in 2006. Since then, financed emissions data are sold as a complement to ESG data to their clients (asset managers, financial analysts). The model is based the same US statistical model enhanced with life-cycle data to cover the sold products emissions of the investees. Inrate cover +2,800 listed companies for cradle-to-cradle emissions (including emissions from sold products use). Inrate team includes 20 people dedicated to ESG rating in Switzerland and makes €XM of annual incomes. In 2007, the env’Impact® model as been used as a basis for the development of a cross-assets, copyrights-free methodology by Stanislas Dupré and Marie-Christine Korniloff* for Utopies and Caisse d’Epargne in 2007, in partnership with the ADEME, WWF and Friends of the Earth (see case study on next page). This method has then be used by Utopies to assess savings products and publish bank rankings.

1.3. CROSS-ASSET FOOTPRINT® MODEL (MFS/ AFD)

The *Cross-Asset Footprint* model was developed in 2012 for the AFD by a start up, Money Footprint Software, based on Inrate’s model and Caisse d’Epargne’s methodology. The model blends bottom-up and top-down approaches to cover all listed non-financial companies and financial institutions (including financed emissions), sovereign bonds, loans to SMEs and households, mortgages, and green projects, for cradle-to-cradle emissions. It is pilot-tested by the AFD since 2012 and commercially available since 2013, as an online balance sheet/portfolio analysis tool.

1.4. P9XCA METHODOLOGY (FINANCE & SUSTAINABILITY CHAIR / CREDIT-AGRICOLE-CIB)

The *P9XCA* methodology was developed in 2011, by Antoine Rose* from the Paris-based Sustainability Chair for Crédit Agricole CIB. It covers commitments to non-financial companies and sovereign issuers. The main goal of the methodology is to avoid multiple counting (cf. page §) in order to provide an order of magnitude for a bank’s financed emissions, rather than informing client selection or industry-allocation. It is based exclusively on open access public statistics (National GHG inventories, public accounts from UNO and OECD). The methodology will be published in 2014 as a PhD thesis.

1.5. SOUTH POLE CARBON’S MODEL

South Pole Carbon is a branch of the South Pole Carbon Group, a company specialized in carbon offset (sourcing Clean Development Mechanisms (CDM) and voluntary projects, asset management) with €24M of income and 100 employees including 5 EFTs dedicated to financed emissions analysis. They operate in 15 offices worldwide. With a mathematical model, they extrapolate from this data set to provide carbon footprints for every listed company. The data is available on Bloomberg terminals since 2012. The methodology is also used to calculate ghg footprints of private equity portfolios in partnership with ESG analytics. South Pole Carbon is currently developing a screening tool for real estate portfolios.

1.6. CARBON SCREENER® MODEL (MERRILL LYNCH / CAMRADATA)

In 2012, Valery Lucas Leclin* has developed another mathematical approach to extrapolate reported data to non-reporting listed companies. Since 2013, the related data are sold by *Camradata*, a firm specialized in institutional investment data and analysis. The approach is based on CDP data (direct + electricity) and covers about 8.000 listed companies.

1.7. PROFUNDO'S APPROACH

Profundo is a 9 people economic research organization based in the Netherlands, working mostly for NGOs. They produce bank rankings based on the amount of financing provided to fossil fuel extraction, coal powered-electricity, etc.. Their approach is exclusively bottom-up: they inventory fossil-fuel companies both listed and private and track the transactions (loans, equities and bonds issuance) between banks and the companies, as well as equity holdings (asset management and on-balance sheet), based on data from Bloomberg and public sources.

1.8. CARBON TRACKER INITIATIVE'S APPROACH

The Carbon Tracker Initiative is not a data provider. They use external data to raise awareness about the carbon bubble issue. Their data are exclusively based on the carbon content of fossil fuels reserves (oil, gas, coal) which is allocated to the owners i.e. the shareholders of energy companies. They analyze 200 listed companies.

1.9. ASN BANK'S METHODOLOGY (WORK IN PROGRESS)

The Netherlands-based ASN Bank is currently (2013) developing a cross-assets framework to assess their balance sheet and track carbon performance. It has as not yet been applied to the balance sheet. The approach is threefold: for equity portfolios (scope 1, 2 & supply chain) it is based on the *Trucost* framework and data. For sovereign and municipal bonds, mortgages, and real estate, ASN commissioned Ecofys, which took up the cross-asset methodological framework developed by Caisse d'Epargne in 2007 (cf. page §) to calculate emission factors based on a mix of reported data and national statistics. Finally, for emissions avoided on project finance, ASN relies on the GHG Protocol/UNEP-FI. The goal of ASN is to balance avoided emissions and financed emissions by 2030 in order to reach carbon neutrality.

1.10. VFU'S METHODOLOGY (WORK IN PROGRESS)

VfU (Association for Environmental Management and Sustainability in Financial Institutions) is a network of financial service providers in Germany, Austria and Switzerland working on environmental issues. They are developing a cross-assets methodology with two consultancies, Connexis and E2. So far tests have been conducted on listed equities and mortgages.

1.11. AD HOC DEVELOPMENTS

In many cases, ad hoc users have commissioned in-house or external experts to fine tune or extend an existing methodology. The examples we identified include CA-Cheuvreux (now Kepler-Cheuvreux) which developed a methodology to calculate the sold products emissions in the automotive, oil & gas, and coal mining sectors for the NYSE EURONEXT LC 100 Index, and CDC, which fine tuned Trucost's approach for the construction and use phase of infrastructure.

OUT OF SCOPE

The scope of the study is limited to organizations that developed and applied methodologies in order to calculate the 'financed emissions' of investment portfolios. Some major initiatives in the field of carbon accounting are therefore not formally included in the review, but mentioned where relevant.

Carbon Disclosure Project

The Carbon Disclosure Project (CDP) is an NGO that asks listed companies to report their carbon emissions, on behalf of institutional investors. They provide raw data directly or via Bloomberg. See page § for details.

Asset4 (Thompson Reuters)

Asset4 provides carbon data reported by companies and quality-checked by their analysts. For some industries their carbon data can be combined with activity data from the Worldscope database, to provide carbon intensity indicators such as the CO_2 emissions per passenger for the airline industry.

Asset Owner Disclosure Project (AODP)

Following the success of the CDP, 2012 saw the launch of a major global campaign by the Asset Owner Disclosure Project (AODP) to mobilize pension and other investment beneficiaries to request increased transparency on GHG emissions and as well as on broader climate change-related risks from their investment agents

Add overview

OVERVIEW OF PORTFOLIO FOOTPRINT METHODOLOGIES

KEY FEATURES		Trucost	Inrate EnvIMPACT®	Cross-asset Footprint®	Cheuvreux	P9XCA
ACCOUNTING RULES	Scopes accounted for investees [p §]	1 + 2 + first tier for suppliers	1+2+ supply chain & sold products	1+2+ supply chain & sold products	Sold products	N/A
	Management of multiple counting [p §]	-	Identification & discounting	Identification & discounting	-	No double counting
	Time boundaries (investees) [p §]	Annual	Annual + lifetime for sold products	Annual + lifetime for sold products	lifetime for sold products	Annual
	Time boundaries (investors) [p §]	Assets outstanding	Assets outstanding	Assets outstanding	Assets outstandin g	Assets outstanding
	Rule of allocation to investors [p §]	Share of ownership (equities) or investment	Share of ownership	Share of investment or share of financing	Share of ownership	Share of investment
COVERAGE OF ASSET TYPES	Listed equities [p §]	◆ 4,500 (reported + modeled)	◆ 2,800 (modeled data)	◆ Same as Inrate + 40.000 (industry-average)	◆Energy, auto	◆
	Corp. bonds & loans [p §]	❖Listed cies	◆	❖◆industry-average		◆
	Private equities /SME loans	◆	◆	❖	◆	◆
	Sovereign bonds [p §]	◆		❖◆20 countries		◆15 zones
	Fin. institutions (including financed emissions) [p §]			❖◆industry-average (balance sheet)		◆
	Other asset types covered	◆Real estate, infrastructure		❖Real estate, mortgages, cons.loans, climate projects		
SOURCES OF CARBON & ACTIVITY DATA	GHG data used to calculate investees' footprint [p §]	CDP + reporting (checked)	US EEIO model enhanced with Life-cycle data	Inrate model enhanced + additional LCA + model per $ of asset held for banks + reporting	Life-cycle data	GHG Emission factors based on national inventories and public accounts
	GHG data used to calculate the carbon intensity of non-reporting investees [p §]	US EEIO model				
	Number of categories in the underlying model [p §]	531	340	340 + 100	Not applicable	9
	Method used to adapt the model to global or/and local contexts [p §]	CO2 intensity of electricity adjusted to global	CO2 intensity of electricity adjusted to global	Same as Inrate + X countries specifics	Not applicable	Extrapolation of EU countries to 15 regions
	Sources of activity data and methods used for matching with emission factors of the model [p §]	Detailed segmentation for 4.500 listed cies (sales)	Detailed segmentation of 2.800 listed cies *(sales, outputs)*	Inrate data + segmentation for governments (budget) & listed banks (assets)	?	Simple assignment (one company = one sector)
	Method used when detailed segmentation is not performed [p §]	Average intensity per industry group (cies)	No extension	Average intensity per industry group (cies) & sector/country		
QUALITY CTL	Measurement and reduction of uncertainties [p §]	Model calibrated with CDP data	Model calibrated with LCA data for some industries	Model calibrated with LCA data + reported data for some industries		Not managed
	CO_2 data analysts (EFTs)	X	X	3	X	-

◆ Methodology applicable ❖ Footprinting tool for investees provided (based on activity/liability data provided by the user)
◆ Financed GHG data (per $ of asset held) provided to users Items in grey relate to developments underway

KEY FEATURES	South Pole Carbon	BofAML Carbon Screener®	ASN/Ecofys (in progress)	Carbon Tracker	Profundo
Scopes accounted for investees	1 + 2	1 + 2	1+2	Reserves for energy cies	1+ sold products
Management of multiple counting	-	-	-	No double counting	Not managed
Time boundaries (investees)	Annual	Annual	Annual	Forward looking	Forward looking
Time boundaries (investors)	Assets outstanding	Assets outstanding	Assets outstanding	Assets outstanding	Same + Cash flows
Rule of allocation to investors	Share of ownership	Share of ownership	Share of of investment	Share of ownership	Share of investment
Listed equities [p §]	◆50,000 (reported +modeled data)	◆8,000 (reported +modeled data)	-	◆200	◆120 (coal, power, oil palm)
Corp. bonds & loans [p §]	❖◆Listed cies		◆		◆
Private equities /SME loans	❖				◆90 (coal, power, oil palm)
Sovereign bonds [p §]			◆		
Fin. institutions (including financed emissions) [p §]					◆50 (balance sheet + AM +underwriting)
Other asset types covered	❖Real estate		◆ Mortgages + Housing + projects		
Carbon data to calculate investees' footprint	CDP + reporting (checked)	CDP + reporting	Reporting	Life-cycle data	Life-cycle data
Method used to calculate the carbon intensity of non-reporting investees	Regression model + extrapolation	Regression model + extrapolation	Dutch GHG inventory & accounts		
Number of categories in the underlying model	600	1.000	14	Not applicable	Not applicable
Method used to adapt the model to local contexts	No	?	No	Not applicable	Not applicable
Sources of activity data and methods used for matching with emission factors of the model	Industry specific approximation formulae based on 1 to 10 activity data (sales, staff, assets, COGS, etc.) from Bloomberg.	Worldscope segmentation by SIC group (sales)	Simple assignment (one company = one sector)	Method based on reserves reported	In house analysis + transactions covered in fi. databases
Method used when detailed segmentation is not performed		Not covered	Industry-average or reported data extrapolated to non reporters	Not applicable	Not applicable
Measurement and reduction of uncertainties	Plausibility check of reported data + uncertainty per industry estimated	Uncertainty vs CDP estimated	-	Not applicable	-
CO_2 data analysts (EFTs)	5	X	X	X	9

2. ACCOUNTING PRINCIPLES

SHOULD ALL SCOPES BE INCLUDED?

"Companies should account for the proportional scope 1 and scope 2 emissions of the investments that occur in the reporting year. Companies should account for emissions from the GHG-emitting business activity, regardless of any intermediary involved in the transaction.
When scope 3 emissions are significant compared to other sources of emissions, investors should also account for the scope 3 emissions of the investee company (…)

The GHG Protocol/UNEP-FI does not set a threshold above which scope 3 emissions should be included; instead, reporting companies should develop their own significance threshold based on their business goals.

Environmentally-Extended Input/output (EEIO) data can be used to quickly estimate the relative size of scope 3 emissions compared to scope 1 and scope 2 emissions for any sector."
GHG Protocol/UNEP-FI Scope 3 guidance, April 2013.

Six aspects are key in delineating the accounting principles underlying the methodologies: (i) investee's operational boundaries (scopes), (ii) time boundaries for investees, (iii) time boundaries for investors, (iv) types of assets accounted, (v) allocation of emissions to different types of assets, (vi) organizational boundaries for banks.

2.1. INVESTEES' OPERATIONAL BOUNDARIES (SCOPES)

2.1.1 Definitions of scopes in accounting standards

The GHG Protocol/UNEP-FI classifies companies' emissions into 'scopes':
• Scope 1: Direct emissions of the company's facilities and vehicles,
• Scope 2: Purchase of electricity, heat, cooling and steam emissions;
• Scope 3: All other indirect GHG emissions, classified into upstream (supply-chain) and downstream (sold products use phase, disposal, and investments i.e. financed emissions). Scope 3 reporting is still in its infancy. Specific guidance from the GHG Protocol/UNEP-FI was only released in 2010 and integrated in the Carbon Disclosure Project questionnaire in 2012. The current level of guidance does not allow practitioners to precisely set the boundaries of sold products emissions for all industries.

2.1.2. Approaches

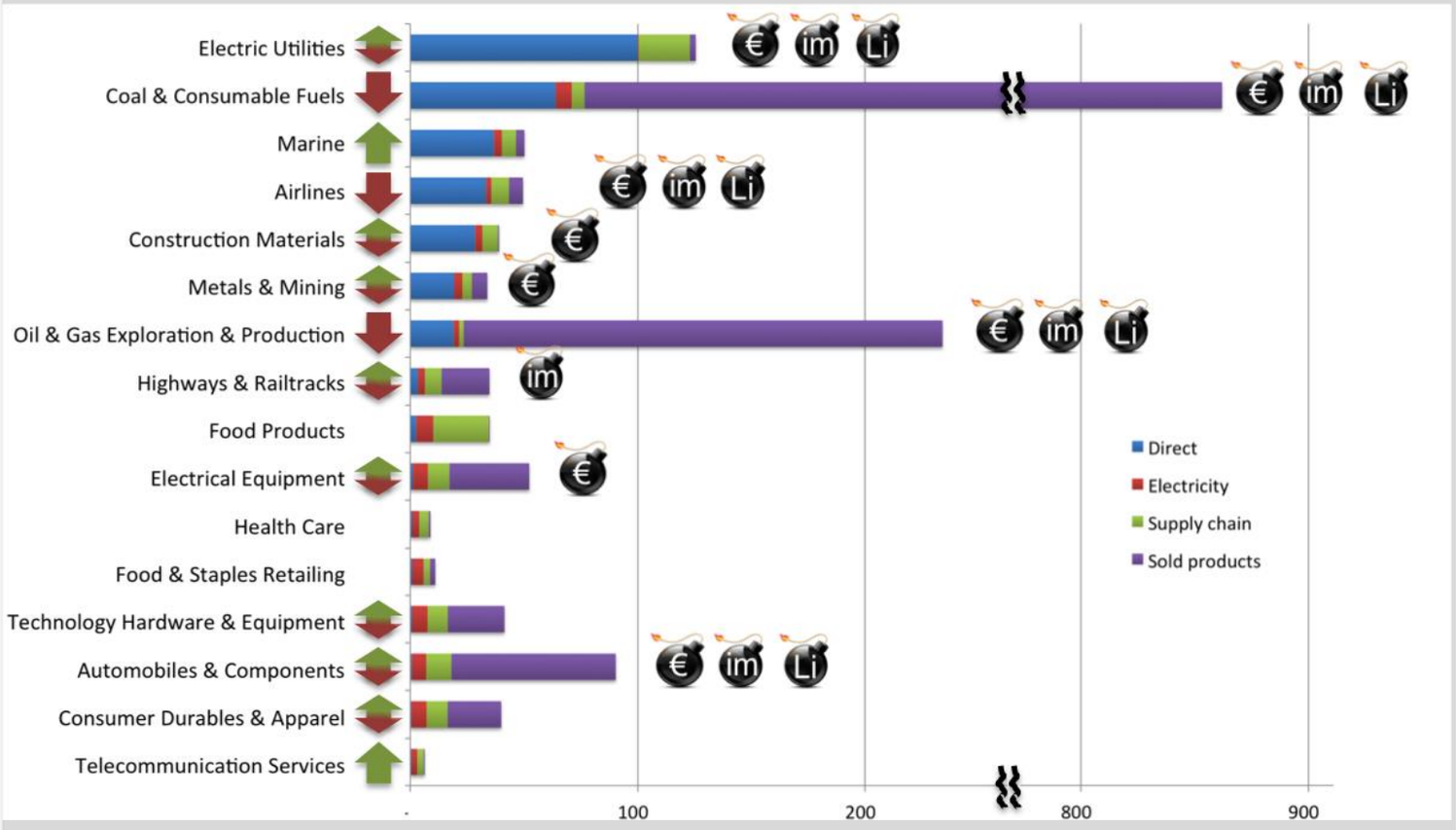
The review reveals a great diversity of approaches tor dealing with scopes:
- Three methodologies (*BofA ML, South Pole Carbon, ASN/Ecofys*), cover scope 1 and 2 of investees to be able to base calculations and/or extrapolations on primary data reported by investees.
- *Trucost* also estimates supply chain emissions using a statistical model;
- *Inrate* combines various sources of data to cover scope 1, 2 & 3, including sold products use and disposal emissions for companies.
- *Cross-Asset Footprint* extends *Inrate's* approach to other investees and includes financed emissions of the finance sector and governments (scope 3 – investments).
- Credit Agricole has chosen a different approach, independent of the GHG Protocol/UNEP-FI, by allocating all emissions across the supply-chain to the actor considered most exposed to carbon risk e.g. car manufacturers for cars' emissions (instead of oil companies, cars owners or highway managers). However, this analysis is only performed at macro-sector level for nine categories (e.g. cars, trucks, airlines, and railways emissions are aggregated to calculate the 'Transport' emission factor).
- As far as project finance is concerned, most banks accounting is based on scope 1 and 2, with optional inclusion of scope 3. Nine development banks (ADB, AFD, EBRD, EIB, IADB, IFC, KFW, Nefco and the World Bank) committed in 2012 to aligning their practices to this approach.

2.1.3. Materiality analysis

From a purely legal perspective, a company is only accountable regarding scope 1 emissions. The following countries have implemented mandatory reporting requirements: Australia, Canada, Denmark, France, Japan South Africa, United States, and the EU (as part of the ETS system). Reporting will be mandatory in the United Kingdom beginning in October 2013, making it the first country to make it compulsory for companies to include emissions data for their entire organisation in their annual reports. Current standards and mandatory reporting requirements are limited to scope 1 and 2. Issues with this approach include:

INTENSITY AND MATERIALITY OF FINANCED EMISSIONS BY SCOPE OF REPORTING FOR SELECTED INDUSTRY GROUPS

Sources: 2°ii, Inrate data for MSCI World index companies



Investing in a 2° scenario

Technology switch more — Invest — Divest

Presence of carbon risks

Carbon price — Impairments — Litigation

Notes:

• The carbon intensities are based on the revenues (an indicator based on assets would lead to a different ranking, notably for coal), and normalized (100 = intensity for Electric Utilities direct emissions). The sample covers about 50% of the MSCI World capitalization and 50% of consolidated scope 1+2+3 emissions, excluding the financial sector. The category 'electricity' includes emissions of the supply chain. Industry-groups are based on GICS taxonomy, with different levels of aggregation applied.

• The analysis of investing needs is based on the IEA WEO and ETP scenarios, completed with 2°ii analysis. The analysis of carbon risks is adapted from the ADEME/OTC 2010 study.

• **Carbon performance**. Our analysis (see table §) shows that for many exposed industries, the investments, divestments and impairments planned in climate scenarios impact sold products emissions (scope 3 downstream). This is especially true for the energy sector, suppliers of power-production technologies, car manufacturers, highways managers, and the financial sector (investments being categorized as downstream scope 3 emissions by the GHG Protocol/UNEP-FI).

´• **Carbon risk.** In the same vein, litigation risks are not limited to direct emissions: car manufacturers and oil companies have been sued on the basis of their sold products emissions (cf. page §). Even in the short term, the carbon price not only affects direct emissions but also energy prices, with impacts across supply chains and on products sales (e.g. cars).

• **The case for comprehensive frameworks**. From both a risk and performance perspective, too narrowed organizational boundaries can mislead investors. According to *Inrate*, non-financial companies (pre-dominantly direct emitters), represent 10-15% of market capitalization in the MSCI World index compared with 50-55% for sold products and 30-35% for the supply chain. Financial companies in turn exclusively contributing scope 3 financed emissions represent XX% of listed companies total assets. The setting of operational boundaries also is critical for the footprint of a portfolio. For the MSCI World Index, about 60% of emissions come from sold products and 15% from suppliers. A proportion of these emissions are double-counted (see next page), but not all as households, governments and SMEs consume a large share. However, only certain calculation approaches allow for covering scope 3 emissions. Thus, the choice of operational boundaries very much depends on the use of carbon data by the investor: if the investor only wants to inform a 'best-in-class' approach in selected industries, like power-production, cement and airlines, it makes sense to prioritize scope 1 and 2 (NB: in this case financed emissions are not the best indicator – Cf. page §). In other cases, and to inform industry-group and strategic allocation, scope 3 emissions, especially for sold products, need to be included.

2.1.4. Challenges to scope 3 accounting

• **Data availability**: Primary data provided by companies are limited to scope 1 and 2. To extend the boundaries, data providers need to use secondary data based on input-output models for supply-chain and life-cycle analysis of product use, with a significant impact on uncertainty and complexity (see page §).

• **Weighting**: Most data providers account scopes 1, 2 and 3 separately. However investors looking for a performance indicator usually aggregate different scopes in a single 'footprint', potentially leading to over-simplification. Given a lack of guidance (from the GHG Protocol/UNEP-FI), emissions are then equally weighted. This approach, directly inspired from product footprinting, does not reflect the various degrees of risk exposure or share of the reporting company by types of indirect emissions and thus may not yield comparable results. For instance, an auto manufacturer has a stronger influence on cars' performance, and is more exposed to related policy risks, than it has on its third tier suppliers' environmental performance. Here, more standardization and more reported and audited Scope 3 data are needed to improve practice.

• **Multiple-counting**: The addition of two companies involved in the same supply-chain in a portfolio leads to problems in terms of double counting. For equity portfolios, *Inrate* identified four cases:

1. *Producer / Purchaser*: an electric utility's direct emissions will be counted as its scope 1 emissions but also as scope 2 emissions of its clients, and the scope 3 emissions of its clients' clients.
2. *Product / Product*: emissions generated by fuel combustion in a car are accounted as the products use-phase of the car manufacturer, the oil company and the highway manager.
3. *Product / Component*: the product use-phase emissions of a car manufacturer coincide, in part, with the one of the engine and tires manufacturer.
4. *Product / Purchased electricity*: emissions generated by use of electrical goods are accounted as the manufacturer's use phase and electricity producer company's direct emissions.

Multiple-counting is inherent to scope 2 and 3 accounting (based on GHG Protocol/UNEP-FI and equivalent). It is increased by the coverage of sold-products emissions, and when equity in the auto industry and car loans are consolidated (see chart §).

A distinction should be made between two cases:

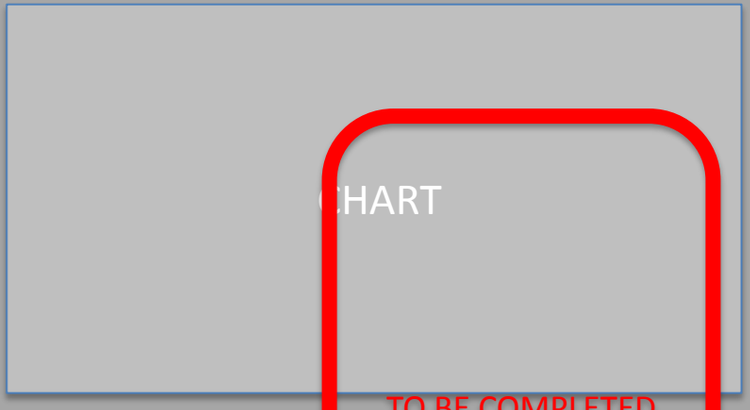
- 'real' double-counting: when two companies held in a portfolio are actually involved in the same supply chain;
- and 'theoretic double-counting': when a company created demand for a type of product offered by another company of the portfolio, even if they do not have business relationships.

FIG. § . AVOIDING, LIMITING OR NEUTRALIZING MULTIPLE COUNTING?

Most practitioners have chosen to limit double counting by covering scope 1 and 2 for equities only and report separately each scope. Two practices stand out:

• P9XCA approach avoids double counting by allocating the emissions only one time, on the basis of the investor's carbon risk exposure (cf. page §), rather than the ownership of the fixed-source (definition of the GHG Protocol/UNEP-FI scope 1). The financial sector and loans to households are considered as carbon neutral.

• The principle of neutralization, developed by *Inrate*, involves identifying, within a given portfolio, all mutual exchanges between industries represented in the portfolio and the related double-counted emissions. This can only be done using an input-output model (see page §) that tracks these exchanges. Once identified and quantified the emissions double-counted can be discounted from total gross emissions to form 'net emissions'. The calculation tool also highlights the double-counted items across the energy supply chain (cf. chart)



Type of portfolio	Investees' scopes covered		
	1+2	1+2+3 upstream	1+2+3 all items
MSCI world index (equities)	%	%	%
Life-insurance (multi-assets)	%	%	%
Retail bank balance sheet	%	%	%

Sources: Cross-Asset Footprint©

The first case is almost impossible to evaluate. For the second case, *Cross-Asset Footprint* estimates that double-counting represents 50% of total emissions for the MSCI World index (cf. box §). Identifying double-counting is useful in order to estimate an order of magnitude for total financed emissions at macro-level (countries, stock-exchanges, etc.), but not necessary if carbon data are used for stock-picking or sector allocation, since only the relative intensity matters.
Practitioners developed various ways to deal with weighting and double-counting (cf. next page). Beyond that, a solution, illustrated below for car transportation, would be to allocate sold product emissions according to the share of investment in the total annual investments (capex) across the whole value chain. In this case, cars' emissions will be mostly allocated to investors financing oil companies and car loans. But this does not reflect the capacity to innovate (i.e. introduce new engines and fuels) and it is not necessarily applicable to more complex value chains.

2.1.5 Beyond scope 3 accounting?

All the methodologies reviewed are based on the core principles of carbon accounting (GHG Protocol/UNEP-FI). To date, carbon accounting rules have primarily been developed to inform decisions regarding industrial processes and product design within companies. Seeking to use them to inform financial investment decisions raises new issues and limits related to the inventory and allocation of emissions across the supply chain.

• **Discounting wages and dividends.** The core rules of carbon accounting, mostly derived from Life Cycle Analysis, are based on material flows: they associate GHG emissions with the consumption of energy and then consider the 'embedded emissions' of the materials produced. When practitioners tried to extend this approach to companies and industries, the same logic of 'embedded emissions' was applied to services. This applies, for instance, to EEIO data. However, even if an economic impact (and therefore induced GHG emissions) is associated with wages and dividends, they are considered carbon neutral in all the methodologies or underlying models that have been reviewed. This however introduces two important biases when the approach is applied to multi-sectors or multi-assets portfolios:

- First, the overall impact of investments in service-oriented or high-dividends industries is underestimated;
- More importantly, the lack of emissions associated with wages and earnings reduces the accuracy of carbon footprint assessment for central governments (cf. page §), since in many countries the bulk of public expenses is related to wages and welfare payments.

Overcoming this obstacle would require assigning carbon emissions factors to wages and thus review both GHG accounting rules and all the related sets of emission factors.

• **The lack of guidance for high-impact services.** In line with the GHG Protocol/UNEP-FI, all the methodological frameworks reviewed associate GHG emissions with material (products consumed or sold), monetary flows (expenses), or investments (shares or debt held), but do not associate emissions with the services delivered by the companies. It can therefore underestimate the influence of industries such as advertising, financial services or engineering of infrastructure projects in the overall climate impact related to the investment decision. To date, no guidance or even conceptual framework exists to assess and allocate these emissions between clients and service providers. The only attempt identified (Profundo) relates to the allocation to investment banks of the GHG emissions associated with underwritten securities.

COMMENTS FROM THE PANEL : PRO AND CONS OF SCOPE 3 ACCOUNTING
+ South Pole
+ C-A
+ AFD

2.2. TIME BOUNDARIES FOR INVESTEES

2.2.1 Rules in accounting standards

Two rules coexist in carbon accounting regarding time boundaries:

- In the general case, the GHG emissions are accounted on an annual basis. This approach is comparable to a P&L. Corporations usually report their GHG emissions this way, as recommended by the GHG Protocol/UNEP-FI.
- Lifetime emissions accounting is recommended for the emissions related to sold products and projects financed (e.g. power plants). Lifetimes emissions are defined as the future emissions over the planed lifetime of the fixed asset. According to the GHG Protocol/UNEP-FI for scope 3, the lifetime emissions of products sold during the reporting year are added to the other annual emissions of the company. Regarding projects financed, it only requires accounting project emissions occurring during the reporting year in the investors' annual emissions, and reporting the lifetime emissions of new projects separately. However the rule may evolve in the near future: the International Integrated Reporting Committee currently tries to develop forward looking reporting for companies, and the GHG Protocol/UNEP-FI seems open to evolutions regarding financed emissions.

2.2.2. Practices

The practices are in most cases in line with the GHG Protocol/UNEP-FI:

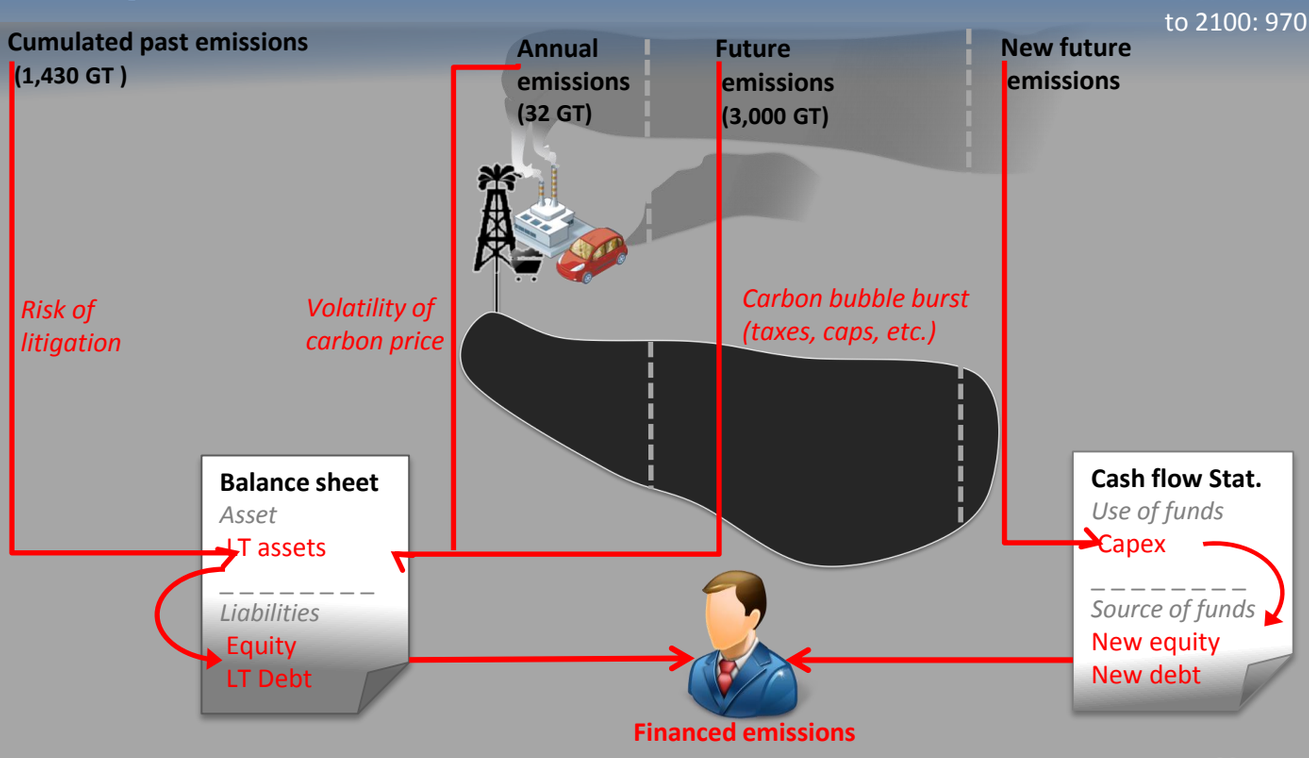
- Methods developed for equity portfolios or loan books account the annual emissions of the companies held. When the boundaries are extended to sold products (Inrate or Cheuvreux), lifetime emissions are accounted and added to other annual emissions.
- Methods applied by banks for project finance are mostly based on lifetime emissions.

Two methodologies stand out regarding timeframes, applying the 'project' rules at company level, on the basis of outstanding assets rather than new investments. Carbon Tracker estimates the carbon content of fossil fuels reserves and considers it as the 'future emissions' of energy companies. Profundo does the same and also considers the locked-in emissions of coal-fired power plants. In both cases, these future emissions are considered as 'embedded' in the fixed-assets of the company, and therefore indirectly held by the investors.

Finally, litigation led by environmental NGOs and activist lawyers link cumulated past emissions with the share of the related companies in the cost of global warming. It as been applied to energy companies, electric utilities and car makers in claims in US courts. This approach however has not be applied to public data or a published methodology so far.

FIG. § . Time boundaries: connecting GHG emissions and liabilities

CO_2 emissions from fossil fuels. Source: 2°ii, IEA, Podstam Institute



2.2.3. Lifetime accounting makes more sense

Accounting based on annual emissions has initially been developed to track progress at company or country level, especially in the context of cap-and-trade schemes. But when considering investment decisions that involve reallocation of assets held or projects selected, rather than an ongoing progress at operational level, lifetime emissions seem to be more relevant:

• **Carbon risk.** An investor is likely to be concerned about future regulation that increases the cost of future emissions and thus will in the first instance affect profitability but may also lead to the impairment of assets and/or litigation targeting the social cost of its cumulated past emissions. In comparison, the exposure to annual changes in carbon price for regulated activities in the short term seems limited (cf. page §).

• **Performance**. As far as the role of investors in financing the energy transition is concerned, the goal is to track the link between financial investments and the long-term investments (R&D or capex) indirectly financed. Once again, the emissions associated with these expenditures are lifetime emissions rather than annual emissions. For instance, in the case of an auto manufacturer investing in a new car project, the main impacts relate to the emissions associated with the cars that will ultimately be put on the road.

• **Emerging topics.** Since the introduction of the concept of a global carbon budget by Meinshausen et al. in 2009, the thinking regarding mitigation is shifting from approaches based on reduction pathways to approaches based on stocks of 'future emissions' and 'carbon budgets' in order to keep global warming below +2°C. In this area, the Carbon Tracker Initiative popularized the concept of 'carbon bubble', based on the idea that there are more fossil fuel reserves held by investors than can be burned. More recently, the IEA (International Energy Agency) applied the same logic to energy infrastructure by comparing the locked-in emissions with the available carbon budget. Finally studies are underway to assess the cumulated past emissions of energy companies.

2.2.4. Obstacles to lifetime accounting

All these elements call for a switch to carbon accounting based on the lifetime emissions of the assets held by the investors. However, practitioners face three major practical obstacles:

• **Nebulous concept**. The concept of lifetime emissions is well defined for infrastructure and durable goods consuming fossil fuels such as power plants, cars or buildings heated with boilers. It is more difficult to assess infrastructure with mostly indirect emissions, such as buildings equipped with electric heating systems or highways. Indeed in these cases, the level of future emissions depends on progress in other industries. Finally, the concept of 'locked-in' emissions is almost never applied to intangibles like patents, future sales and R&D expenditures. These make calibrating a specific methodology difficult.

• **Uncertainty regarding lifetime**. Infrastructure that can be retrofitted to improve energy-efficiency like buildings may lead to biases in accounting.

• **Lack of data**. Finally, beyond the energy sector data, detailed reporting on physical assets, capital and R&D expenditures is rare (cf. page §§). There is obviously no reporting on locked-in emissions.

Overall, based on data available for listed companies, our estimates suggest that a switch to lifetime emissions accounting, can be applied to about X% of listed companies' total assets representing X% (scope 1+2) to X% (all scopes) of total emissions. But it would require indepth company-per-company analysis.

Average lifetime, payback period, and locked-in emissions for investments in selected fixed-assets

Sources:

TO BE COMPLETED
HELP FROM REVIEWERS WELCOMED!

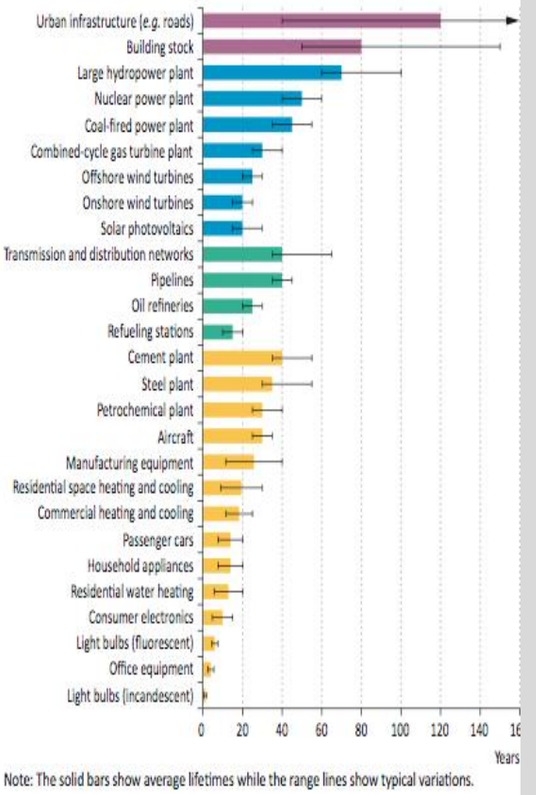
- ...ngs
- Coal-fired power plants
- Wind farms
- Cement plants
- Oil field

Payback period (years since the first investment including R&D and exploration)

Lifetime (excluding refurbishment)

1T/$M Carbon intensity ($CO_2$e/$ invested)

Figure 1.3 • Typical lifetime of energy-related capital stock



Note: The solid bars show average lifetimes while the range lines show typical variations.

EXAMPLES OF INVESTMENT HORIZONS IN YEARS

Asset type	Maturity	Holding period
Listed equities	∞	0.75
Corporate bonds		
Corporate loan		
Loans to SMEs		
Car loans		
Consump. loans		
Mortgages		
Securitized loans		
Financial bonds		
Gov. bonds		
PE funds		
Derivatives		

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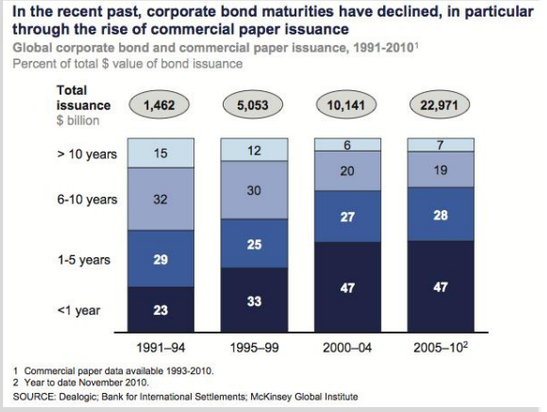
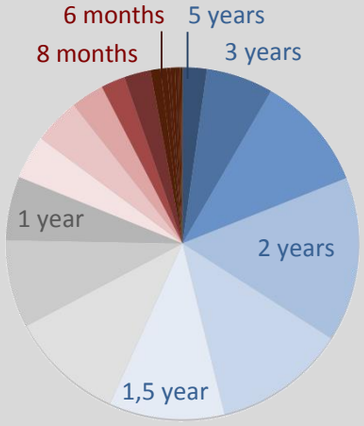


INVESTMENT HORIZONS OF LONG-ONLY EQUITY MANAGERS (2006-09)

Source: Mercer/IRRC 2010[6]



2.3. TIME BOUNDARIES FOR INVESTORS

Time boundaries for investees is a question already addressed by existing guidance. Investors on the other hand suffer from almost no applicable guidance or even conceptual framework to set time boundaries. The financial statements provide either a snapshot of assets held at a single point in time (balance sheet) or capture transactions and operations made during the reporting period (cash flow and P&L statements). Should an investor report on the footprint of its stock of assets or the impacts of the transactions incurred (cash-flow accounting)?

2.3.1. Stock-based accounting

Most assets held by investors are traded (equities, bonds, securitized loans). Therefore, any accounting system based on stocks relies on the notion that there is a responsibility (or risk) related to the initial investment in the real economy. This is then transferred and assigned to the holder of the security at balance sheet date, whatever the number of transactions in between. This approach is preferred by all practitioners working on equities and most practitioners working on loans. It is also recommended by the GHG Protocol/UNEP-FI in order to account investments for financial companies annual emissions. It raises several questions related to investment horizons:

- **Payback period.** Financial assets have different intrinsic 'lifetimes' which can be different from the lifetime of the underlying physical asset. For instance a power plant can have a lifetime of 40 years and a pay-back period of 7 years. Beyond infrastructure projects and investments with known use of purposes, the concept of payback period applies to venture capital, private equity and equity investments in pure players for which the ultimate R&D project costs of capital expenditure is concrete and homogeneous. The length of the payback period is material from both a risk and performance perspective: a longer payback period gives a bigger role to the investors and increases their risk exposure.

- **Maturity.** Debt instruments have maturities which range from days to decades. Equity investments have endless maturities, even if the lifetime and payback period of the underlying physical asset can in certain circumstances be assimilated to the maturity of the investment. For carbon accounting of debt financed emissions, the maturity is crucial. Short-term debt finances the day-to-day operations, while long-term debt finances the R&D and capital expenditures. Long-term debt investors have more influence on future emissions and are exposed to more risks.

- **Holding period.** How should the holding period be taken into account? Depending on the style of investors, the holding period of a security ranges from decades to milliseconds. The average for stock markets is as short as 9 months (***source***). On paper, the emissions accounted are supposed to be based on the average allocation of the portfolio over the reporting period: taking into account only a proportion of the emissions associated with assets held for less than a year. All applicable methodologies and datasets allow for this, but for practical reasons, the calculation is in most cases based on a snapshot at the date of closure. At the same time, beyond this technical question, stock-based accounting raises a more fundamental question regarding the holding period: accounting standards for banks distinguish assets held for trading, highly exposed to market risks, and assets held to maturity, which are mostly exposed to credit risks. As far as carbon intensity is concerned, the risk exposure is highly correlated with the holding period. Carbon policy is a point-in-time risk: the probability of a 2° global policy scenario is

significant in the long-term and close to zero in the short term. The same applies to climate litigation.

Regarding the role of investors in financing the energy transition, the correlation with the holding period is established but more difficult to quantify:

- The holding period influences the expectations of the investors and thus the behavior of the investees. A short term investor will only look for decisions that have an immediate impact on stock price. The investor has no interest in the anticipation of long term risks and opportunities. This increases the cost of capital for R&D and projects with a long pay-back period and thus handicaps emerging technologies that can impact future emission pathways.
- The holding period has an influence on market price and thus on the cost of capital for investees. It will increase the valuation effect in bull markets and reduce it in bear markets. In all cases, short-termism increases market volatility and therefore restricts the types of investors able to finance the underlying activity.

Overall, for practitioners using stock-based accounting, these various time dimensions are not taken into account when allocating emissions. This is the case for both methodologies based on annual GHG emissions of the investee (Trucost, Inrate, Cross-Asset Footprint, South Pole Carbon, P9XCA, etc.) and those based on lifetime emissions such as Carbon Tracker's.
This situation clearly calls for an evolution of methodologies.

2.3.2. Cash flow-based accounting

• **Practices**. Cash flow-based accounting is the preferred and recommended method for project finance (for both absolute emissions and emission reductions). The framework recently published by nine development banks (cf. page §) recommends reporting the consolidated lifetime emissions of new mitigation projects when they receive financing. The GHG Protocol/UNEP-FI also recommends accounting annual emissions separately. At company level, this approach is also applied by Profundo for underwritten securities and syndicated loans allocated to investment banks. In this case, Profundo takes into account the cumulated flows over the past five to ten years.

Issues related to payback periods and maturity of debt investments also apply to cash flow-based accounting. Beyond that, this approach is associated with specific unsolved methodological questions when a financial institution wants to consolidate its GHG emissions, such as:

• **Investment in traded securities.** Contrary to project finance, 1$ injected in financial markets does necessarily lead to 1$ invested in a physical asset associated with direct GHG emissions on the other side of the investment chain. It is generally used to purchase an existing security on the secondary market, which does not immediately generate additional GHG emissions. As illustrated on page § for equity markets, a range of parameters confound the picture (liquidity, risk premium, etc.). To date, no method exists to neutralize all these factors (cf. page XXX).

• **The case of divestments.** On paper, if a footprint is accounted for a new investment, a divestment would require accounting something in the other direction. However, divestment is generally not associated with the closure of the factory initially financed. The security is only sold to someone else: the only element impacted is the market price of the security and thus the cost of capital for the issuer.

HOW DO MACRO-ECONOMIST TAKE INVESTMENT HORIZONS INTO ACCOUNT?

2.4. TYPES OF ASSETS ACCOUNTED

2.4.1. Classification of asset types

For the purpose of this study we define 'asset types' as a mix of *asset classes* (equities, private equities, fixed-income, real estate, etc.) used in finance, and *sectors* used in economics (households, non-financial companies, banks, central administrations, etc.). Based on this definition, we can consider that investors willing to assess all types of assets need to consider the categories listed in table §, as well as 'projects' financed through equities, loans and bonds. In addition, a bank balance sheet also includes other assets such as derivatives and repurchase agreements that are very difficult to link with investments in the real economy, both from a methodological and technical point of view.

2.4.2. Guidance provided by the GHG Protocol/UNEP-FI and perspectives

To date, the GHG Protocol/UNEP-FI provides reporting guidelines for companies (scope 1, 2 and 3), the public sector, projects and products. These can be helpful to calculate the annual emissions of the entities (company, state) or projects (house, car, power-plant) financed, but they provide very limited guidance on how to allocate these emissions to equity shares and debt (this issue is discussed page §). In addition, nine development banks agreed in 2012 to harmonize their methodologies regarding new projects.

Regarding future steps, the 'scoping workshops' organized early 2013 (in London and New York) and the online survey of the GHG Protocol/UNEP-FI/UNEP-FI which paves the way for standardization came to the following conclusions:

- Banks prioritized project finance and general purpose corporate loans to high impact industries. Some participants were also interested in including mortgages and commercial real estate loans.
- Institutional investors and asset-managers prioritized listed equities and to a lesser extent corporate bonds. However the business case of accounting emissions was discussed in both London and New York, given the lack of materiality of carbon data from a risk management perspective and the lack of demand for such data from asset-owners. This perception contrasts with the survey, in which 77% of investors said that measuring financed emissions is an important business issue and 70% called for guidance. It also contrasts with reporting practices and data market demand which focus almost entirely on equity portfolios to date.

The case of financial bonds, which is very specific from a methodological perspective, was not explicitly discussed. Retail loans, commodities and derivatives have been initially excluded from the survey and consequently were not substantially covered by the discussions.

FIG. 1. MATERIALITY OF CARBON RISK AND CHALLENGES BY TYPE OF ASSET

Asset type		Global outstanding value ($Tn)	Weight in long term financing	Financial risk weight	Carbon risk exposure	Carbon intensity
Listed equities		50 (31)	12%	160		
Corporate bonds		11	6%	120		
Corporate loans		36		120		
Retail loans	SMEs			150		
	Car	26		120		
	Consumption			130		
	Mortgages			100		
Securitized loans		13	63%	115		
Financial bonds		42		110		
Government bonds		47	19%	100		
Private equity funds		2	N/A	200		
OTC Derivatives		35 (3.6)	0	150		0

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Sources: MGI, City UK, 2°ii, Cross-Asset Footprint. Details provided in endnote #§

2.4.3. Practices for different types of assets

• **Listed equities** are the main focus for asset managers. They represent almost all market outlets for 'financed emissions' data providers. The reasons include the greater availability of both carbon and financial data, the existence of SRI funds seeking differentiation, and marketing practices that are more transparent for equity funds vis-à-vis fixed-income funds. Moreover, the ownership and the voting rights creates a responsibility associated with 'owning' an asset vis-à-vis lending.

• **Project finance** is the main focus of banks. The GHG Protocol/UNEP-FI survey identified at least nine banks accounting their related emissions. The AFD (French public Development Bank) developed a scope 3 calculation tool in 2007 for new projects. The IFC adopted the tool in 2009. The European Investment Bank and Citi now also account the scope 1+2 emissions of new projects, for high impact projects and thermal power plants respectively. Finally, nine development banks committed to accounting and reporting emissions in 2012. Most banks perform 'standard' carbon footprint on a project-per-project basis using detailed data. In 2011, the French public financial institution (CDC) used Trucost data to estimate the emissions of its infrastructure portfolio.

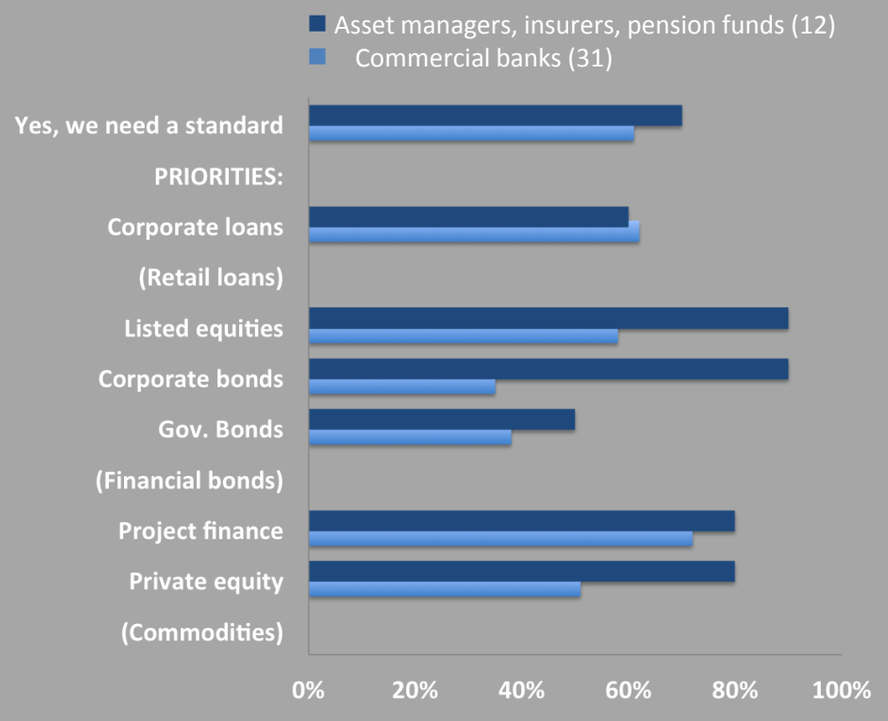
• **Corporate loans** is the second step, for bankers and NGOs initially focused on high-impact projects, and data providers who started with listed equities. The GHG Protocol/UNEP-FI survey identified five banks accounting their emissions for at least a part of their portfolio. Most of them cover 'scope 1 intensive' industries. For instance RBS publicly reports on its loans to the Oil & Gas and Power sectors since 2010. We identified five other banks which extended footprinting to their entire loan book. Carbon data are either provided by the client, calculated based on the clients' activity data, or estimated based on public data if the client is listed.

• **Corporate bonds and SMEs**. Occasionally, these approaches have been adapted to assess corporate bonds portfolios, private equity funds, and SME loan books. However this is made difficult by the lack of systematic carbon reporting and the cost of accessing financial and activity data to estimate emissions (cf. page §). *Trucost* and *South Pole Carbon* extend their approach to corporate bonds and SMEs on a company-per-company basis when requested. *Cross-Asset Footprint* developed a dataset to estimate loans to SMEs and corporate bonds based on their industry classification. The P9XCA methodology, based on 9 levels macro-sectors classification, also systematically includes them.

• **Sovereign, financial bonds, mortgages and consumer loans.** Accounting for other assets has been very limited to date. The P9XCA and ASN methodologies allow to calculate raw estimates for sovereigns. The coverage and consolidation of all assets accounted on a balance sheet (for a bank, insurer or pension fund) are limited to the Cross-Asset Footprint model.

FOCUS. PERCEPTION OF PRIORITIES

Source: GHG Protocol/UNEP-FI survey 2012



• **Evolution.** However, the landscape is currently changing:

- South Pole Carbon has developed a footprinting model applying emission factors per $ to the expenses made with a credit card. This model is used to inform card holders but it is technically possible to use it to assess the related credit lines for the bank.
- South Pole Carbon is also currently developing a 'real estate carbon screener'.
- Trucost is currently adapting its approach to cover sovereign bonds.
- ASN Bank is currently developing a multi-assets balance sheet-based approach based on the core rules used by the *Cross-Asset Footprint* model.

FOCUS: SOVEREIGN BONDS

The development of a framework regarding sovereign debt raises two issues in terms of the operational and organizational boundaries to consider:

- Which emissions should be taken into account? Only the emissions of the investee? The impact of public policies? The footprint of the country?
- How should the 'share of investment' principle be applied without shareholders?

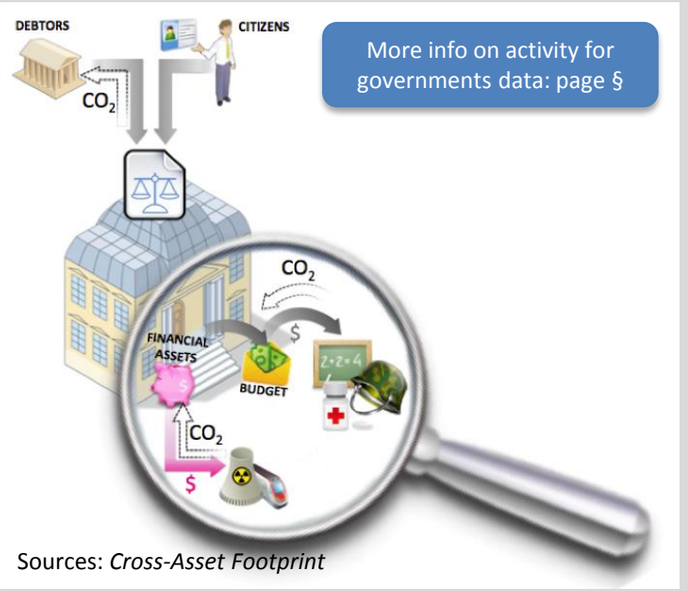
The two approaches reviewed (*Cross-Asset Footprint* and Ecofys/ASN, under development) are both based on the general accounting principles defined in 2007 by the first cross-asset framework (cf. page §) designed for bank footprinting. P9XCA have a different approach.

- **Operational boundaries**

The organization considered is the central government which issues the bond. CAF covers all scopes, therefore the footprint calculation is based on public spending, as well as shares in state-owned companies and financial assets (cf. page §) in order to calculate the government's financed emissions. All calculations are based on national accounts and reporting (cf. page §). Ecofys covers scope 1 and 2. The calculation is based on carbon reported data for the Dutch government and extrapolated to foreign countries. P9XCA only allocate military emissions (from national inventories) to governments. These approaches are consistent with the accounting rules for the corporate sector. Nevertheless, the regulatory power of governments is not taken into account. The carbon intensity therefore neither reflects the contribution of public policies to mitigation, nor the exposure to litigation risks under the no-harm rule policy (cf. page §).

- **Allocation rule**

The carbon burden is shared between sovereign bond holders and citizens, based on the relative level of debt compared to the government's total liabilities. This ratio is applied directly by Ecofys. CAF calculation aims at adjusting the value of governments' non-financial assets. Indeed, in public accounting, the book value of public buildings and infrastructure is underestimated (and sometimes equal to zero). All the same, the intangible assets (the ability to raise taxes, the economic value of the services provided by local ecosystems) are not valued. The various approaches have not been conclusive due to the lack of data. So the citizens' share is normalized to align sovereign bonds relative carbon intensity per $ held with the carbon intensity of the governments budget and assets. The resulting footprint is mostly correlated with the level of military expenditure, the weight of financial assets and the carbon intensity of electric power. However, due to the zero carbon intensity of social expenses and wages in carbon accounting (see page §) and the rule followed to allocate emissions to liabilities, the carbon intensity of sovereign bonds is much lower than average corporate bonds.



More info on activity for governments data: page §

Sources: *Cross-Asset Footprint*

FOCUS: MORTGAGES

TO BE COMPLETED

FOCUS: CONSUMPTION LOANS

TO BE COMPLETED

2.4.4. Exposure to risk and challenges

To date, the priorization of projects and listed equities by most practitioners seems to be driven by the availability of primary carbon data and the clients' motivations (i.e. ownership of asset vs. lending, see page §), rather than a comprehensive review of risks and levers for change from an investor's perspective. Our analysis shows that assets analyzed not only usually represent a small share of total asset of the institution but are also not necessarily the most exposed to carbon risks.

• For investors willing to finance the energy transition, it is important to identify the sectors concerned about investment needs and exposed to divestments in climate scenarios. An analysis based on the IEA scenarios shows that 40% of financing needs to come from households (Fig. §), especially for energy-efficiency investments and purchases of low-carbon vehicles. This value is equivalent to that of companies. As far as divestments are concerned, the analysis of the IEA shows that governments own the majority of fossil fuel reserves (90% of oil and gas and about 2/3 of coal) and power plants, but listed companies play a key role in unlocking state owned assets with the technology and capital they contribute. When these long-term investment needs are crossed with sources of financing (Fig. §), the analysis shows that sovereign bonds and bank loans to companies and households will play the bigger part. Despite this, to date, equities and corporate bonds seem to play a minor part in providing long term financing, especially for climate projects.

• The risk exposure not only depends on the characteristics of the asset but also on the way the risk is hedged by the investor. However, the relative exposure of asset types to carbon risks as defined on page § (market, impairment and litigation) can be analyzed based on the average profile of the related investors. In this respect, five criteria stand out:

- **Correlation**, i.e. the systematic exposure of the underlying economic activities to the policy risks or litigation. For instance, private equities are usually less diversified (country and sectors) than blue chips;
- **Time horizon**. Listed equities held for 9 months on average are less exposed to long-term policy risks then a 20-year bond held to maturity.
- **Probability of default**. Once materialized, the carbon risk can cause the investee to go bankrupt or just slightly affect its profitability.
- **Risk already hedged**. For some asset classes, investors already anticipate and hedge a high level of risk. Additional risks might therefore be mitigated.
- **Lost given default**. For mortgages, the exposure of the collateral to value depreciation is key.

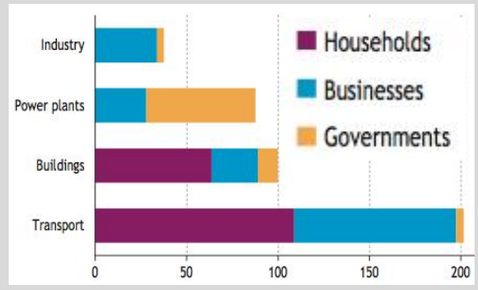
In this respect, projects and private equity portfolios are highly exposed, as well as mortgages (when not diversified). Listed equities held for trading are once again not necessarily a priority due to short holding periods (cf. page §).

2.4.5. Obstacles to cross-assets approaches

Cross-assets accounting is made difficult by various obstacles:

- The lack of guidance for calculating and allocating emissions (see next page);
- The difficulties in identifying the 'final' investees when there are many intermediaries across the investment chain (financial bonds, funds, etc.);
- The lack of primary carbon data or activity data reporting (governments, banks, insurers, SMEs – cf. page §);
- The occurrence of additional multiple-counting effects when several types of financing are added up (e.g. loan to a car manufacturer and car loans);
- According to Cross-Asset Footprint® calculations, given the high financial value of real estate assets and governments' assets on one hand, and their 'unproductive nature' on the other hand (i.e. no sold products emissions), assets types like mortgages and sovereign bonds happen to have a very low carbon intensity per € held, even if they are exposed to climate risks.

ADDITIONAL ANNUAL INVESTMENTS IN 2020 IN THE IEA 2° SCENARIO IN $BN



Allocation based on capital ownership of the asset concerned

COMMENT FROM IEA + stock markets data

FIG. 1. LINKING FINANCIAL ASSETS WITH GHG EMISSIONS: COMPLEX CASES

• **Commodities** In the case of commodities or reserves, the investor acquires a stock. This stock does not generate direct GHG emissions. The production and use phase generate emissions that are mostly concentrated on end-users for energy commodities (oil, gas, etc.) and mostly on producers in the case of food commodities and passive materials (gold, etc.). Since financial companies with trading activities are not considered as links in the value chain (or life cycle) of the related materials in the underlying model used for carbon assessment, no emissions are indirectly allocated to commodities accounted on their balance sheet. This can be considered as a limitation of the model since trading activities do influence the market price and thus the demand and offer for commodities. However the modeling of such impacts is too complex and requires too much data to be integrated in the methodology.

• **Derivatives** The case of derivatives is even more complex. The same reasoning can be applied regarding the indirect impact of derivatives trading on the offer and demand for the underlying asset (commodity, security, etc.). As far as the more direct impact is concerned, derivatives are considered as 'bets' between two parties: they do not finance an economic activity related to the underlying asset. The value recognized in investors' balance sheet just represent the market value of the instrument, which has no link with the payment, received by the counterparty for the acquisition of this instrument, if any.

• **REPO** (repurchase agreements) In this case, the investor received cash equivalent in exchange of the short-term borrowing of an asset (the collateral). Therefore the Repo is assimilated to cash equivalent.

Extract from the ©Asset Footprint Methodology, *Cross-Asset Footprint (2012)*

2.5. ALLOCATION OF EMISSIONS TO DIFFERENT TYPES OF INVESTORS

In addition to linking emissions to different financial products, the analysis also extends to the methodological differences in allocating emissions to different types of investors. This study identifies three cases: equity-only portfolios, multi-assets portfolios, and the 'share of external financing'. Each of these will be discussed in turn.

2.5.1. The case of equity-only portfolios

For most practitioners, financed emissions are calculated separately for each asset type (usually listed equities only) and are not consolidated. In this case, most practitioners follow the GHG Protocol/UNEP-FI corporate standard's 'financial control' approach and apply the 'equity share' principle by allocating 100% of GHG emissions to the shareholders. From a practical perspective, the investor just needs to know his or her share of ownership for each company held in the portfolio. This is the approach generally applied by *Trucost*, *South Pole Carbon* and *BoAML*.

2.5.2. The case of multi-assets portfolios

The process is far more complex in the case of cross-assets methodologies (*Cross-Asset Footprint*® and the methodology under development for ASN and VfU). When a bank, a pension fund or an insurer wants to assess its balance sheet, it is necessary to allocate the emissions of the investees to various types of financing (equities, bonds, loans, etc.) and then to the related investors. The first cross-asset methodology (see page &) developed in 2007 introduced the principle of 'proportional share of investment' according to which 100% of the investee's emissions are allocated to equity and debt investors, based on their share of 'equity + financial debt' (investee's liabilities). When the GHG Protocol/UNEP-FI introduced guidance on investments in its 2010 Scope 3 standards, they took up the approach for debt investments, while keeping the equity share for equity investments. This might lead to inconsistencies for multi-assets portfolios.

To allocate the GHG emissions of an investee to an investor following this approach, two steps are required:

1. **Allocating the emissions to the various types of liabilities** (equity, bonds, loans). This step can be very complex from both a methodological and practical perspective (cf.page § and §) when the investee financed is not a company with a 'standard' balance sheet (e.g. central administration, houses and cars for loans);

2. **Calculating the 'share of investment'** held by the investor. To do this, it is necessary to link the amounts accounted on the investee's balance sheet (liabilities) with the amounts accounted on the investors' balance sheet (assets) – cf. fig § page §. This task can be quite complex since theses values usually do not match for traded securities, due to various factors such as changes in market price, impairments in the investor's accounts, retained earnings in the investee's accounts, etc. The conversion usually requires accessing financial databases (cf. page §).

2.5.3. The 'share of external financing' approach.

The 'investment share' approach is based on the assumption that equity and debt investors finance 100% of the companies' activities. The profits reinvested are assigned to shareholders who have a legal right to them (cf. chart below). Another approach, applied by some macro-economists (MGI 2013) assumes that the 'responsibility' of investors is limited to the share of external funding in capital expenditure, the profits reinvested being 'self-financing'. This approach reflects the relative capital intensity of each company. In 2013, *Cross-Asset Footprint* adopted this method to calculate financed emissions. Applying this approach leads to significant changes in both the average intensity of a portfolio (-X% for the MSCI World index) and in the relative intensity of industries.

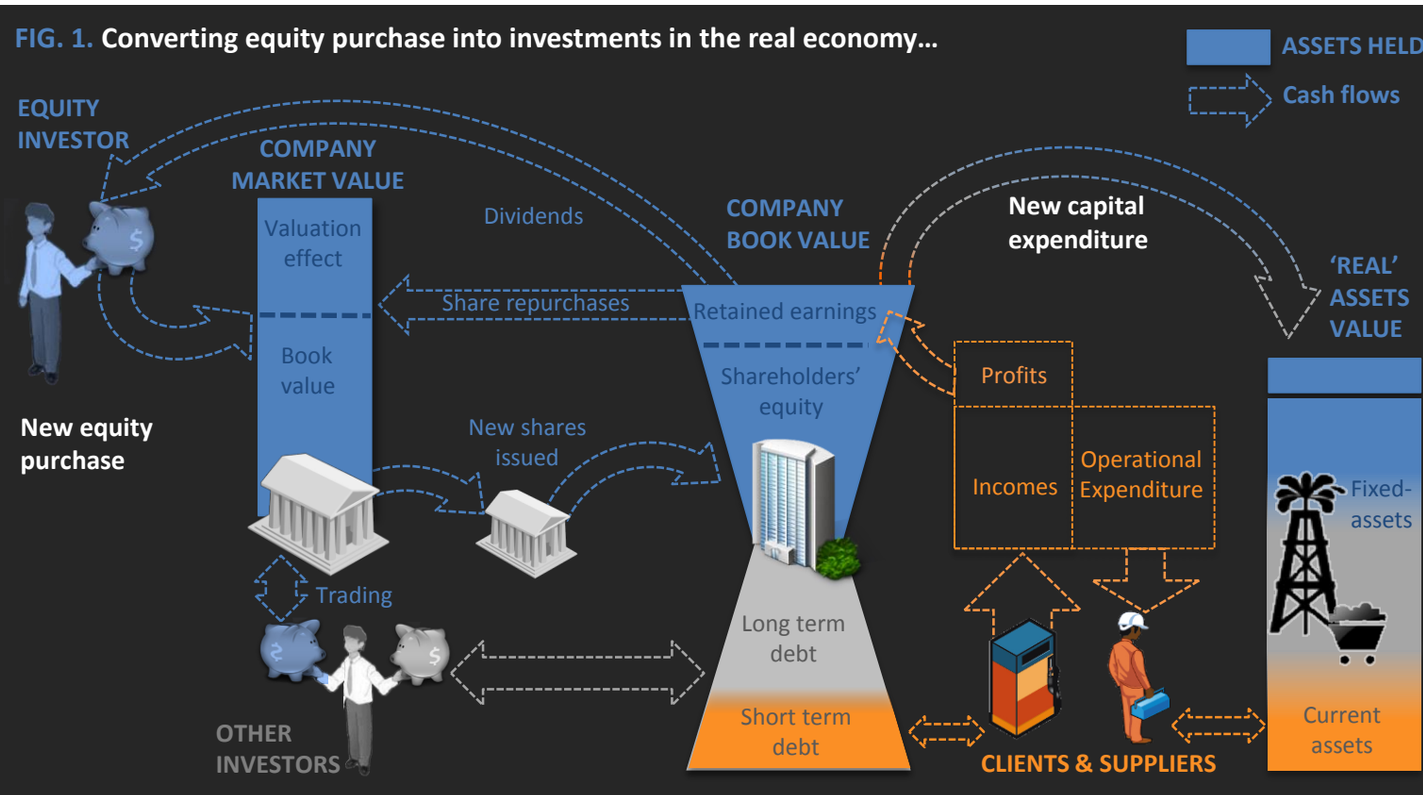
2.5.4. Current challenges.

The current allocation rules are relatively simplistic and based on accounting principles rather than a genuine attempt to model economic effects or risk exposure. Beyond the time horizon issue (page §), other interfering factors include:

- **Push vs. pull dynamics**. Financed emissions accounting is based on the assumption that the allocation of funds to an asset will lead to new investments in the real economy. However the dynamic of the financial sector is more complex than that: some asset-classes are managed in a top-down way (e.g. listed equities), others like SME lending are more frequently managed in a bottom-up way, the bottleneck situated in the lack of viable projects rather than the availability of capital.
- **Valuation effect**. For traded securities and real estate, new cash flows may lead to an increase in market prices rather than the construction of new buildings and factories.
- **Guarantees**. No specific rule is set by the GHG Protocol/UNEP-FI or used by practitioners to take into account the role of guarantees, neither when a credit line associated with a guarantee is assessed, nor to assess guarantees themselves. More generally, the current methodological frameworks are not designed to assess the carbon footprint associated with insurance services and similar mechanisms such as the use of derivatives to hedge market risks.
- **Cost of capital and earnings**. In line with the practices regarding guarantees, the cost of capital for the investee, and thus the risk-adjusted profitability for the investor is not taken into account in existing methodologies. This is a major limitation when trying to distinguish investments in high-risk mature and low-risk emerging technologies.

Finally, all these limits call for a fine-tuning of existing allocation rules, but it will clearly come with an increase in the complexity of calculations and the amount of financial data required regarding investees. Moreover, this would probably require different rules for investors seeking to optimize their 'climate performance' and those seeking to reduce their 'risk exposure'.

FIG. 1. Converting equity purchase into investments in the real economy…



Sources: 2°ii©

2.6. ORGANIZATIONAL BOUNDARIES FOR BANKS

2.6.1. Current practices for calculating banks footprints

As illustrated below, financial institutions, and especially banks influence the allocation of capital in various ways. Not all of these are necessarily accounted on their balance sheets. The opportunity to consider these items has been intensively discussed during the 'scoping phase' of the GHG Protocol/UNEP-FI work on financed emissions. The participating banks tend to favor a reporting standard limited to on-balance sheet items for bank-specific reasons, while acknowledging the key economic role of other channels and their weight in the industry revenues.

To date, few practitioners have tried to calculate the footprint of entire banks or multi-activity institutions:
- Profundo assessed banks' financing of fossil fuels to establish rankings, taking into account balance sheets, asset management, and amounts underwritten, based on Bloomberg data.
- The methodology developed by Utopies/Inrate for Caisse d'Epargne and now deployed by *Cross-Asset Footprint*, originally took into account on-balance sheet items, asset management and investment products retailing. However, when applied on the basis of publicly available information in order to categorize banks, this has been limited to on-balance sheet items due to gaps in reporting on other items.
- The approaches under development by ASN and VfU are to date limited to on-balance sheet items.

2.6.2. Rationales for accounting beyond balance sheet

- **Risk management.** From a strict risk management perspective, the exposure is higher for on-balance sheet items in which the bank has a legal claim. Some off-balance sheet items, such as guarantees, also bear direct financial risks. However the exposure is considered lower vis-à-vis capital requirements frameworks (Basel III). Other categories such as asset management, retailing of mutual funds, underwriting and securitization bear indirect risks related to litigation: during the subprime crisis, issuers of sub-prime backed securities and fund managers have been sued for breach of their fiduciary duties. All the same investment products retailers face significant fines and class action suits for deceptive marketing and mis-selling. Therefore a 'carbon bubble burst' would have direct financial impacts on banks' assets but also indirect ones through litigation. On short and medium term, we can even consider that the legal strategy of activist NGOs and the current lack of transparency on underlying assets and their carbon footprint primarily expose off-balance sheet items.

FOCUS §. LANDSCAPE OF ACCOUNTING STATEMENTS FOR FINANCIAL CORPORATIONS

For practical reasons, any accounting of financed carbon emissions for investors should be based on financial accounts. In this respect, practitioners can rely on several documents:

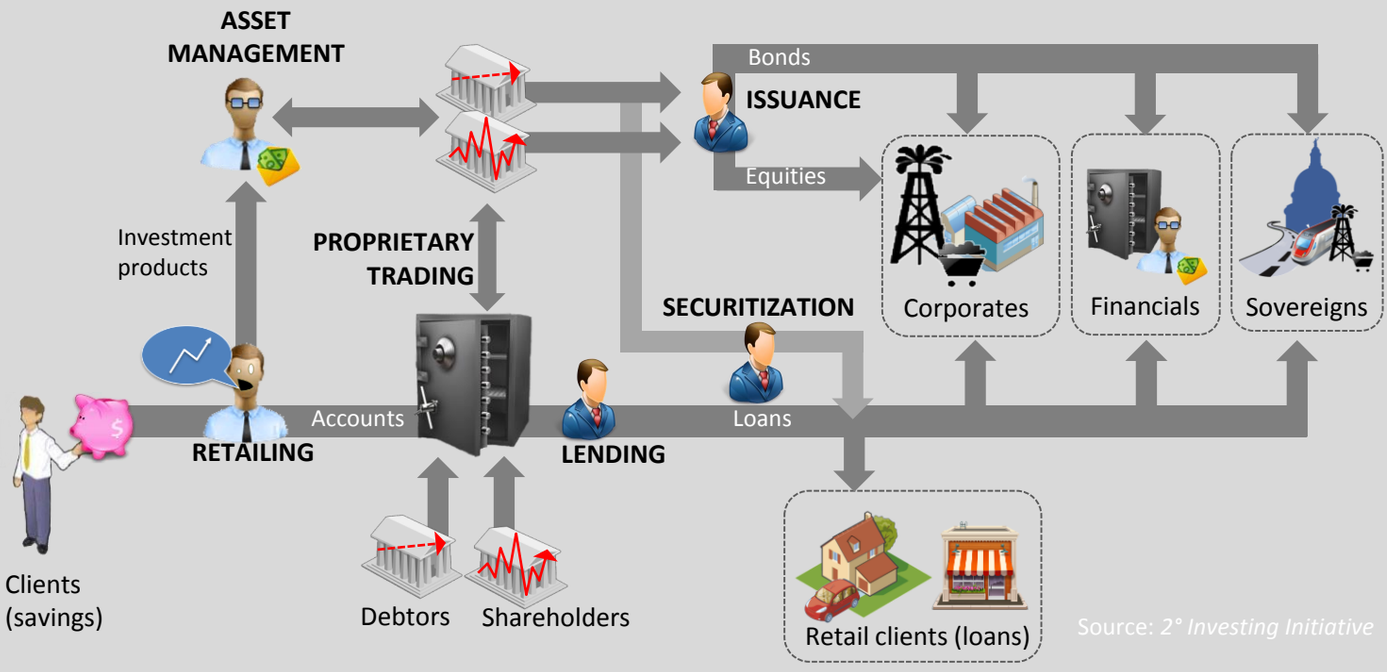
- **Profit and loss statement**. The P&L summarizes the revenues, costs and expenses incurred during the reporting period (year or quarter). Given the reporting format for financial companies and the variability in the revenues generated by different activities, it is very difficult to convert P&L items into amounts invested in investees or activities associated with relevant carbon emission factors. However it can help to identify the relative weight of advisory services, off-balance sheet transactions and on-balance sheet investments.

- **Balance sheet**. This statement is a snapshot of what the firm owns and owes at a single point in time. The assets held, the obligations toward its debt investors (liabilities) and the shareholders' equity. In financial corporations accounting, the list of assets generally allows to identify the underlying type of investee, but retreatment is often required. All the same, the liabilities help to identify how the institution is financed (e.g. via equities, debt and/or deposits).

- **Cash flow statement.** This statement captures the cash received from operations (receipts and payments) and the changes in balance sheet during the reporting year: purchase and sale of assets, loan granted or received, issuance of securities, dividends paid and repurchase of equities, etc. It can be an alternative to the balance sheet for flow-based carbon accounting (cf. page §).

- **Basel II**, **Pillar III report.** This report is a snapshot of banks' gross credit exposure by asset category, industry-group and country at balance sheet date. It can be very useful as a complement to the balance sheet, but requires retreatment.

FOCUS. BOUNDARIES AND ALLOCATION RULES FOR BANKS



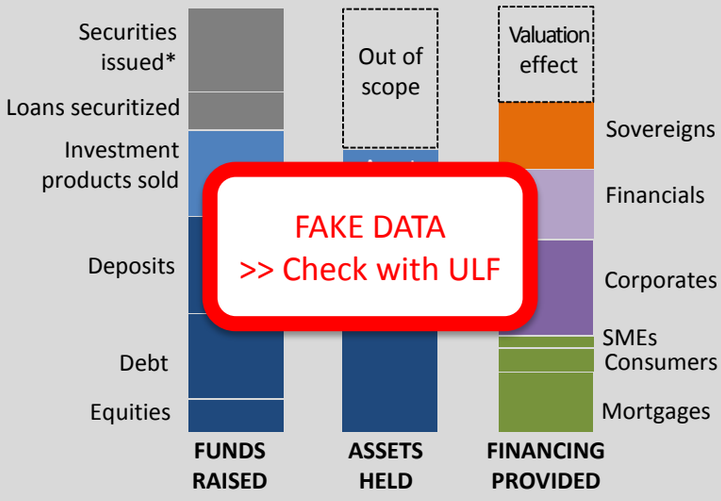
ROLE OF A BANK IN CHANNELING CAPITAL

The diagram above illustrates the role of a 'universal' bank in allocating capital across asset classes and sectors:

- Lending and proprietary trading relates to 'on-balance sheet' items for which the bank directly bears the risks;
- For other activities that are not accounted on the balance sheet, the bank plays an active role in the allocation of capital, but transfers the financial risk to someone else.

The capacity to channel capital is not necessarily correlated with the level of risk taken by the bank. For instance, given constraints related to capital requirements, a bank may have more influence as a retailer of investment products than as a lender. The chart below provides an example of asset allocation ('on' and 'off' balance sheet) for a universal bank.

ASSETS OUSTANDING (UNIVERSAL BANK)



STAKES FOR CARBON ACCOUNTING

Many practitioners try to allocate financed emissions to a bank (as an organization) and ultimately to the deposits in order to communicate (e.g. Caisse d'Epargne), set targets (e.g. ASN Bank) or rank banks (e.g. Rainforest Action Network in Canada, Friends of the Earth in France). These approaches lead to major methodological questions regarding boundaries. In the post-bank crisis wave of communication, banks highlight local loops, considering that local deposits finance exclusively local lending (e.g. Credit Agricole advertising campaign in France). On the other hand, NGOs tend to assign the groups' financed emissions (including corporate banking and advisory services) to deposits. Given the impact on carbon intensity, this question will be key for standard organizations.

1) **For network of mutual savings banks, do clients' deposits finance local loans or the whole group's balance sheet?** Pros for local loops include the fact that a local saving bank is independent from the group in terms of ownership and has its own balance sheet. On the contrary, Asset & Liability Management is performed at group level, and network of mutual savings banks are usually evaluated as a group by credit rating agencies.

2) **Should 'off-balance sheet' items be allocated to the bank's deposits?** From a strict accounting perspective, deposits only finance on-balance sheet items. However, one could argue that the savings bank arm is used as a basis to develop asset management, underwriting and other off-balance sheet activities.

• **Performance**. As far as the role of investors in financing the energy transition is concerned, our analysis calls for the integration of at least some off-balance sheet items in the inventory of the financed emissions of a bank. While the allocation of on-balance sheet assets is highly constrained by the structure of its local markets (retail banking), the expertise of its teams (corporate banking), and prudential regulation, the choices of the bank regarding capital allocation is to a certain extent less constrained for asset management and product retailing. Indeed, in this area, balance sheet-like behavior regarding marketing practices and especially the use of benchmarks, seems to play a central role in the misallocation of capital (cf. page §). On the other side of the investment chain, debt issuance and IPOs also offers significant opportunities to influence capital allocation. Indeed, in industries highly exposed to climate issues, such as oil & gas extraction and clean techs, the market is moving fast, paving the way for the development of new specialized teams and changes in league tables.

2.6.3. Obstacles to calculation

In terms of methodology, there is no specific difficulty in including off-balance sheet items beyond those already identified for complex asset types (guaranties, repos, etc.). The main barrier is the accessibility of financial data:

• **In-house.** When the assessment is conducted in collaboration with the bank, off-balance sheet data is accessible through reporting channels. However, in practice, siloism and subcontracting of mandates usually slows down the process and necessitate a higher clearance level.

• **Based on public reporting.** The challenge is much more pronounced when the assessment is based on public reporting. In this case, banks reporting on assets under management is usually limited to total amounts and at most the exposure by asset classes. The amounts related to product retailing are barely mentioned with little detail about the underlying assets. Due to the fact that underwriting is considered a service, reporting is limited to total fees. Given these gaps in reporting, it is therefore almost impossible to apply emission factors to off-balance sheet items. The best-case scenario allows the analyst to estimate an order of magnitude based on the average emission intensity of the asset classes.

• **Based on financial databases.** Another approach, only explored by *Profundo* relies on external data compiled in financial databases such as Bloomberg and Thomson One. This data includes:

- Outstanding amounts held by the bank directly or on behalf of its clients (AM) for listed equities and corporate bonds;
- The inventory of deals in the past decade for equity and bonds underwriting and syndicated loans.

This approach allows for establishing bank rankings based on datasets used by financial professionals. However it requires significant qualitative analysis, does not cover all transactions, and is based on assumptions regarding the allocation of emissions between bookrunners and other banks. In addition it requires an identification of all companies, listed and non-listed, involved in a given business activity. For its global study on coal financing, Profundo identified 40 electric utilities and 30 mining companies covering respectively 51% of coal-fired generation capacity and 45% of coal production.

INCLUDING OFF BALANCE-SHEET ITEMS? SUMMARY OF GHG PROTOCOL/UNEP-FI WORKSHOPS

PRO

Services such as underwriting are essential to company activities so they 'enable' the company's emissions

Underwriting [IPO] is the point of maximum information in the market, and therefore potentially the point of most influence

Financial services can represent a large portion of a FI's revenue stream, and where you are earning money you are responsible

To change behavior in your organization you need to look at the P&L valuation

The guidance should be as comprehensive as possible – all of a FI's activities should be covered

GHG emissions reporting on underwriting can improve transparency in general

CON

They are off-balance sheet activities, so they should be accounted for by the holders of the assets instead

In most cases, like for underwriting, the service company is not directly exposed to a financial risk

There is no clear way to allocate a proportion of the company's emissions to the financial service provider

If service providers have to account for the emissions from the companies to which they provide the service, then this logic should also be applied to other service providers that are equally essential to the transaction, e.g., lawyers, consultants, etc.

2.7. CONCLUSION

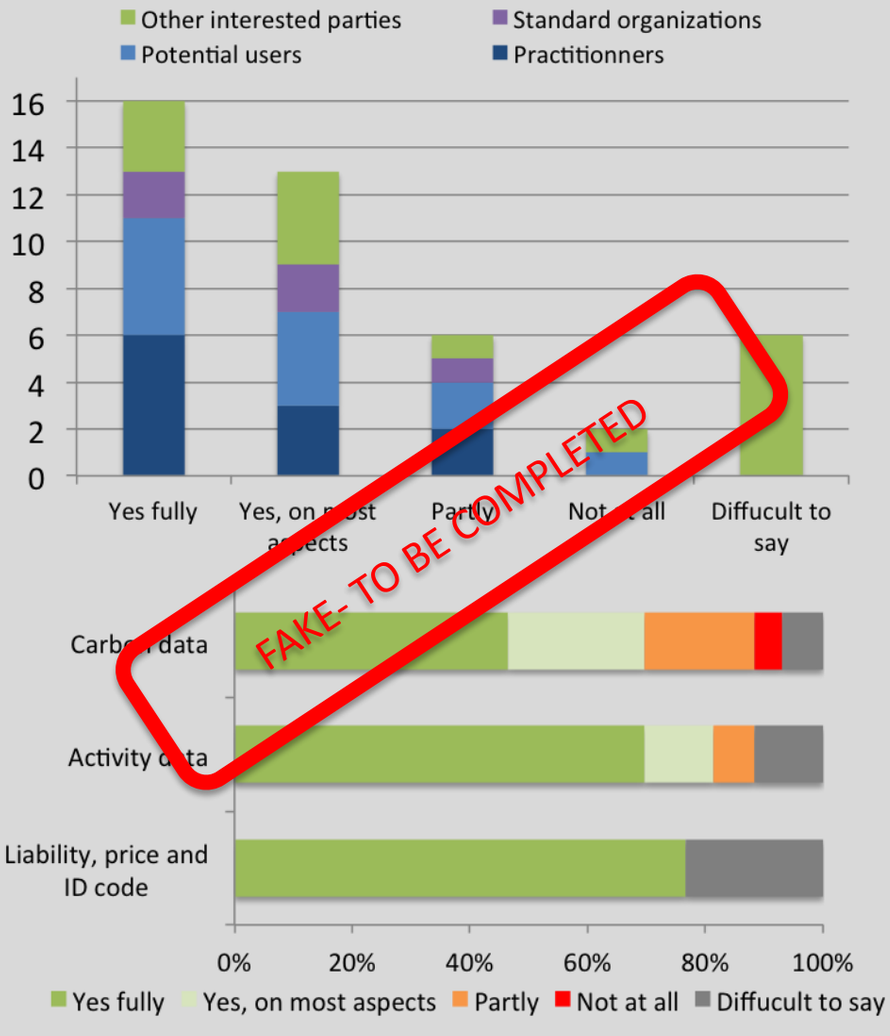
The reviewed accounting principles in sum provide the backbone of consistent financed emissions methodologies, applicable to all industries and all types of assets held by financial institutions.

Our study reveals a great diversity of practices regarding the integration of supply-chain and sold product emissions of investees, and the coverage of non-corporate investees and 'off-balance sheet items' for a bank. Our analysis clearly calls for a comprehensive approach that considers both the carbon risk and climate performance perspective.

In addition, the evolution toward genuine carbon performance and risk metrics will require further methodological development that takes investment horizons into account, fine-tunes the rules allocating emissions to investors, and estimates locked-in emissions. This target is feasible.

REVIEW PANEL VIEWS

Summary Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation



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3. DATA SOURCES

COMMENTS FROM THE PANEL

Country	Scheme
Australia (National Greenhouse and Energy Reporting Act 2007)	Scope 1 and 2 mandatory, scope 3 voluntary, for emitters > 50,000 tCO2e/year, or energy consumption > 200 TJ/year.
Canada (GHG Emissions Reporting Program 2004)	Scope 1 for emitters > 50,000 tCO2e.
France (Grenelle II Bill 2011)	Scope 1 and 2 for companies with > 500 employees
Japan (GHG Reporting Scheme 2006)	Scope 1 for emitters > 3,000 tCO2e/year and > 21 employees.
New Zealand (Emissions Trading Scheme 2008)	Scope 1 for all facilities covered.
United Kingdom (Mandatory reporting on GHG emissions, from 2013 onwards.)	All companies listed on the Main Market of the London Stock Exchange.
USA (EPA GHG Reporting 2009)	Scope 1 and 2 for emitters > 25,000 tCO2e/year.
EU (ETS 2005)	Scope 1 for all facilities covered

In addition to accounting principles, the second pillar of sound finance methodologies is the quality and credibility of data. For 'financed emissions' methodologies, three types of data are particularly pertinent: carbon data and emissions factors, activity data, and liability data. This section will discuss each type of data and associated sources, preceded by a discussion of the taxonomy of calculation approaches.

3.1. TAXONOMY OF CALCULATION APPROACHES

3.1.1. Calculation of the investees' footprint

Three methods are used to assign emissions to an investee:

• **Detailed calculation.** For project finance, the banks usually calculate the footprint using life-cycle emission factors, based on a detailed analysis of the construction and planed operational inputs and outputs in volume.

• **Reported data.** For scope 1 and 2, most practitioners use the data reported by the companies in their annual report or through the CDP. Some of them (e.g. *South Pole Carbon*, *Trucost*), perform plausibility checks and correct mistakes.

• **Estimates with a model.** For scope 3 and non-reporting investees, the emissions are estimated applying *carbon emission factors* to *activity data* reported by the investee in annual reports or through financial databases

- per volume of output (tons of cement, barrels of oil, coal-based kwh of electricity, etc.) or inputs (jet fuel, etc.);
- per $ of revenues/spending by category of industry/product. In this case, most practitioners conduct an in-depth analysis of the activities for each investee and assign several categories to an organization;
- for combination of metrics ($ of sales, $ of fixed assets, staff, etc.) specific to each industry group (*South Pole Carbon*).

A closer look shows that some providers (*Inrate*, *Trucost*, *Cross-Asset Footprint*) actually merge various approaches, filling gaps and/or extending the spectrum to non-reporting investees.

3.1.2. Calculation of the asset lines' financed emissions

The footprint of the investee should be converted to financed emissions per $ of asset held by the investor. Depending on the type of asset and the allocation rule (cf. page §), this can require additional data on the liabilities of the investee and the market price of its shares and bonds (cf. page §).

3.1.3. Calculation of the portfolio's footprint

To consolidate the emissions of a portfolio, there are two approaches:

• **The 'bottom up' approach**, aligned with traditional carbon accounting, is based on the consolidation of reported' emissions, calculated or estimated for each investee financed. In practice, investors face three cases:

- Some assets types are associated with ID codes matching with datasets of pre-calculated financed emissions (e.g. listed equities). In this case the calculation can be automatized for thousands of lines;
- Other asset types (e.g. corporate loans) enjoy a dataset but no standardized ID code, necessitating manual matching.

Datasets of pre-calculated financed emissions (e.g. private equities, loans to SMEs) do not cover all assets. The calculation should thus be performed by the investor based on the activity data available on the individual investee. Practitioners usually provide calculation tools to exploit their model.

• **The 'top down' approach** speeds up the process when there are many lines (e.g. loans to SMEs and households) and fills the gaps where a long investment chain hinder the tracking of the final destination of some asset lines (e.g. shares in mutual funds). The approach relies on specific 'secondary' emission factors (by $ of asset) directly applied to the outstanding amount held by the investor. Emissions factors usually match the categories reported in banks information systems e.g. industry groups for companies, countries for sovereign bonds, and country-specific subcategories for mortgages/consumer loans. This approach is applied by *Cross-Asset Footprint* for local banks partnering with the AFD, *P9XCA* on Credit Agricole CIB and underdevelopment by ASN Bank.

3.2. SOURCES OF CARBON INFORMATION

3.2.1. GHG reporting and CDP data (scope 1 + 2)

• **Listed equities**. Practitioners mainly rely on corporate reporting for data on listed equities. Annual carbon emissions for scope 1 & 2 are disclosed in annual reports and to the CDP (see box §). Financial data providers such as Bloomberg and Reuters (*Asset4*) have included these data in their services. Overall, the practitioners surveyed estimate that about 4,500 listed companies report at least partly their carbon emissions (roughly 40 to 65% of the investment range of most equity managers and 7% of listed companies). This number has doubled since 2008 with slower growth since 2010. Equally, quality-checks lead practitioners to discard or adjust most reported data. *Trucost*, *BofA ML* and *South Pole Carbon* respectively keep reported data for only 500, 1,200, and 3,000 companies for scopes 1 & 2 (description of quality checks processes on page §). After screening, the coverage of reported data represents about 47% of global market capitalization (2011) and an estimated X% of scope 1 and 2 cumulated GHG emissions, but is close to zero for scope 3.

• **Other asset types**. Low reporting levels requires filling the gaps with non-reporting companies' estimates (mostly small caps and emerging markets) and scope 3 emissions. The same applies to other asset classes with little public reporting. In 2010, the GHG Protocol/UNEP-FI and LMI released public sector accounting guidelines focusing on scope 1 and 2 emissions (partly covering financial assets and public expenses related emissions). Scope 3 emissions are optional and no detailed guidance is provided.

3.2.2. Life-Cycle emission factors (all scopes)

Life-Cycle Analysis (LCA) provides emission factors per unit of physical input or output (tons of materials, energy, etc.) for each stage of the life-cycle and therefore each scope. Carbon data exist for virtually every type of product, industrial process and raw material in LCA and carbon databases (see the GHG Protocol/UNEP-FI for a list). *Profundo*, *Carbon Tracker*, *Trucost*, *Inrate* and *Cross-Asset Footprint* use these to calculate energy sector and utility emissions and for some industries reporting sales in volumes (e.g. cement). One of the challenges is that many companies do not report volumes. Overall, our analysis shows that the industries for which this approach is applicable represents about XX% of global market capitalization (cf. page X). *Inrate* extended the use of LCA data to estimate and add sold products emissions for about 100 industries reporting sales in $, pro-rata their relative weight to scope 1 and 2 emissions.

THE STATE OF CARBON REPORTING

In 2012, 4,112 companies, acting on behalf of more than 650 investors, reported to the CDP including listed, private and public companies (although CDP takes only limited data from private companies) . According to the CDP, listed companies reporting scope 1 and 2 emissions represent respectively 48% and 47% of total global market capitalization. The disclosure rate reaches 80% in London, 77% for the Deutsche Borse, 71% for Euronext, 63% for the NYSE. It is also high for large caps indices such as the S&P (65%%) and the Stoxx 600 (81%).

However disclosure rate are lower for 'emerging stock exchanges': it is limited to 38% for the Nasdaq, 39% for Brazil, 10% for Hong Kong, 0% for Shanghaï and Shenzen.

Among Global 500 companies, 46% reported scope 3 emissions in at least one category, however, almost no company covers all scope 3 emissions in line with the GHG Protocol/UNEP-FI guidance.

(graphs: coverage per sector and index)

3.2.3. EEIO models (scopes 1 + 2 + 3 upstream)

Environmentally-Extended Input/Output (EEIO) models quantify the economic exchanges between industries in a national economy in order to calculate the carbon emissions per $ of revenue for each industry or product category (cf. chart below). These emission factors include cradle-to-gate emissions (scope 1, 2 and 3 upstream) but exclude the use of sold products. Trucost and Inrate both use the U.S. 550 sectors model to estimate the emissions for non-reporting companies and supply chains. *Cross-Asset Footprint* also uses them to estimate the emissions from central government spending (for sovereign bonds), households spending (for consumer loans) and SMEs. In each case, the original model is corrected to reflect changes in price levels and the carbon intensity of electric power. In addition, Inrate has chosen to merge certain categories that are not reflected in the diversity of listed companies activities. The output is a set of emission factors for 450 to 550 categories (industries, product or technology). For each category, the emission factor is not a single number: it is broken-down in 500 categories representing the indirect expenses in each industry across the supply chain. This 'traceability' allows for an adaption of the model to local energy-mixes (cf. page §) and the identification of multiple-counting (cf. page §).

3.2.4. Regression models (scope 1 +2)

In 2010, South Pole Carbon introduced a new mathematical approach to derive emission factors from the carbon data reported by the available sample of listed companies (cf. 3.2.1). The core principle is based on an identification of the correlations between the carbon footprint reported by companies (on scope 1+2) and their activity data, in each industry-group. In 2013, BofA-Merrill Lynch took up this core principle with different types of variables.

- South Pole Carbon's approach is based on a core set of 10 types of activity data ($ of sales, assets, number of employees, cost of goods sold, etc.) and some industry-specific metrics. For each of the 150 industry groups, their model provides a formula to estimate the non-reporting companies footprints based on a weighted combination of these activity data (see example below). If the company does not report on some activity data, an alternative, less-precise formula is available.
- The BofA ML model is based on a breakdown of each company revenues by SIC activity (1,000 categories). Based on the carbon footprint reported by a sample of companies, they estimate carbon intensity factors per $ of sales for each SIC activity. The values for electric utilities are corrected based on the primary energy mix. These emission factors can then be used to calculate the emissions for non-reporting companies, based on the breakdown of their revenues by SIC activity.

According to BofA ML and South Pole Carbon, these approaches significantly reduce the deviation between estimated emissions and data reported by companies, relative to models based on EEIO data. However, given the poor level of reporting on scope 3, this approach cannot be extended to supply chain and sold products emissions in the near future.

FIG. § . HOW DO REGRESSION MODELS WORK?

Sources: 2°ii

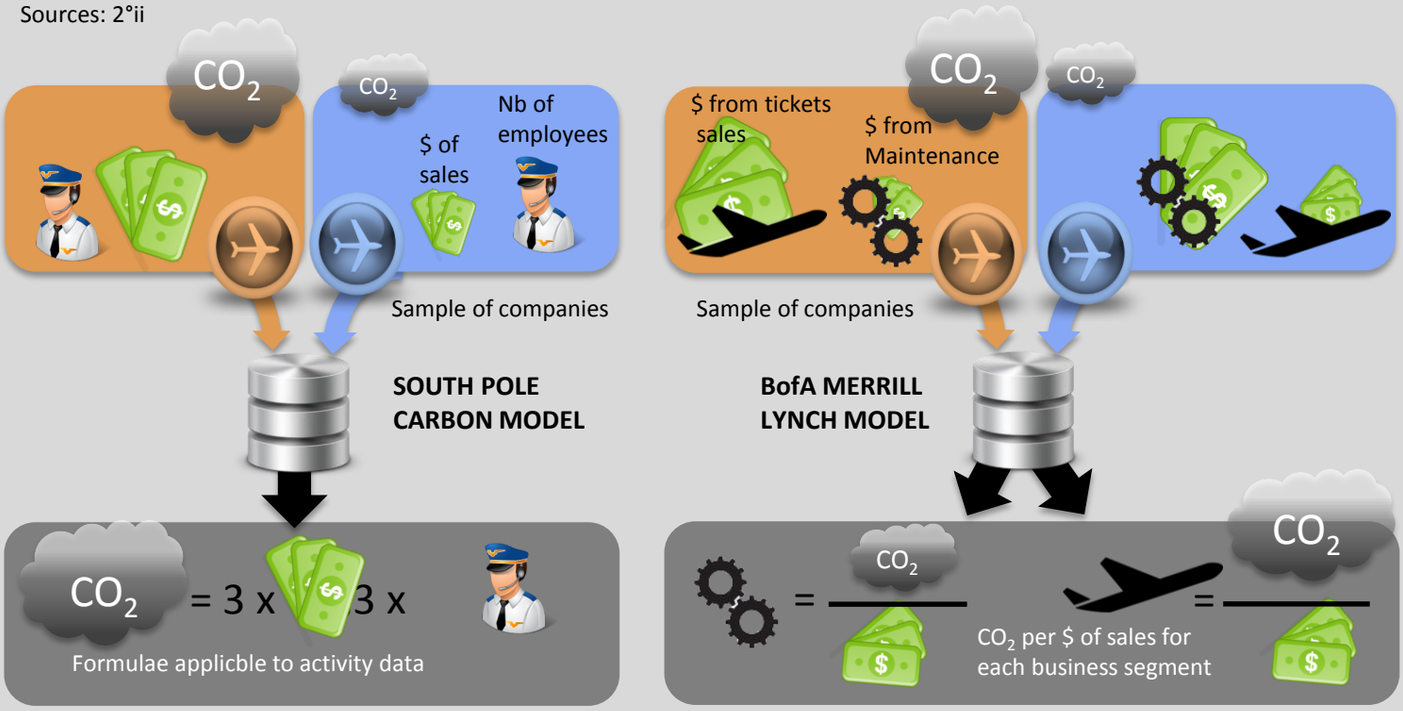
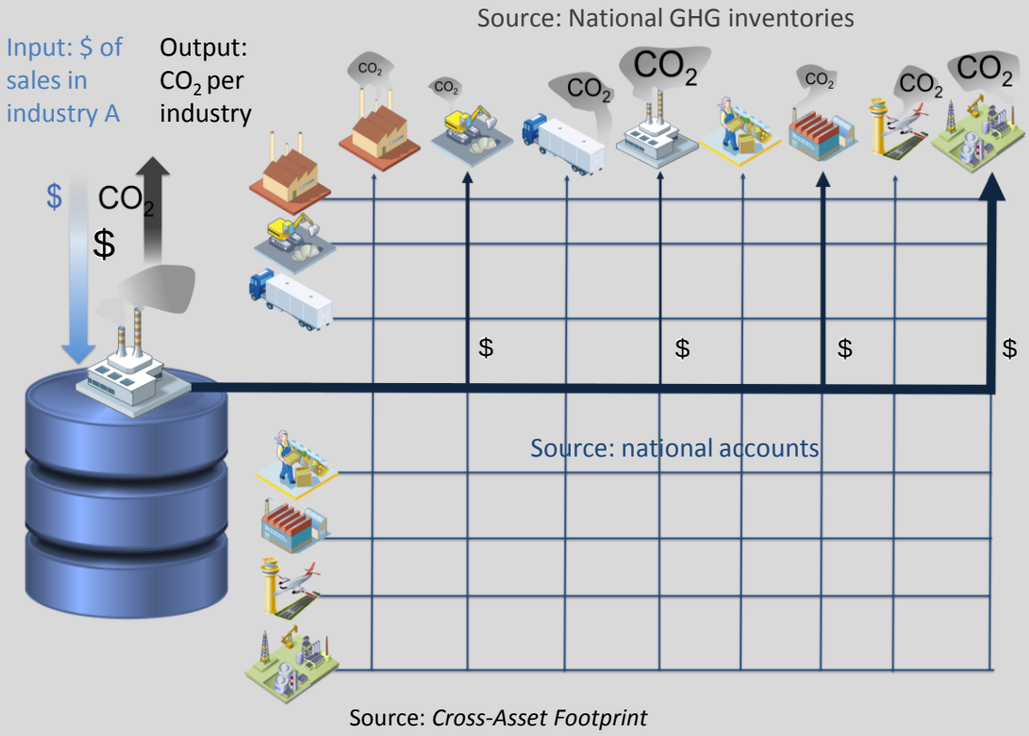


FIG. § . HOW DO EEIO MODELS WORK?

Monetary input-output (IO) tables give insight into the value of economic transactions between different sectors in an economy, including output for exports, capital formation and final government and private consumption. They allow for calculating the added value that each sector contributes to the final output of an economy. Such monetary IO tables can be 'extended' with environment-related information for each sector, such as its GHG emissions.
Source: European Commission



Source: *Cross-Asset Footprint*

3.2.5. Macro-sectors emission factors (all emissions, scope concept not applicable)

The P9XCA methodology (cf. page §) directly calculates emission-intensity factors per € of asset outstanding by country. The national inventories of the UNFCCC provide GHG emissions by source (fuel use in transport, changes in land use, etc.). Emissions are categorized by nine macro-sectors (agriculture and land use, construction and housing, energy, industry, transport, services, waste management, public administration, others) based on the respective risk exposure to an increase in carbon costs. Then, the emission intensity by € of added value is calculated based on data by industry provided by OECD and UN. Finally, based on Eurostat data on debt and equity outstanding by € of added value in each industry, the emission factor by € of asset is calculated for 10 countries. These factors are extrapolated to other countries to determine emission factors for 15 geographic zones relevant for the bank (France, Africa and Middle East, etc.).

3.2.6. Getting country-specific carbon emission factors

The need to adapt a model to various regions occurs when GHG emissions factors are applied to estimate the emissions of local investees (for loans to SMEs, private equity, etc.) or to correct the bias related to the use of the US model at local level.

- A first approach, described above, is based on the construction of country-specific factors from GHG inventories and economic accounts. However, this approach is limited due to issues with the availability of data for industries balance-sheets and the quality of inventories and national accounts.

- Another option is to correct a single model (usually based on the US economy) for use at global level (for multinationals). Trucost and Inrate both align the carbon intensity of electricity with the average primary energy mix at the global level in order to recalculate the emission factors for both scope 1 emissions of electric utilities and the scope 2 and 3 emissions of other industries. Cross-Asset Footprint applies the same methodology to estimate country-specific factors. These approaches assume that the structure of exchanges between industries, and price levels are similar to the US economy, which is obviously not the case in many countries. Cross-Asset Footprint also experimented with the correction of purchasing power parities, but the results were not satisfactory.

- A last option, currently pilot-tested by Cross-Asset Footprint® is to directly use local EEIO models. EEIO models exist for 40 countries including most OECD members with industry taxonomy ranging from 40 to 150 industry-groups.

3.2.7. Beyond carbon emissions…

• **Data availability and quality.** The sources of carbon data and emission factors also cover other types of environmental, economic and social outputs:

- The US EEIO model includes about a 30 different outputs (fig. §). Other models generally are much more limited, but generally cover primary energy consumption, air pollutants and economic activity;
- Companies report on hundreds of outputs in their sustainability reports, however the information is usually not comparable from one company to another, even in the same industry. Financial data providers like Thomson Reuters (Asset4) and Bloomberg collect and normalize data for various indicators, covering 2,000 to 5,000 companies.
- In addition, for certain sectors reporting on physical outputs (see page §), it is possible to apply life-cycle impact factors.

On this basis, it is therefore possible to calculate the 'financed outputs' for a wide range of topics: toxic releases, water consumption, impact on land use, job creation, contribution to the GDP, etc. However there are two major limitations:

- 'Environmental' coverage is much lower than for carbon emissions;
- For many environmental issues, the impact depends not only on the volume of output released but also on the sensitivity of the ecosystems: water withdrawals will have higher impacts per m^3 in water scarce regions. The same applies to job creation and economic impact.

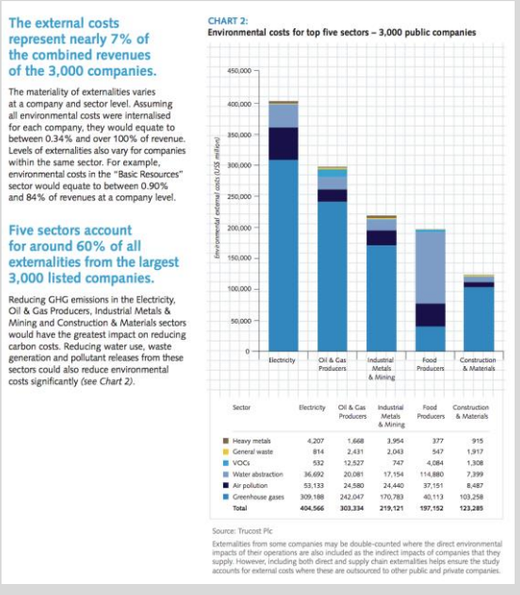
• **Practices.** Among 'financed emissions' data providers reviewed, only *Trucost* integrates most outputs available in the US EEIO model. Based on our research the use of such data by banks is minimal. The review of SRI funds (available to French investors) by Novethic in 2012 identified seven funds reporting on "scope 1" for water consumption (Pictet), energy consumption (La Financière Responsable), and job-related indicators (Pictet, Banque Postale AM, OFI, BNP Paribas, Allianz). From a risk management perspective, the extension to energy might make sense to assess risk exposure related to market price increases and fuel taxes.

• **From impacts to external cost assessment.** Going further, *Trucost* applies conversion factors to its footprint calculations, estimating the external costs of companies operations (including scopes 1, 2 and supply chains). The results are compared with the profits and the global cost of environmental externalities. Since 2010, *Trucost* publishes a report with the Principles for Responsible Investment (PRI) and the UNEP-FI on this topic (fig §).

The 'social cost' of CO_2 is $85 per ton (about $4.5 tn for global emissions in 2008), based on the discounted future cost of global warming estimated in the Stern Review. For other impacts, *Trucost* applies average values from TEEB studies. For 2008, *Trucost* concludes that the top 3,000 companies external cost amounts $2.15 Tn or 1/3 of the global external cost of human activity. About 2/3 of the total cost comes from GHG emissions.

To date this type of indicator has been mostly used to publish studies, and occasionally by some companies like Puma, which published an 'environmental P&L' In addition, *South Pole Carbon* applies the cost of offsetting emissions, i.e. the cost of reducing the equivalent amount of GHG today. Naturally, one of the challenges of these approaches is 'quantifying' and/or pricing these factors (e.g. water in different regions).However, it can potentially be useful to assess the tort cost in the context of climate litigation (cf. page §).

Outputs of the US EEIO model
Primary energy (Coal, gas, Oil, Biomass, Waste, renewables)
Air pollutants (CO, NH3, Nox, PM10, PM2.5, SO2, VOCs)
Hazardous waste (To air, water and land)
Toxic releases (Rail, truck, pipeline, water)
Water withdrawals
Transportation
Land use (ha)
Economic activity (Value added, taxes, wages, profits, indirect impact))



The external costs represent nearly 7% of the combined revenues of the 3,000 companies.

The materiality of externalities varies at a company and sector level. Assuming all environmental costs were internalised for each company, they would equate to between 0.34% and over 100% of revenue. Levels of externalities also vary for companies within the same sector. For example, environmental costs in the "Basic Resources" sector would equate to between 0.90% and 84% of revenues at a company level.

Five sectors account for around 60% of all externalities from the largest 3,000 listed companies.

Reducing GHG emissions in the Electricity, Oil & Gas Producers, Industrial Metals & Mining and Construction & Materials sectors would have the greatest impact on reducing carbon costs. Reducing water use, waste generation and pollutant releases from these sectors could also reduce environmental costs significantly (see Chart 2).

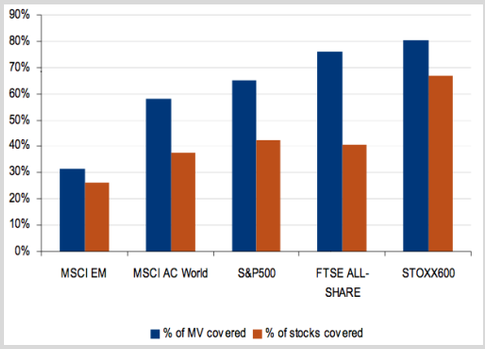
CHART 2:
Environmental costs for top five sectors – 3,000 public companies

Sector	Electricity	Oil & Gas Producers	Industrial Metals & Mining	Food Producers	Construction & Materials
Heavy metals	4,207	1,668	3,954	377	915
General waste	814	2,431	2,043	547	1,917
VOCs	532	12,527	747	4,084	1,308
Water abstraction	36,692	20,081	17,154	114,880	7,399
Air pollution	53,133	24,580	24,440	37,151	8,487
Greenhouse gases	309,188	242,047	170,783	40,113	103,258
Total	404,566	303,334	219,121	197,152	123,285

Source: Trucost Plc

Externalities from some companies may be double-counted where the direct environmental impacts of their operations are also included as the indirect impacts of companies that they supply. However, including both direct and supply chain externalities helps ensure the study accounts for external costs where these are outsourced to other public and private companies.

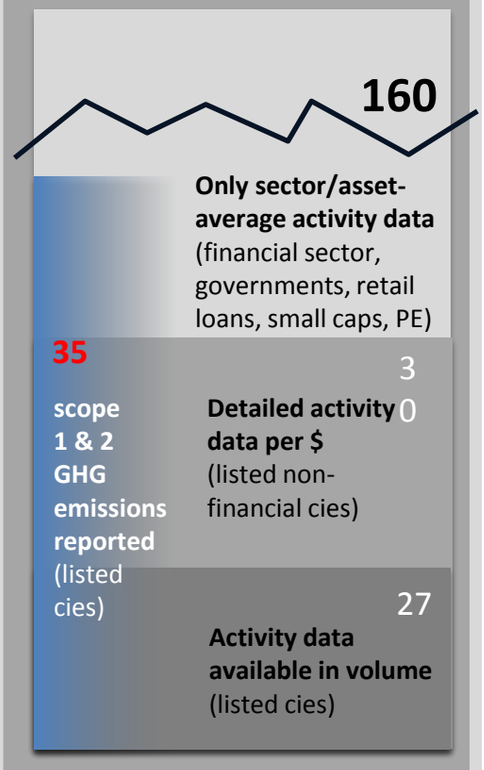
Level of disclosure in stock indexes



Source: BofAML

GLOBAL AVAILABILITY OF ACTIVITY AND CARBON DATA FOR FINANCIAL ASSETS

In $Tn of financial asset outstanding (equity + debt) 2011. Source: 2°ii



3.3. SOURCES OF ACTIVITY DATA

3.3.1. Overview of practices

The application of carbon emission factors to estimate the emissions of an investee requires an analysis of the investee's activity. The type of activity data needed depends on the format of the emission factors used:

- Life-cycle emission factors require process-based data (e.g. tons of coal consumed) or outputs, in volume (e.g. sold cars per type, barrels of oil, kWh, passenger/km, etc.);
- Emission factors based on EEIO and Inverse Distance-Weighted Interpolation models (Cf.page §) require a breakdown of the $ of sales or expenditures by category (industry and/or product).
- The regression model developed by South Pole Carbon use various activity metrics ($ of sales, assets, cost of goods, etc.) available in the Bloomberg database.
- Finally for the financial sector, the carbon footprint (including financed emissions) is correlated with the assets held by the investee rather than revenues, it therefore requires the breakdown of assets held.

Several approaches are used to perform the analysis. All of them are applicable to listed non-financial companies (cf. chart §), but the options are much more limited for other types of investees such as central governments for sovereign bonds; SMEs and households for retail loans; and financial sector's equities and bonds (cf. chart §). In addition, several practitioners developed approaches based on the application of emissions factors per $ outstanding of asset held by the investor in an industry or asset class, to get estimates quickly and identify hotspots (*P9XCA*, *Cross-Asset Footprint*).

3.3.2. Reporting in volume of output (non-financial companies)

Several industries report in a way that allows the application of life-cycle emission factors (cf. page §) to determine scope 1, 2 and 3 emissions:

- Producers of raw materials with relatively homogeneous carbon intensity, such as fossil fuel extraction, mining, cement, steel, etc.
- Industries such as airlines, car manufacturers and electric utilities provide enough data to determine the carbon intensity of sales in volume.

Our estimates show that overall this category represent 15-20% of listed companies' total assets, and about X (scope 1 and 2) to X% (all scopes) of their total footprint.

3.3.3. Reporting per $ of sales by product category (non-financial companies)

Listed companies are not legally required to report the breakdown of their sales by product category or activity, and practices in this area are not standardized, even if various classification systems exist.

To match the companies activity data with the categories of their EEIO models, *Inrate* and *Trucost* perform in-house segmentation analysis. *Trucost* and Inrate respectively cover about 3,600 and 2,800 non financial companies. *BoA Merrill Lynch* uses the segmentation analysis provided by Worldscope (Thompson Reuters), based on 1,000 SIC categories. Since the segmentation analysis is not initially performed with the purpose of applying GHG emission factors, it requires a fine tuning for electricity production and ten other industries.

3.3.4. Assignment of single industry-group to companies

Due to the limited size of the teams or the restricted coverage of financial databases, relevant detailed activity data are not available for most listed companies, not to mention the SMEs financed by private equity funds and retail loans. In these cases, practitioners should exclusively rely on the industry-group assignment of the company.

• **Listed companies** are classified in industry-groups. Four classifications are widely used: the Global Industry Classification Standard (GICS) developed by MSCI and S&P, the Industry Classification Benchmark (ICB) launched by Dow Jones and FTSE, Thomson Reuters' Business Classification (TRBC) and Bloomberg Business Classification System (BICS). The most detailed level (level 4) includes 115 to 150 categories. They are pretty similar but ICB and TRBC distinguish renewable energy in the energy sector. The assignment of the companies are available in financial databases.
Based on the sample of companies covered by reported data or detailed assessment, the practitioners are able to calculate industry-group average intensity factors for several denominators ($ of revenue, $ of equity, $ of asset, number of employees, cost of goods sold, etc.).
These emission factors are used by *Cross-Asset Footprint*, *Trucost* and *South Pole Carbon* to extend the investment spectrum. In this way, *South Pole Carbon* has tested correlations for various indicators to determine the most appropriate combination of variables for each industry group (cf. page §). They therefore use an in-house taxonomy based on GICS, BICS and ICB and additional sectors.

• **Private companies** are assigned a code, based on the national taxonomy. The assignment is available in financial institutions' internal reporting systems. National taxonomies are usually derived from or expressed with international ones such as the NAICS (2,000 categories) and SIC (1,000 categories) in the US, NACE (615 categories) in Europe and the UN's ISICS (161 categories). The EEIO models provides emissions factors per $ of revenue that can be matched with classifications, but this requires a reprocessing of data. On this basis, practitioners using these models (*Trucost*, *Inrate*, *Cross-Asset Footprint*) are able to estimate the carbon footprint of SMEs, based on their revenues and industry assignment, and allocate emissions to an investment line, using data on the SMEs' liabilities (cf. page §). *South Pole Carbon* can also directly apply its model to SMEs based on specific activity data.

However, standard data stored in banks' information systems regarding loans to SMEs are usually limited to $ of assets outstanding (equity or debt), not the revenues. To overcome this barrier, *Cross-Asset Footprint* computes national statistics on companies balance sheet data in order to provide industry-average emission factors per $ of asset outstanding and thus estimate emissions for loans to SMEs. *P9XCA* applies a similar approach for all companies with a lower level of granularity (9 groups).

CALCULATION TOOLS FOR SMEs

South Pole Carbon/ESG Analytics

Cross-Asset Footprint

3.3.5. Overview of activity data for other types of investees

Most methodologies and datasets are primarily designed for non-financial companies. Similarly, the GHG Protocol/UNEP-FI provides guidelines to calculate and allocate corporate emissions to equities and debt, but not for other types of investees and financial assets.

• **French cross-asset guidelines**. In 2007, in the context of the Caisse d'Epargne project (see page §), the EEIO-LCA hybrid model developed by Inrate has been adapted to apply the emission factors to other types of investees: the related accounting rules have been developed, published and endorsed by the French environmental agency (see page §). In 2010, a working group lead by the consultancy Utopies and involving five French banks fine tuned this approach to evaluate the financed emissions of banks, on the basis of assets outstanding. This methodology is now deployed by Cross-Asset Footprint to rate banks' assets (see page §). In these approaches the precision of segmentation is weaker than what is applied to non-financial listed companies, due to the lack of appropriate activity data. However, the carbon intensity of sovereigns and retail loans is much lower than for corporate portfolios, so this lack of precision does not necessarily impact the accuracy of the consolidated footprint calculation (see page §). The only exception is investments in the financial sector, which are both carbon-intensive (including financed emissions) and only for which calculations are based imprecise activity data (assuming assessment based on public reporting).

• **Other extensions.** P9XCA also cover sovereign bonds, applying one of its 9 macro-sector emission factors. Other practitioners including Trucost, ASN/Ecofys and VfU are currently developing their own approach to extend footprint measurement beyond the corporate sector, especially to sovereign bonds. The methodologies being not finalized and tested yet, the activity data are not analyzed in this report. Unless otherwise specified, the following pages are therefore based on the French framework described above.

3.3.6. Data for sovereign debt

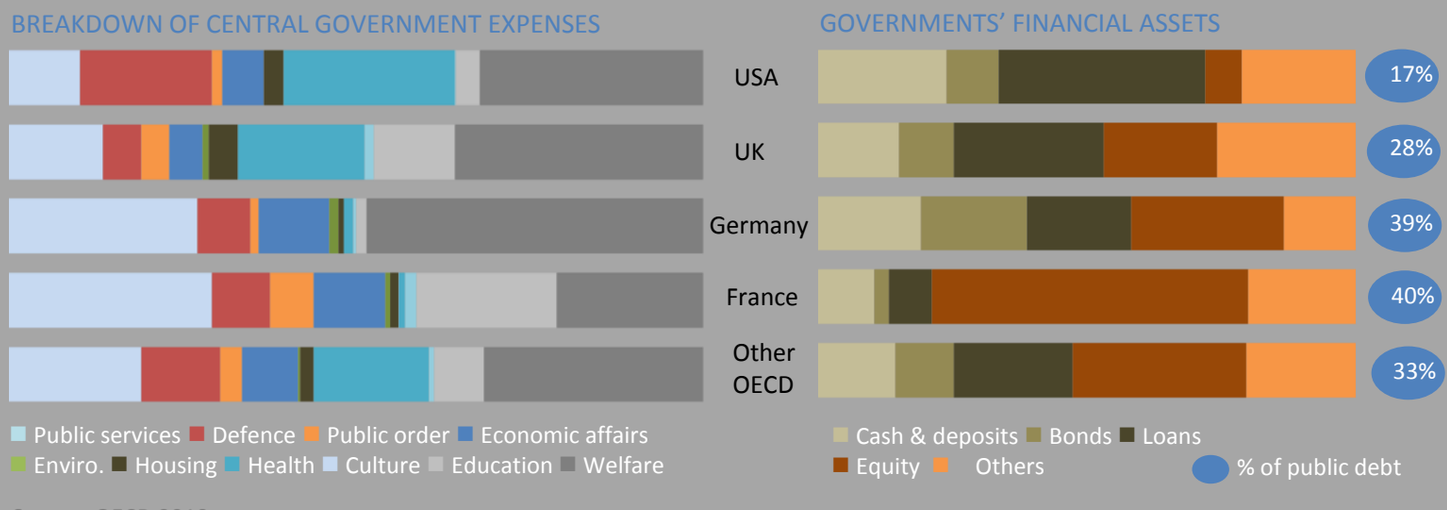
The methods developed for sovereign debt are aligned with practices for companies: they are based on the emissions of the organization financed, e.g. central governments (see page §). Three approaches have been identified:

• **Application of ratios**. *ASN/Ecofys* use carbon data reported by the Dutch government (scope 1+2) and extrapolates results to other countries based on the ratio of government officials to total workforce per country (cf. page §).

• **Military expenditures.** In *P9XCA* model, governments' footprint are exclusively based on military direct emissions from national inventories, other governmental emissions being allocated to the transport and construction sectors.

• **Segmentation analysis**. In CAF framework (covering scope 3 and financed emissions of the investees), the main sources of emissions are government expenses and their financial assets. The related activity data are reported by international organizations in a standardized format at sector level (cf. chart below). To get more precise data, with a level of aggregation consistent with EEIO taxonomies (40 to 500 categories), it is necessary to analyze financial reporting from each country. At this level, the taxonomy used is in most cases country-specific, as well as the language.

FOCUS §. ACTIVITY DATA FOR CENTRAL GOVERNMENTS



Source: OECD 2010

3.3.7. Data for mortgages and consumption loans

Similarly, *CAF* methdology for retail loans is based on the annual scope 3 carbon footprint of the residence (mortgage, housing loans, real estate), car (car loan) or household's current expenses (consumer credit, revolving loans, credit cards, etc.) – cf. page §. The activity data required relates to the average characteristics of residences (size, type, type of heating, value), cars (type, average annual mileage, value) and expenses (types of goods, use scenario, value). The guidance allows three ways to analyze activity data:

- The preferred way is a bank-specific analysis of the assets and expenses financed based on internal reporting. Credit lines are in many cases associated with claims on property or insurance that allows the bank to collect detailed information on the collateral. For credit lines associated with credit cards, it is also possible to analyze spending (cf. page §);
- A second way is based on customer surveys;
- Finally, the latest approach is based on market surveys and national statistics about housing, cars sales and household spending. This latest approach is the only one that has been applied at large scale to date. It is also currently tested by ASN for mortgages.

3.3.8. Activity data for financial institutions

Financial institutions (banks, insurers, mutual funds) represent a major part of global financials assets: about XX% of global market capitalization and 80% of corporate bonds and other securitized debt outstanding. Paradoxically, most calculation methodologies do not assign 'financed emissions' to financial institutions resulting in measured emissions about 700 times lower than the scope 3 footprint calculated for portfolios holding similar financial assets.
The reason for this inconsistency is twofold:

- The emission factors of financial institutions in the various models do not take into account financial assets held but only the impact of offices.
- Emission factors per $ of sales cannot be matched with activity data reporting in the P&L. Indeed, given the volatility of financial markets, the correlation between incomes derived from a service and the underlying footprint is too weak in the real economy.

The only way to proceed is therefore to consider financial institutions as 'investment portfolios' and use balance sheet data (breakdown of assets), instead of P&L data.

• **Using internal data.** If the calculation is conducted in collaboration with the financial institution, using internal data, the method for multi-asset portfolios is applicable. Then, the main barriers are threefold:

- Associating certain lines of the balance sheet, such as impairments or repurchase agreements, with investees in the real economy (cf. page §);
- Converting the value accounted on the bank's balance sheet (asset) to the value accounted on the investee's balance sheet (liability) – cf. page §;
- Getting the activity data or proxies for all the investees inventoried (thousands to millions depending on financial institutions).

Using a methodology specifically developed for banks' assets, average factors, and a software to deal with the 'box in the box' effect and large number of lines (cf. page §), *Cross-Asset Footprint* partly overcomes these barriers.

• **Using reporting.** Reporting is far more difficult when the assessment is only based on publicly reported data. In some countries, the enforcement of Basel II has led the banks to publish their gross exposure per asset type and industry group, allowing the application of industry-average emission factors (cf. page § and example on the right). But in most countries, reporting is limited to asset-class level. This is also the format of information available in financial databases, which only allows for estimates of orders of magnitude. The same applies to other types of financial institutions such as insurers.

TRACKING EXPENSES BEHIND CONSUMER CREDIT

South Pole Carbon Credit Card

TO BE COMPLETED

EXAMPLE OF PILAR III DISCLOSURE

AVERAGE ASSET ALLOCATION OF FINANCIAL INSTITUTIONS

BANKS

INSURERS

TO BE COMPLETED

PENSION FUNDS

PROFUNDO SEGMENTATION ANALYSIS OF FIXED ASSETS

TO BE COMPLETED

• **Using financial databases**. Balance sheet data provided by professional services such as Thomson Reuters or Bloomberg reflect the poor level of reporting on the underlying activities financed by the financial sector. As an alternative way, Profundo uses data reported on deals (underwriting, syndicated loans, etc.) and company's shareholding to get an (albeit incomplete) picture of the bank's investments in fossil fuels (coal mining and coal-fired power plants or oil & gas extraction for instance), including both on-balance sheet and off-balance sheet items (cf. page §). However, this approach has not been applied to all industries and assets.

Hence, it is already possible for a financial institution to assess its own balance sheet. But proxies should be used to assign emission factors to investments in the financial sector since only a small part of financial institutions report sufficient activity data on their assets.

To date, the attempts to evaluate the carbon footprint of banks or other financial institutions have been limited to the publication of rankings at country-level (see page x) and a few pilot tests conducted by French banks. But pilot projects have begun in the Netherlands (ASN Bank) and Germany (VfU).

3.3.9. Data available on forward looking and historical items

Most methodologies are based on annual emissions. However, our analysis shows that it is worth including 'locked-in' emissions from both a risk and performance perspective, as well as the cumulated past emissions to assess climate litigation risks (at least from the first IPPCC report in 1990). In these cases, the assessment should obviously entirely rely on the application of emission factors to the relevant activity data.

• **Historical data.** As far as past emissions are concerned, the activity data required include by decreasing order of accuracy: the production in volume, the turnover and the assets outstanding. Only a limited number of carbon-intensive concentrated industries are potentially concerned by climate litigation risks (cf. page §). Practically, these data are almost never available before the year 2000 in financial databases and reports. Thus, an analyst needs to dig into the companies records to elaborate estimates prior to 2000. Some providers supply GHG data time series (e.g. *South Pole Carbon* going back to 2005).

• **Physical assets.** A more accurate segmentation of the companies' activities and the assessment of locked-in emissions, requires information about the physical assets of the companies in exposed industries (cf. page §). From an accounting perspective, they could be fixed assets in the case of power plants for instance, intangibles in the case of extraction permits for energy companies, or the R&D pipeline of auto manufacturers. Financial databases and financial reporting only provide amounts per accounting category. Beyond the energy sector, determining the extract breakdown and the lifetime of assets requires qualitative research and estimates.

• **Capital and R&D expenditures.** The same applies to new investments, however, the news coverage in the financial and professional press or the annual reports can help to get better estimates. On the other hand, no methodology exist to allocate GHG emissions to R&D expenditure.

Overall, our review show that to date, among practitioners, the methodology of *Profundo* is the only which includes in-depth, regular segmentation analysis based on physical assets and capital expenditures.

3.4. SOURCES FOR LIABILITY DATA, PRICE AND ID CODES

3.4.1. Overview of difficulties

The application of the "equity share approach" does not require much data on the companies liabilities, since 100% of emissions are allocated to equity investors. However, the situation is more complex when the "share of investment" (equity + financial debt) approach is applied:

• **Allocation to equity and debt**. It is necessary to access specific data on the value of investees' liabilities to assign emissions to equity and debt investors. They are usually not covered by portfolio reporting and require access to financial databases.

• '**Book-to-book' conversion.** In the case of securities (equities and bonds), conversion issues also add complexity to the assessment process. Indeed, for a given proportion of equity or financial debt, the value accounted in the investors' books does not match with the value accounted in the investee's books:

- in the investors' books, the securities are accounted at their historical cost (price of acquisition) or their fair value (i.e. market value at balance sheet date) depending on the reporting format.
- In the investee's books, the value accounted (called 'book value' for equities and 'face value' for debt) is the amount initially received for equity plus retained earnings and the outstanding debt for bonds.

To match these figures, it is therefore necessary to get data on the date of acquisition of securities, the investees liabilities and the market price of the securities at the relevant date.

• **Matching**. For large portfolios including hundreds to thousands of securities, it is necessary to match the lines with the GHG emission data on the investees. For practical reasons, this process requires an identification code. The ISIN (International Securities Identification Number) uniquely identifies a security (equity or bond) and thus the issuer. Other identifiers are also used by *Trucost*, *South Pole Carbon* and *Camradata* including but not limited to SEDOL, CUSIP, Valoren, Reuters' and Bloomberg's. In most countries SMEs are also identified by a unique code.

3.4.2. For listed and private companies

For issuers of listed equity and bonds, financial databases such as Thomson Reuters, Bloomberg and Factset provide the required information on liabilities, market price and ISIN codes. Access is expensive however, especially for bonds (see page §). For private companies, business intelligence databases exist at country level in most developed countries and include liabilities and IDs. To date most tests conducted on SME loan books and private equity funds by practitioners relied on industry-group average data rather than company-specific.

3.4.3. For loans to households

For mortgages, car loans and consumer loans, the approach can only rely on sectors' average emission factors per $ of asset. The amount accounted in the bank's books is the amount due by the client.

3.4.4. For sovereign bonds

The IDs and market price data for sovereign bonds are available in fixed-income databases just as for companies. Liability data are reported in annual accounts and available in international databases such as the OECD or Eurostat.

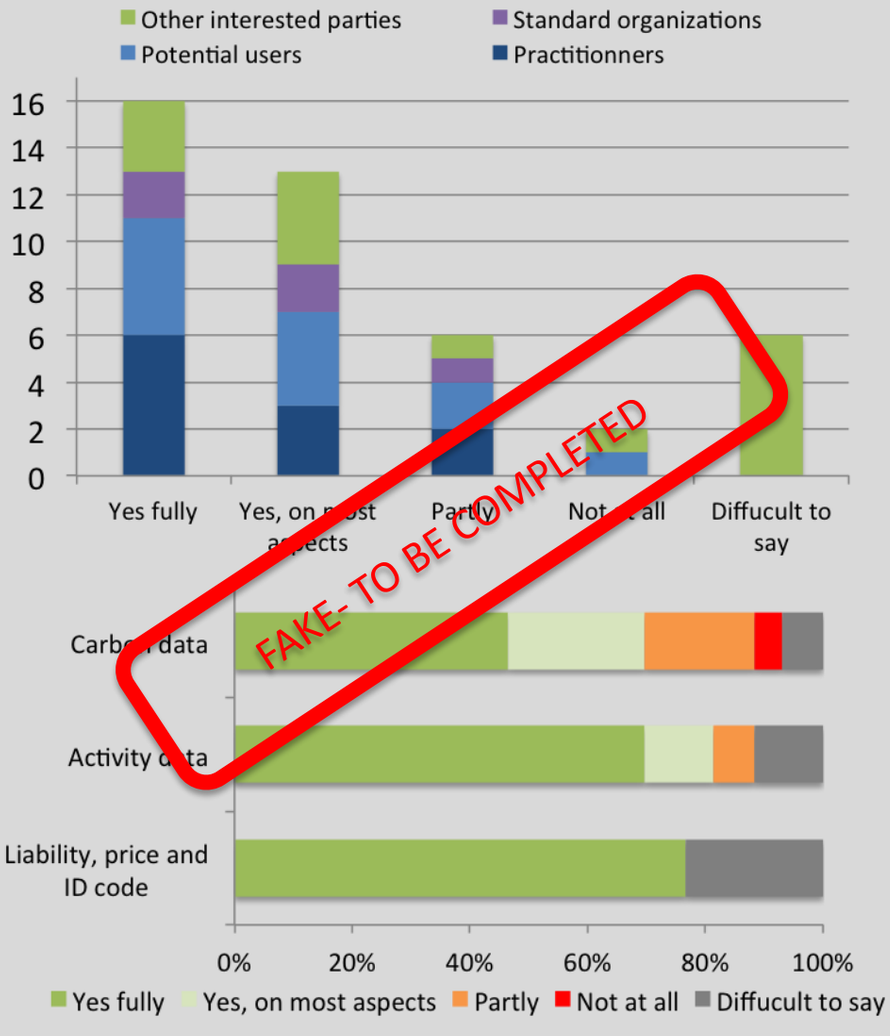
3.5. CONCLUSION

Despite past progress, corporate reporting only covers 50% of total market capitalizations for direct and electricity-related GHG emissions. Gaps remain for supply-chain and sold products emissions, small companies, and all other investees (governments, households, etc.). However, the various modeling techniques developed over the past seven years allow methodologies to fill the gaps and estimate annual financed emissions for all types of investees, covering all emissions sources.

To date these models are not able to capture all past and future emissions in a comprehensive way. Gaps remain also for complex assets such as derivatives. Thus, current trends show that there is still a lot of room for improvement. We are just at the beginning of the innovation curve.

REVIEW PANEL VIEWS

Summary Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation



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4. PRACTICAL ISSUES

MAIN CONCERNS

GHG Protocol/UNEP-FI SURVEY

"Beyond methodological concerns, the main practical challenges identified by the GHG Protocol/UNEP-FI survey are:
- *data availability and quality,*
- *time and resources required and*
- *clients confidentiality."*

This chapter highlights a number of practical challenges associated with developing 'financed emissions' methodologies and some of the specific issues the reviewed methodologies have faced in elaborating and applying their individual metrics. These issues include the level of uncertainties, frequency of updates, confidentiality, costs and timeframe.

4.1. LEVEL OF UNCERTAINTIES

Uncertainties are associated with the relevance of the indicator (cf. page §) and the choice and use of the methodology. This section looks at the desired level of precision and different practices to evaluate errors on estimates. It then looks at the magnitude and sources of the error and provides some preliminary conclusions on 'best practice'.

4.1.1. When is precision needed?

The need for precision depends on the way the information is used to inform investment decisions: for stock selection, industry-group weighting or allocation by asset-class and sector (see page §).

- **To inform stock-picking and client selection** the level of precision is crucial in industries with low dispersion between companies. Stock-picking based on carbon data makes sense only in industries facing a challenge related to carbon intensity: improving their contribution to the energy transition or managing policy risk (see page §).

- **To compute the footprint of a portfolio** looking for precision on items in categories with low carbon intensity will generally not change much. Themed investments (e.g. tech funds) or investments that are blank in CO2 intense sectors may however still be affected, although we do not consider them material. Equally, it is important to focus on sectors with high carbon intensity and to have precise numbers especially if the size and diversification of the portfolio does not provide an averaging effect between companies. Carbon intensity at the portfolio level is often used by investors as a proxy for climate risk or performance (even if it is not always a relevant metric - cf. page §). Based on this analysis, table § (page §) provides a snapshot of the hotspots for which a good level of precision is required.

In addition, policy makers and economists may want to calculate the order of magnitude of financed emissions in order to compare the climate impact of the whole financial sector (i.e. extended sum of portfolios) with that of other sectors. Here, any systematic deviation of the underlying model will be key insofar as absolute numbers are concerned (global emissions vs. ranking).

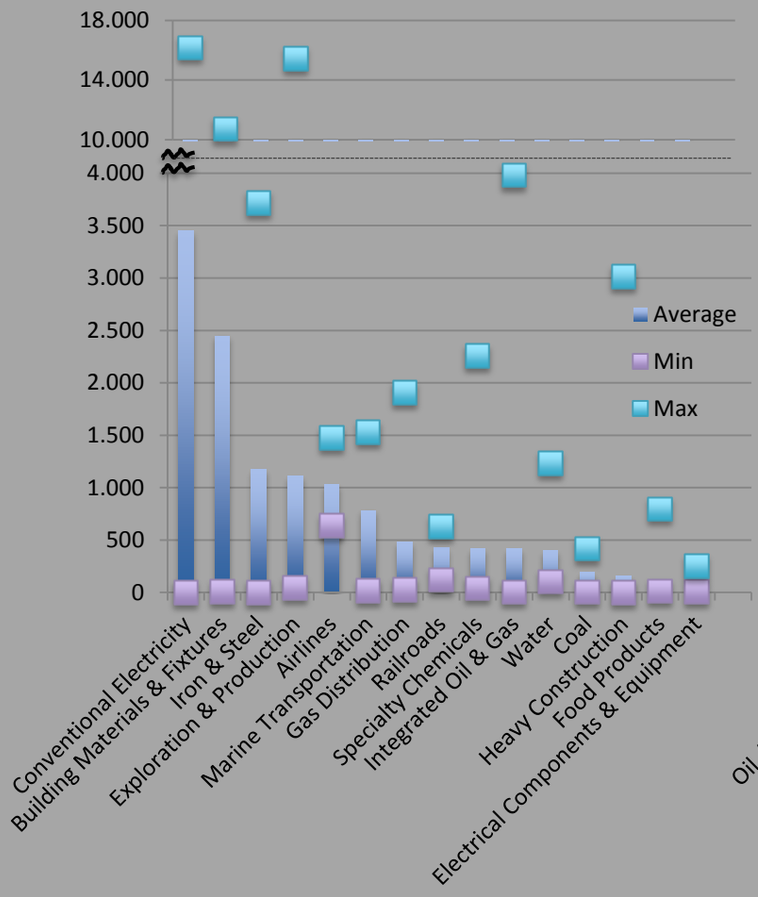
For the purpose of this study, we estimated the range and standard deviation of carbon intensity between industry-groups and asset types and between investees within these categories, using data from several providers.

4.1.2. Practices regarding evaluation of uncertainty

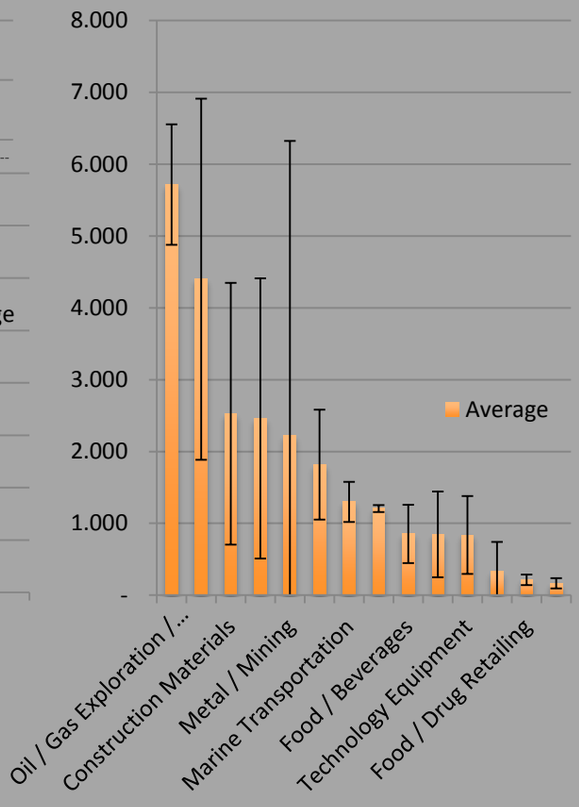
The level of uncertainty of a footprint calculation depends on four factors:
- The systematic deviation of the underlying models and emission factors used for individual calculation (in the case of EEIO models for instance);
- The non-systematic errors in reporting and consolidation;
- The uncertainties introduced when average data are used as proxies;
- The positive averaging effect related to the diversification of portfolios.

WHERE DO UNCERTAINTIES MATTER?

Carbon intensities (scope 1-2) from disclosed data for a selection of ICB4 sectors. Source: BofAML



Carbon intensities (scope 1-3) from disclosed data for a selection of TRBC sectors. Source: Inrate



Category	Average carbon intensity		Standard deviation	
	scope 1+2[1]	all scopes[2]	scope 1+2	all scopes

Analysis under validation

To date, no practitioner has systematically assessed the overall level of uncertainty associated with the data they provide. The best practices include:

- The provision of a 'Trust metrics' by *South Pole Carbon*, based on consistency tests for reported data and the identification of companies footprints based on industry-group average intensity;
- The calculation of the standard deviation of reported data vis-à-vis modeled data by *BofA Merrill Lynch* to evaluate the uncertainty introduced by the use of a model;

In addition several practitioners used various techniques to reduce uncertainties and 'calibrate' their model (see box §).

4.1.3. Sources and magnitude of uncertainties

For the purpose of this study, we tried to estimate the uncertainties related to the various techniques and processes used in footprint measurement.

• **Corporate reporting.** In most cases, carbon data provided by reporting companies for scope 1 and 2 are secondary data based on the application of emission factors to primary energy, raw material consumption and electricity purchases. The uncertainty of the related emission factors ranges from 5% (oil, gas and coal) to 10-15% (electricity). In addition, quality checks conducted by *South Pole Carbon* show that 25% of companies are affected by errors in reporting (cf. box §).

• **Use of life-cycle data.** When practitioners apply process-based emission factors to outputs reported in physical units (oil barrels, tons of cement, etc.) by the companies, the level of uncertainty varies greatly between different types of products and industries: the chart § page § provides a series of examples ranging from 5% for energy products to 50% for manufactured goods. In many cases, the precision of activity data reported necessitates the use of industry averages rather than process-specific factors, which in turn leads to additional uncertainties (in some industries differences between old/innovative processes can be as high as 100% compared to benchmark).

• **Use of emission factors per $ of revenue.** Statistical departments usually do not provide the level of uncertainties associated with EEIO data, but the average uncertainty associated with national inventories is 20%. Besides, it is possible to analyze the various biases introduced in the development of emission factors. They include two main factors:

- The difference of price levels: temporal (i.e. inflation), between countries, and between products classified in the same category/industry. A comparison of different EEIO models for the same category allows an estimation of the order of magnitude of the standard deviation in various sectors (see box §).
- The second factor relates to the aggregation of several industries in terms of carbon intensity in broad industry groups for non-homogeneous industries. To limit this bias, the number of categories in the model is critical (cf. page §). For instance, 40-150 EEIO models use aggregate cement production with concrete production in Europe, which is roughly 10 times less carbon-intensive. This is not the case in the US 500-sectors model used as a basis by all practitioners reviewed.

• **Matching with investees activity data.** A third factor relates to the segmentation analysis of the investee activity and matching process with emission factors. This analysis can be relatively precise when EEIO taxonomy matches the categories reported by the investees, as is the case for basic resources and raw material production, and very imprecise for diversified groups such as General Electric or ABB Group.

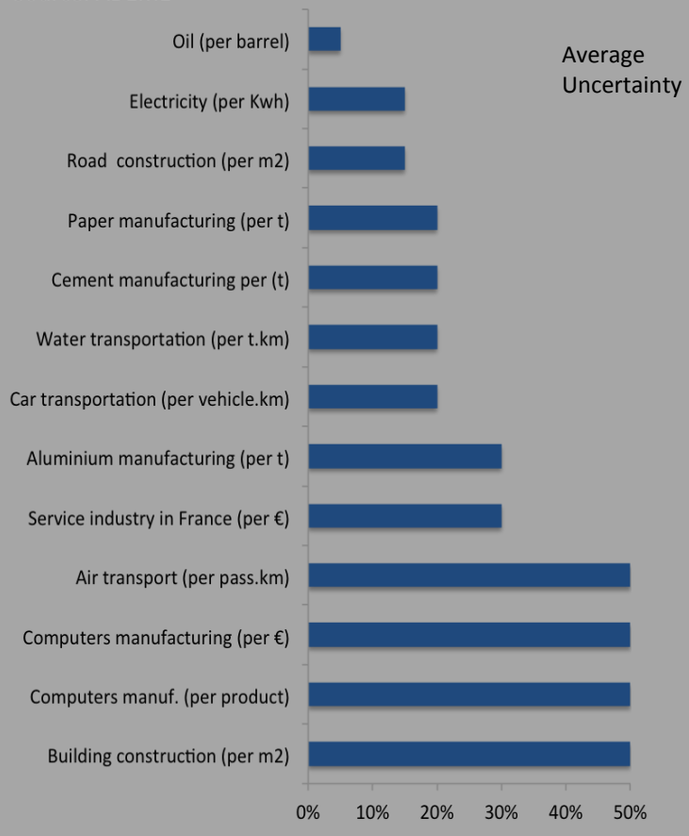
TRAKING AND REDUCING UNCERTAINTIES

- South Pole Carbon runs an automatic plausibility check on self-disclosed data and complement this with manual research. Reported data from 1,000 companies are discarded.
- Trucost systematically check reported data, and correct them based on its model or other reported data (other sources, previous years, etc.).
- BofA ML/Camradat's *uncertainty matrix* allows clients to understand how gaps in carbon disclosure in their investment universe affect the portfolio overall uncertainty.
- Based on the standard deviation between companies and the average carbon intensity in each industry-group, CAF identifies industry-groups and asset classes which required detailed carbon or activity data and those which can be assessed based on industry average factors.

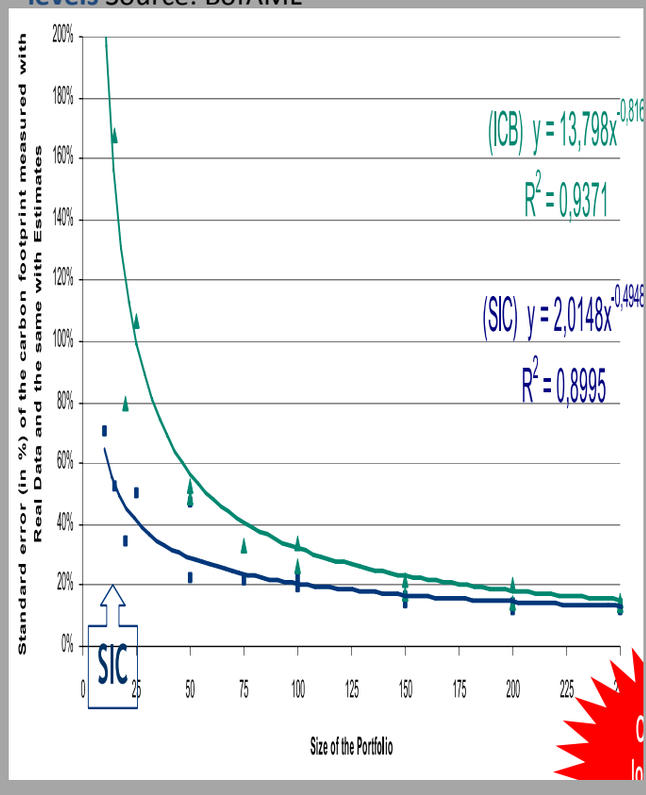
LEVELS OF UNCERTAINTY FOR SELECTED EMISSION FACTORS

Cradle-to-gate life-cycle emission factors

Source: ADEME



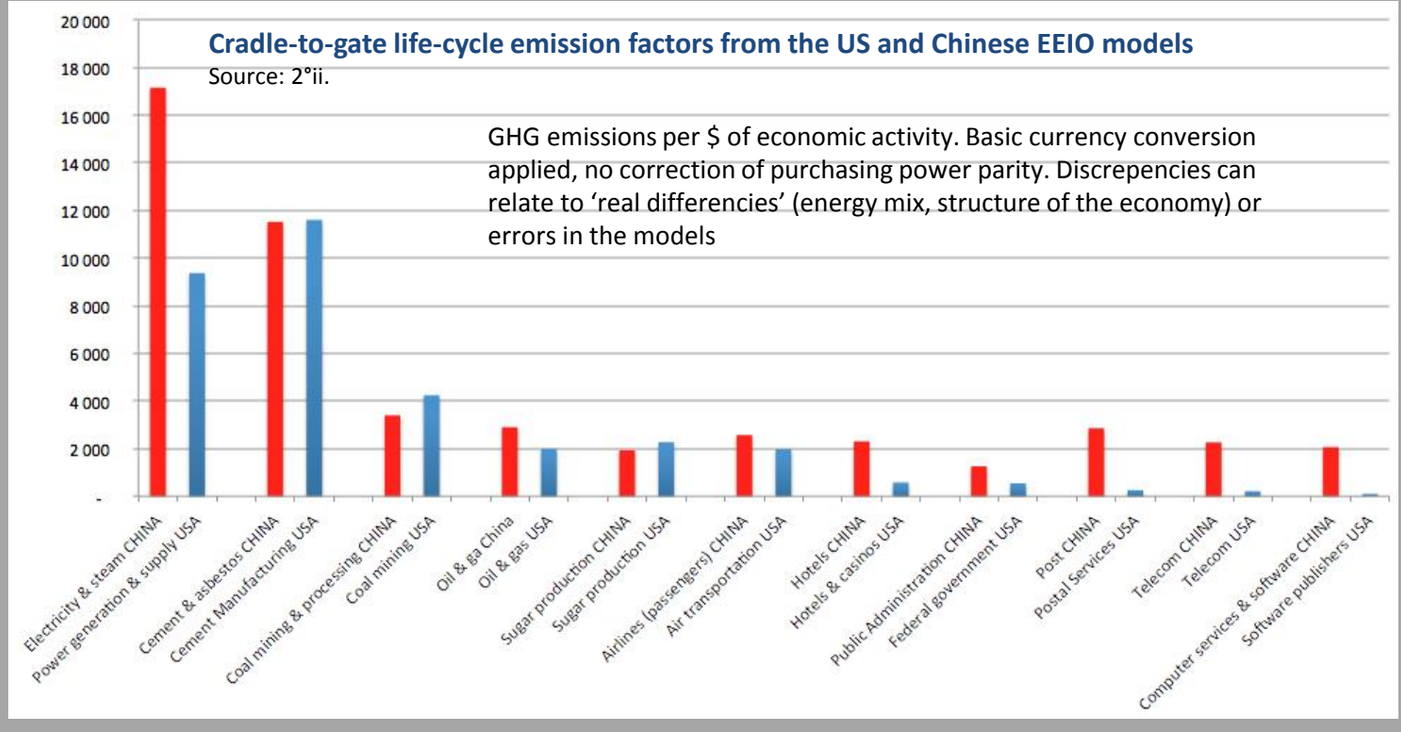
Standard error (in %) of the carbon footprint between real data and estimates, for two different classification levels Source: BofAML



Cradle-to-gate life-cycle emission factors from the US and Chinese EEIO models

Source: 2°ii.

GHG emissions per $ of economic activity. Basic currency conversion applied, no correction of purchasing power parity. Discrepencies can relate to 'real differencies' (energy mix, structure of the economy) or errors in the models



Standard deviation between model data and reported data for a selected industries in Scope 1+2
EEIO
Regression models

CO2 peer group estimates
(in grams CO2eq/US$ of revenues)
Source: Bank of America Merrill-Lynch

Company	ICB4 code	Real disclosed carbon data	ICB peer-group estimate		SIC peer-group estimate	
			Average	Distance from average	Average	Distance from average
A	3577 Food Products	**22**	**66**	-67%	**33**	-34%
B	3577 Food Products	**129**		95%	**76**	70%
C	3577 Food Products	**50**		-25%	**46**	8%

These three food companies are classified in the same category group of the 114-subsector FTSE Industry Classification Benchmark (ICB4). While providing one of the finest financial nomenclature, these three firms are still at least 25% away from the sector average value, and one of them has a CO2 intensity twice the average of the sector. Using an even finer classification can remove further uncertainty: the three companies indeed belong to three different activities of the 900-category US Standardized Industrial Classification (SIC), and estimated peer-group average data at this level allow to get closer to the real values.

• **Use of industry/sector-average emission factors.** Finally, uncertainty arises when average factors are used in place of real data. The use of sectorial mean values can be relevant for items in categories with low carbon intensity and/or low dispersion, but can be misleading for sectors with both high carbon intensity and high dispersion.

For instance, according to Inrate there is a factor 200 between lowest and highest estimated scope 1 intensities for companies classified in the Energy sector (one of 10 sectors representing the whole economy in the Thomson-Reuters Business Classification). Therefore, using the sector average value as a proxy for a company of this sector, which is very inhomogeneous, can be very far from reality. Of course, homogeneity between companies gets better with higher level of granularity in the definition of sectors. At the TRBC 124-industry level, the Energy sector for example is divided into 9 industries, in each of which highest/lowest intensities ratios are smaller than 10, and can be as small as 1.5. The table across provides a precise example for three food companies.

Despite the inevitable weakness of sector average data compared to individual company real data, it can still be totally relevant to use such industry mean estimates at portfolio level, thanks to a statistical averaging effect if the portfolio is representative of the actual dispersion of the sector (see below 4.1.5.).

4.1.4. For 'best-in-class' selection: relevant for many industries

All in all, the deviation between modeled data and reported data for scope 1 and 2 emissions in carbon-intensive industry-groups gives a proxy for the magnitude of uncertainties related to these various factors (cf. box §). As a consequence, assuming that carbon intensity is a relevant metric (cf. discussion of performance indicators page §), the precision of models (assuming the application of best practices for each case) is sufficient to apply a best-in-class approach in some carbon-intensive industries like oil & gas, utilities and car manufacturers. This also holds even for the supply-chain and sold products emissions. On the contrary, in industries with less homogeneous activities (cf. chart §), such as capital goods, construction, computer manufacturing, or the financial sector, the emission intensity metrics should still be used with caution to enhance a qualitative analysis. Fortunately, for scope 1 and 2, the level of carbon reporting is higher in relevant carbon-intensive industry-groups (cf. page §), thus limiting the need for modeled data. As far as scope 3 is concerned, many carbon-intensive sectors also report activity data in volume or number of products per category (oil & gas, coal mining, car and aircrafts manufacturers, etc.) thus allowing relatively precise estimates (Cf. chart §).

4.1.5. For 'best-in-universe' allocation and benchmarking

The high variability of firms emission profiles is not fatal to compute a carbon footprint at portfolio level in the absence of real data: above 200 lines, assessments of diversified equity portfolios based on estimated scope 1+2 data show a rather small (20% or lower) deviation compared with reported data, whatever the approach (EEIO models, IDWI models or even industry-group average data) (cf. chart §). This is in line with uncertainties for standard non-financial companies or product footprinting.

4.2. FREQUENCY OF UPDATES

4.2.1. Practices

For equity managers, the frequency of updates is a key concern. Regarding financed emissions, the time lag of data is relevant at two levels:

- The lasted update of the underlying model providing carbon emission factors in order to estimate the investee's footprint;
- The latest update of investees' activity data and reported carbon data (when available).

The nature of the first 'level' differs substantially between models. Regression models are updated on a yearly basis, based on reported data. EEIO models are usually updated every 5 to 10 years by statistics departments, but they are adjusted every year by the data providers to reflect evolutions in price levels. Life-cycle data share similar update frequencies.

For reported emissions and activity data, the company usually reports the results for the previous year between March and May. The data are then analyzed until October and sometimes until March (N+1). Finally, the asset managers apply these data to assess their portfolio usually at closure date (31/12/N+1).

At the end of the process, the information provided to the final investor is one to three years old. This process can however be speeded up: for the labeling scheme tested in France on +100 investment products by the Caisse d'Epargne bank in 2008-10, the accounting standard required a maximum age of one year when printing the leaflets (cf. page §). Besides, most data providers developed online platforms that included an upload function for the data when released and performed live recalculations of the portfolio footprint based on the daily price of the securities.

4.2.2. Stakes

At first sight, the usage of 'vintage' data might appear to be a major obstacle to professionals accustomed to tracking the weekly or daily performance of their portfolio. However the picture is actually more balanced:

• The stress-tests conducted in the context of the Caisse d'Epargne bank project on funds and the balance sheet show that, in stock-based accounting, the inertia of portfolios is actually relatively high. This is obviously true for banking books due to the maturity of loans and the relative stability of clients profile, but also for most trading portfolios (especially mutual funds) that in most cases track the performance of a benchmark index and thus reproduce its industry-group allocation.

• From a final user perspective, the annual financed emissions indicators are used in most cases as a proxy of either carbon risk or performance (cf. page §). Both risks and performance are actually connected to future and/or past emissions rather than annual emissions, rendering the relevance of the 'up-to-dateness' negligible.

• Finally, in most cases, the levels of uncertainties do not capture yearly progresses in the eco-efficiency of processes, actually a minor factor in the consolidated footprint of a portfolio, relatively to changes in organizational boundaries (e.g. M&A) at company level and evolutions in the composition of the portfolio (cf. page §).

COMMENTS FROM THE PANEL

TOTAL COST FOR INVESTORS

For a financial institution (bank, insurer, pension fund) the cost of fully assessing its financed emissions (balance sheet, asset under management, and sold investment products) using a mix of techniques can range from $10,000 to $200,000 per year, depending on the level of uncertainties and scope of reporting. In comparison, this is cheaper than the annual license fees paid by one financial analyst to access financial databases. Carbon screener access tools are available from $500/month

WHAT IF FINANCED EMISSIONS REPORTING BECOMES MANDATORY?

Financed emissions calculations are a capital-intensive activity: R&D expenditure and fixed costs are very high for a niche market. On the contrary, variable cost are limited to client relationship management and quality-checks. If the market gets bigger and regulation-driven, two effects can be forecasted:

- Data providers will be able to smooth out R&D and fixed costs and thus cut the prices by a factor of 2, 3 or more, in addition to realizing sharp improvements in data quality and accuracy of methodologies. Over time financed emission data will just be integrated in the basic package of financial databases.

- Bulk data processing and IT risk management will require the full integration of calculation models in internal information systems. Some tools offered by data providers already allow this at almost no extra cost. Thus, the estimated implementation cost is less than $100,000 per financial institution: about 0.01% to 0.05% of the cost of Basel III implementation!

4.3. COST

4.3.1. Overview

In the GHG Protocol/UNEP-FI survey, cost is identified by potential users as a major barrier to the development of financed emissions assessment. Our analysis shows that financed emissions calculation actually involves significant cost for research and data, but that scale economies, automation of data processing, and the use of sector-average factors for low-carbon intensity segments of the portfolios can keep the total cost for investors to largely insignificant levels.

4.3.2. Cost of R&D

As shown in section 1, the accounting rules for financed emissions are still evolving and gaps remain. R&D is therefore a key component of the total cost for financed emission data to date and will remain so in the future:

- **No methodology without database**. A difficulty specific to financed emissions assessment lies in the fact that methodology development should go hand in hand with the development of the related model, dataset and calculation tool. Unlike other carbon accounting metrics for non-financial companies, reporting guidelines by themselves do not make sense since it is almost impossible to cover a portfolio, not to mention the millions of lines of a bank's balance sheet based exclusively on a bottom-up approach without any automation of data computing and the modelling. In the case of top-down approaches based on sector-average factors, the same logic applies since most methodological aspects relate to the robustness of the underlying model. Furthermore, in all cases, the development phase requires on-going pilot-testing.

- **Multi-disciplinary approach needed**. Such development requires a good knowledge of financial databases, carbon accounting, banks and AM information systems, bank accounting, macroeconomics, as well as database management and computer science. These multi-disciplinary skills are not often available in a single organization or department, even within financial institutions, where CSR or sustainability departments usually have little to no skills in these areas and a very low level of clearance to assess internal financial data. Siloism between activities within financial institutions and the low interest of mainstream professionals in climate issues also hinders the formation of efficient multi-disciplinary teams. In a nutshell, on paper large financial institutions do have the skills to develop a robust framework in-house, but most experiences reviewed show that in the real world, they are unable to do so. Moreover, in-house metrics may give rise to credibility issues.

- **Limited scale economies.** To data most methodologies and tools have been developed by consultants and/or data providers in partnership with a strategic client. The upstream steps of the model development (e.g. EEIO or regression) usually involved academic researchers. The only exceptions identified are the BofA ML model, developed in-house by a former client of data providers, and the Caisse d'Epargne project that turned into a collaborative initiative involving several institutions, including ADEME and NGOs (cf. page §). Based on the experience of practitioners, the cost of R&D ranges from $50,000 to $M1+ for a full framework (method, model, dataset and tool). It is usually co-financed by the client and the data provider or consultant. Despite the current limited size of the market for financed emissions data, the collaboration between practitioners has been limited to date, even if informal cross-fertilization has taken place.

4.3.3. Cost of primary data

Unlike carbon footprinting for non-financial sectors, providing financed emissions data involve significant annual operational expenditures to ensure the access to financial databases. Indeed, due to on-going changes in market value and organizational boundaries for listed equities and corporate bonds, the activity data need to be updated on a yearly basis if users want to minimize uncertainties, even if industry-average emission factors are used. For bottom up approaches, they are also necessary to automate the matching of asset lines and investees. We estimate the annual costs between $50,000 for a basic coverage of listed equities and about $300,000 for offering detailed assessment on a cross-assets basis. The annual cost of carbon data (e.g. license for the US EEIO model, LCA and CDP data)) is below $10,000 and included in the figures above.

4.3.4. Investees' activity analysis

Depending on the methodological framework, the workload required to quality-check carbon data and/or analyze activity data ranges from zero to several hours per company. This procedure may have to be repeated for thousands of companies. In comparison, the time spent to analyze a company is 1-2 days in the ESG rating business and 5-15 days in mainstream equity research. In the organizations reviewed, the full time equivalent staff dedicated to analysis of carbon and activity data ranges from 0 to 10 people. Several players have minimized as far as possible this workload, relying exclusively on standardized carbon and activity data already available in financial databases. However, this necessarily comes with limitations in terms of scopes covered and lack of precision where correlations are too weak. In the future, the potential extension to sold-products emissions, future emissions and non-corporate assets will increase the need for investee-by-investee analysis.

4.3.5. Portfolio assessment

The time required for portfolio assessment very much depends on the approach used and the availability of a calculation tool. Given the number of asset lines for banks or long-term investors, line-by-line approaches are limited to pilot-tests on portfolios. To apply footprint assessment to a bank or an institutional investor, it would take thousands to millions of man-hours. To avoid this, three approaches are applied:

- T**op-down** approach used by *P9XCA* (Credit Agricole CIB) and *Cross-Asset Footprint* (in partnership with AFD) is based on sector-average emission factors applied to the categories already used in banks' internal reporting systems. The implementation of Basel II Pilar III has lead to huge improvements in the internal reporting of banks' exposure by industry-group and type of asset. With such approaches, the assessment of a bank balance sheet can be limited to a few hours to get a first picture of the 'hotspots'.

- **Bottom-up** approaches are necessary to assess the hotspots, if the investor wants to manage its performance or benchmark it against peers. In this case, calculation tools allow bulk data processing by automating the matching between asset lines and financed emissions data. Nevertheless, automation still requires, as a rule, the manual processing of residual lines.

- **Peeling the onions.** Institutional investors have a significant part of their assets invested in investment trusts, funds of funds, and other types of boxes within boxes vehicles. Two options are available in order to deal with this in a cost effective way: applying category-average factors when a benchmark index or generic portfolio can be used as a proxy, or using online calculation and reporting platforms (cf. page 66).

CONFIDENTIALITY

Accessing the components of investment portfolios and balance sheets in financial institutions requires a high level of clearance, which is usually not provided to the CSR or sustainability department in charge of piloting tests.
For most practices reviewed, this issue is managed via confidentiality agreements between the clients and the data provider. Besides, the development of assessment software and apps embedded in financial data terminals (Cf next pages) allows investors to assess their portfolio while keeping the components confidential.

As far as public reporting is concerned, the disclosure of financed emissions, even with a high level of details regarding the breakdown by industry-group and asset type does not significantly reveal information that are not already available in financial databases, annual reports and market studies. If applied to extended scopes with advanced methodologies, they might however shed light on some controversial facts e.g. the heavy weight of derivatives and the weakness of SME outstanding loans in banks balance sheets, or the short term investment horizons of long term investors.

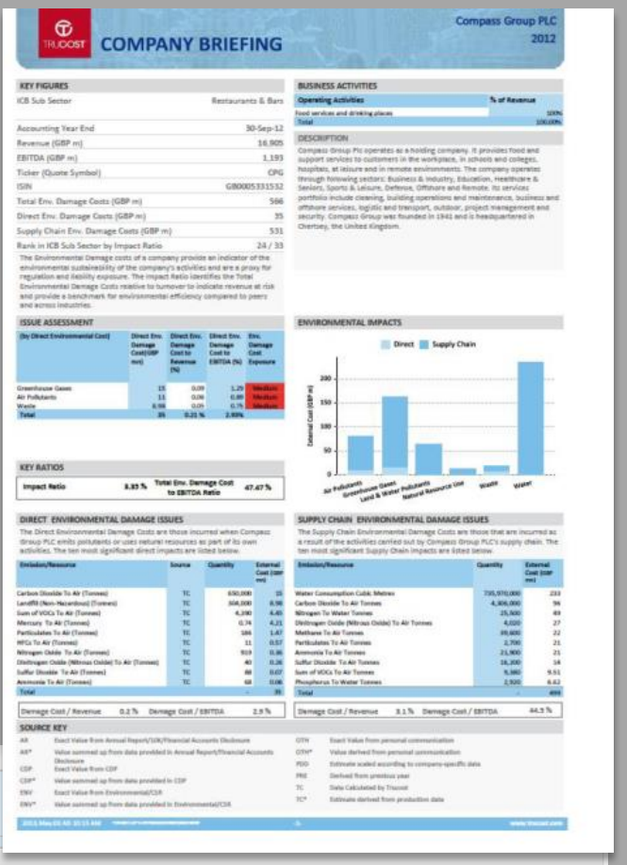
FOCUS: **ASSESSMENT TOOLS**

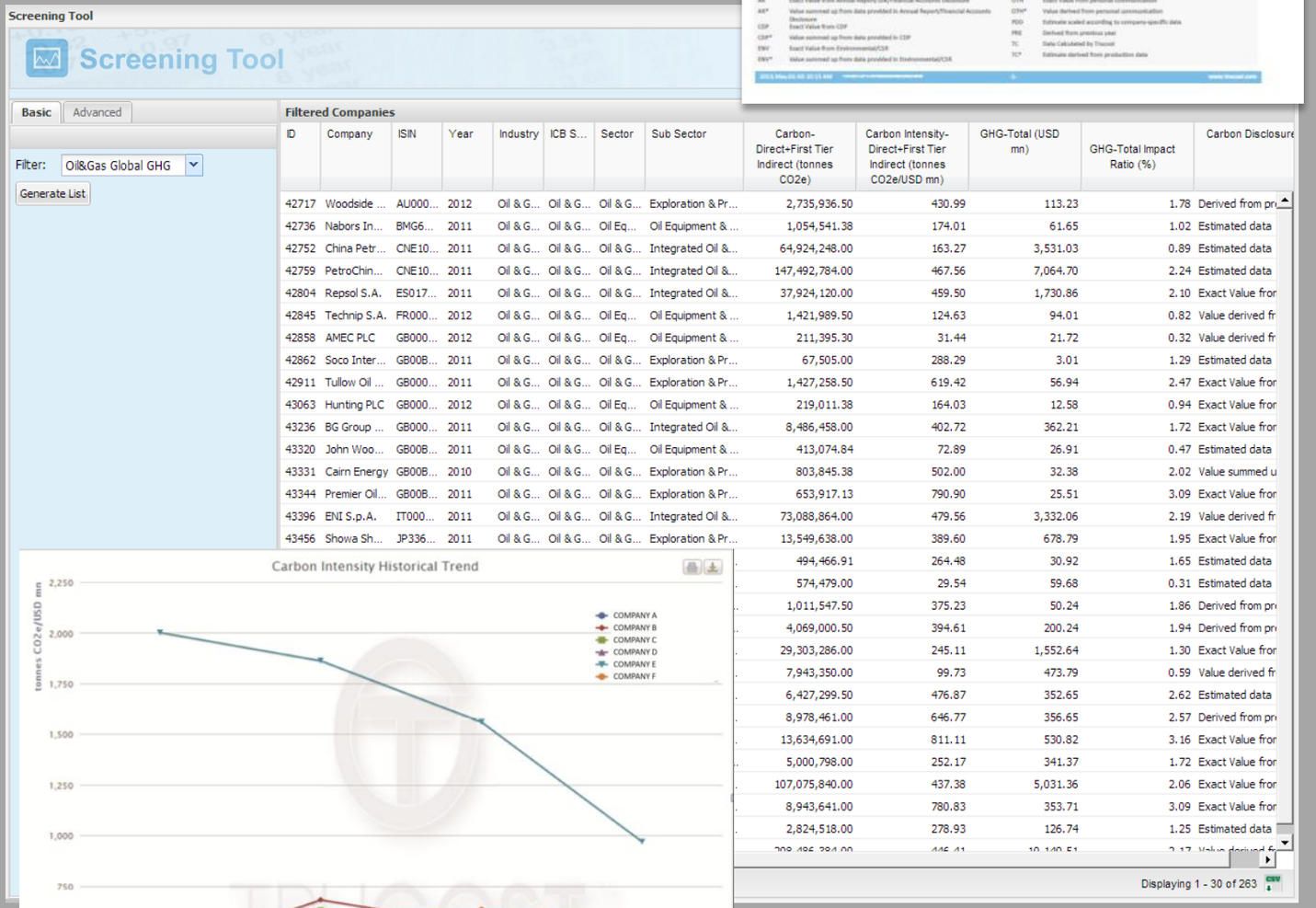
TRUCOST EBoard

Trucost proprietary platform is designed for equity managers and equity research analysts. It provides:

- A screening tool (4,500+ listed companies), providing carbon metrics and the sources of carbon data for each line.
- Detailled company briefings for any company in the research universe, including a breakdown of GHG emissions by scope, the status of carbon disclosure, a peer analysis, other environmental impacts and the related external cost.
- A portfolio analysis tool, allowing to compare its consolidated impact to a chosen benchmark. For portfolio analysis, the user should enter financial identifiers (ISIN, SEDOL or FactSet Tickers) as well as constituents' weights or value of holdings are required to run some carbon and environmental analysis.

To be developed

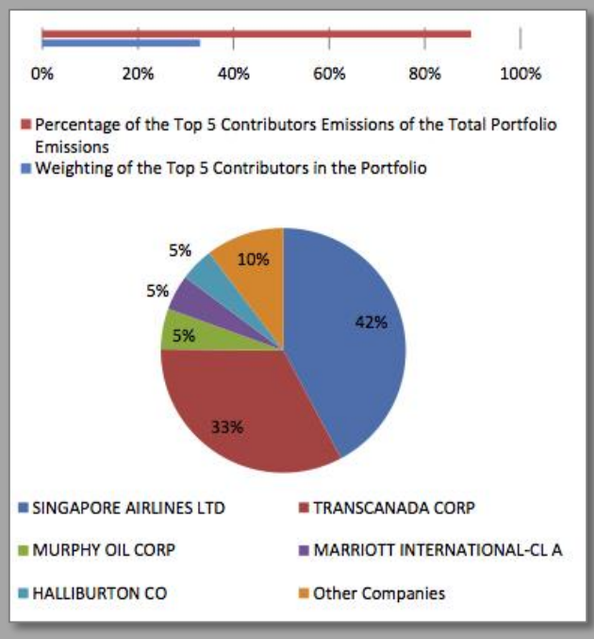


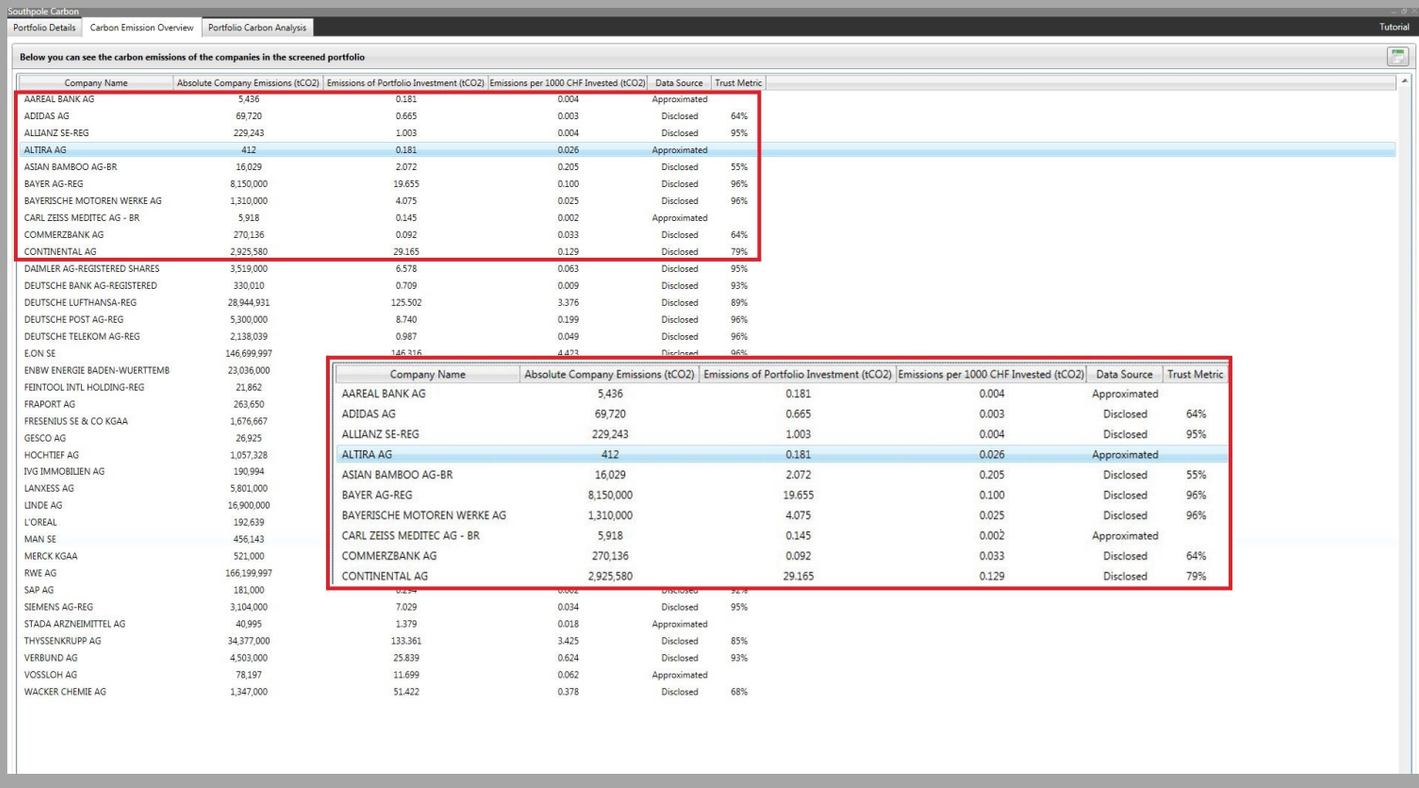


Investment Carbon Screener on Bloomberg

The South Pole Carbon app (available as an option on Bloomberg) is design for equity manager and equity research analysts. It allows:

- to upload any equity portfolio (from the client portfolios on Bloomberg) or build one bottom up in the screener. The app allows bulk processing via ID codes.
- To look up individual securities (40,000), getting emission per company, per share of investment with information on the level of trust in data.
- Shows reported vs. approximated data and rates plausibility.
- To visualize the consolidated emissions with graphical explanation: sector exposure vs emission exposure, Top 5 Emitters portfolio and equally weighted, etc
- Download all data into excel, as well as investment footprint factsheet with graphs and metrics – labelled with the client logo.
- The price is 6,000 USD/ year in addition to the cost of the Bloomberg access. The chart below provides a snapshot of the download history since the launch of the product.



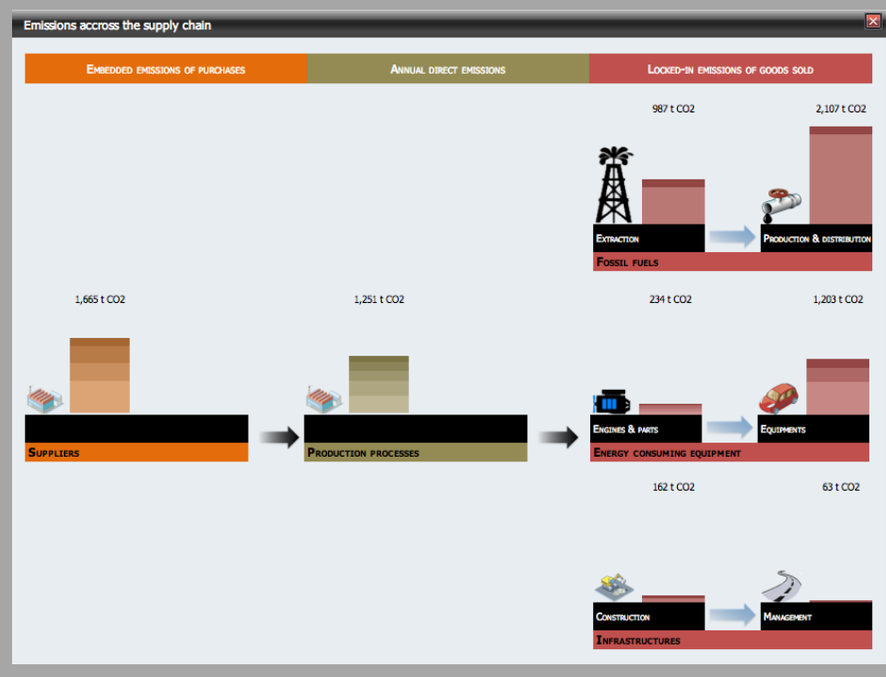


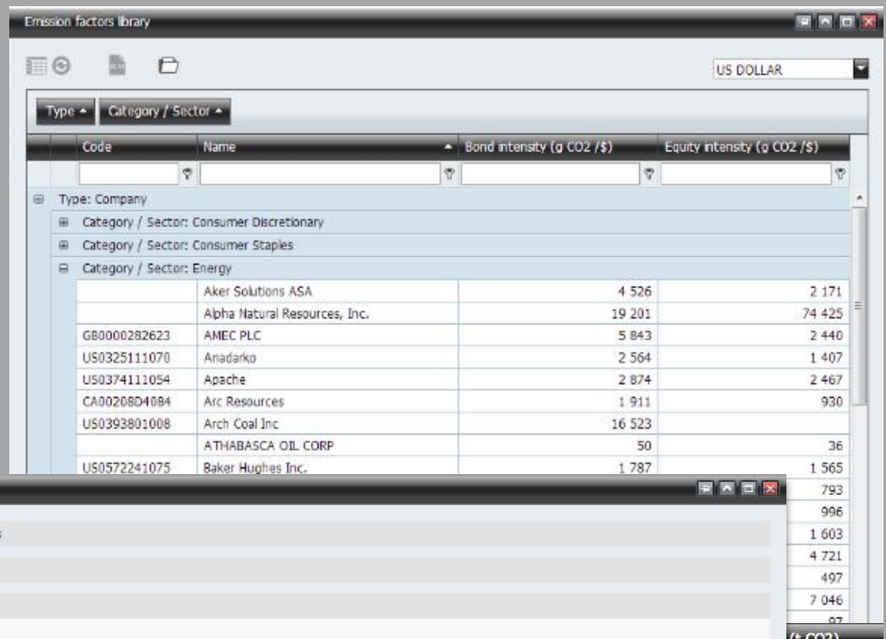
FOCUS: **ASSESSMENT TOOLS**

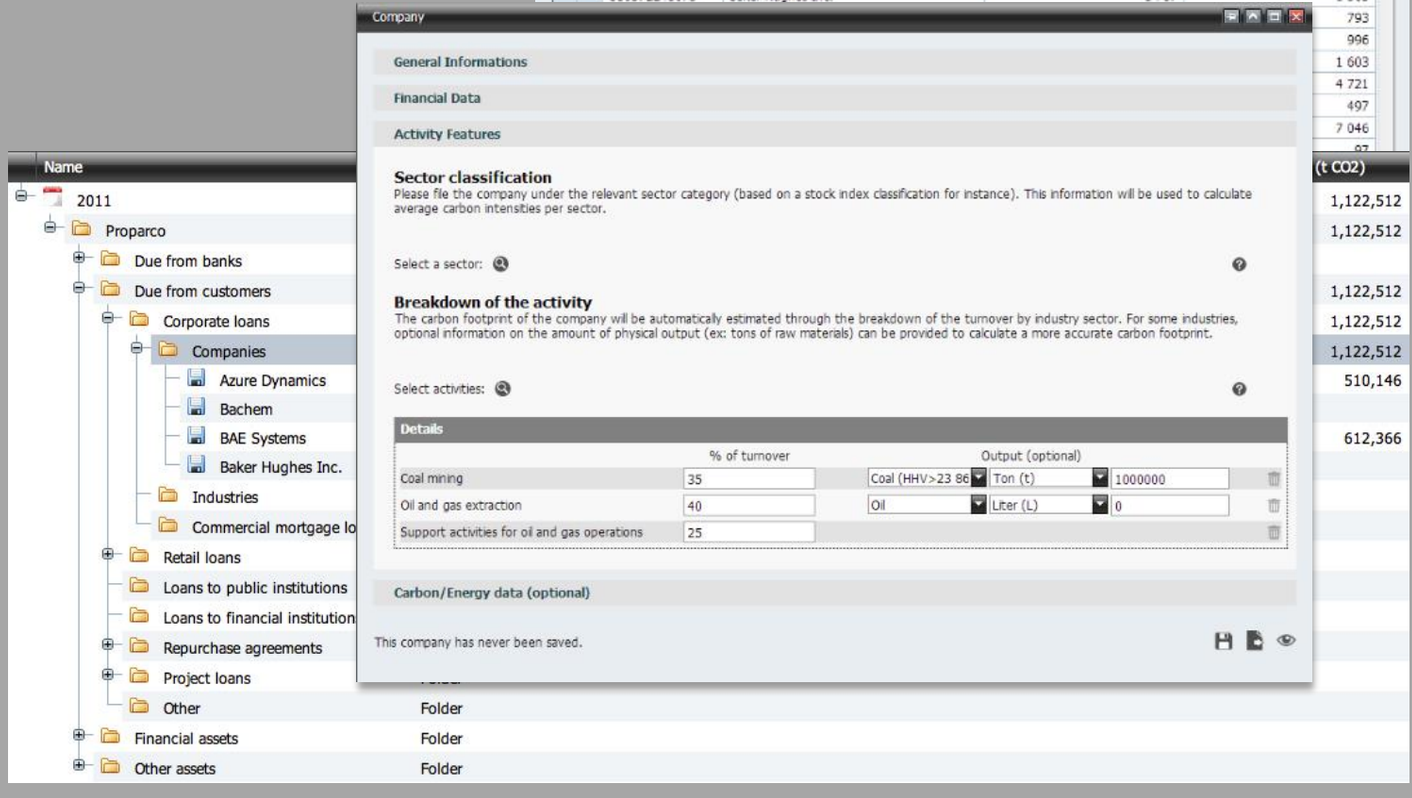
CROSS-ASSET FOOTPRINT CALCULATOR

The software is available online or as a 'web service' to fuel clients internal information systems. It is designed for multi-assets portfolio managers, banks and insurers. It combine a calculator for investees, a reporting tool and a calculator for portfolio managers. It allows:

- to upload a list of securities and other asset lines for bulk processing (equities) or to enter each line manually;
- to assign carbon intensities to each asset line, using the 'emission factors library' (40,000 equities, sovereign bonds, average factors for corporate bonds, SMEs, mortgages, etc.) ;
- to add new investees in the library based on their industry assignment, activity data or carbon data.
- to ask a client or an investee to estimate and share its footprint (while keeping activity data and components confidential).
- The user see the footprint line-by-line, the consolidated footprint, as well as the breadown of emissions across the energy supply chain to visualize double-counting. The results can be downloaded as an excel sheet and/or uploaded as an emission factor in the clients 'emission factor library' (for funds of funds).







FOCUS: ASSESSMENT TOOLS

P9XCA

4.4. CONCLUSION

Data quality, confidentiality and cost are among the main perceived barriers to voluntary deployment of financed emissions assessment.

The review shows that a combination of reported carbon data and modeling techniques allows for an assessment of financed emissions with a sufficient level of certainty to inform investment decisions. Assessments are far more precise than the macroeconomic data used to inform policy-making decisions. Nevertheless, measurement and optimization of uncertainties remain a work in progress for practitioners and further research in this field is needed.

The available calculation tools enable a combination of bulk data processing and top-down estimates. The implementation costs is thus marginal for most financial institutions.

REVIEW PANEL VIEWS

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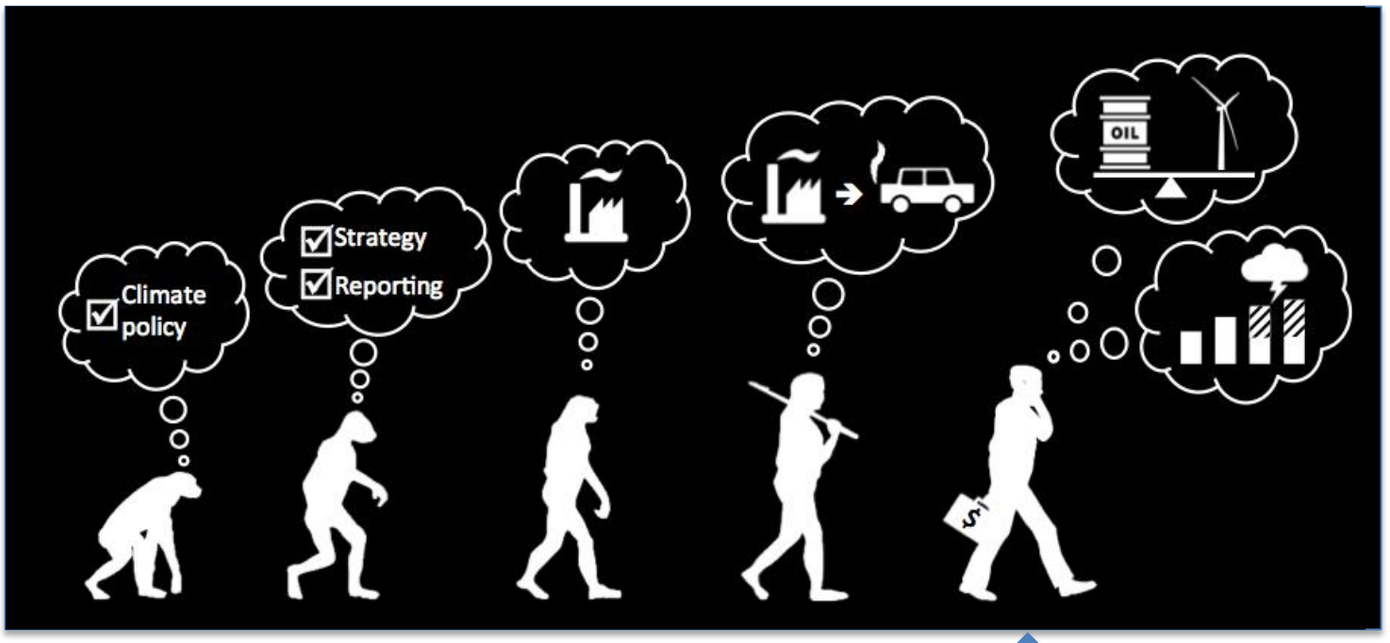
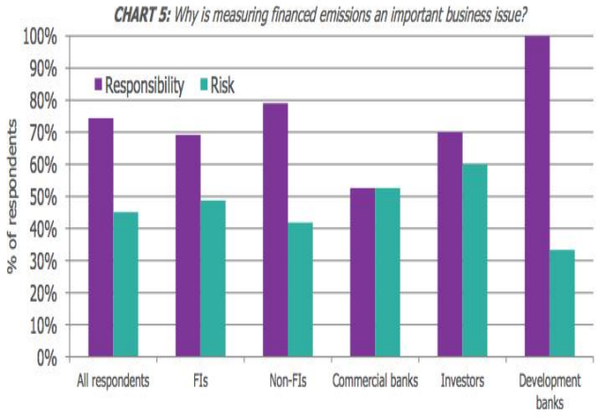
PART III. TOWARD 2° INVESTING



WE NEED TO GO THERE

1. SETTING PERFORMANCE INDICATORS



Source: *GHG Protocol/UNEP-FI*

1.1. STATUS QUO: CARBON INTENSITY PER $ AS A PROXY

1.1.1. What could be the purpose of assessing 'financed emissions'?

We define 'financed emissions' as the GHG emissions associated with a financial asset (equity, bond, loan, etc.). Assessing these 'financed emissions' is an integral element in achieving the 2° climate target. As shown on page §, quantitative approaches based on the assessment of impacts potentially offer significant benefits over traditional SRI and green investing approaches (based on the assessment of investment processes) for investors and policy-makers. The main one is to allow the development of cross-industries and cross-assets performance indicators.

The purpose of this section is:

- To analyze the potential uses of 'financed emissions' methodologies vis-à-vis the expectations of investors and policy-makers;
- To understand if the current users exploit the full potential of these methodologies;
- To identify the next steps to bridge the gaps between expectation and reality.

We consider the application of carbon metrics at portfolio level by:

- Analysts and data providers informing investment decisions;
- Asset managers (investment strategy and performance measurement);
- Asset owners (definition of mandates and objectives);
- Policy-makers (metrics used for incentives and prudential frameworks).

The use of carbon data to inform mitigation strategies and risk management at company level, especially in the context of shareholder activism and dialogue, is beyond the scope of this study. We focus on the direct use of 'financed emission' data to select or weigh securities, industries and assets classes. ESG investment processes using 'financed emissions' as raw data to help formulate an opinion on the climate strategy of a company are not covered.

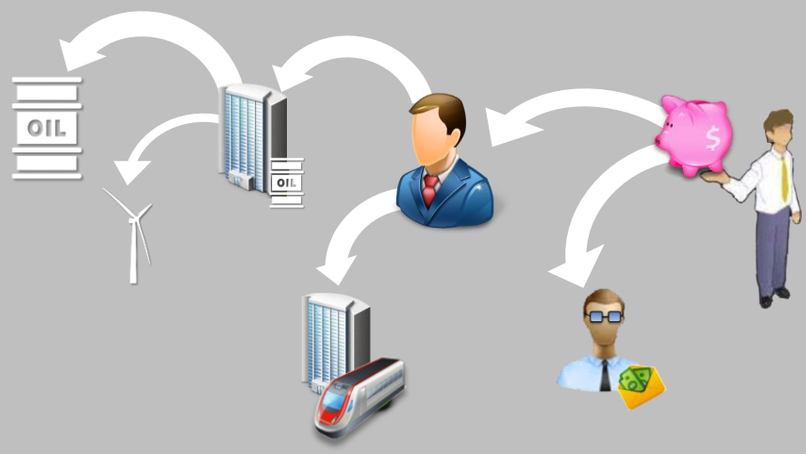
1.1.2. How does carbon data inform investment decisions?

To date, the objectives followed by investors when using 'financed emissions' are more or less in line with those of SRI investors (cf. box §) when they use ESG criteria. On paper, they are used as a proxy to assess either their exposure to financial risks correlated with carbon intensity (a.k.a. carbon risk – cf. page §) or their contribution to financing the transition to a low-carbon economy (a.k.a. climate performance and responsibility – cf. page §). But in practice, the way 'financed emissions' are used is not always consistent with the objective followed.

• **Investment research.** Equity research analysts (sell side or buy side) use carbon intensity data to adjust their ESG rating or the valuation of the company (DCF) - cf. page § for examples.

• **Selection**. The selection of the less carbon-intensive companies within their industry-group, while keeping the industry-group weighting in line with the benchmark index seems to be the main way 'financed emissions' are directly used by 'low-carbon' equity funds managers and indices

FIG. § . LEVERS FOR CARBON-INTENSITY OPTIMIZATION



TO BE COMPLETED

Selection (stocks & clients)

Industry allocation (e.g. choice of the benchmark)

Strategic asset allocation (weighting by asset-class or type of investment product)

providers (e.g. NYSE-Euronext' LC100 index). In corporate lending, Bank of America sets a target on the carbon intensity of its loan book to the electric utilities (cf. page §). Finally Credit Agricole CIB uses its assessment to identify priorities for the development of sector-specific policies.

• **Industry-group allocation**. A small minority of SRI investors underweights carbon-intensive industry-groups thus diverging significantly from benchmark indices (e.g. Mirova – an investment division of Natixis AM), and not requiring quantitative carbon data to inform decisions. In most cases, this approach is limited to oil & gas extraction and coal mining.

• **Strategic asset allocation.** We have identified very few investors relying on carbon data to adjust asset-class weighting, with such cases usually limited to the pilot tests conducted in the context of Mercer study (cf. page §). In these cases, the focus is climate-risk management. Carbon intensity is simply used as a metric among others to calculate the risk profile of each asset class.

• **Ranking of equity funds and savings products**. Several rankings have been published by *Trucost* and its partners in the UK, US, Australia, XX. Online brokers like BNP Paribas' subsidiary Cortal Consors (France, Germany) also use footprinting to provide additional criteria to their clients for funds selection. From 2008 to 2009, the retail bank Caisse d'Epargne (France) applied this approach to all its savings products (cf. page §). Many funds managers responded to this new trend by assessing and disclosing their financed emissions. Some of them have set absolute reduction targets (cf. page §).

• **Banks footprints**. Finally, several NGOs published bank rankings based on *Profundo* and Utopies/Inrate data to inform clients' choice for current and savings accounts. Some banks, like RBS and Credit Agricole-CIB, have taken up the 'financed emissions' methodologies to publish their own footprint measurement (cf. page §). Generally these banks did not use the results in the context of marketing campaigns. Recently ASN (The Netherlands) set the goal to be carbon neutral by 2030.

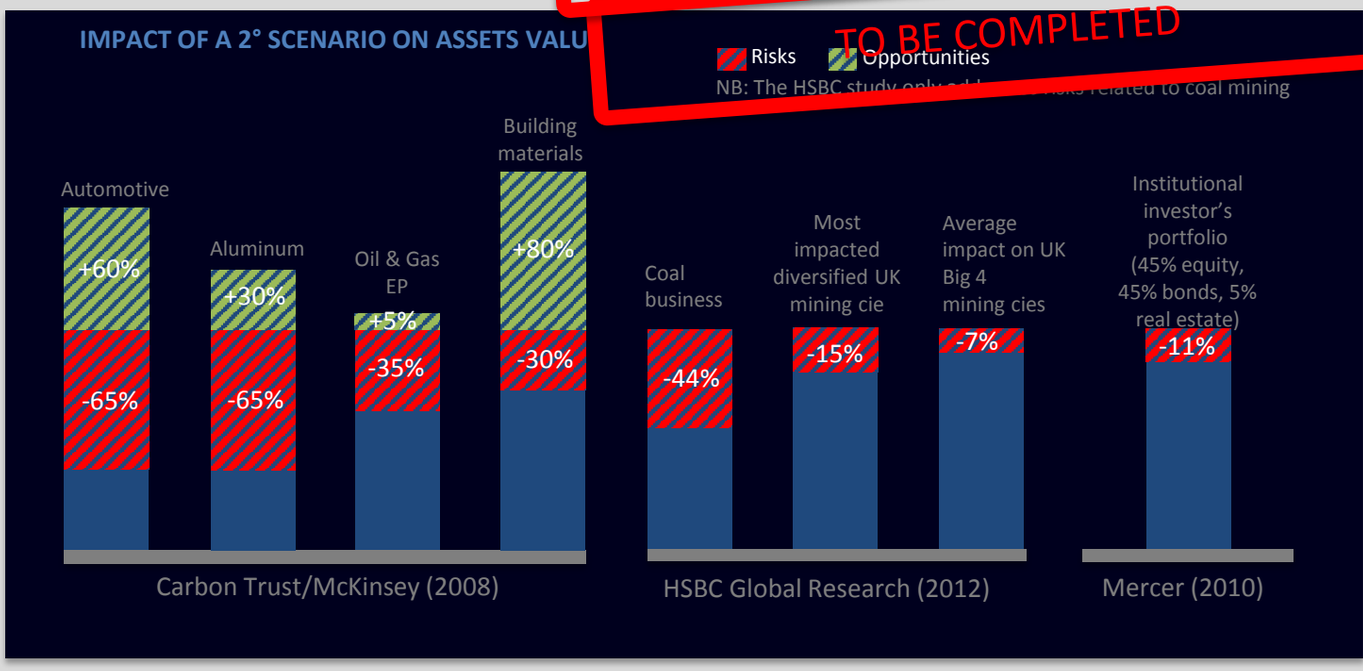
Overall, 'financed emissions' data are used in two ways:
- To communicate on consolidated emissions at portfolio level;
- To optimize carbon-intensity based on a best-in-class approach with carbon data acting as a complement or substitute to ESG ratings (subject to the same limitations, cf. page §).

However, we did not identify investors using all levers available to optimize carbon-intensity thus failing to exploit the full potential of financed emissions metrics. The main reason is the willingness to fit in traditional investment processes (notably the use of benchmarks), but there are also technical difficulties in situating relevant performance indicators and targets at portfolio level.

PLEASE SUGGEST CASE STUDIES

TO BE COMPLETED

FIG. 1. CASE STUDIES: RISK ASSESSMENT



MERCER, 2011 - *Climate Change Scenarios – Implications for Strategic Asset Allocation*

In this report, Mercer analyzes the impact of climate change on institutional investment portfolios, with a focus on how strategic asset allocation can contribute to the resilience of portfolios and the opportunity to align institutional investors' interests with both their clients' financial interests and the objective to fight against climate change. A scenario analysis is made through the distinction of families of risks and opportunities based on 3 factors: technology, physical impacts and carbon policy (which are estimated to have a potential contribution to overall portfolio risk reaching as much as 10%).

Carbon Trust / McKinsey, 2008 - *Climate change – a business revolution? How tackling climate change could create or destroy company value*

The Carbon Trust / McKinsey study computed such adjusted DCF in a number of 2000-2050 climate scenarios to a low carbon economy (here the most ambitious scenarios have less than 20% chance of limiting climate change to +2°C), driven by either carbon markets, targeted regulations, technology innovation or consumption patterns. It appears that depending on the preparedness of companies and the sensitiveness of sectors, these low carbon scenarios can lead to either strong value creation opportunities or significant potential risks. The Automotive and Aluminum sectors are for instance facing a potential 65% risk, while companies in Building materials can demonstrate an opportunity up to 80% gain in value.

HSBC Global Research, 2012 - *Coal and Carbon — Stranded assets: assessing the risk*

In this report, HSBC Global Research focused on the UK Coal Mining sector, using three different 'carbon future' scenarios affecting the demand of coal. It appears that carbon constraints post-2020 leading to a declining coal industry could impact DCF valuations of coal assets by as much as 44%. The impact on UK major miners stocks value could be -7% under the most extreme scenario and as much as -15% for coal-heavy miners.

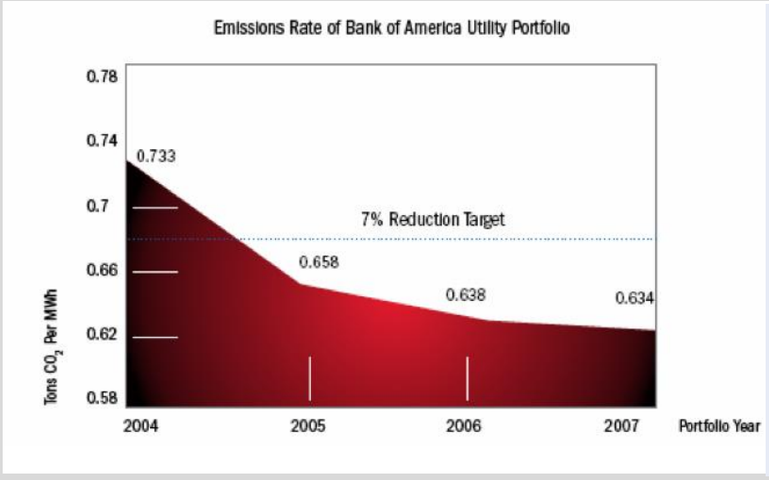
Standard & Poor's, 2013 - *What A Carbon-Constrained Future Could Mean For Oil Companies' Creditworthiness*

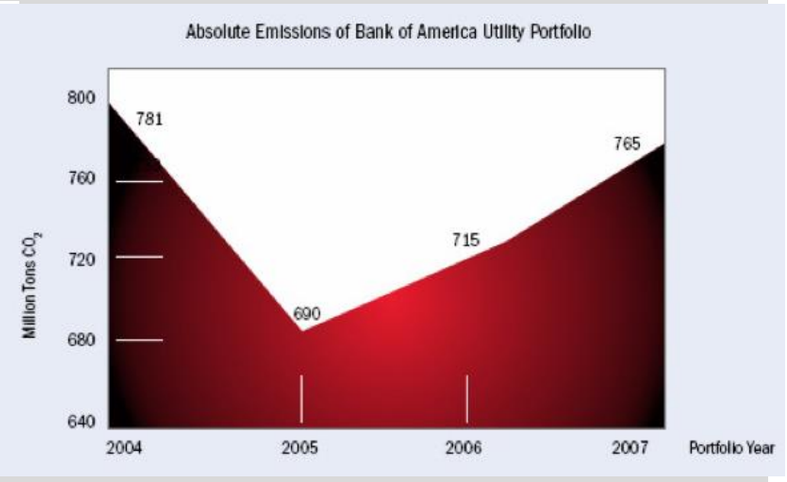
In this report, Standard & Poor's assess the implications of future carbon constraints (driven by a series of global, national, and local policy actions aimed at moderating CO2 emissions and reducing demand for hydrocarbon products and crude oil) on the oil sector on moderately sized, independent, unconventional oil companies and major oil and gas producers. In this scenario, where oil prices tend to decrease if less reliance is to be placed on undeveloped or probable reserves than at present, the results show a deterioration in the financial risk profiles of small non-diversified companies that could lead to downgrades over 2014-2017.

FIG. 1. CASE STUDIES: PERFORMANCE

PLEASE SUGGEST CASE STUDIES TO BE COMPLETED

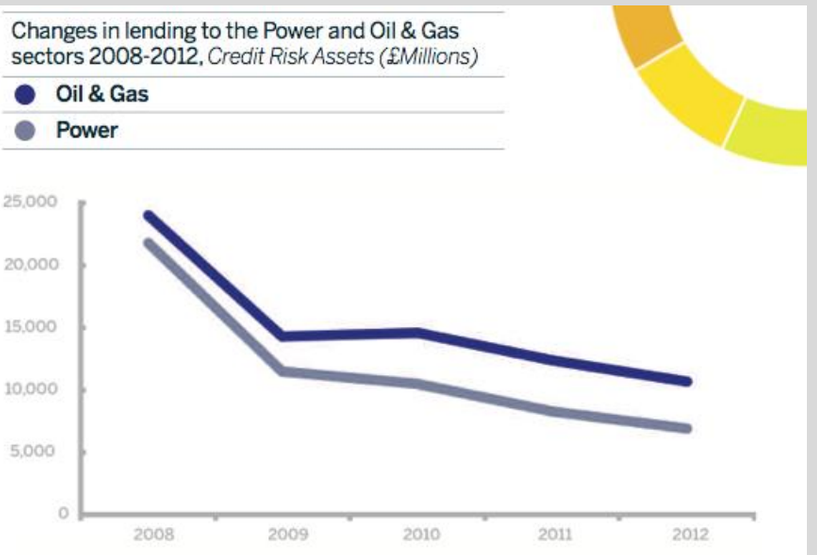
Bank of America:
Setting relative targets





RBS: Tracking absolute performance

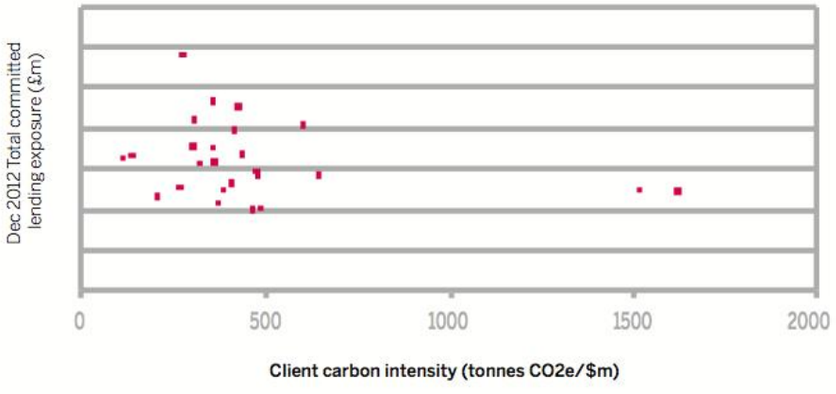
Changes in lending to the Power and Oil & Gas sectors 2008-2012, *Credit Risk Assets (£Millions)*



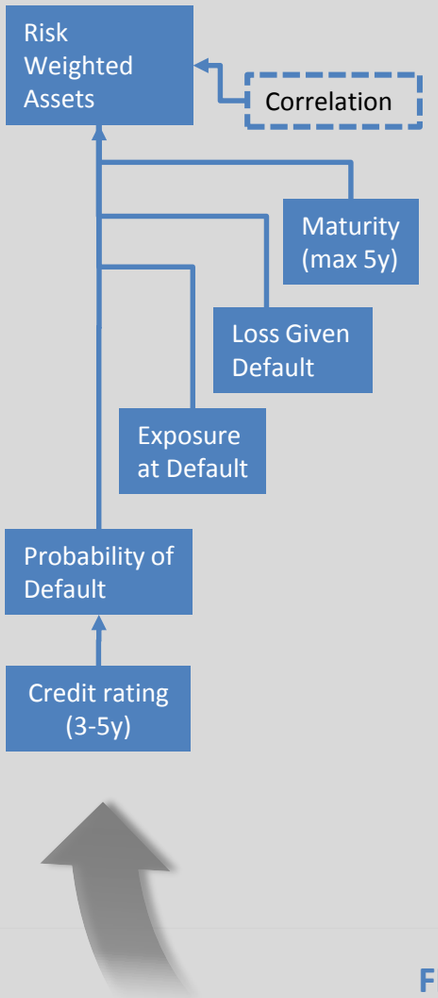
Power sector activities supported by our general lending (top 25 Power clients)

Distribution (gas and electricity)	34%
Nuclear	23%
Coal	18%
Gas-power generation	12%
Renewables	6%
Other business activities	5%
Petroleum-power generation	2%

Carbon intensity vs. lending exposure: RBS Top 25 Power clients



"Quote" Investor



1.2. MOVING TOWARDS MANAGING CARBON RISK EXPOSURE

1.2.1. Format required to fit in risk assessment frameworks

This section explore the potential of financed emissions to be used as a basis for the development of carbon risk indicators that can fit in current and future risk assessment frameworks. As defined page § , carbon risk is threefold: the carbon price risk, which is ongoing but minimal in a foreseeable future; impairments due to the carbon bubble burst; and risks of climate litigation, which are point-in-time risks and probably not material for several years.

Consequently, most carbon risks are not material for the 1 to 5 years horizon of standard risk-assessment models and frameworks, from equity and credit-risk analysis (3-5 years max) to prudential frameworks such as Basel III and Solvency 2 frameworks (mostly focused on the next 12 months). Therefore, from a business perspective, carbon risk assessment is only relevant for very long-term investors with buy and hold strategies. As far as regulation is concerned, it would require the introduction of long-term stress tests to cover point-in-time risks at company or financial institution level. Finally, these stress tests might be useful for regulators in order to monitor systemic risks. In each case, we assume that it would make sense to assess the full spectrum of carbon risks.

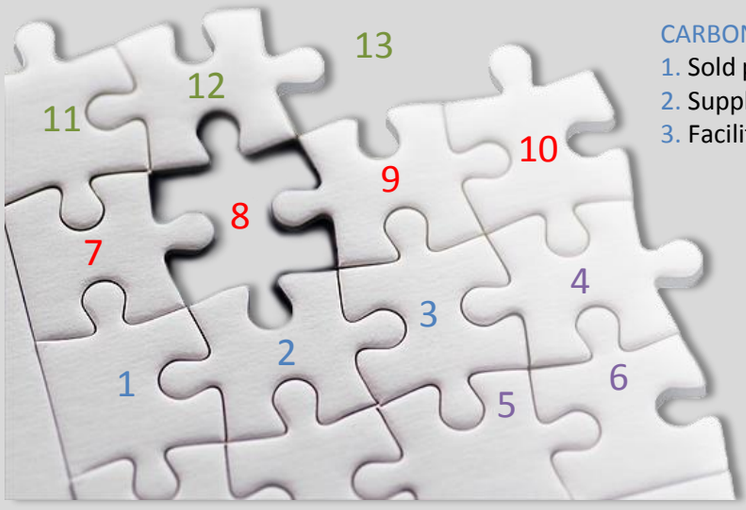
1.2.2. Data required and current practices

For our three categories, the carbon risks are concentrated in a few sectors (e.g. energy, utilities, auto, real estate – cf. page §) with relatively good reporting practices for both carbon and relevant activity data.

- **The case of non-financial organizations.** The case studies page § give a good overview of the current landscape of practices. The best practices are based on a stress test of specific scenarios for a specific industry conducted on an ad hoc basis. They have in most cases been computed by equity research teams (Cheuvreux, HSBC, XX), credit-rating agencies (S&P) or strategic advisors (McKinsey) based on a modification of their existing DCF model. They only cover non-financial companies in risky industries.

The scenario is usually based on the increase in the price of carbon and more recently on a sharp drop in the demand for fossil-fuels based on the IEA 2° scenario. We did not identify scenarios based on litigation.

FIG. § . FROM CARBON INTENSITY TO CREDIT RISK EXPOSURE



CARBON INTENSITY OF ACTIVITIES
1. Sold products (scope 3)
2. Supply chain (scope 3)
3. Facilities (scope 1 and 2)

TIME DIMENSIONS OF CARBON RISK
4. Past emissions (litigation)
5. Annual emissions (carbon price)
6. Locked-in emissions (impairment)

EXPOSURE TO REGULATION AND LITIGATION
7. Sales geographic exposure
8. Supply-chain geographic exposure
9. Facilities geographic exposure
10. Critical size to be an interesting target for litigation

CAPACITY TO ADAPT TO NEW POLICIES
11. Cash available for acquisitions, R&D and face liabilities
12. Ability to relocate facilities and supplies
13. Cost pass through capacity

To assess the carbon risk exposure of a company, the data required are:

- The GHG emissions, covering for certain industries the sold products emissions (scope 3), as well as the past and locked-in emissions. On these items, carbon data are inexistent and activity data reporting is minimum (cf. page §)
- A dozen of other activity parameters affecting the exposure and resilience to policies and litigation risks (cf. figure § above). Reporting on these items is also minimal and not standardized. The assessment therefore requires an in-depth analysis of each company.

Our analysis shows that, even if methodological frameworks have been developed by several equity research teams, it remains very difficult to assess carbon risk based on publicly available data. To date this analysis is possible for reporting organizations themselves, or in the best case mainstream analysts who know the company, the industry, have a good access to their top management and run a DCF model on a regular basis. Specifically, we believe that this is expertise is limited to brokerage houses, credit-rating agencies and large asset-managers.

• **The case of financial organizations and diversified portfolios**

To inform selection and industry-allocation, investors need risk indicators on non-financial companies and assets (central governments, mortgages, etc.), but also on financial companies (banks, insurers, mutual funds, etc.) that usually represent at least 20% of their assets (cf. page §). All the same, if reporting practices are to develop in the financial sector, the reporters need to build an indicator relevant for their audience.

At portfolio level, most quantitative approaches are based on a price set on consolidated financed emissions and do not distinguish the type of regulatory or litigation risks they face. Usually, the same approach is applied whatever the maturity of credit and the turnover of trading portfolios. We believe that this type of approach is useful in order to raise awareness but not robust enough to inform risk management. We only identify a few alternative approaches for multi-assets portfolios (cf. page §), which are based on asset-classes scoring, rather than financed emissions.

1.2.3. Next steps

We believe that carbon-risk assessment can be a driver of non-financial companies carbon reporting on new metrics more relevant to investors, but will not be the sole purpose of investors' accounting and reporting of their consolidated financed emissions, at least in the short and medium term faces a number of challenges:

• First because carbon-intensity is only a piece of the puzzle of carbon-risk (cf. figure §) and cannot enable proper risk assessment if reported separately from the other pieces (cf. box §). Since financial institutions will not report line-by-line for confidentiality reasons, they can only report on a risk exposure score (i.e. not on their financed emissions).

• Secondly because given the resources required to assess each investee, it will be very costly to develop specific datasets in silo. These datasets are therefore unlikely to emerge if brokerage houses and credit-rating agencies are not required by their clients to provide data on an ongoing basis.

• Finally, the materiality of carbon-risk in existing risk assessment frameworks is too weak to forecast a rise in demand in the short term. If they become a driving force, we believe that policy-makers are more likely to prioritize carbon performance, which is both less costly to evaluate and more material to public policy goals.

THE CARBON EFFICIENCY HYPOTHESIS

« Carbon efficiency is valuable for all companies because it can reduce operating costs, help drive lean business, encourage product innovation and strengthen supplier relationships. In addition, research has shown that achieving high levels of carbon efficiency is not easy, so it is a useful test for good management overall. The Carbon Efficiency Hypothesis (…) provides a rationale for tilting the indices for all companies, including those with comparatively low emissions intensities. » **Extract from the FTSE Carbon Index brochure**

GHG Protocol/UNEP-FI LONDON WORKSHOP

"Some investors at the workshop did think that using GHG emissions data at the investee level (company-by- company, transaction-by-transaction) is useful and necessary in order to understand and assess GHG risk exposure.

However, once data at the investee-level is aggregated into data at the portfolio level it loses its ability to inform risk assessment. This is because carbon risk is a function of both carbon emissions (or carbon emissions intensity) and carbon regulation (carbon price, etc.) in the places where the emissions occur.

As portfolios will most often be associated with GHG emissions from a variety of potentially very different countries, jurisdictions and regulatory frameworks, carbon data (absolute and intensity figures) at portfolio level will often not enable carbon risk assessment." **Extract from the summary**

« ASN Bank's goal is to be climate neutral in 2030. This means that investments in projects that reduce emissions by the use of renewable energy or energy efficiency measures will have to counterbalance the emissions caused by other investments by ASN Bank. » **ASN internal document**

1.3. MOVING TOWRDS MANAGING CARBON PERFORMANCE

1.3.1. Requirements to build performance indicators

This section analyzes the possibility to use financed emissions data to build a carbon performance indicator(s). For the purpose of this report, we define an investor's 'carbon performance' as its contribution, positive or negative, to financing the transition to a low-carbon economy, in line with 2° scenarios (see page §). This definition is focused on mitigation rather than adaptation. We assume that the purpose of indicators at portfolio level is to manage the performance of the portfolio and report results in order to inform clients' and investors' choices and benefit from potential tax incentives. Consequently, performance indicators should allow users to:

- Benchmark diversified portfolios;
- Set performance targets for inclusion in mandates and bonus schemes;
- Optimize the carbon footprint while continuing to finance the economy;
- Link performance with climate policy goals (2° scenarios).

To be effective, these indicators should fit in investment processes:

• They are useful when investors use metrics to weight portfolios with a top-down approach: creation of benchmarks, definition of mandates, strategic asset allocation, setting of sector exposure for loan books, etc.

• They need to be used hand-in-hand with standard metrics such as liquidity, risk exposure and management cost in order to optimize climate performance without compromising financial performance.

1.3.2. Defining a relevant denominator

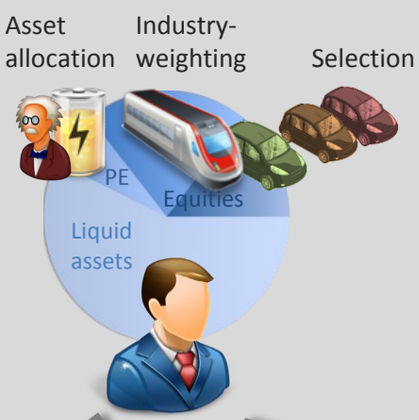
To date most performance indicators based on 'financed emissions' measure the carbon intensity per $. The most common indicators are expressed:

• per $ of investee turnover, and sometimes per EBITDA for equity portfolios;

• per $ of asset held by the investor for equity and multi-assets portfolios.

On paper, financed emissions data offer the possibility to inform industry weighting and strategic asset allocation. To a certain extent NGOs, retail banks and online brokers who compare the carbon intensity of funds and banks use the data this way. However, current indicators based on carbon intensity per $ of asset or turnover are just a proxy for climate performance. Their use as a genuine performance indicator is limited by two factors:

- The biases related to price levels and capital intensity;
- The denominator in $ that does not measure the economic contribution.



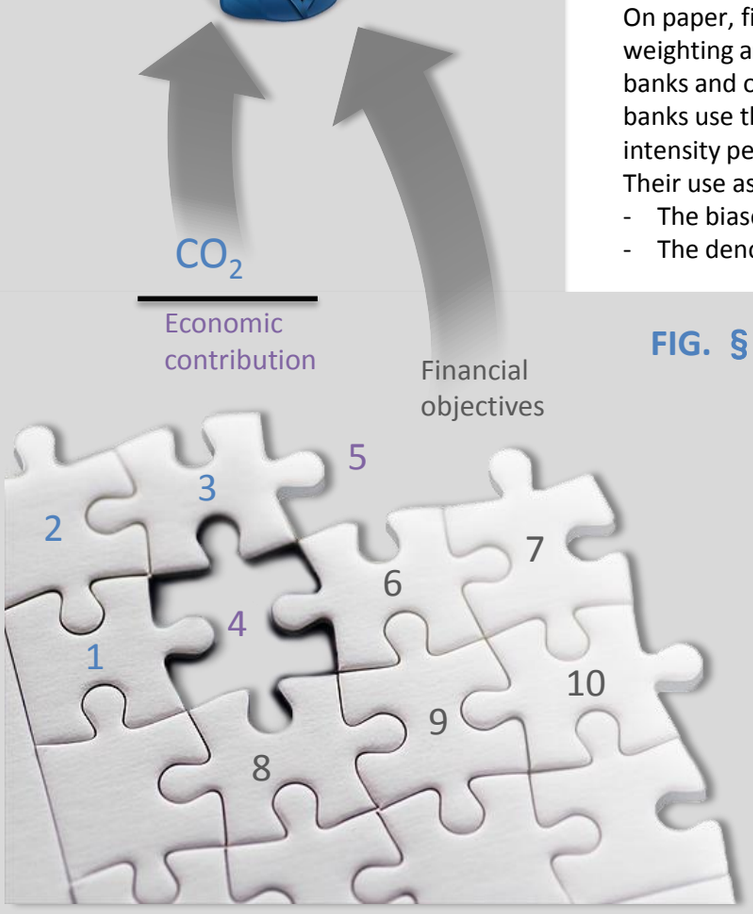


FIG. § . FROM CARBON INTENSITY TO PERFORMANCE

CARBON INTENSITY OF ACTIVITIES

1. Locked-in emissions of assets
2. Future emissions of capital expenditure
3. Potential impact of R&D expenditures

ECONOMIC CONTRIBUTION

4. Contribution to financing long term investment needs
5. Strategic role of capital vs other factors

FINANCIAL PROFILE

6. Expected returns
7. Credit and market risk
8. Diversification of exposure
9. Liquidity
10. Cost of asset management fees

1.3.3. Dollars are not a relevant proxy for the economic contribution

• **Best-in-class.** Carbon intensity per $ can be misleading for certain industries (cf. page §). For instance a gas-guzzling sport car manufacturer like Porsche has a lower than average carbon intensity per $ of sales due to its luxury positioning. In those cases, fund managers use industry-specific indicators to inform best-in-class selection: carbon emissions´per kWh of electricity (utilities), per km (automotive manufacturing), per barrel (oil), per ton of cement, etc. Some data providers like *Inrate* directly neutralize this bias in carbon intensity calculations. However this option is limited to a short list of industry-groups (cf. page §) that do report on sales in volume. For other high-stake industries such as capital goods manufacturers, multi-utilities and the financial sector, it is not yet possible to neutralize this bias.

• **Allocation**. At portfolio level, the carbon intensity per $ cannot distinguish a 'low-carbon' portfolio built with non-industrial assets (software, service sector, etc.) which has no significant impact - positive or negative - on the energy transition, and another portfolio composed of low carbon part-of-the-solution industries, such as renewables or green housing**.** In practice, this obstacle does not significantly bias the comparison between equity funds or banks, since the exposure of stock indices and large banks to these part-of-the-solution industries is usually not significant. However it is a major obstacle for the use of financed emissions in optimization processes.

• **Net emissions.** To overcome this obstacle, various banks track the 'net emissions' calculated at project level by comparing the project footprint (e.g. for a wind farm) with the footprint of baseline scenario (e.g. a coal-fired power). In this case, they use the country-specific fuel mix of electricity as a baseline scenario. Some of them, like the AFD, have extended this approach to energy efficiency investments, in this case the net emissions equal the additional emissions related to the extension of capacity or lifetime (e.g. retrofitting of a plant). However the potential of this approach is limited: when the investment includes several industries and countries, the concept of baseline scenario is not meaningful.

1.3.4. Selection of benchmarks

Most managers benchmark their fund against a stock index to assess the 'emission reductions' or their portfolio. Doing so they use the index as a 'baseline scenario'. Our analysis shows that this approach is at the very least questionable, if not misleading, for two reasons:

• The sector exposure of most stock-indices used as benchmarks (MSCI World, FTSE, DJ, Stoxx, S&P, etc.) is strongly biased toward fossil fuels compared to the real economy;

• The limitation of the investment universe to large caps and the reproduction of the benchmark's industry exposure has its origin in marketing strategies, remuneration schemes and governance structures of financial institutions. It is almost never an absolute constraint for the final investor: targets in terms of risk-adjusted returns, liquidity, diversification and control of management fees can be achieved with broader universes.

1.3.5. Next steps

The current state of methodologies allows investors to use carbon intensity as a proxy for climate performance, but it requires additional qualitative analysis to optimize the footprint in a meaningful way. To go further, research is needed to define a denominator and benchmarks reflecting the industry weighting in the long term investment needs of the real economy.

THE CLIMATE-UNFRIENDLY BIAS OF STOCK INDICES

The sector allocation of standard stock indices do not reflect the sector exposure of the real economy. The main criteria for the selection of components is capitalization and free-float. That leads to an over-weighting of established players and the exclusion of new comers from the investment universe. The consequence is a high exposure to fossil industries (10-15%) and a very low exposure to clean technologies (<2%) compared to both investment targets of climate scenarios and the trends of the real economy.

Problems with deviating from benchmark (UNEPFI):

First, deviating too much from the benchmark sector allocation exposes the portfolio to increased benchmark risk. Second, by underweighting a certain sector, the investor may reduce the exposure to risk but may also miss out on opportunities that the sector provides in a transition to a low-carbon economy. Many of the opportunities arising from this trend will be captured by innovative, less carbon-intensive companies within carbon-intensive sectors such as utilities or oil & gas.

TRACKING THE PERFORMANCE OF ESTABLISHED BENCHMARKS

"The index series aims to closely track the performance of established FTSE benchmark indices and includes all of the underlying constituents. (…) *The overall weights of each sector are the same as for their benchmark indices, but some companies in each sector are over-weighted, while others are under-weighted. This mitigates the impact of sector performance effects on index outcomes."* **Extract from the FTSE Carbon Index brochure**

1.4. CONCLUSION

Combined with qualitative analysis, financed emissions can already be used to inform investment decisions and policy-makers. However, in most cases, they are not used to their full potential. The main obstacle is not related to quality or cost, but rather to the underlying logic of investment decisions that in most cases fails to integrate both long-term financing goals and long-term risk management.

In addition, valuing carbon intensity as a share of $, which is the typical proxy for either carbon risk exposure or performance in financing the energy transition, falls short as the appropriate performance indicator for a number of industries. Further research in this area is needed.

From both a technical and political perspective, we find that the role 'carbon performance' indicators can expand quickly, driven by government needs. Risk indicators will take more time however, since they are not straightforward at bank level and should be bottom-up (line-by-line) based. This bottom-up approach is needed because the GHG footprint for a bank is not a good proxy for the sum of carbon risks.

REVIEW PANEL VIEWS

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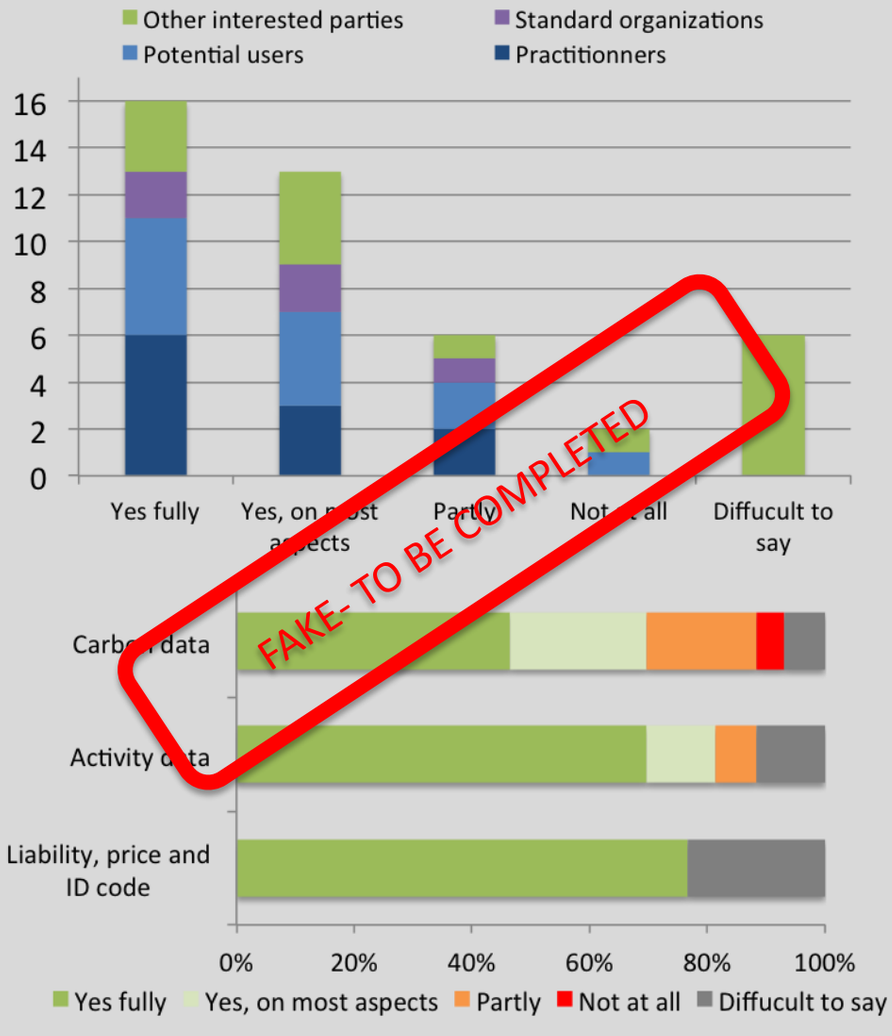

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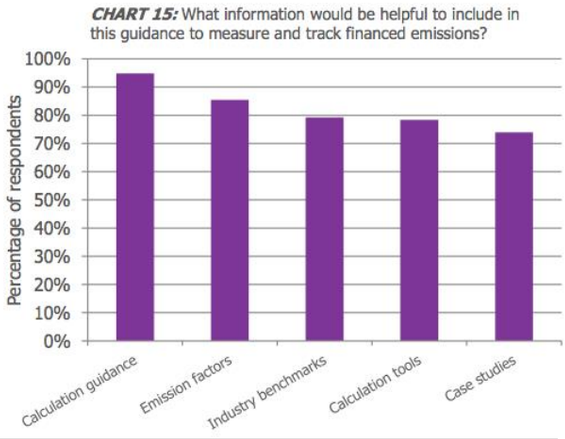
2. BENCHMARKING PERFORMANCE

GHG Protocol/UNEP-FI SURVEY AND WORKSHOPS OUTCOMES

"There is also broad interest in the availability of a standardized methodology for measuring and reporting financed emissions, but many financial institutions are concerned about complexity and the cost-benefit ratio."

MAIN CONCERNS

- Data availability and quality
- Normalizing emissions to enable comparison of companies
- Time and resources required
- Methodological concerns (e.g., avoiding double counting)
- Protecting client confidentiality
- Ensuring consistency between different financing activities
- Interpretation of results (unclear what the resulting figures mean)
- Lack of senior management buy-in (and resulting lack of any sanctions for non-compliance)



Source: *GHG Protocol/UNEP-FI*

2.1. NEXT STEP: CARBON ACCOUNTING STANDARD

2.1.1. Landscape of standardization projects

Most methodologies developed to date are inspired by the GHG Protocol/UNEP-FI corporate standard or have inspired it. Most of them are proprietary, except the cross-asset framework developed with and endorsed by the French Environmental agency (ADEME) in 2007 (cf. page §). But all in all, the main accounting rules are publicly available, many sources of data are free (EEIO models) or accessible (CDP and financial data) and the majority of the intellectual property associated with 'financed emissions' methodologies is not protected. In 2010, the GHG Protocol/UNEP-FI introduced its scope 3 protocol which provides more guidance on 'investments' but not enough to allow standardized reporting from financial institutions. Yet, the landscape is about to change:

- In France, several organizations have announced their willingness to develop a standard: the CSR business network (ORSE) and the carbon accounting association (ABC) will team up, sponsored by the ADEME, for a one-year project with the objective of developing reporting guidelines for the financial sector.
- The GHG Protocol and UNEP-FI have started a two-year project to release an international standard in 2014. To date, two workshops have been conducted, involving about 70 people, to discuss expectations and priorities.
- In Germany, the banks and insurers' environmental network VFU has commissioned two consultancies to develop a cross-assets standard. A few meetings have been organized to discuss the scope and priorities.

2.1.2. Goals and vision of standard organizations

As mentioned in the first section of the chapter, managing carbon risk or performance leads to different types of indicators and thus different reporting formats for financial institutions. To date, the priorities of the various standard organizations in terms of users and roles in the investment processes are not clearly set. The objectives seem to oscillate between the harmonization of the current practices (GHG Protocol/UNEP-FI), the creation of a new methodology (VFU) and the endorsement of an existing one as a national standard (ORSE). Given the current low appetite of financial institutions to actually use financed emissions on a voluntary basis, we forecast two scenarios:

- **Pessimist scenario**. The developers only seek to harmonize practices while minimizing development costs and complexity. The future standard aligns practices with the lowest common denominator, fostering voluntary reporting by financial institutions and fund managers. There is very limited uptake from actual investment decision-makers and policy-makers given the lack of relevant performance indicators, and finally a risk of reporting fatigue.

- **Optimist scenario**. The carbon accounting standard will level the playing field by aligning requirements on the best practices in each area. It will be the first step of a more ambitious project, aiming at developing metrics to track the contribution of financial institutions to financing the energy transition and the long term, thus opening the way for the use of these metrics as performance indicators in public mandates and for tax incentives.

2.1.3. Technical stakes and options

• **General rules or detailed guidance?** The scope of technical guidance on GHG emission accounting in general (i.e. for non-financial companies) can vary from a set of general accounting rules, to the provision of emission factors and calculation tools. The second option is necessary to allow full comparability and the coverage of scope 3 emissions. As far as financed emissions are concerned, the objectives of the various standard organizations are not clear at this stage. If they choose to cover a large scope while ensuring comparability, they will need to 'get their hands dirty' by providing guidance regarding: the calculation of emission factors for each type of investee and each industry, the construction or the use of the underlying models, the use of financial data, the conversion of securities market value, etc. Based on the content of existing models, methods and databases and our understanding of the landscape, this task will be far more costly than what is currently budgeted by standard organizations. In the current landscape it should therefore rely on a - voluntary or not, free or not - transfer of knowledge from data providers.

• **Carbon accounting and beyond?** The vision of most standard-setters to date seems to be based on the idea that the future standard will be focused on the calculation of carbon data (the numerator), letting users free to turn this raw material into relevant performance indicators for either climate risk or performance management. On the contrary, our analysis suggests that a one-fits-all approach is almost impossible to achieve, for several reasons:

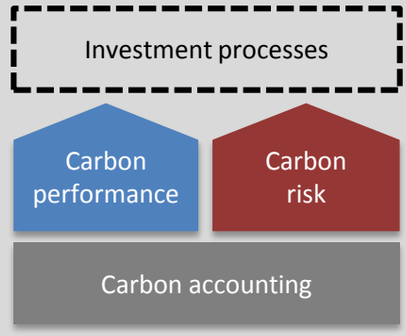
- The construction of either a risk or performance indicators for a financial institution (or multi-assets portfolio) requires both carbon data and the related activity data for each asset line or at least each segment of the portfolio (cf. page § and §) in order to calculate the denominator. Given confidentiality concerns, it is very unlikely that financial institutions will accept reporting with such a level of granularity and 'open' their books.
- As shown in chapter II.2, the choice of accounting rules depends on the objective of the user even for the calculation of the investees' emissions.

Consequently we consider that in the long term, the standard setters will be obliged to prioritize *climate performance* or *climate risk* measurement and develop guidance beyond carbon accounting, at least as a second step. The other option is to stick to carbon accounting only, without a precise vision regarding its concrete use. In this case however, the associated data will not be useful to provide relevant information to guide the investment decision-making process.

2.1.4. Financial and business stakes

• **The cost of R&D**. Based on the figures provided by practitioners we estimate that the current market for financed emission data is 10 to 20 times smaller than the global market for ESG data. Financed emission footprinting involves significant operational costs to purchase financial data and analyze investees (cf. page §), as well as significant R&D costs. In comparison, the cumulated R&D budgets available for standard development to date (+/- $250,000 based on our estimates) seems very limited given the complexity of the task. Especially if we consider that the development of a robust standard, in line with best practices, will require an access to financial databases in order to evaluate the feasibility and cost of the various methodological options available. In this context, standard organization will be obliged to choose between:

- publishing general accounting rules only,
- partnering with one or several existing data providers,
- or/and raising more funds for R&D.



GHG Protocol/UNEP-FI WORKSHOPS OUTCOMES

"It became clear from the discussions that there were two broad objectives for measuring financed emissions.

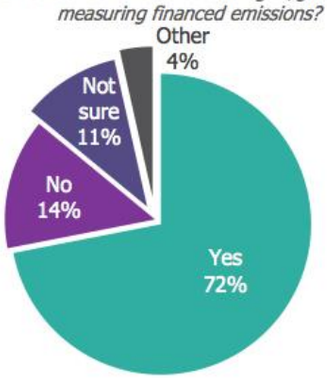
- *The first objective is to understand the 'responsibility' of financial institutions for the emissions they enable through investing and financing vis-à-vis external stakeholders (including financing the transition to a low carbon economy).*

- *The second objective is to understand the risks to the FI associated with GHG emissions. (…)*

It was clarified that the goal of the GHG Protocol/UNEP-FI is to provide an accounting framework for measuring and reporting upon which all other elements can develop. Therefore, the guidance should not focus on one single use (i.e., risk management) but instead the driving force should be to provide an accounting framework that will serve the majority of possible users.
It was explained that accounting of financed emissions enables financial institutions to perform risk management as a next and separate step. Most financed emissions data collected for GHG accounting and reporting purposes are unlikely to serve as risk management information directly but can instead provide the data to perform such assessments subsequently."

Extract from the summary of the London workshop

CHART 7: FIs only – *Is there a significant and long-term need for standardized methodologies/guidance for measuring financed emissions?*



GHG Protocol/UNEP-FI SURVEY

"Overall 10% of the respondents did not regard financed emission as an important business issue, and did not think there was significant need for standardized methodologies/guidance. Their reasons included:

- *Emissions should be measured and managed at source, not by lenders/investors*
- *Measuring financed emissions is prohibitively complex and time-intensive*
- *No link established between measuring financed emissions and risk assessment frameworks*
- *Financial institutions should focus on other, more useful risk assessments and policies*
- *Financial institutions should focus on advising clients on more substantive strategies to reduce*
- *emissions."*

NYC WORKSHOP SUMMARY

"The business case for GHG accounting for investment portfolios was not clear to many participants. (…) any drive to measure and report GHG emissions from investment portfolios needs to come from the asset owners, not the asset managers".

LONDON WORKSHOP SUMMARY

"Disclosure of GHG emissions of investments is part of asset owners' RFPs (Requests for Proposals) to asset managers and may become legal requirements. It was generally agreed that the GHG Protocol/UNEP-FI guidance would help to standardize the reporting framework so that regulators can align with an existing standard."

Source: GHG Protocol/UNEP-FI (2013)

• **Competition stakes**. The landscape of methodology authors and data providers shows that the profitability of the activity is currently very low due to fixed and R&D costs and very limited outlets (to date). If well managed, the emergence of a standard could boost demand and fuel R&D expenditure, leading to dramatic improvements in methodologies and data quality. Even if limited to carbon accounting in its first version, it can pave the way for the development of genuine performance indicators through road testing by public banks, the deployment of assessment tools, and the emergence of a debate on mandatory disclosure. On the contrary, an alignment with the lowest common denominator can impair the value of past and current R&D investments and limit the pool of potential users to compliance-oriented players.

2.1.5. Political stakes

• **Reluctance from the financial sector.** Beyond the few examples featured in this document and the limited number of pilot-tests conducted across the globe, the support of the financial sector for the development of 'financed emissions' reporting has been very limited. The idea that the financial sector has an influence and a responsibility beyond its direct operations (office management, employee commuting, etc.) is still far from being commonly accepted within the industry. In France, one of the most advanced countries in terms of pilot-testing, the publication of pilot-tests and studies between 2008 and 2010 has led many banks to defend the opposite view, and sometimes to actively oppose the initiative started to standardize financed emissions (cf. box §). Two years later, only half of the banks acknowledge the existence of 'financed environmental impacts' in their annual report (Novethic) and only one, Crédit Agricole (cf. page §), has reported its financed emissions.

• **Appetite for new indicators.** To the contrary, standard organizations can rely on various supportive trends, even within the financial sector:

- To a certain extent, financed emissions and other impact assessment approaches can be considered as a lifeline for SRI. In a difficult business context for asset management, SRI managers are increasingly challenged by NGOs and the media on the lack of impact and deceptive claims related to best-in-class approaches. Switching to quantitative assessment can be a way to rebuild trust.
- The wave of regulation on capital requirements, combined with public budget cuts, reduce the availability of long term assets. In this context, governments and the European Commission are currently seeking new ways to incentivize private investors to finance long-term economic needs. Among the proposals and ideas in debate, various mechanisms such as long-term benchmarks, green project bonds, and tax incentives on 'impact investment' will require the development of impact-based cross-asset performance metrics. It is an opportunity for standard organizations and SRI/CSR professionals to mainstream their agenda into more high-level initiatives, and connect the indicators developed to regulatory incentives.

• **Stakeholder engagement**. In this context, it is very likely that the small number of motivated professionals involved in the early stages of standard development will be joined by more conservative colleagues once the project will get momentum. This could result in pressure to lower the relevance of metrics in order to prevent uptake by NGOs, media and policy-makers. Alternatively, there could be a push for very precise measurement necessitating long-term

EXAMPLE OF STAKEHOLDER ENGAGEMENT PROCESS

« Our mission consisted in providing a fresh and external look at the project. Several methodologies were introduced to us along the project timeline. We were able to express our opinion regarding the directions to prioritize. The main exchanges took place between July 2007 and April 2008, during a dozen meetings, in plenary session. We were sometimes called upon individually by phone or email. Our comments were heard by the project team, which took them into account when drafting the final version of the methodology. When full agreement could not be reached between us, we proceeded to vote and the outcome was always respected. Practically speaking, we did not directly develop the methodology, but we were consulted at each stage of its development, in complete transparency. We had access to every document we asked for and every product- rating file, even though we did not systematically check the latter.

We fully endorse this version of the methodology, which should reach its first target: the raising of customer awareness. This version of the methodology is a good compromise between quick and easy implementation, methodological rigor and easy understanding by the bank's customers. We are aware of the innovation brought through this pilot-project and we think that the various limits at this stage were well identified. Each of these limits is explained in the methodology, which suggest possible areas of improvements.

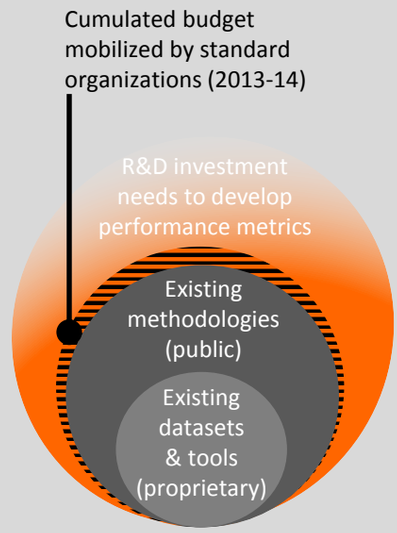
The public release of the methodology applied to savings products is only a first step. We are expecting the Caisse d'Epargne to continue applying the methodology to other product ranges, to its subsidiaries, as well as to rollout the approach to its staff. Moreover, we would like to invite other banks to join us in this adventure. We remain fully available to handle the evolution of the methodology, and accompany the process. »
Paris, June 18th 2008.
Mathieu Wellhoff, for the ADEME; Cécile Ducrot-Lochard for WWF-France;
Sébastien Godinot, for Friends of the Earth France; Olivier Eon, for Testé Pour Vous

academic research and discriminate against short-term application. One way to counterbalance this is to involve policy-makers and NGOs in the governance of the standardization projects. To date the main 'final users' (*i.e.* people who actually base decisions on the results of calculations), promoters and to a certain extent authors of financed emissions methodologies have been the environmental NGOs: to establish rankings, target some banks, endorse others and raise awareness. Tomorrows' main final users will probably be policy-makers. It is obvious that any attempt to develop a standard while ignoring the expectations of these groups will lead to criticism over greenwashing and the development of alternative practices. Besides, the first experience of standard development in France showed that a very technical work could be combined with a demanding stakeholder engagement process.

2.1.6. Financed emissions as a first step toward 2° investing

Our analysis concludes that an ambitious standardization project designed as a first step toward the development of carbon performance indicators will be more likely to receive strong support from financial institutions and governmental authorities, and to reach 'mainstream' professionals than a project strictly restricted to carbon accounting, without any 'next step'.

Regarding the process, we believe that the budget constraints of standard organizations and the existence of models and methodologies already commercially exploited calls for the construction of an international R&D project involving all players to level the playing field and share the cost of the upstream phase of research. We consider that a general carbon accounting guidance document can be published in the short-term based on best-practices, followed by a more ambitious methodology (Cf. next page) addressing potential user needs.



CUMULATED R&D EXPENDITURES & NEEDS
(2°ii estimates based on interviews)

2.3. THE STEP BEYOND: 2° INVESTING METRICS

2.3.1. Research objectives

• **Bridging the gap.** The development of a carbon accounting standard for the financial sector will probably boost reporting practices and strengthen the capacity of data providers to connect the dots between financial assets and investments in the real economy. Nevertheless, whatever the level of sophistication achieved, the standard will probably leave certain issues unresolved such as the lack of genuine performance indicators and 'benchmarks' to track the alignment of investment strategies with climate scenarios (cf. page §). The research program of the 2° Investing Initiative aims at bridging this gap.

• **Outcomes.** The research project aims at developing a 'model' to assess the contribution of investors toward financing the transition to a low carbon economy, and long-term economic targets. The objective is to build on existing climate scenarios, best-practices in financed emissions methodologies, and other 'micro-to-macro' methodologies in order to:

- convert climate scenarios and economic prospective studies into 'investment targets' for long-term investors;
- benchmark the forward-looking economic and carbon footprint of investors against these targets.

2.3.2. Output

The final deliverable of the project will be an assessment framework composed of: a calculation methodology and a pilot-model. The model will include:

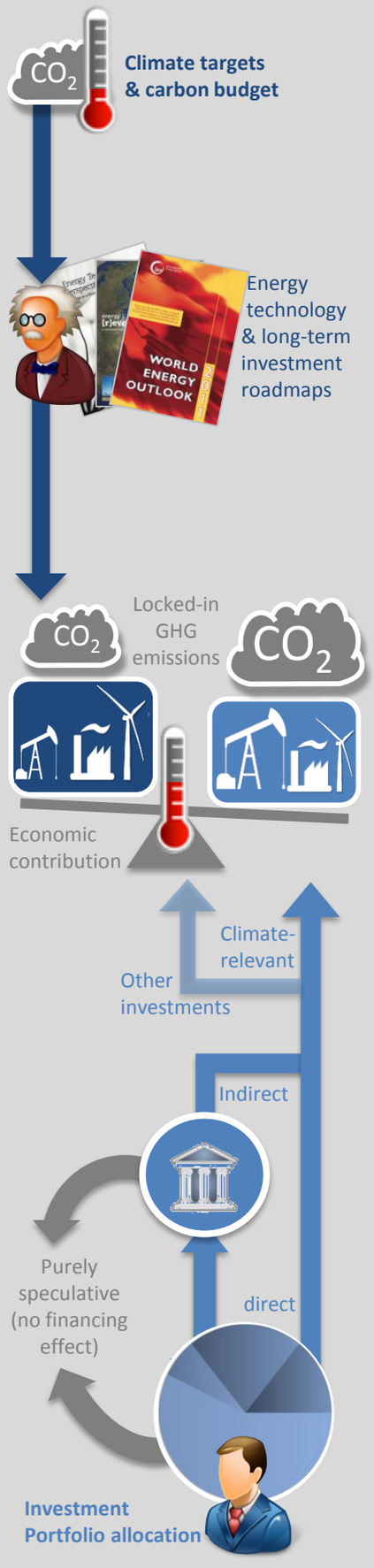
• **Targets**. Translation of 2° climate scenarios into a carbon budget available for a given amount of economic services provided by economic players (energy production, housing, transportation, etc.);

• **Assessment**. Methodology and dataset enabling an assessment of the contribution of the role of a multi-assets portfolio (fund, bank, insurer, etc.) in financing economic activity and associated carbon emissions.

• **KPIs**. Set of key performance indicators indicating to the investor the alignment of his investment strategy with investment needs for 2°C climate scenarios, and allowing him to adjust selection, industry and strategic allocation while keeping the same risk-adjusted returns and liquidity.

The intermediate deliverables will include methodological inputs on major gaps identified in this review in order to supplement existing carbon accounting standards and methodologies. The final output will be designed as a 'plug-in' for climate scenarios and portfolios management tools. The output will be made publicly available to facilitate the adoption by data providers, users and policy-makers.

2° INVESTING PERFORMANCE ASSESSMENT FRAMEWORK



2.3.3. Organization

• **Scope and governance.** The project, lead and coordinated by the 2° Investing Initiative team is conducted in partnership with our members and partners: final users (investors, banks and public authorities), authors of climate scenarios, academic researchers and data providers in order to avoid duplication of research efforts. The project will be limited to research and the production of a pilot-model, which will be open-source. The potential commercial development, maintenance and related services will be developed by users and practitioners.

• **Feasibility study**. The project started in 2012, with a study (Corentin Decouty, Imperial College London) exploring the feasibility of a 2° investing indicator for investments in the power and transportation sectors. It analyzed the availability of data in the IEA scenarios and companies accounts, pilot-tested a simplified global model, and adapted it to the UK national climate roadmap. This first study concluded that the conceptual relevance is promising, although the pilot-model contains some limitations which would need to be addressed in further research: regarding the power-sector for instance, the investments in new capacities are relatively easy to cover, but it is difficult to distinguish investments in 'smart' and standard electrical grids from public data. The study also stressed the need to explore methodological issues mentioned in the present report, related to time boundaries (page §) or allocation rules (page §).

• **Working groups.** The present state-of-the art review will be followed by a scoping phase in mid-2013 to link our program with the research streams of standardization initiatives. In addition, the research team has started to engage with professionals to explore methodological issues in uncharted waters:

- A working group on 2° investing performance for venture capital, private equity and loans to SMEs has started in May 2013. It will help to develop a framework for investments in innovation and immature technologies.
- A second working group, gathering financial analysts and listed companies highly exposed - positively or negatively - to the energy transition (e.g. electric and gas utilities, railways operator, telecommunication, construction, etc.) started in April 2013 to pilot-test new accounting and reporting practices regarding forward-looking items such as locked-in emissions and stress-tested cash flows. This group will allow the research team to test the relevance of advanced performance indicators.

FOCUS. RESULTS PROVIDED BY THE PILOT-TEST MODEL FOR THE POWER SECTOR

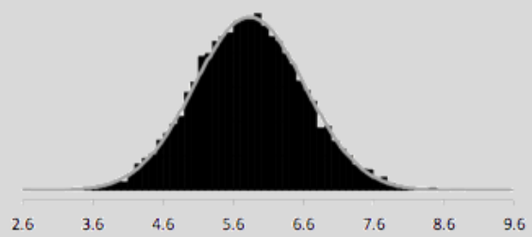
Calculation

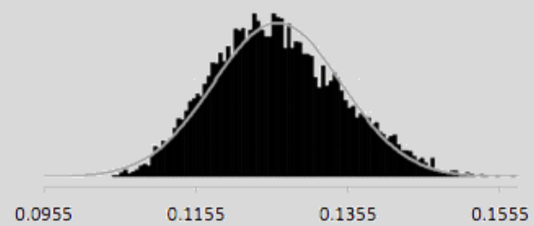
Carbon deviation	ktCO2/USD M	ktCO2
Energy technologies (i)	**D_i/USD M**	**D_i**
Coal	4	448
Gas	1	137
CCS	0	0
Wind	0	0
Solar	0	0
Other Renewables	0	0
Nuclear	0	0
T&D	0	0
Total Carbon Deviation	**6 ktCO2/USD M**	**585 ktCO2**

Financing contribution	
Energy tech (i)	**‰**
Coal	0.46‰
Gas	0.27‰
CCS	0.00‰
Wind	0.19‰
Solar	0.07‰
Other Ren.	0.05‰
Nuclear	0.18‰
T&D	0.14‰
Total CET	**0.13‰**

Output

Total Carbon Deviation	***6 ktCO2/USD M***	**Contribution to CET financing needs**	***0.13‰***





TO BE COMPLETED

2.5. CONCLUSION

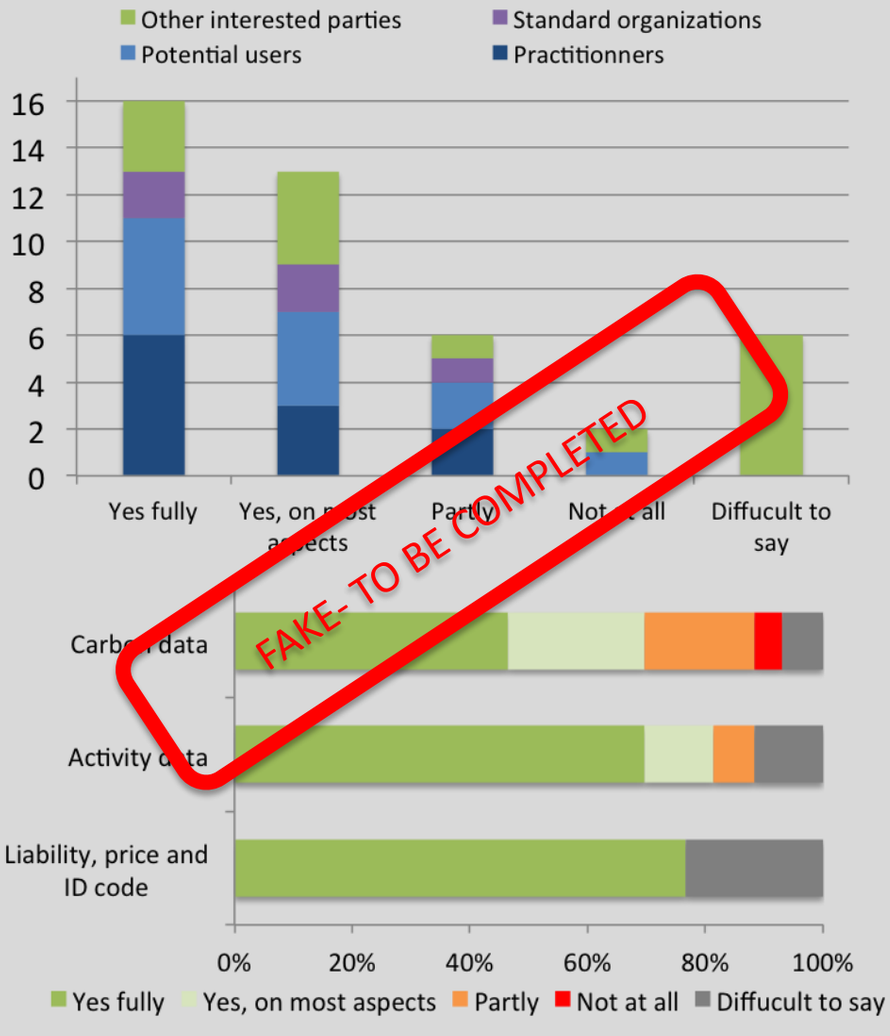
The existing methodologies provide all the pieces to build a carbon accounting standard for the financial sector, but the related data have almost no end-users. This despite the evident need of governments, public banks and long-term investors for new long-term financing metrics.

The financed emissions methodologies are well positioned to provide a backbone for such developments.

However, to go down this road, a scale effect is required. Indeed, it appears that the amount of work to be done by standard organizations and/or research agencies is not commensurate with their current R&D budgets. This calls for increasing the prominence of this topic on the public and corporate agenda, including amassing public support and fostering collaborative work between practitioners and users.

REVIEW PANEL VIEWS

Summary Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim veniam, quis nostrud exerci tation



COMMENT #1

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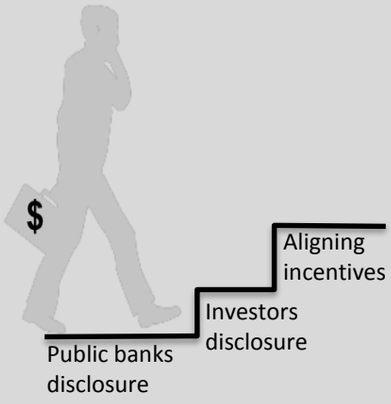
3. IMPLICATIONS FOR INVESTORS AND POLICY-MAKERS

2° INVESTING REGULATION STEP-BY-STEP



PUBLIC BANKS WITH CLIMATE-RELATED GOALS

TO BE COMPLETED HELP FROM THE REVIEW PANEL WELCOMED

3.1. IMPLICATIONS BEYOND CLIMATE ISSUES

• **Embedding climate goals in financial regulation**. The emergence of financed emissions standards and advanced assessment methods will allow investors and policy-makers to develop new approaches and incentives to channel capital toward financing the energy transition and reduce carbon risks.

• **Micro to macroeconomics.** Beyond climate issues, financed emissions assessments provide methods and calculation tools to connect the dots between financial assets and investments in the real economy, develop stress-tests for point-in-time risks, and integrate investment horizons in the understanding of financial markets. In this respect, the methodologies reviewed are not only interesting from an environmental perspective but also as constitute the avant-garde of a new generation of micro t -macro economic tools.

3.2. IMPLICATIONS FOR PUBLIC BANKS

Most public banks have in their mandate the objective to finance the long-term needs of the economy, and (often explicitly) the energy transition. The advanced financed emissions metrics will provide tools to manage and report on these objectives.

3.2.1. Annual reporting

Due to the lack of relevant metrics, we did not identify a public bank reporting on the alignment of its investment strategy with climate scenarios in a quantitative way. In most cases, banks report on the progress of their investments in 'green' assets and projects and in the best-case on the implementation of sector policies for carbon-intensive sectors. However, such reporting does not provide a comprehensive picture of the overall degree of alignment and therefore does not allow parliaments and governments to set precise progress targets. In this context, the emergence of new metrics allows public banks to report annually and set progress targets. ASN Bank provide an example of such a policy.

3.2.2. Performance metrics in PRFs

Beyond lending and assets directly managed by public banks, the new metrics allow public banks to cascade their objective in the requests for proposals for the management of their equity and bonds portfolios:

- By the definition of new performance metrics;
- By the use of long-term benchmarks instead of standard stock-indices.

3.3. IMPLICATIONS FOR POLICY MAKERS

3.3.1. Climate scenarios and economic forecasts

Most models and datasets that inform policy-makers are based on macro-economic models that in most cases very poorly capture the role of financial institutions and markets in channeling capital. Beyond climate issues, the models presented in this study can help to improve the understanding of financial markets through a micro to macro approach.

3.3.2. Disclosure for non-financial companies

To assess companies on climate performance or risk, investors need forward-looking data allowing a comparison of companies performance with climate scenarios, as well as 'integrated performance' indicators:

• **Forward-looking activity data**. For industries highly affected by the energy transition, companies should report on the breakdown of their fixed assets, capital and R&D expenditure by type of energy-technology and type innovation (business as usual, incremental innovation, radical innovation) in the context of climate scenarios. To avoid releasing confidential information as to their strategy, the companies can report aggregated data by category and compare them to investments required in climate scenarios.

• **Locked-in GHG emissions**. When associated with long-term assets or durable products (e.g. power-plant, aircraft manufacturing, etc.), these activity data need to be associated with estimates on locked-in GHG emissions.

• **Point-in-time risks stress-tests**. Companies with high carbon risk exposure need to conduct climate stress tests on long-term carbon risks: impairments in a 2° C policy scenario and litigation risks due to expected total cumulated emissions.

• **Developing guidelines.** On each topic, the reporting guidelines can be elaborated on the basis of best-practices by existing multi-stakeholder international organizations (e.g. GHG Protocol/UNEP-FI, the Global Reporting Initiative, the International Integrated Reporting Council), and then taken up public authorities. In 2013, 2° Investing Initiative has launched a working group with large companies and financial analysts to pilot-test new approaches and develop guidance (Cf. page §).

• **Amending disclosure requirements.** Policy-makers can modify existing reporting requirements on risk factors in 10k reports and equivalent, or the emerging requirements regarding ESG performance and GHG emissions. In many countries, this evolution does not required a new law, but merely a strengthening of market authorities' guidelines. Beyond annual reporting, a special focus would be required for IPO filing documents. Mandatory disclosure regarding carbon risks can also pave the way for the evolution of accounting standards, especially regarding rules for calculating impairments.

3.3.3. Disclosure for financial institutions

• **Investments in the real economy**. Today, institutional investors and banks do not report on the economic activities financed through their investments. In the best case, disclosure is limited to the exposure to top level sectors (in line with Basel II, Pillar III disclosure requirements). Institutions should be required to report on the breakdown of their assets and 'financed investments':
- by sector and industry group, and - when relevant – energy technology;
- by investment horizons (maturity or portfolio turnover);
- by country (already done partially in the "Large Exposures" regulation).

• **Financed emissions.** Today, financials institutions are in the best case required to report on their direct and electricity-related emissions. By 2014, policy-makers can introduce mandatory disclosure of annual financed emissions based on the first accounting standard (page §) and existing modeling techniques to fill the corporate reporting gaps. Once again, in several countries it only requires a modification of existing reporting guidelines on GHG emissions and/or ESG performance.

EUROPEAN COMMISSION WORK PROGRAMME 2013

Following the Green Paper to be adopted by the Commission at the end of the year, and the ensuing debate, the Commission will propose policy actions to improve the conditions for long term finance in Europe. Some of the actions may be included in other proposals (like UCITS VI)

TO BE COMPLETED HELP FROM THE REVIEW PANEL WELCOMED

CORPORATE DISCLOSURE

The 2010 Global Investor Survey on Climate Change finds that only 10% of surveyed asset owners utilize carbon footprinting analysis to track the integration of climate change factors into investment management. However, our workshops suggest that even that number may be overstated in terms of actual footprinting informing investment decisions. However, the advantages of reporting are increasingly becoming apparent. UNEP-FI highlights five reason in particular: improving client reporting, realizing efficiency gains (e.g. more energy-efficient housing), strengthening risk management, monitoring managers and providing public accounting

From 2015 onwards, the requirements can be extended to the disclosure of other items currently associated with less mature assessment methodologies and datasets such as the alignment of their asset allocation with climate goals set in eligible 2° scenarios (cf. page §). Such a requirement might seem premature but introducing it today will trigger research, pilot-testing and the development of reporting practices. As shown on page § , the cost of implementation for the financial sector would be marginal.

• **Stress-testing**. A number of countries stress-test so-called 'systemic important financial institutions' (e.g. banks, insurers) on a regular basis. They evaluate the resilience of the bank to an extreme adverse economic scenario, described by the IMF as "unlikely but plausible". To date these scenarios do not include the surge of point-in-time carbon risks (Cf. page §) related to a new wave of climate policies combined with successful mass litigation, triggered for instance by an extreme local weather event. Given the cumulated weight of highly exposed industries such as oil & gas, electric utilities and transportation in financial institutions portfolios, it arguably makes sense to include such a scenario in future stress-tests. This is achievable in the short term. In the long-term, if relevant from a systemic-risk management perspective, theses tests can pave the way for a modification of risk-weight in Basel and Solvency frameworks, or the introduction of carbon-risk related capital buffers.

3.3.4. Key Information Documents (KID) for investment products

In Europe alone, the market for packaged investment products is €9 trillion in 2009. Up to now, mandatory disclosure on the activities financed by financial products in KIDs is usually limited to the investment universe (asset class, stock index, etc.) and in the best case the integration – if any – of ESG criteria in management processes. At European level, the related regulation (PRIPS) is currently debated and will be implemented from 2014 onwards.

• **Where does my money go?** The implementation of a 2° investing framework would require disclosure of the same items as for financial institutions (investments in the real economy and financed emissions) for all savings products: savings accounts, funds, life-insurance products, etc. This information would be fully disclosed, and reported in the form of standardized labels as part of simplified KIDs. This change would require a minor amendment to the European Commission's proposal on PRIPS, completed by the setting of relevant guidelines by the European Security & Markets Authority.

• **Risk exposure**. Information on financial risks in KIDs is usually based on past performance and a short-term investment horizon (1 to 3 years), reflecting a huge gap with investors' average horizons (5 to 15 years). In line with Finance Watch's proposals, our analysis calls for the inclusion of scenario analysis, including an adverse economic scenario with the surge of point-in-time carbon risks (cf. section of stress-testing above).

3.3.5. Alignment of top-down incentives

The asset allocation strategies of financial intermediaries results from a complex mix of bottom-up and top-down approaches: risk/return analysis is conducted asset line by asset line to select securities and clients, but the investment decisions are also driven in a 'top-down way', by risk-weighing from capital requirement regulations, tax incentives on savings interests that determine the composition and sales of investment products, and the use of benchmarks (e.g. stock indices) to set industry allocation for most equity funds.
The emergence of 2° investing metrics can allow governments to align these incentives with their economic growth and climate-related goals.

WHERE DO WE STAND ON DISCLOSURE?

INVESTMENT CRITERIA

Since 2002, several countries including Australia, Denmark, Belgium, Germany, Great Britain and recently France introduced mandatory disclosure of ESG criteria taken – or not – into account, for pension funds or investment products. A similar obligation is currently debated at European level of packaged retail products (PRIPS regulation).

TRACEABILITY

Basel II and III requirements indirectly obliged banks to identify the economic activities financed with their assets. However, disclosure is limited to the credit exposure by top level sector and asset types. Only a few small ethical banks such as Triodos(NL) or NEF (Fr) report on all the activities they finance. In 2012, the retail bank Crédit Coopératif (Fr) introduced a 'green current account' only associated with green financing, like electric utilities did years ago for renewable power.

• **Regulation of benchmarks.** As described on page §, the use of stock indices as benchmarks in equity management channels massively equity investments toward fossil-fuel industries. To date this practice is not regulated, even if it strengthens the 'sheep-like' behavior of equity managers, prevents the anticipation of some long-term financial risk and reduces the availability of capital for industries not well weighted in major stock indices (such as clean techs). In the wave of the Libor manipulation scandal, the European Union is currently introducing a directive on the use of benchmarks. Issues related to industry allocation are not addressed by the directive, but it opens the way for a regulation of these instruments and their use. In the short term we recommend that policy-makers require stock-indices and bond-indices providers to assess and disclose the gap between the index allocation and the allocation aligned with long-term investment needs over the next 10-20 years. The information document would require a specific focus on climate scenarios based on qualitative analysis in the short-term and quantitative data when the 2° investing metrics will be available.
This reporting will allow market authorities to evaluate if financial markets contribute toward financing the real economy and do not fuel new financial bubbles. They can then introduce regulations on the use of benchmarks if the results are interpreted as a threat to economic growth and financial stability.

• **Taxes on savings interests.** At global level, household savings represent the bulk of the $200 trillion global financial assets outstanding: $85 trillion are held by households and $50 trillion managed on their behalf by pension funds and insurers, in addition to private bank deposits. In most countries, tax incentives on savings interests is the main policy tool to channel these private savings and influence asset managers' allocation strategies. From a public accounting perspective, these incentives are considered as subsidies to foster savings and investments in the real economy. Their cost is significant: they represent tens of billions of euros in countries like France or the UK. These tax schemes are designed at country level and reviewed on a yearly basis. Incentives related to the financing of the economy (e.g. bonus for long term savings and investment in equities) are in most cases indirectly linked with specific investment vehicles (e.g. tax-free accounts, UCITS, etc.).

In this context, the 2° Investing Initiative recommends that policy-makers:
- Assess, in each country, the impact of tax incentives on long-term finance and the energy transition, using the best-available techniques;
- Study the alignment of these incentives with the investment roadmaps of 2° scenarios. A mechanism for this would for instance include the modulation of the tax scale applied to all savings products (fund, account, life-insurance contract, etc.) based on the contribution of the underlying asset portfolio to the financing of the energy transition (cf. metrics page §). This scheme would first act as a carbon tax on investments, resulting in lower capital costs for green investments (green bonds, funds, loans, clean techs companies, etc.) and higher capital costs for industries and projects not aligned with the goals of the energy transition such as coal mining or the construction of coal-fired plants. It would therefore encourage investors to design 'green' investment vehicles and companies to raise capital for green capital expenditures and R&D projects. The second effect would be to increase the flows of investments in the real economy (vs. purely speculative activities).

EUROPEAN COMMISSION GREEN PAPER ON LONG-TERM FINANCING 2013 *(Extracts)*

The taxation of savings has a number of important economic implications, including by affecting the total amount of savings in the economy and thereby influencing capital allocation and investment. Given these effects, tax policies in this area have to be designed carefully. Many Member States have already put in place a number of incentives to increase (long-term) savings, notably with respect to pension-related savings. In addition, many Member States apply dual income tax systems, where capital income is generally taxed separately at a lower rate than other sources of income; Tax incentives are often considered as instruments to encourage certain types of investment; a tax subsidy might be justified when the social return to an investment is higher than the private return of the investor and therefore investment levels are below the social optimum (e.g. R&D and environmental concerns).
(..)
Q: What considerations should be taken into account for setting the right incentives at national level for long-term saving? In particular, how should tax incentives be used to encourage long-term saving in a balanced way?
(...)
Q: Is there a need to develop specific long-term benchmarks?

3.4. CONCLUSION

Policy-makers and long-term investors are looking for new metrics and tools to channel capitals toward the long-term and improve the anticipation of long-term risk by financial markers. Financed emissions provide the basic pillar for building such metrics and tools.

However, the experience of the past seven years shows that financed emissions' accounting and reporting will not develop without a strong support from governments. They can:

- **Finance the development of methodologies and test them on a large scale e.g. via public banks;**
- **Immediately improve mandatory disclosure to increase the availability and quality of raw data from companies;**
- **Introduce mandatory disclosure for the financial sector to create reporting channels and boost innovation from data, indices and services providers;**
- **Plan the introduction of incentives based on 2° /long-term investing metrics.**

REVIEW PANEL VIEWS

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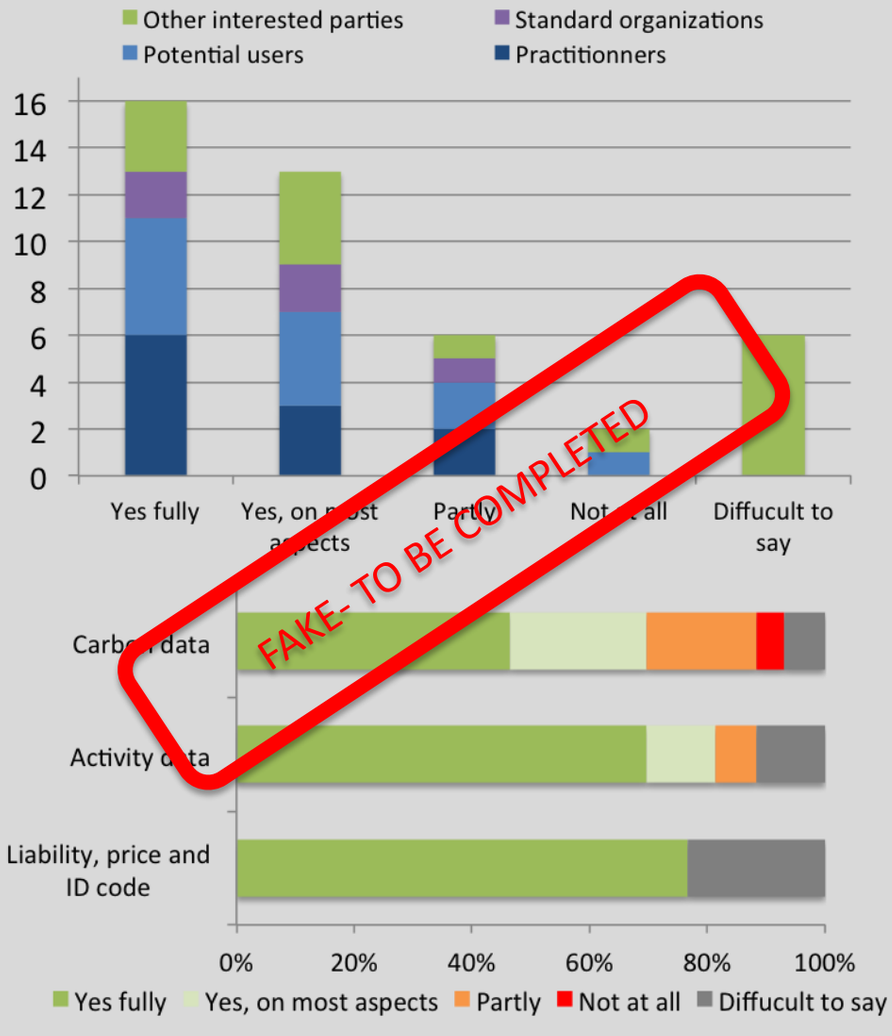

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CONCLUSION

The present report has made the case for assessing financed emissions, reviewed the current landscape of methodologies and provided some perspectives as to the future opportunities for developing more sophisticated financed emissions methodologies and the associated implications for policy-makers and investors. The results of the report can be summarized as follows:

- The global economy faces a substantial shortfall in long-term and climate finance relative to projected capital demand and climate targets. Reorienting the finance sector will require incentives that bridge the climate and long-term finance gap, mobilize the assets of long-term investors and reduce excessive investment in fossil fuels.

- The financial sector is increasingly exposed to carbon risk, manifesting itself in the form of policy risks in the short-term and the threat of 'stranded assets' and possible climate litigation in the medium to long-term. This suggests that tracking 'financed emissions' and carbon exposure will increasingly be in the interest of profit-maximizing financial institutions and investors, as well as policy-makers concerned with financial stability.

- Aligning the finance sector with 2° climate scenarios and the associated climate performance and carbon risk challenges will require new cross-asset, impact-based methodologies and incentives to move assets not only towards 'green' investment but also away from fossil fuels, in addition to allowing for technology-neutral market mechanisms with a focus on impact.

- The state-of-the-art review of current 'financed emissions' methodologies suggests that a number of indicators already exist allowing for the coverage of a broad scope of assets and liabilities when assessing an investment portfolio, providing results with a relatively high degree of certainty and low implementation costs.

- Key areas of further development for 'financed emissions' methodologies include accounting for *cumulated* and *locked-in* emissions beyond *annual* emissions. Gaps also remain for covering complex assets such as derivatives. Finally, investments horizons are not appropriately taken into account in existing methodologies. Several initiatives on national and international level are working to standardize and improve methodologies by 2014-2015.

- While the development of carbon accounting standards for the financial sector will probably boost reporting practices and increase transparency, the standards are likely to leave certain issues unresolved, key of which will be the lack of genuine performance indicators and 'benchmarks' to track the alignment of investment strategies with climate scenarios.

- Parallel to the research push, governments should act now to support the drive towards improving accounting and reporting standards and incentivizing transparency, including providing public support, improving mandatory disclosure standards of both the real economy and the financial sector, and planning the introduction of regulatory incentives based on 2°/long-term investing metrics.

The results of this review encourage the *2° Investing Initiative* to bridge the research gap highlighted above by developing a model to assess the contribution of investors toward financing the transition to a low carbon economy and realizing long-term economic targets. Starting in 2012, the project aims at publishing a 2° investing model in 2015-16. This project will be accompanied by further research on inter alia the possible regulatory instruments in driving investment towards long-term and climate finance and the role of benchmarks in driving long-term finance.

PART IV. BIBLIOGRAPHY

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1. ..

Glossary

Investment - In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate and be sold at a higher price (see page §).

Financing - The act of providing funds for business activities, making purchases or investing (see page §).

Asset - A resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit (see page §).

Cross-asset – An approach that integrates and accounts different asset classes (i.e. bonds, equities, etc.) (see page §).

Liability - An obligation that legally binds an individual or company to settle a debt. When one is liable for a debt, they are responsible for paying the debt or settling a wrongful act they may have committed (see page §).

Investee - The legal entity into which an investor has made an equity or a debt investment (see page §).

Risk - The chance that an investment's actual return will be different than expected. Different versions of risk are usually measured by calculating the standard deviation of the historical returns or average returns of a specific investment (see page §).

Benchmark - Standard, or a set of standards, used as a point of reference for evaluating performance. Benchmarks may be drawn from a firm's own experience, from the experience of other firms in the industry, or from legal requirements such as environmental regulations (see page §).

Investment process - The investment process outlines the steps in creating a portfolio, and emphasizes the sequence of actions involved from understanding the investor's risk preferences to asset allocation and selection to performance evaluation. (see page §).

Impairment – A reduction in a company's stated capital (see page §).

Balance sheet - A financial statement that summarizes a company's assets, liabilities and shareholders' equity at a specific point in time (see page §).

Stress-test - A simulation technique used on asset and liability portfolios to determine their reactions to different financial situations. Stress tests are also used to gauge how certain stressors will affect a company or industry (see page §).

ESG (environmental, social, governmental) – A subset of non-financial performance indicators that includes sustainable, ethical and corporate governance issues such as managing the company's carbon footprint and ensuring there are systems in place to ensure accountability (see page §).

SRI (Socially responsible investing) – An investment that is considered socially responsible because of the nature of the business the company conducts. Socially responsible investments can be made in individual companies or through a socially conscious mutual fund or exchange-traded fund (see page §).

Input-output – A quantitative economic technique that represents the interdependencies between different branches of a national economy or, on a microeconomic level, the production process (see page §).

Carbon data – Carbon data cover CO2-related economic activity e.g. carbon content of reserves, CO2 emissions, etc. (see page §).

Activity data – Data on the magnitude of human activity resulting in emissions or removals taking place during a given period of time (see page §).

Emission factor –The average emission rate of a given GHG for a given source, relative to units of activity (see page §).

Cradle-to-cradle – An assessment of a complete product life cycle from resource extraction (cradle) to recycling/reuse (see page §).

Cradle-to-gate – An assessment of a partial product life cycle from resource extraction (cradle) to the factory gate (i.e., before it is transported to the consumer). Usage and disposal are omitted in this case (see page §).

The 2° Investing Initiative (2° ii) is a multi-stakeholder think tank bringing together financial institutions, policy makers, research institutes, experts and environmental NGOs. Dedicated to research and awareness raising to promote the integration of climate goals in financial institutions' investment strategies and financial regulation, 2° ii organizes sharing and diffusion of knowledge, and coordinates research projects.

The 2° Investing Initiative has been created in 2012. Its work is funded by the Caisse des Dépôts, the AFD, the ADEME (French Agency for the Environment and Energy Management) and the French Ministry of Ecology and Energy. The members include 60 organizations and professionals from the financial sector from 6 countries, including most 'financed emissions' practitioners.

The name of the initiative relates to the objective of connecting the dots between the +2° C climate goal, risk and performance assessment of investment portfolios, and financial regulatory frameworks.

This report offers an overview of selected methodologies to assess investors' financed emissions. It explores the next steps for practitioners and the related opportunities for investors and policy makers. The report is the first brick of a three years research project that aims at developing a model to measure how a portfolio allocation strategy contributes (positively or negatively) to the financing of the energy transition.

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Download our first study!

- Review of the main barriers to 2° investing
- Description of what would be a 2° investing regulatory framework
- 30 pages report (English)
- Animated summary available on our website.