

Investing in a low carbon economy

The Paris Agreement on climate change came into force on November 4th 2016 after more than 55 countries representing over 55% of global Greenhouse Gas emissions signed and ratified it. The agreement will trigger significant shifts in capital allocation towards a “low carbon” economy and away from the most polluting industries as we aim to move to a zero emissions scenario by the second half of the century.

The increasing availability of environmental impact data, together with the development of sophisticated portfolio optimization techniques, can help investors better align their portfolios with climate-related regulations and their associated technological breakthroughs. Amundi’s Index management platform is well positioned to provide suitable solutions to investors in this regard.

In December 2015, representatives of 195 countries signed the Paris Agreement, an important commitment aimed at strengthening the global response to the threat of climate change by keeping the global temperature rise in this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to further limit the temperature increase to 1.5 degrees Celsius. More than 135 countries and the European Union have joined the Agreement, exceeding the 55 percent threshold for emissions. The Marrakech Climate Conference (COP 22) in November 2016 hosted the first constructive meetings of the parties committed to the agreement. ■

“Carbon intensive” businesses will be impacted

Reaching the Paris Agreement’s ambitious objectives will require a drastic reduction in Greenhouse Gas (GHG) emissions. This reduction will be achieved by an **implicit** increase in the cost of GHG emissions, i.e. additional environmental regulations preventing the use of certain high polluting technologies, and an **explicit** increase by means of a flat carbon tax or more stringent cap and trade pricing mechanisms.

Overall, companies that need to emit significant quantities of GHGs to generate revenue should expect to see their operating and financial costs increase in order to comply with upcoming climate-related regulations.

While not necessarily emitting greenhouse gases, businesses involved in fossil fuel exploration and production are considered as “owners” of carbon reserves. The aggregation of the carbon reserves across the planet is not compatible with the 2°C scenario of the COP21, as the release of all these reserves into the atmosphere would lead to global warming significantly above 2°C.

Table 1 shows the current best estimates of what quantity of known fossil fuel reserves would have to stay in the ground in order to keep global warming under 2°C in the absence of Carbon Capture and Sequestration (CCS) technology.

It appears that in a 2°C scenario, around one third of existing oil reserves, 50% of

gas reserves and nearly 90% of coal reserves would have to stay in the ground.

The development of CCS will only marginally help to mitigate these figures. Fossil fuel owners are therefore at risk of seeing some or all of their assets becoming economically unviable in such a scenario. ■

TABLE 1_ UNBURNABLE FOSSIL FUEL RESERVES IN A 2°C SCENARIO

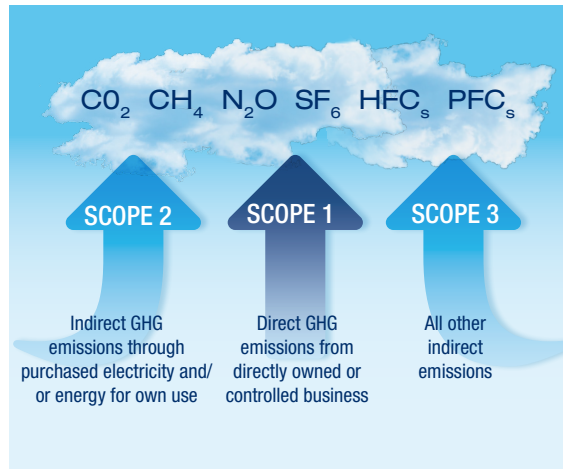
COUNTRY OR REGION	OIL		GAS		COAL	
	Billions of barrels	%	Trillions of cubic meters	%	Gt	%
Africa	28	26%	4.4	34%	30	90%
Canada	40	75%	0.3	24%	5.4	82%
China and India	9	25%	2.5	53%	207	77%
FSU	28	19%	36	59%	209	97%
CSA	63	42%	5	56%	11	73%
Europe	5.3	21%	0.3	6%	74	89%
Middle East	264	38%	47	61%	3.4	99%
OECD Pacific	2.7	46%	2	51%	85	95%
ODA	2.8	12%	2.1	22%	17	60%
USA	4.6	9%	0.5	6%	245	95%
GLOBAL	449	35%	100	52%	887	88%

Source: Nature, McGlade et al. as of Jan 2015

The Greenhouse Gas reporting ecosystem

Over the past few years, companies have increasingly been reporting their greenhouse gas emissions as well as other environmental data. These efforts towards greater transparency have been supported by the development of widely recognized reporting standards such as the **Greenhouse Gas Protocol**.

The Greenhouse Gas Protocol defines how companies should calculate, measure and ultimately disclose their GHG emissions. It is, in a way, the “IFRS” of carbon reporting, and defines three broad categories of emissions:



Source: GHG Protocol, 2016

- **Scope 1** emissions are GHG emissions from sources that are owned or controlled by the organization,
- **Scope 2** emissions are GHG emissions from the consumption of purchased electricity, steam, or other sources of energy (e.g. chilled water) generated upstream from the organization,
- **Scope 3** emissions are GHG emissions that are a consequence of the operations of an organization, but are not directly owned or controlled by the organization. ■

Amundi, a key player in the low-carbon transition

Amundi, Europe’s largest asset manager⁽¹⁾ is one of the co-founders of the Portfolio Decarbonization Coalition(PDC) and a pioneer in low carbon index solutions with approximately USD 5bn AUM⁽²⁾ in “decarbonized portfolios”.

A decarbonized portfolio will have similar sector, style and country exposures to a conventional parent index, but with a lower exposure to carbon intensive businesses. We therefore expect the decarbonized portfolio to outperform the parent index if and when implicit and explicit costs of emitting GHGs significantly increase. Otherwise, given the low tracking error of the decarbonization process, we expect that potential performance will be in line with the market.

Amundi has extensive experience helping asset owners to reduce the carbon footprint of their equity portfolios and hedge long-term climate change effects with a low tracking error budget through both ETFs and open-ended index funds.

The Portfolio Decarbonization Coalition (PDC) is a multi-stakeholder initiative that will drive GHG emissions reductions by rallying a large mass of institutional investors committed to gradually decarbonizing their portfolios.

There are currently extensive debates about which scope investors should focus on when they look at the GHG emissions of their investments. Shareholder pressure is a second key factor that contributed to the development of GHG emissions and reserves data. The Carbon Disclosure Project (CDP) is a not-for-profit organization supported

by 800+ institutional investors representing over USD100 trillion in terms of managed assets. The CDP’s backing from institutional investors provides a powerful incentive for companies to report their Carbon and other environmental impact data⁽²⁾.

Carbon data providers also estimate the potential CO₂ emissions of fossil fuel

companies by calculating the quantity of CO₂ that would be released if their fossil fuel reserves were to be burned. These estimates are relatively straightforward as fossil fuel companies have to report their reserves and this number can be used as a proxy to determine the potential stranded assets of the company. ■

Mapping “carbon risk” in equity portfolios...

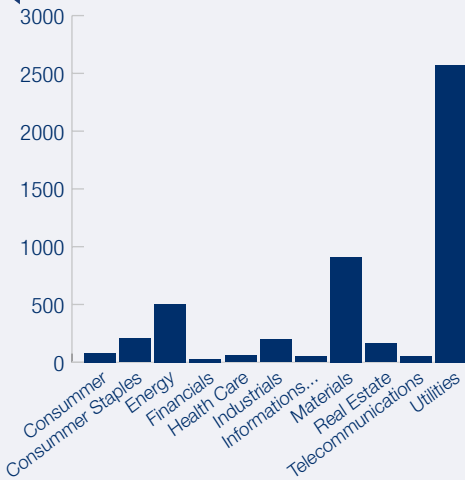
The carbon footprint of a portfolio can be monitored by looking at two different metrics: emissions intensity and reserves intensity. The **emissions intensity** of a portfolio is

calculated by dividing the annual aggregated CO₂ emissions of the portfolio by its aggregated revenue. The calculation is made bottom-up so investors can have a high level

of granularity as to which company, sector or country contributes the most to the portfolio carbon risk exposure. ■

(1) No.1 European asset manager based on global assets under management (AUM) and the main headquarters being based in Continental Europe – Source IPE “ Top 400 asset managers” published in June 2016 and based on AUM as at December 2015. (2) Source: Amundi as of 30/11/ 2016.

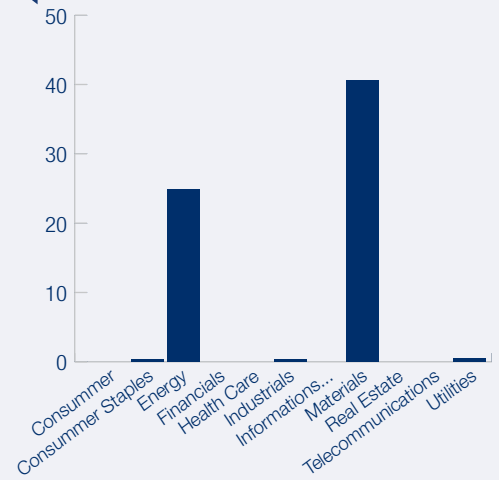
FIGURE 1 - EMISSION INTENSITY (TCO2/€MLN) MSCI WORLD INDEX



◀ **Figure 1** below shows that for the MSCI World index, the sector with the highest emissions intensity is the Utilities sector.

▶ The **reserves intensity** of a portfolio is calculated by dividing the aggregated potential CO₂ emissions of the portfolio by its total market capitalization. Most of a portfolio's reserves intensity is concentrated in the Energy and Materials sectors as shown on **Figure 2**.

FIGURE 2 - RESERVES INTENSITY (TCO2/€MLN) MSCI WORLD INDEX



Source: MSCI as of 31/12/2016

Reducing portfolios carbon footprint

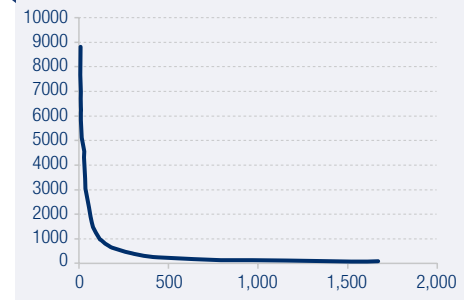
Figure 3 shows the distribution of emissions intensity of companies in the MSCI World index. The distribution is highly skewed, i.e. a small number of stocks contribute disproportionately to the total portfolio emission intensity, see below.

A portfolio manager wishing to reduce the carbon footprint of the managed portfolio could therefore naively remove the most emissions intensive securities and already achieve significant decarbonization results. For example, by removing the 20 most

emissions intensive companies from the MSCI World index which approximately represent 1% of the total investment universe, the emission intensity could be reduced by 25%.

This approach can be generalized in a disciplined process using a portfolio optimizer in order to reduce the portfolio emissions and/or reserves intensity at the lowest tracking-error cost possible relative to the initial investment universe.

FIGURE 3 - DISTRIBUTION OF COMPANY EMISSIONS INTENSITY MSCI WORLD INDEX (TCO2/€MLN)



Source: MSCI as of 31/12/2016

Figure 4 shows the **efficient frontier** obtained by building portfolios that have the lowest possible tracking-error relative to the MSCI World index while reducing their emissions and reserves intensity by various amounts. This efficient frontier is obtained using standard portfolio optimization techniques.

FIGURE 4 - CARBON & STRANDED ASSETS' EFFICIENT FRONTIER - MSCI WORLD



Source: MSCI as of 31/12/2016

It is worth noting that, in line with what is observed in **Figure 1**, the marginal tracking-error cost of reducing the emissions intensity of the portfolio is very low, as the slope of the efficient frontier is very high, implying that a small tracking-error budget can lead to a significant emissions intensity reduction. ■

Index management: Towards customization

While "passive has become massive", investors increasingly ask their index managers for customization capabilities in order to implement factor tilts designed to enhance expected returns or to mitigate

specific risk exposures such as carbon risk. These implementations don't only require in-depth understanding of optimization techniques, but also the ability to qualitatively analyze the increasing amount

of data available to investors. Amundi ETF, Index and Smart Beta platform has actively developed a strong expertise in these two fields in order to best support investors in their index management program. ■

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A decarbonized portfolio is not intended to exclude all the companies with carbon emissions but to reduce the representativeness of the latter relative to the composition of their parent indexes. In addition, a decarbonized portfolio will retain a sectoral and geographical composition similar to its parent index. Their construction is realised with the objective to get highly correlated performances to those of the parent indexes. Thus, the deviation of the geographical and sector weights of the strategy index compared to the parent index is limited to 2%.

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Design and production: Amundi Design Studio - Communication Department - © freestockcenter/FreePik - June 2017