PRI Principles for Responsible Investment

GREEN EQUITY INVESTING

10 CASE STUDIES OF INTEGRATION

UNEP FINANCE INITIATIVE | United Nations Global Compact

An investor initiative in partnership with UNEP Finance Initiative and UN Global Compact

THE SIX PRINCIPLES

PREAMBLE TO THE PRINCIPLES

As institutional investors, we have a duty to act in the best long-term interests of our beneficiaries. In this fiduciary role, we believe that environmental, social, and governance (ESG) issues can affect the performance of investment portfolios (to varying degrees across companies, sectors, regions, asset classes and through time). We also recognise that applying these Principles may better align investors with broader objectives of society. Therefore, where consistent with our fiduciary responsibilities, we commit to the following:

1 **We will incorporate ESG issues into investment analysis and decision-making processes.**

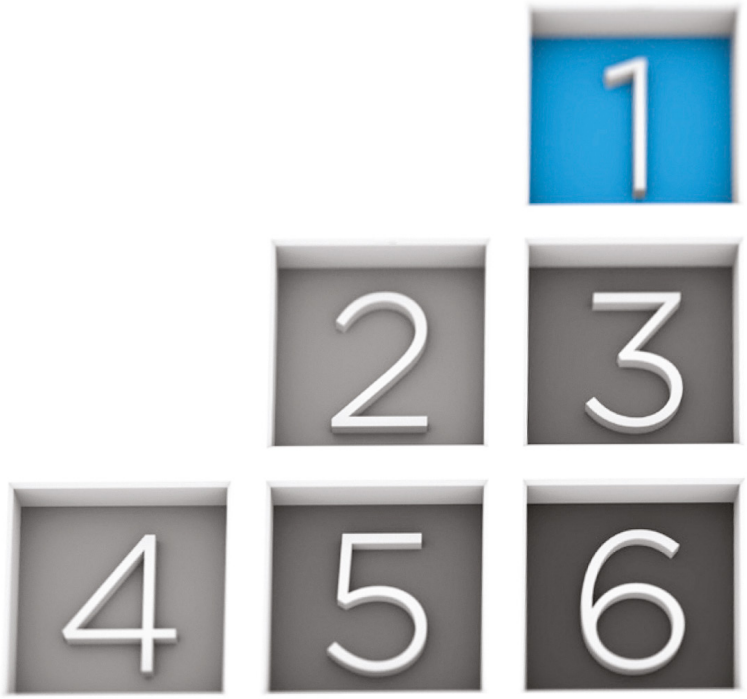
2 We will be active owners and incorporate ESG issues into our ownership policies and practices.

3 We will seek appropriate disclosure on ESG issues by the entities in which we invest.

4 We will promote acceptance and implementation of the Principles within the investment industry.

5 We will work together to enhance our effectiveness in implementing the Principles.

6 We will each report on our activities and progress towards implementing the Principles.



PRI's MISSION

We believe that an economically efficient, sustainable global financial system is a necessity for long-term value creation. Such a system will reward long-term, responsible investment and benefit the environment and society as a whole.

The PRI will work to achieve this sustainable global financial system by encouraging adoption of the Principles and collaboration on their implementation; by fostering good governance, integrity and accountability; and by addressing obstacles to a sustainable financial system that lie within market practices, structures and regulation.

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LISTED EQUITY INTEGRATION SUB-COMMITTEE

- Michelle R. Clayman, CFA, Founder & CIO, New Amsterdam Partners (Chair)
- Jessica Alsford, Executive Director and Head of Morgan Stanley's Sustainable + Responsible investment research, Morgan Stanley
- James Ayre, Fund Manager, CCLA
- Scott Blair, CFA, Head of Equity Research, BcIMC
- Leanne Clements, Responsible Investment Officer, West Midlands Pension Fund
- Jeremy Cote, Research Analyst, Trillium Asset Management
- Sudip Hazra, Head of Sustainability Research & Responsible Investment, Kepler Cheureux
- Karianne Lancee, Senior Pension Investments and Sustainability Manager, Univest Company
- Mary Jane McQuillen, Managing Director, Portfolio Manager, Head of ESG Investment, Clearbridge Investments
- Matthias Müller, Senior Sustainable Investment Analyst, RobecoSAM
- Patrick O'Hara, Responsible Investment Analyst, USS Investment Management
- Willem Schramade, Sustainability and Valuation Specialist, Robeco
- Seema Suchak, ESG Analyst, Schroders
- Sebastien Thevoux-Chabuel, Head of Research, Comgest
- Stephane Voisin, Independent Research Analyst, IntegratedValue

LISTED EQUITY ADVISORY COMMITTEE

- Alex van der Velden, Partner & CIO, Ownership Capital (Chair)
- Mamadou-Abou Sarr, SVP & Global Head of ESG, Northern Trust Asset Management
- José Alberto Baltieri, CFA, Equity Portfolio Manager, Bradesco Asset Management
- Neil Brown, Investment Manager – Pan European Equities, Alliance Trust plc
- Michelle R. Clayman, CFA, Founder & CIO, New Amsterdam Partners
- Jeremy Cote, CFA, Research Analyst, Trillium Asset Management
- Arnoud Diemers, Head of Investments, Delta Lloyd Asset Management
- Aline Geraldi Gouveia, International Business Development Analyst, Bradesco Asset Management
- Anne-Charlotte Hormgard, Senior Manager, Responsible ESG Integration, AP3
- Daniel Ingram, Head of Responsible Investment, BT Pension Scheme
- Bozena Jankowska, Director & Global Co-Head of ESG, Allianz Global Investors
- Mary Jane McQuillen, Managing Director, Portfolio Manager, Head of ESG Investment, Clearbridge Investments
- Martijn Olthof, Senior Portfolio Manager, APG Asset Management
- Brian A. Rice, Portfolio Manager, California State Teachers' Retirement System
- Owen Thorne, Investment Manager, Merseyside Pension Fund
- Amanda Young, Head of Responsible Investment, Standard Life Investments

LISTED EQUITY OUTREACH SUB-COMMITTEE

- Mamadou-Abou Sarr, SVP & Global Head of ESG, Northern Trust Asset Management (Chair)
- Maria Eugênia Buosi, Partner, Resultante Consultoria Estratégica
- Emily Chew, Vice President & Head of Asia-Pac ESG Research, MSCI
- Hellen Goorse, Responsible Investment & Governance Advisor, MN
- Seiji Kawazoe, ESG Specialist & Associate General Manager, Sumitomo Mitsui Trust Bank
- Ronnie Lim, Senior Investment Specialist, Robeco
- Gustavo Pimentel, Managing Director, SITAWI
- Sandra Rockett, Director – Institutional Business Development, Irish Life Investment Management
- Malcolm A. Ryerse, Director of Responsible Investment, Columbia Management Investment Advisers
- Francois Schockaert, Principal, Ownership Capital
- Aaron Ziulkowski, Senior ESG Analyst, Walden Asset Management

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- Jennifer Anderson, Responsible Investment Officer, The Pensions Trust
- Urs Bitterling, Allianz SE, ESG Office
- Sébastien Chabot, Director, Public Market Investments, Pension Fund and Treasury, University of Ottawa

- Anne-Charlotte Hormgard, Senior Manager, Responsible ESG Integration, AP3
- Leanne Clements, Responsible Investment Officer, West Midlands Pension Fund
- Daniel Ingram, Head of Responsible Investment, BT Pension Scheme
- Karianne Lancee, Senior Pension Investments and Sustainability Manager, Univest Company
- Manuel Lewin, Head of Responsible Investment, Zurich Insurance Group
- Divya Mankikar, Head of ESG Integration, CalPERS
- Edward Mason, Head of Responsible Investment, Church Commissioners for England
- Barbara Miazga, Former Treasurer and Director, Pension Fund, University of Ottawa
- Martin Parsons, Project and Risk Officer, Environment Agency Pension Fund
- Katharine Preston, Director, Responsible Investing, OPTrust
- Brian Rice, Portfolio Manager, CalSTRS
- Beth Richtman, Investment Manager, Real Assets & Global Governance, CalPERS
- Faith Ward, Chief Responsible Investment and Risk Officer, Environment Agency Pension Fund

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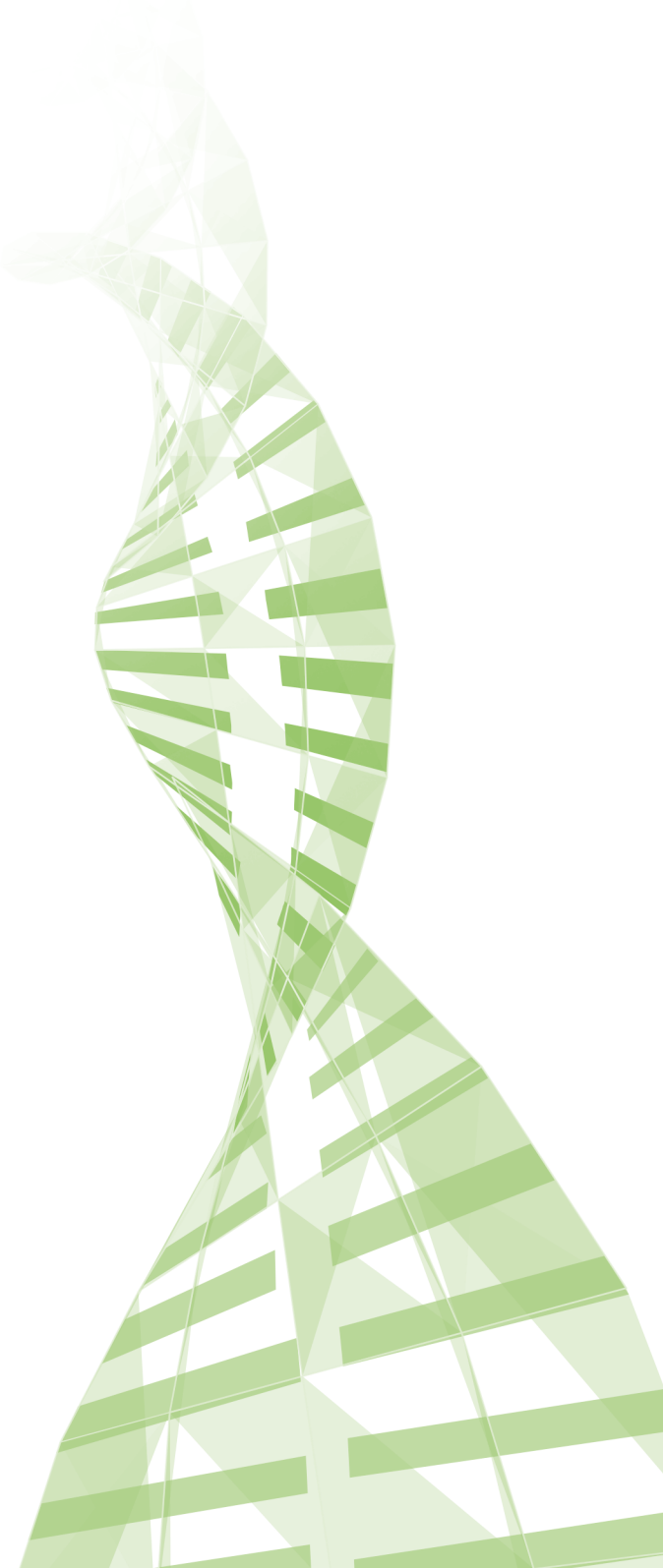
- Jennifer Coulson, Senior Manager, ESG Integration, bcIMC
- Lise Renelleau, Director of SmartBeta and Managed Volatility Equity, Axa Investment Managers



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INTRODUCTION

WHY THIS GUIDE?

2016 – THE YEAR OF GREEN POLICY SIGNALS

As a global investor initiative representing US$62 trillion in assets under management, the UN-supported Principles for Responsible Investment (PRI) welcomes The Paris Agreement coming in to force. We also welcomes recent national policy updates, including France's Energy Transition Law and China's Guidelines on establishing the Green Financial System.

That's because together, these strategic policy signals help build investor confidence in policymaker action on green issues, providing a stronger foundation for greening institutional investment. We look forward to The Paris Agreement being implemented transparently.

THE FUTURE DIRECTION – SCALING UP GREEN INVESTMENT ACROSS ASSET CLASSES

Green assets are small but growing; green bonds presently stand out, with issuance at US$65.4 billion in 2016. Chinese issuance accounts for 38% of the global total for the first three quarters in 2016, highlighting how supportive policy can catalyse greening of assets. Nevertheless, green institutional investment could be boosted across more markets and asset classes including listed equities, infrastructure, real estate and property, and private equity.

As detailed in the PRI's Greening Institutional Investment, policymakers can take steps to overcome barriers investors face in scaling up green investment. Priority areas for attention include:

- green definitions and standards;
- policy frameworks and stability;
- capacity for mainstreaming;
- transparency;
- product innovation;
- risk mitigation;
- adequate data from companies and issuers;
- risk analysis methodologies.

These areas have been identified by major global investors that are PRI signatories including AP7, Caisse des dépôts et consignations, CalPERS, CBus Superannuation Fund Deutsche Asset Management and PREVI.

PRI SUPPORT FOR GREEN CAPACITY-BUILDING

As policy maker attention shifts to scaling up green investment, this guide aims to support capacity-building among policymakers and investors. It provides practical insights into green equity investing through 10 case studies from investment practitioners that are successfully implementing their approaches.

The case studies show that:

- Green factors can be integrated within a range of equity investment strategies including fundamental and passive.
- A broad range of green factors can be integrated including emissions intensity and reserves, air pollution, water solutions and energy efficiency.
- Investors can integrate both risks (e.g. regulatory) and opportunities (e.g. electric vehicle potential).
- Both buy-side and sell-side financial analysts can integrate green factors.

We hope that both policymakers and investors find these case studies useful. These green case studies are taken from a longer PRI publication, A Practical Guide to ESG Integration, published in 2016.

For further information contact:

- sagarika.chatterjee@unpri.org
- justin.sloggett@unpri.org

CASE STUDY: Fundamental

VALUING THE IMPACT OF INCREASINGLY STRINGENT ENVIRONMENTAL REGULATION

Sector/Industry	Automotive	**Company**	Standard Life Investments
Integration technique	Revenue	**Author**	Rebecca Maclean, Mikhail Zverev

Our fundamental, bottom-up approach to selecting stocks is partly informed by ESG research (available to all our investment professionals), which is supported by our in-house Responsible Investment Team. The Responsible Investment Team provides ongoing analysis, as well as additional research on any issues that cause concern, and frequently contributes to internal meetings held by our investment teams to highlight trends, emerging risks/ opportunities and company-specific analysis.

ANALYSING THE ESG ISSUE

In April 2015, the European Commission voted in favour of implementing 'real world' NO_x emissions testing procedures in the automobile industry.

Our Responsible Investment Team and members of the equity teams explored what this change would mean for vehicle manufacturers and companies in their supply chains, as well as the risks and opportunities that a trend of increasingly stringent environmental regulation might present for investors.

We analysed the pollution reduction solutions available to vehicle manufacturers and identified companies that would benefit or suffer from a shift away from diesel engines to other types of internal combustion engine or alternative vehicles. The analysis was informed by discussions with a range of industry participants including vehicle manufacturers, auto part suppliers, catalysis producers and environmental NGOs.

In particular, we considered:

- the options available to cut NO_x emissions from diesel engines, including exhaust gas recirculation (EGR), selective catalytic reduction (SCR) and lean NOx trap (LNT);
- the cost for vehicle manufacturers to comply with the more stringent emissions regulation under real world testing procedures;
- the raw material content required by different solutions, and who the key providers are;
- the implications for the mix of diesel compared to petrol;
- the outlook for alternative vehicles, including hybrids and plug-in electric vehicles.

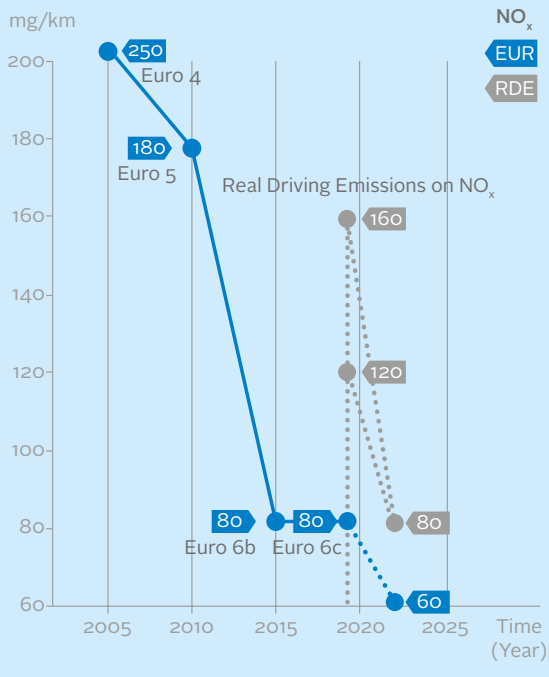
NO_x EMISSIONS UNDER SCRUTINY

Managing NO_x emission levels, of which automobiles are a major source, is a challenge for heavily populated and industrialised economies struggling with air pollution and its related health consequences.

Pressure on the industry has been further increased by the emissions scandal that began in 2015, where some manufacturers were found to be misrepresenting emission levels during testing, and a study by International Council on Clean Transport (ICCT) in October 2015 that found that permitted loopholes in emissions testing, such as driving on an unrealistically smooth surface and taping over door and window gaps, means that the average diesel vehicle emits seven times more NOx emissions under real driving conditions than stated.

Consequently, the European air pollution regulation, intended to cut NO_x emissions by 68% between 2005 and 2015, has not been achieved.

NO_x emissions under the current test (blue) and real world (grey) procedure. Source: Faurecia



IMPACT ON VALUATION

We came to two conclusions that informed stock selection across our equity fund range:

- Margins and R&D budgets at traditional auto manufacturers will be under increasing pressure to comply with more stringent emission regulations.
- Some aspects of internal combustion (e.g. SCRs, platinum group metals in catalysts) might benefit, but we will also see manufacturers shift their R&D focus from internal combustion engine efficiency to greater electrification (e.g. hybrid, plug-in hybrid and pure electric).

Examples of how these conclusions have influenced portfolio construction include the following:

- We assessed the extent to which a company may need to pass the cost of complying with increasing regulation on to their customers and/or supply chain. This is particularly pertinent for manufacturers of medium and small diesel vehicles given those vehicles' lower sale price. This has informed our bottom-up stock selection of certain auto part suppliers in global and US equity funds.
- We analysed a number of companies based on their capability and strategy with electric and hybrid vehicles, particularly for our emerging market equity funds.
- We looked at companies that are well-placed to serve/support electrification efforts in the market, for example certain battery manufacturers.

EXAMPLE - VALUING POTENTIAL OPPORTUNITY OF ELECTRIC VEHICLES FOR LG CHEM

Korean integrated petrochemical manufacturer LG Chem is, amongst other things, a leading lithium-ion battery manufacturer, and has won contracts to supply electric vehicle batteries for international automotive manufacturers. LG Chem has been investing in new kinds of battery technology and we expect the electric vehicle segment to break even in 2016.

1. **Valuing the opportunity**
   LG Chem is targeting Korean won 2 trillion (US$1.73 billion) revenue from batteries by 2017. Using discounted cash flow analysis with an assumed operating margin and weighted average cost of capital, the analysts value the net present value of the electric vehicle battery revenue stream for the company to be US$1.5bn-US$3bn, representing 9%-18% of the company's current market value. This is based on LG Chem's currently known capacity plans and contracts, but still assumes a very small penetration of electric vehicles globally.

2. **ESG assessment**
   Our assessment was that LG Chem has a good safety track record and can demonstrate extensive road testing. It has a strong history of good business execution and a positive reputation with customers and investors. These factors should position the company to be a preferred supplier of the new generation of battery technologies to the large manufacturers.

3. **Market price**
   The market tends to be slow to price in structural changes, and LG Chem's electric battery segment is yet to contribute materially to its profits. Comparing the share price to peers, Lotte Chemical is a Korean petrochemical company with no exposure to electric vehicles and has outperformed LG Chem over 2015 on the back of a strong petrochemical cycle. In early 2016, Lotte and LG Chem trade at similar price-to-book valuations.

Our view was that the market was at that time not pricing in LG Chem's US$1.5bn-US$3bn electric vehicle potential. The long-term structural drivers of increasing environmental regulation for vehicle manufacturers and falling battery costs, as well as LG Chem's strong ESG profile, increase the probability that the company will achieve its revenue target from electric vehicle batteries and we believe that this could lead to a re-rating of the company by the market.

CASE STUDY: Fundamental

ASSESSING THE REVENUE IMPACT OF THE SDGS

Sector/Industry	Consumer staples	**Company**	Alliance Trust Investments
Integration technique	Revenue	**Author**	Martyn Jones

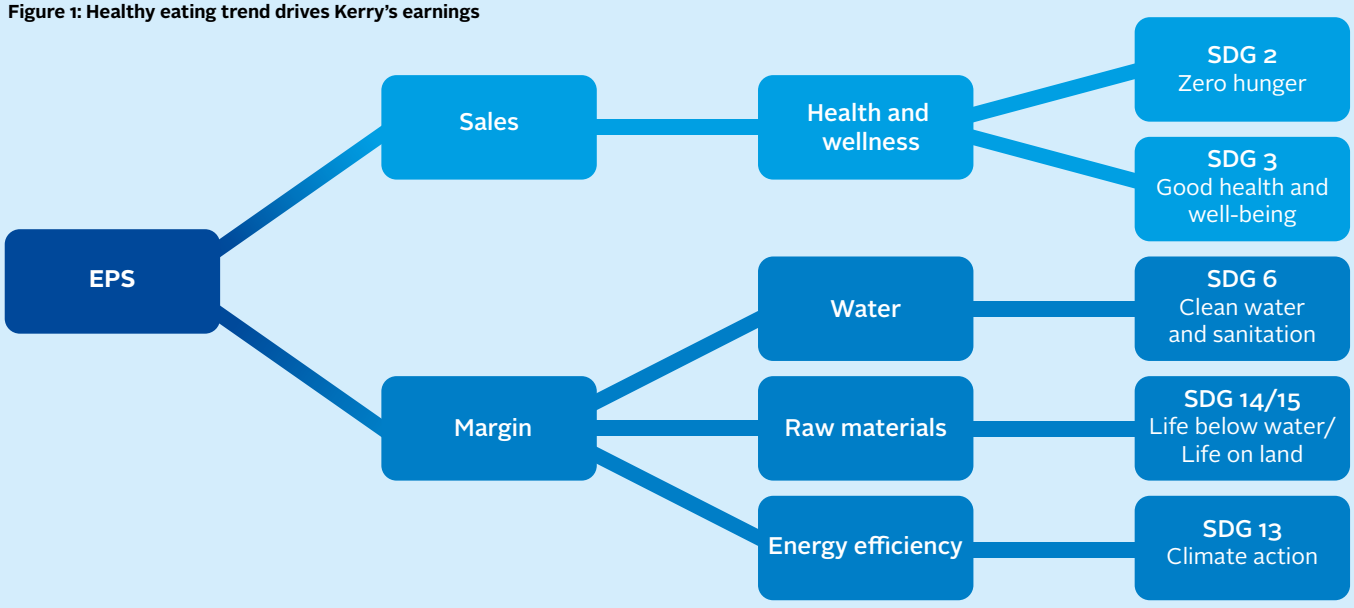
Our assessment of the consumer staples sector identified three business activities - the production of food, the production of household chemicals and the retail of them both - in which revenue can be driven by the Sustainable Development Goal (SDG) themes.

IDENTIFYING TRENDS

We assessed Kerry Group - a €14bn listed Irish company established in 1972 as a dairy cooperative that has evolved to be one of the largest and most advanced ingredients and flavours technology companies in the world - as being exposed to Sustainable Development Goals 2 and 3, in particular target 3.4 to reduce pre-mature mortality from non-communicable diseases (NCDs) by a third. (Obesity is linked to myriad NCDs including Type 2 diabetes, heart disease and stroke. The prevalence of obesity has doubled since 1980 and is set to double again by 2030, with the World Health Organisation declaring obesity a global epidemic impacting emerging and developed economies.)

We found that the ingredients and flavour division, which accounts for roughly 75% of total Group revenues, will be materially impacted by structural trends towards healthy eating preferences: Kerry is sought out by food majors for its expertise in reformulating foods (reducing the calorie, sugar, salt and saturated fat content, whilst retaining the same taste, texture, feel and shelf-life) and for its development of healthier ingredients for new products.

Figure 1: Healthy eating trend drives Kerry's earnings



Proactive disclosure of environmental, social and governance factors can help companies navigate through regulatory and reputational risks, and mitigation strategies can highlight opportunities for operational efficiency, especially when related to environmental impact reduction. Kerry Group is well positioned to address environmental issues having implemented carbon, water and waste reduction programmes. The company has worked to address deforestation risks presented by its raw material inputs, and in 2014 moved to 100% RSPO-certified sustainably sourced palm oil. This helps to secure a sustainable supply for the future, protects against reputational risk and gives the large food manufacturers the opportunity to differentiate their offering with transparent labelling and traceable supply chains.

ASSESSING IMPACT

When assessing the growth of the ingredients and flavour division, we look at likely exposure to these key trends, resulting in multiple changes to our 2014-17 estimates for the company:

- We believed that the division's exposure to SDG 2 and SDG 3, and the associated acceleration in the shift toward healthier eating, would result in volumes growing at an average of 5%.
- Our top line revenue forecast was about 150bps ahead of consensus estimates, also enabling us to increase our margin expansion expectations as a result of the operational leverage.
- Integrating these factors resulted in projected earnings growing at a compound annual rate of 12%, over 100bps higher than consensus estimates, in turn improving expected return on capital.

We believed that Kerry, delivering steady growth and returns, would be recognised for its quality and would overtime develop a premium valuation relative to its peers. So far, our forecast of superior returns and valuation appreciation has been corroborated by the company outperforming the index and the sector since our analysis was conducted.

CASE STUDY: Fundamental

EVALUATING ESG IMPACT ON PROJECT COSTS

Sector/Industry	Mining	**Company**	Morgan Stanley Research
Integration technique	Cash flow and operating costs	**Author**	Jessica Alsford, Alain Gabriel

Building desalination plants appears to be the mining industry's favoured solution to the issue of water scarcity. Chile is proposing a law directing all mines using more than 150 litres of water per second to incorporate seawater in their operations.

Our analysis suggests that desalination adds US$2,000-US$2,800 per tonne to capital intensity and US$92 per tonne to annual operating costs. To maintain a minimum unlevered project IRR of 15% (pre-tax), this requires copper's US$6,724 per tonne estimated price to rise by US$400-US$500 per tonne.

This incremental cost can have a material impact on project economics. We believe that the environmental scrutiny of Antofagasta's Los Pelambres expansion has reduced the project's IRR from 14% to 11%.

The 90kt-95kt copper project was initially planned to commence production in 2018, but we estimate that the two-three year delay in obtaining the environmental permit, resulting from the requirement to construct a desalination plant with associated infrastructure, means that volume growth at Los Pelambres will not materialise before 2021.

THE GROWING COST OF WATER

Water is critical to copper production: 78% of copper produced by the world's 20 largest mines is currently in water-challenged regions, with Chile (33% of 2014 global production) most affected. The problem is getting worse: global demand for water is set to exceed supply by 40% in 2030, whilst structural shifts in copper mining, such as a change in the targeted geology (lower grades and rising sulphide content), demand more water-intensive processes.

The use of fresh water, increasingly contested between mining companies and local communities, has been at the source of a dispute with Antofagasta.

Recent protests that led to a temporary stoppage of copper shipments from Antofagasta's largest mine are the most serious disruption yet and an indication of the heightened social scrutiny of Antofagasta's, and more generally the mining industry's, activities in Chile.

Project permitting has become more stringent, influenced by rising friction between local communities and mining companies in general around environmental issues, notably fresh water usage and the impact of mine tailings on nearby communities.

Figure 1: Additional investment in a water treatment facility will raise the capital intensity...

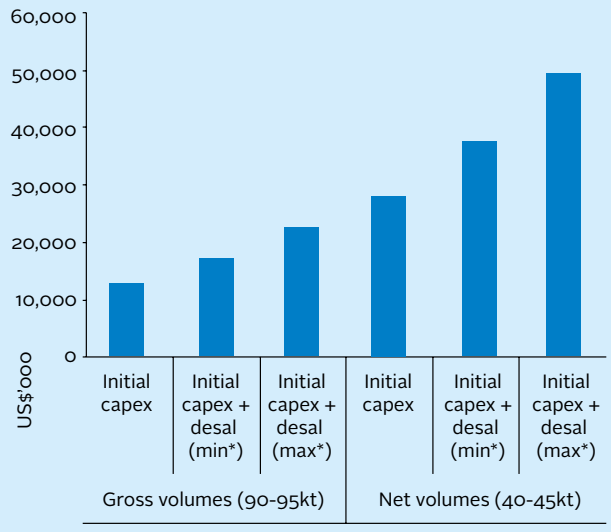
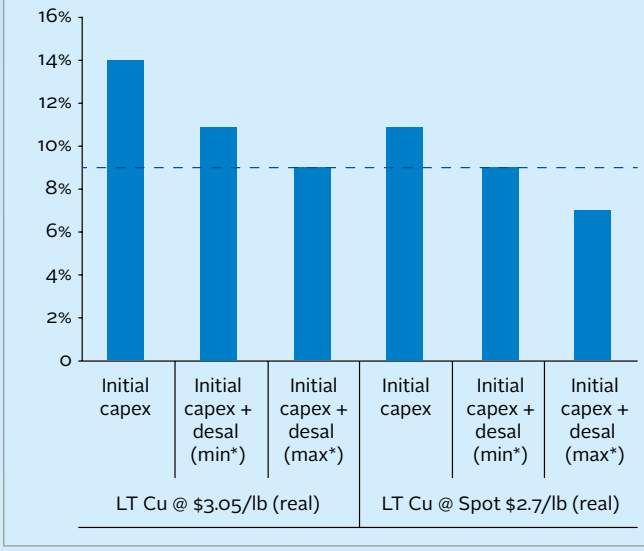


Figure 2: ...and reduce the investment post tax unlevered IRR from 14% to 11%



IMPACT OF INTEGRATION

In April 2015, we published a detailed report on Antofagasta, with a negative perspective on the company's copper mining operations. Due to production disruption from water usage disputes and permit delays for new projects, the analysts believed that the company's modest growth profile could deteriorate and additional capital on new infrastructure (i.e. the construction and running of a desalination plant) might need to be spent to deliver top-line growth and offset the impact of declining grades and rising rock hardness. This would increase capital employed per tonne about 48% by 2021, eroding benefits of a copper price recovery.

Maintaining additional infrastructure would also result in higher operating costs, further contracting margins. Additional spending and permitting delays were factored into the base case valuation.

CASE STUDY: Smart Beta

CONSTRUCTING A SMART WATER INDEX

Company	Calvert Investments
Author	Andreas G. F. Hoepner, John Streur

THE SMART BETA PROCESS

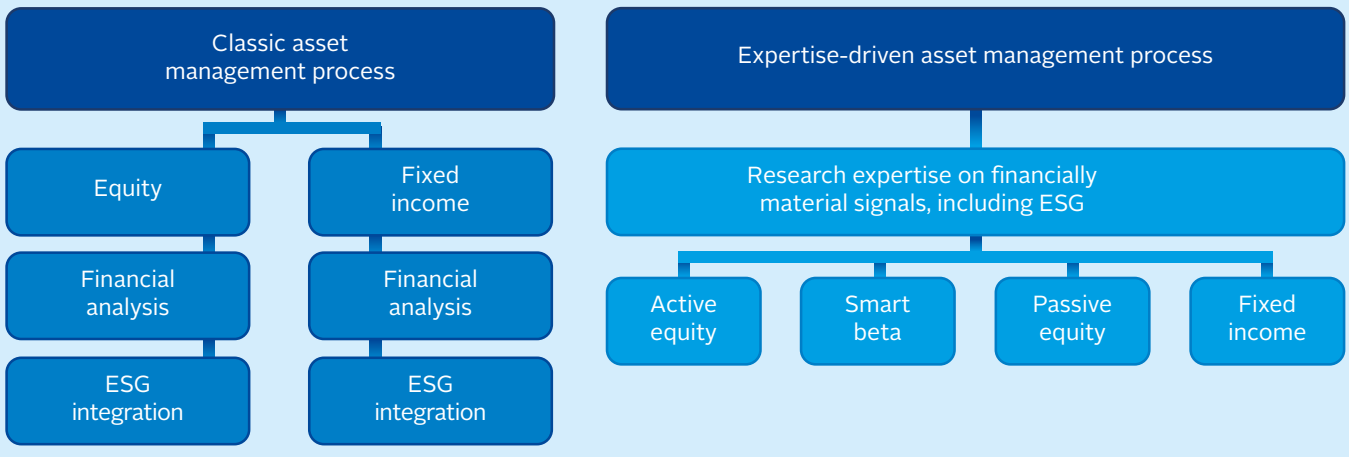
In order to support a variety of investment strategies that incorporate ESG standards, we conduct research in a manner that allows the output to be used to comprehensively score certain segments of the capital markets (equity and debt) relative to ESG criteria. This enables us to develop a high-quality ESG smart beta investment process and to integrate ESG research into the traditional investment decision-making process.

Our process has four building blocks:

1. **Firm- and portfolio-level attributes:** Smart beta strategies seek corporate attributes that have consistent positive performance impact across all firms sharing these attributes, as opposed to focusing on the large outperformance opportunities of a few individual firms, as some active strategies do. Smart beta generally searches for small positive moves by the dozens, if not hundreds, that when combined together can result in better, more effective overall portfolio performance. Hence, our smart beta investment process assesses attributes at the individual firm level, and understands in detail whether these firms represent the right combination of companies at the portfolio level.
2. **Data quality and independence:** Since smart beta requires firms to be assessed on the same attributes, it is crucial to systematically source high-quality, independent data.
3. **Financial data science:** Understanding how ESG attributes affect the risk-adjusted return of investment portfolios involves not just how any factor impacts a portfolio's return variation, but also the hierarchy between the drivers (e.g. is the return variation of this equity portfolio driven more by value characteristics or corporate governance attributes?).
4. **Scouting for disruptive data:** Continuously scouting for new sources of data indicating risks and opportunities, and other technology breakthroughs, enhances the process. Any investment process that considers itself complete is at risk of losing out to someone able to capitalise on new opportunities.

This differs from a classic asset management process, where teams and research are usually separated by asset class, instead centring the process around and starting it with research in financially material ESG signals, which is shared with all asset class teams and applied to those that appear to have the highest probability of creating positive outcomes at low risk (figure 1).

Figure 1: Classic asset management process with ESG consideration/integration (left) and expertise-driven asset management process of an ESG specialist (right)



CONSTRUCTING THE INDEX

Based on the above process, our Calvert Water Research Index is constructed by:

- selecting constituents from water supply sectors;
- identifying:
  - companies operating in water-intensive industries;
  - innovative water solutions providers.

To initially select index constituents from three water supply sectors (utilities, infrastructure and technology), we started with a universe of 30,000 publicly listed companies, which was filtered based on market capitalisation, float-adjusted market capitalisation and 20-day average trading volume to a long list of about 6,000 securities. This was reviewed to create a short list of firms with more than 30% total revenue or earnings derived from water-related business activities.

To select innovative water solution providers, we use our proprietary research system to identify financially material indicators of water efficiency and water impact among firms in sectors with high water intensity, such as food products, paper or semiconductors, and include organisations that offer particularly innovative solutions to the global water challenge, as defined by the United Nations Sustainable Development Goals.

To diversify the index, specialised water products and water supply sectors are weighted by a modified market capitalisation, with each of the three sectors receiving a quarter of the overall index weight. Water solution providers are equally weighted to represent the fourth quarter of the overall index. The index itself is rebalanced quarterly and reconstituted annually within a 5% maximum weight per security and a 20% maximum aggregated weight for emerging markets.

CASE STUDY: Passive

WEIGHTING VS EXCLUSION IN LOW-CARBON INDEXES

Company	MSCI
Author	Thomas Kuh

We have two main approaches to developing indexes institutional investors may use as they decarbonise their portfolios (to mitigate carbon risks and support a transition to a low-carbon economy):

- reweighting high-carbon stocks (the MSCI Low Carbon Target Indexes);
- excluding the most emissions-intensive and reserves-intensive companies in each sector (the MSCI Low Carbon Leaders Indexes).

Figure 1: Comparison of MSCI Low Carbon Target Indexes and MSCI Low Carbon Leader Indexes

	MSCI Global Low Carbon Target Indexes	MSCI Global Low Carbon Leaders Indexes
Approach used in index design	Re-weighting	Selection & Re-weighting
Short-term risk	Uses optimisation to reduce tracking error to parent index	Uses optimisation to reduce tracking error to parent index
Long-term thesis	Uses optimisation to reduce exposure to companies most vulnerable to stranded assets (i.e. exposed to current and future emissions) while retaining complete opportunity set	Exposure reduction based on selecting companies with low current carbon emission and low fossil fuel reserves
Objective	Minimise the carbon exposure (emission intensity and reserves relative to market cap) while constraining the ex-ante tracking error to the benchmark to a target (default: 30bps)	Exclude based on carbon emission intensity and reserves relative to market cap, and then minimise tracking error while constraining the carbon reserve relative to market cap and emission intensity to a maximum value (default: 50%)
Opportunity set	Any MSCI market cap weighted index	Any MSCI market cap weighted index
Approach used in index design	Re-Weighting	Selection & Re-weighting
Exclusion	No exclusions	Largest 20% emitters by number in the parent index, with a maximum of 30% by weight from any sector Largest owners of reserves (up to 50%)

	MSCI Global Low Carbon Target Indexes	MSCI Global Low Carbon Leaders Indexes
Optimisation / weighting	Minimise emission intensity and minimise reserves relative to market cap, subject to the given constraints Ex-ante tracking error to benchmark: specified target (default: 30 bps) Turnover constraint: < 10% semi-annual Sector constraint: < 2% under- or over-weight, no constraint on Energy Country constraints: < 2% under- or over-weight Model: Barra GEM3	Exclude based on emission intensity and reserves relative to market cap Minimise ex-ante tracking error to benchmark Reduce emission intensity and reserves relative to market cap by at least 50% (default) Turnover constraint: < 10% semi-annual Sector constraint: < 2% under- or over-weight Country constraints: < 2% under- or over-weight Model: Barra GEM3
Short-term risk	Uses optimisation to reduce tracking error to parent index	Uses optimisation to reduce tracking error to parent index
Long-term thesis	Uses optimisation to reduce exposure to companies most vulnerable to stranded assets (i.e. exposed to current and future emissions) while retaining complete opportunity set	Exposure reduction based on selecting companies with low current carbon emission and low fossil fuel reserves
Public stance	Allows for engagement with companies	Can allow subscriber to signal an intent to influence corporate behaviour

MSCI ACWI LOW CARBON TARGET INDEXES

Our Global Low Carbon Target Indexes reweight stocks to reduce carbon exposure. The indexes are designed to achieve a target level of tracking error while minimising the carbon exposure.

The inputs include carbon emissions and carbon reserves exposures of the individual securities. The objective is to minimise carbon exposure subject to a tracking error constraint of 30 bases points relative to the parent index. The optimisation parameters include country weights, sector weights and other constraints.

Put simply, the index may include two securities from the same sector with similar risk characteristics exposures, but overweight the security with lower carbon exposure and underweight the one with higher carbon exposure. Figure 2 outlines the top and bottom 10 active weighted constituents within the MSCI ACWI Low Carbon Target Index relative to the parent index. Most of the underweight and overweight securities belong to the energy sector.

Figure 2: Top and bottom active weights of the MSCI Low Carbon Target Index

		Country	Sector	Weight (%)	Active Weight (%)
TOP ACTIVE WEIGHTS	**Ultrapaper part On**	BR	Energy	0.2	0.2
	Spectra Energy	US	Energy	0.2	0.2
	American Water Works Co	US	Utilities	0.2	0.2
	Formosa Petrochemical Co	TW	Energy	0.2	0.2
	Grupo Mexico B	MX	Materials	0.2	0.2
	Enbridge	CA	Energy	0.2	0.2
	PrairieSky Royalty Ltd	CA	Energy	0.1	0.1
	Inter pipeline	CA	Energy	0.1	0.1
	Fortis	CA	Utilities	0.1	0.1
	Transcanada Corp	CA	Energy	0.2	0.1
BOTTOM ACTIVE WEIGHTS	**Exxon Mobil Corp**	US	Energy	0.0	-1.0
	Chevron Corp	US	Energy	0.1	-0.4
	Total	FR	Energy	0.0	-0.3
	Royal Dutch Shell B	GB	Energy	0.0	-0.3
	Royal Dutch Shell A	GB	Energy	0.0	-0.3
	BP	GB	Energy	0.0	-0.3
	Occidental Petroleum	US	Energy	0.0	-0.2
	Duke Energy Corp	US	Utilities	0.0	-0.2
	NextEra Energy	US	Utilities	0.0	-0.2
	Southern Company	US	Utilities	0.0	-0.1

CASE STUDY: sell-side analysis on energy

Report title	Energy Darwinism II (August 2015)
Sell-side broker	Citi
Lead analysts	Elaine Prior, Jason Channell and Liz Curmi

Citi contributes to the debate on climate change and its impact on economic growth by mapping the expected mitigation and adaptation costs of two scenarios:

- Inaction scenario: "We allow macroeconomics to drive demand for energy by ignoring the implications for emissions and feeding energy demand based purely on (often short term) economics and the immediate availability of fuel. To meet rapidly growing energy demand, this scenario will result in an enormous 'energy bill' for the world, and alongside this we must also consider the potential financial implications of climate change."
- Action scenario: "We mold our energy future driven by a blend of emissions, economics, avoided costs and the implications of climate change. This requires an assessment of how much 'extra' we will spend on transforming the global energy mix to a low carbon energy complex, and what the other associated costs will be in terms of lost global GDP, stranded assets etc., offset against the avoided costs of climate change."

By assessing the global spend required under each scenario from 2015-2040 (action = US$190.2trn; inaction = US$192.0trn) and the relative damage costs (cumulative losses from inaction are estimated at US$2trn-US$73trn or 1.5%-5% of GDP, in subsequent years), Citi uses scenario analysis to construct a direct line-of-sight argument from energy and climate to economic growth forecasts.

Figure 1: The 3 scenarios of the Potencial Costs of Climate Change, Showing the Significant Effect that Different Discounting Rates Have. Source: Citi Research

Discount rate	Low US$ trillion	NVP of "Lost GPD central US$ trillion	Upper US$ trillion
0%	-20	-44	-72
1%	-14	-31	-50
3%	-7	-16	-25
5%	-4	-8	-13
7%	-2	-5	-7

CASE STUDY: sell-side analysis on utilities sector

Report title	What keeps energy analysts awake at night (June 2015); What keeps utilities analysts awake at night (June 2015)
Sell-side broker	Credit Suisse
Lead analysts	Sandra McCullagh

Credit Suisse's sector analysts identify megatrends affecting the sector, then flag which specific ESG issues affect the sector and finally analyse how those issues impact individual company valuations.

Figure 1: Megatrends affecting utilities

	Sustainability		
Description	**AGL.AX**	**APA.AX**	**AST.AX**
Emerging risks			
Renewables/aversion to fossil fuels	Negative	Warning	
Energy storage	Warning	Warning	Warning
Waste & recycling			
New materials	Warning	Warning	Warning

Figure 2: Environmental issues for utilities

	Environmental		
Carbon emissions	Negative	Negative	Negative
Upstream carbon emissions	Warning		
Energy efficiency	Negative	Negative	Negative
Insuring climate change risk			Positive
Opportunities in renewable technologies			

Figure 3: Utilities MSCI ESG rating and target price impacts

Company	Target Price (AUD)	ESG downside included	Market cap ($mn)	ESG impact ($mn)	Analyst view on rating
AGL.AX	18.10	-2.1%	10,775	229	Positive
APA.AX	8.10	-3.0%	10,218	316	Neutral
DUE.AX	2.40	-1.0%	3,794	38	Positive
ENE.AX	8.00	-3.1%	1,201	39	
ORG.AX	11.00	0.0%	14,680	-	Negative

CASE STUDY: sell-side analysis on utilities sector

Report title	Two degrees (2°C) of separation (March 2016)
Sell-side broker	Barclays
Lead analysts	Mark Lewis

Barclays evaluates two environmental factors in the German utilities sector:

- short-term outlook for both (companies) overshadowed by nuclear-funding uncertainty;
- COP-21 and the long-term implications for fossil-fuel generation.

These have fundamental implications for valuation of the major companies (RWE and E.ON). With the first factor, Barclays applies a nuclear-funding discount to both companies' sum of the parts (SOTP) valuations to derive its price targets.

When assessing the impact of the second environmental factor, Barclays calculates the EUA (carbon credit price) that would be necessary for gas to displace coal and for the share of renewable energy to grow in sufficient quantities for emissions reductions commensurate with 2°C. This price is then applied to the merit order for German power generation with the results for asset valuation shown below.

Figure 1: Sensitivity of E.ON's German and European fossil-fuel assets to our 2°C analys (€m). Source: Barclays estimates

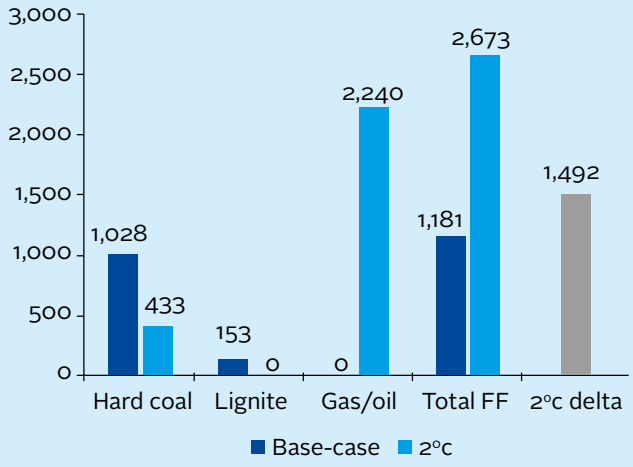
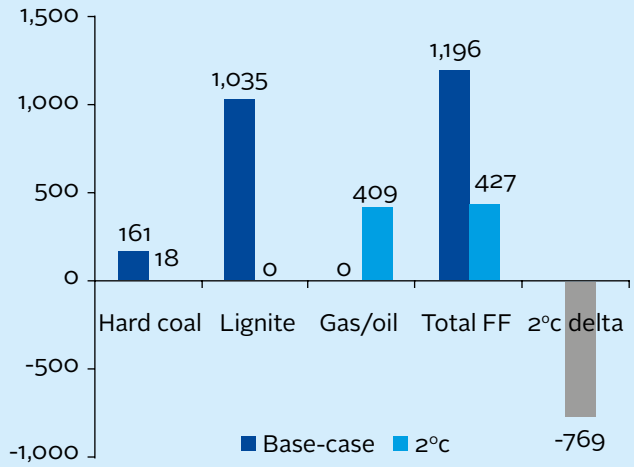


Figure 2: Sensitivity of RWE's German fossil-fuel assets to our 2°C analysis (€m). Source: Barclays estimates



CASE STUDY: sell-side analysis on emissions

Report title	Getting Real: The New Emissions Era (October 2015)
Sell-side broker	Exane
Lead analysts	Stuart Pearson, Edoardo Spina, Dominic O'Brien, Erwan Créhalet

Exane conducted a review of likely developments in the regulatory environment in the wake of the VW scandal, assessing the short-term impact on compliance costs, as well as the long-term impact on powertrain mix: "We estimate EUR22bn in gross emissions compliance costs by 2021e – of which EUR5-6bn are incremental post VW."

Exane draws four valuation-relevant conclusions from its review of emissions and the autos sector. Each conclusion affects the valuation of companies in a different way:

- Air quality concerns over diesel engines are adjusting the product mix of OEMs. (Differing margins between products means that an adjusted project mix leads to a change of margins.)
- CO2 compliance targets are becoming harder to reach, due to moves towards 'real world' testing, and compliance costs are growing.
- The preparedness of OEMs for the emergence of a "a new powertrain order" (of hybrids and electric vehicles) is likely to be defined by their current footprint and relative levels of R&D capex.
- Risks and opportunities for suppliers (from a swifter decline in diesel) would show in revenues, but the impact of rising selective catalytic reduction (SCR) penetration balances with the declines shown in diesel volumes.

Figure 1: Europe's CO reduction by technology area, and potential additional headwind, g/km CO_2. Source: Plastic Omnium, Exane BNP Paribas estimates

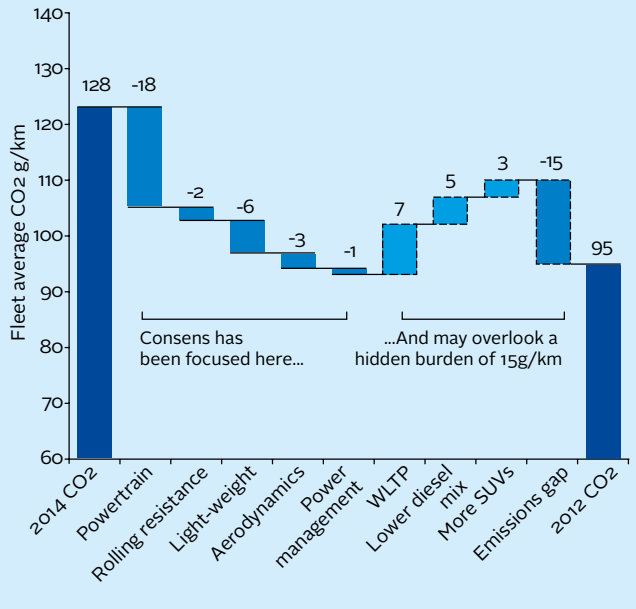
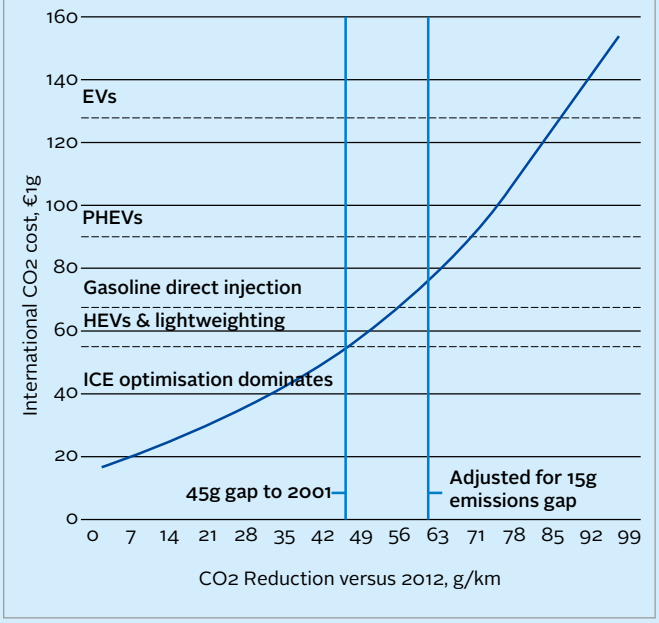


Figure 2: Incremental CO2 reduction cost per gram (in 2014 costs), EUR/g. Source: Exane BNP Paribas estimates



CASE STUDY: sell-side analysis on green impact and energy efficiency

Report title	"Green Impact Screener" (April 2014)
Sell-side broker	Kepler Cheuvreux
Lead analysts	Samuel Mary

Stage 4 - Kepler Cheuvreux details the EBIT and/or sales exposure to green themes.

Figure 1: Exposure to green themes (2013 and 2016E)

Company	Sector	Exposure (2013)	Exposure (2016E)
Alternative Energy and transport			
Alstom	Capital goods	Total group: 56% of sales	60% of sales 48% of EBIT
o/w:		Rail transport: 28% of sales 21% of EBIT	Rail transport: 30% of sales 25% of EBIT
		Energy efficiency (grid management solutions): 19% of sales 14% of EBIT	Energy efficiency (grid management solutions): 20% of sales 16% of EBIT
		Renewable energy (power generation): 9% of sales 6% of EBIT	Renewable energy (power generation): 10% of sales 7% of EBIT
Ansaldo STS	Capital goods	100% of sales	100% of sales
CAF	Capital goods	100% of sales	100% of sales
Groupe Eurotunnel S.A	Transport	94%	NA
Vossloh	Capital goods	100% of sales	100% of sales
Biomass resources			
Ence	Paper	27% of sales	27% of sales

Report title	Semiconductors - a driving force for energy efficiency (July 2015)
Sell-side broker	DZ Bank AG
Lead analysts	Marcus Pratsch

Stage 4 - DZ Bank argues that energy efficiency is a key revenue driver for the semi-conductor industry, and identifies a number of companies that can benefit from demand from major industrial sectors for products that help reduce CO_2 emissions. "IFX (Infineon Technologies) generates around 60% of sales with its products and solutions for a more efficient use of energy. It has a firm position in the power semiconductor market where it is the global leader. Infineon's semiconductors control the power supply for electric drives, household devices and lighting systems, among other things[...]. With its current portfolio, IFX has reported average annual sales growth of around 9% between 1999 and 2014. The four segments with a focus on the key challenges energy efficiency, mobility and security remain in high demand. IFX anticipates it will continue to generate growth in the range of its historic growth rates and targets an average of 8% p.a."

THE ROAD AHEAD

We are encouraged by the advanced integration practices of the investors and sell-side brokers that have contributed to this publication. Their case studies and insights have demonstrated that green integration practices are becoming more sophisticated and that the impact of green issues on the portfolio is quantifiable.

We expect this positive trend of investors systematically valuing green factors alongside other financial factors to continue. The increasing availability of company green data will support it, as will regulation, capital flowing into green-integrated assets and training on green integration.

Another market force that will increase the uptake of green integration is demand from asset owners. Asset owners' expectations of investment managers to embed green factors into their investment processes and investment decisions are rising. Their manager selection and monitoring processes increasingly include technical questions on green integration and requests for specific examples of investment decisions and trading activity that have been influenced by green factors.

Investment managers are responding to these demands. As demonstrated in this publication, green integration is being applied to all investment strategies along the active-to-passive investment spectrum, including fundamental, smart beta and passive. This allows asset owners to integrate green factors across the whole of their listed equity portfolios.

In addition, the case studies show that investment managers are investing in green integration resources and are developing advanced tools that will ensure green factors are systematically integrated into investment decisions.

We are also seeing reassuring signs from sell-side brokers. To understand the type of green-integrated sell-side research that is available, we asked sell-side brokers to submit research to the PRI, some of which is featured here. We received nearly a hundred pieces of research, highlighting both the demand for green-integrated research from the buy-side, and the sell-side's efforts to meet these demands.

We expect more asset owners, investment managers and sell-side brokers to follow the progress that the leaders highlighted in this publication have made so far. We hope that this publication will assist all investors, at all levels of integration, in their next step towards explicitly and systematically integrating green factors into their investment analysis and decisions.

CREDITS

Author: Justin Sloggett, CFA, Sagarika Chatterjee
Contributors: Don Gerritsen, Mike Tyrrell (contractor)
Reviewers: Kris Douma, Tomi Nummela

Editor: Mark Kolmar, Ruth Wallis
Design: Alessandro Boaretto, Thomas Salter

The Principles for Responsible Investment (PRI)

The PRI works with its international network of signatories to put the six Principles for Responsible Investment into practice. Its goals are to understand the investment implications of environmental, social and governance (ESG) issues and to support signatories in integrating these issues into investment and ownership decisions. The PRI acts in the long-term interests of its signatories, of the financial markets and economies in which they operate and ultimately of the environment and society as a whole.

The six Principles for Responsible Investment are a voluntary and aspirational set of investment principles that offer a menu of possible actions for incorporating ESG issues into investment practice. The Principles were developed by investors, for investors. In implementing them, signatories contribute to developing a more sustainable global financial system.

More information: www.unpri.org

PRI Principles for Responsible Investment

The PRI is an investor initiative in partnership with **UNEP Finance Initiative** and the **UN Global Compact**.

United Nations Environment Programme Finance Initiative (UNEP FI)

UNEP FI is a unique partnership between the United Nations Environment Programme (UNEP) and the global financial sector. UNEP FI works closely with over 200 financial institutions that are signatories to the UNEP FI Statement on Sustainable Development, and a range of partner organisations, to develop and promote linkages between sustainability and financial performance. Through peer-to-peer networks, research and training, UNEP FI carries out its mission to identify, promote, and realise the adoption of best environmental and sustainability practice at all levels of financial institution operations.

More information: www.unepfi.org

UNEP FINANCE INITIATIVE

United Nations Global Compact

The United Nations Global Compact is a call to companies everywhere to align their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption, and to take action in support of UN goals and issues embodied in the Sustainable Development Goals. The UN Global Compact is a leadership platform for the development, implementation and disclosure of responsible corporate practices. Launched in 2000, it is the largest corporate sustainability initiative in the world, with more than 8,800 companies and 4,000 non-business signatories based in over 160 countries, and more than 80 Local Networks.

More information: www.unglobalcompact.org

United Nations Global Compact