NORGES BANK
INVESTMENT MANAGEMENT

Environmental indices

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Environmental investments

Environmentally friendly investments continue to attract attention from various market participants. Investments that focus on companies or projects committed to environmental sustainability are often referred to as “green”, a term that is interpreted differently by different people and organisations. Currently, there are many definitions for “green” investments in circulation and use, and according to a paper by the OECD “expert opinions vary from very broad and generic to more technical and specific explanations” [1].

Despite this uncertainty, private and institutional investors’ interest in the topic, and their willingness to move towards a more environmentally focused investment strategy has increased. In order to implement such strategies, investors require independent and reliable information on the financial performance of companies that can be characterised as “environmentally friendly”. To meet this growing demand, financial information bodies, such as FTSE and MSCI, have developed a number of indices with a specific focus on environmental investment opportunities. These offerings could potentially serve as benchmarks for investors seeking to integrate environmental factors into their portfolio.

This report investigates some of these indices in more detail, covering both equities and fixed income securities categorised as “green bonds”. We look at broader indices marketed with a “green” or environmental label as well as more narrow indices covering investment opportunities within the renewable and alternative energy space. The ambition of this report has not been to provide an all-encompassing review of all indices available, but rather to focus on a few which we believe could be of relevance for a big, global investor considering thematically based investments. Our analysis indicates that different index vendors have developed different sets of criteria in order to establish whether an investment opportunity can be characterised as “green” and “environmentally friendly”.

In the first section of this report, we compare different equity indices, and assess the implications in terms of relative risk and ownership share of a strategic overweight in this segment. In the second section, we turn the attention to the rapidly growing market for green bonds and present two recently developed green bond indices. In an appendix to this note, we further examine the details of FTSE’s and MSCI’s environmental indices and address characteristics such as the geographical and sector distribution, survivorship bias, turnover and concentration.

[1] Inderst, G., Kaminker, Ch., Stewart, F. (2012), “Defining and Measuring Green Investments: Implications for Institutional Investors" Asset Allocations”, *OECD Working Papers on Finance, Insurance and Private Pensions*, No.24, OECD Publishing.

EQUITY INDICES

In Table 1.1, we summarise key characteristics of the equity indices we refer to in this note. The table includes both environmental indices and two global equity indices. Unless otherwise specified, all figures, tables and charts in this report are all based on the full list of constituents for all indices as of 30 June 2014[2]. Note that the term "pure play" is used to describe publicly traded companies that derive all or most of their revenues and profits from environmentally focused business activities, but that the index providers differ in their methodology for determining whether a company is "pure play" or not.

Overview of indices

Table 1.1a: FTSE environmental indices

Index description	Code	Description	#	Value (USDm)
FTSE Environmental indices				
FTSE Environmental Opportunities All-Share Index	EOAS	The FTSE Environmental Opportunities Index Series requires companies to have at least 20% of their business derived from environmental markets. "Environmental Markets" is defined as "companies that provide products and services offering solutions to environmental problems, or that improve the efficiency of natural resource use", and it is also stated specifically that these solutions include "include environmental technology, also sometimes referred to as cleantech". The FTSE Environmental Opportunities All-share Index (EOAS) is the free float adjusted headline benchmark index.	498	2,591,789
FTSE Environmental Opportunities 100 Index	EO100	The FTSE Environmental Opportunities 100 Index (EO100) is a free float adjusted sub-index of the EOAS and is the headline tradable index, including the 100 largest companies by full market capitalization in the EOAS. The EOAS Index also has several other sub-indices covering narrower universes. These are FTSE EO Renewable & Alternative Energy Index, FTSE EO Energy Efficiency Index, FTSE EO Water Infrastructure & Technologies Index, FTSE EO Pollution Control Index, FTSE EO Waste Management & Technologies Index, FTSE EO Environmental Support Services Index and FTSE EO Food, Agriculture & Forestry Index	100	1,897,177
FTSE Environmental Technology 100 Index	ET100	The FTSE Environmental Technology Index Series (ET) is a sub-set of the FTSE Environmental Opportunities Index Series and measures the performance of companies globally whose core business is in the development and deployment of environmental technologies, including renewable & alternative energy, energy efficiency, water technology and waste & pollution control. The FTSE Environmental Technology Index Series comprises the 100 largest pure play environmental technology companies globally. FTSE requires companies to have at least 50% of their business derived from environmental markets and technologies in order to be categorized as "pure play".	100	338,513
FTSE Environmental Technology 50 Index	ET50	The FTSE Environmental Technologies 50 Index comprises the 50 largest pure play environmental technology companies globally, and is a sub-set of the ET100.	50	265,730

[2] The GC100 Index presented in panel b is assumed equal weighted at the end of June 2014. The actual weights are not available.

Table 1.1b: MSCI environmental indices

Index description	Code	Description	#	Value (USDm)
MSCI environmental indices				
MSCI Global Climate Select Index	GC100	The MSCI Global Climate Select Index (GC100) is an equal weighted index designed for investors seeking a global basket of companies that are leaders in mitigating immediate and long-term causes of climate change. The constituent companies in the MSCI Global Climate Index are defined by the index provider to have pure play involvement in themes such as renewable energies, future fuels, clean technology and efficiency. The GC100 is based on the concept of the climate solutions value chain. The sources of climate change are widely distributed across the economy – transportation, factories, and commercial and residential buildings are the main sources of greenhouse gases – and climate change affects every sector.	100	2,946,357
MSCI Global Environment Index	GEIB	The MSCI Global Environment Indices (GEIB) are free float-adjusted index designed to provide exposure to environmental themes by identifying pure play companies that focus on offering products or services that contribute to a more environmentally sustainable economy by directly reducing the consumption of or improving t he productive use of limited global natural resources. Within this index family the following five thematic indices exist: Global Alternative Energy Index, Global Clean Technology Index,Global Sustainable Water Index, MSCI Global Green Building Index and MSCI Global Pollution Prevention Index.	191	758,169

Table 1.1c: Other environmental indices

Index description	Code	Description	#	Value (USDm)
Other environmental indices				
WilderHill New Energy Global Innovation Index	NEX	The New WilderHill Energy Global Innovation Index (hereafter referred to as NEX) is comprised of companies worldwide whose technologies and services focus on generation and use of cleaner energy, conservation, efficiency, and advancing renewable energy generally. The index includes companies whose lower-carbon approaches are relevant to climate change, as smart "solutions" to avoid greenhouse gases, and whose new technologies reduce emissions relative to traditional fossil fuel use. This index is mainly comprised of companies in wind, solar, biomass & biofuels, small-scale hydro, geothermal, marine and other relevant renewable energy businesses. The NEX is a rule-based index and uses equal-weighting methodology modified by sector and market capitalization bands to provide diversification across the clean energy industry.	106	318,474

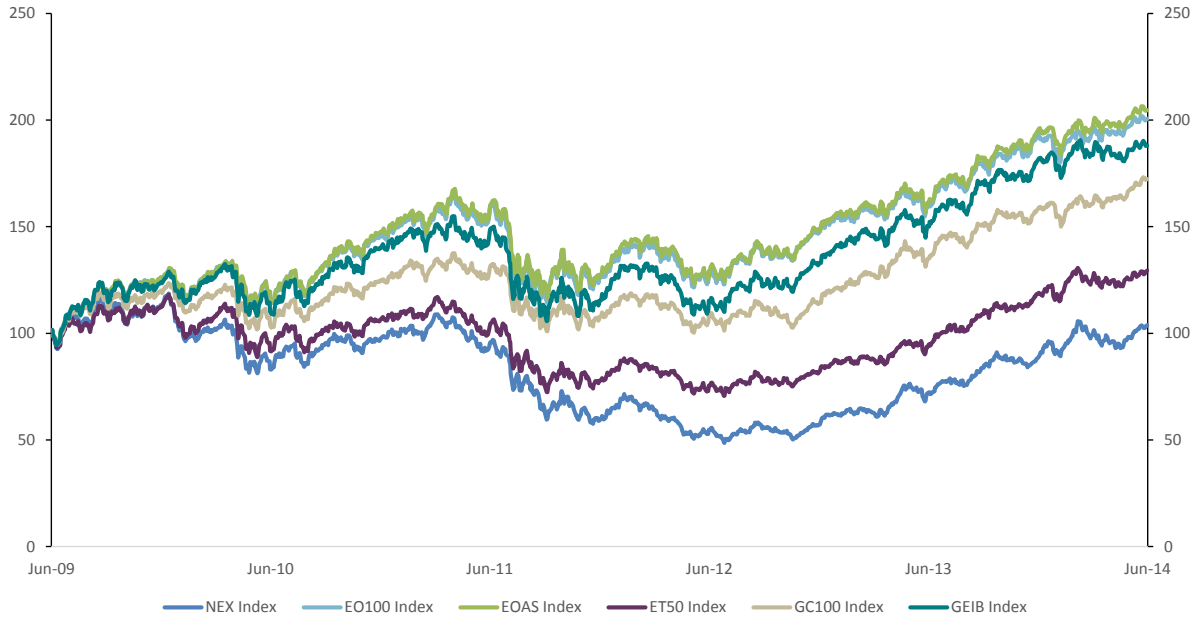
Table 1.1d: Global market indices

Index description	Code	Description	#	Value (USDm)
Global market indices				
FTSE Global All Cap Index	GEISAC	The FTSE Global All-Cap Index is a free float-adjusted market-capitalization weighted index representing the performance of large, mid and small cap stocks globally. The index aggregates around 7,400 stocks and covers 47 countries in total, both within Developed and Emerging Markets, and according to FTSE covers 98% of the world's investable market capitalization. This report will use the FTSE Global All-Cap Index as a benchmark when analysing various environmental indices from FTSE.	7476	43,396,918
MSCI All-Country World Index	ACWI IMI	The MSCI ACWI Investable Market Index (IMI) captures large, mid and small cap representation across 23 Developed Markets and 23 Emerging Markets. The index is free float-adjusted and weighted by market capitalization. According to MSCI, the index covers approximately 99 per cent of the equity investment opportunity set in listed equities, with its approximately 8,500 constituents. This report will use the MSCI ACWI IMI as a benchmark when analysing environmental indices from MSCI.	8549	54,908,118

Historical returns

Figure 1.1 displays the historical returns of the different environmental equity indices over a five-year period from month-end June 2009 to month-end June 2014. Please note that the graph depicts returns for ET50 only, as the return history for ET100 is only available from 2013. While the broadest index, the EOAS, has been the best performer, the narrow alternative energy index NEX has by far been the worst performer over the period examined.

Figure 1.1: Returns of the environmental indices



Source: Bloomberg

Overlap analysis

The index vendors make a number of discretionary choices in the construction of these indices. One way to gauge the impact of these choices is by conducting an overlap analysis. In Table 1.2 we show the percentage share of constituents in the different indices that recur in one of the other indices. For example, 1.0 per cent of the constituents in the GEISAC Index are included in the NEX Index, while 67.9 per cent of the constituents in the NEX Index are included in the GEISAC Index.

The analysis in Table 1.2 suggests that the choices made by the index providers have a significant impact on the composition of the different environmental indices and hence also on the composition of a "green" portfolio tracking one of these indices closely. For example, only 19 per cent of the constituents in FTSE's pure-play index, ET100, recur in MSCI's pure play index GC100. Similarly, FTSE's headline index EOAS emulates a global universe of environmental investment opportunities, but a mere 46 per cent of the environmental

companies in MSCI's GC100 index are also found in the EOAS. This fairly low overlap could point to a lack of compatibility between how FTSE and MSCI characterise a company as being involved in "environmental" activities.

Table 1.2: Inclusion overlap

	GEISAC	EOAS	EO100	ET100	ET50	GC100	GEIB	NEX
GEISAC	100.0	6.7	1.3	1.3	0.7	1.3	2.1	**1.0**
EOAS	100.0	100.0	**20.1**	20.1	10.0	9.2	21.9	13.1
EO100	100.0	100.0	100.0	12.0	12.0	27.0	18.0	7.0
ET100	100.0	100.0	12.0	100.0	50.0	19.0	43.0	39.0
ET50	100.0	100.0	24.0	100.0	100.0	28.0	46.0	40.0
GC100	98.0	**46.0**	27.0	**19.0**	14.0	100.0	32.0	17.0
GEIB	83.8	57.1	9.4	22.5	12.0	16.8	100.0	19.4
NEX	**67.9**	61.3	6.6	36.8	18.9	16.0	34.9	100.0

Figures in per cent

Table 1.3 shows the overlap between the indices based on respective constituents' weight in the index. For example, although the EO100 contains only 20.1 per cent of the constituents in the EOAS (as shown in Table 1.2), these constituents represent 73.2 per cent of the weight of the EOAS Index.

Table 1.3: Weight overlap

	GEISAC	EOAS	EO100	ET100	ET50	GC100	GEIB	NEX
GEISAC	100.0	6.0	4.4	0.8	0.6	6.8	1.7	0.5
EOAS		100.0	**73.2**	13.1	10.3	21.8	20.2	7.5
EO100			100.0	6.7	6.7	22.4	19.6	5.1
ET100				100.0	78.5	14.4	23.0	27.9
ET50					100.0	13.1	18.6	20.4
GC100						100.0	22.0	15.9
GEIB							100.0	10.5
NEX								100.0

Figures in per cent

Capacity – average ownership share

For a big investor, investment capacity is of relevance. One proxy for investment capacity may be to calculate the ownership share implied if the investor chooses to invest a certain amount in a portfolio tracking one of these indices. In Table 1.4 we investigate the impact of a NOK 50 billion allocation to an environmental index. The allocation is invested in the index constituents according to their weight.

In addition to the average ownership share, we also show the highest and lowest ownership share. Since the indices are free-float adjusted, the allocation of NOK 50 billion is invested according to the proportion of shares in respective companies that are readily available in the market. The ownership share, on the other hand, is calculated relative to the number of total shares available. Please note that the GC100 and the NEX indices differ from the other indices in that they are weighted based on an equal-weighting methodology, and the ownership share will by definition not be identical. Naturally, within a more limited index universe, such as the sub-indices focused on renewable and alternative energy, an investment of NOK 50 billion leads to higher ownership stakes than in the larger index universes.

Table 1.4: Impact on ownership of a NOK 50 billion investment in the indices

	Ownership impact		
Index	Average	High	Low
FTSE EOAS	0.22	0.38	0.01
FTSE EO100	0.33	0.43	0.03
FTSE EO Renewable & Alternative Energy	1.88	3.45	0.12
FTSE ET100	1.75	2.88	0.38
FTSE ET100 Renewable & Alternative Energ	6.80	12.73	2.01
FTSE ET50	2.20	3.66	0.48
MSCI GC100	1.58	22.38	0.02
MSCI GEIB	0.78	1.11	0.21
NEX	5.28	28.39	0.24

Figures in per cent

Ownership share is calculated relative to the number of total shares available

Risk analysis

This section of the report analyses the risk profile of the various environmental indices considered. We first examine the factor risk exposure of the different environmental indices presented in the previous section. Thereafter, we calculate historical risk both in absolute and relative terms for a selection of the FTSE environmental indices.

Factor risk analysis

The Barra Global Equity Model (GEM3) is a global multi-factor equity model that has been developed specifically for global equity portfolio management and construction, and aims to aid in the identification of sources of global equity returns that are common across a broad set of securities, and estimate their associated risks.

Figure 2.1 analyses the environmental equity indices considered in this report using the Barra GEM3, specifically quantifying the relationship between the index returns and their underlying exposure towards systematic risk factors as defined by the Barra model. These are:

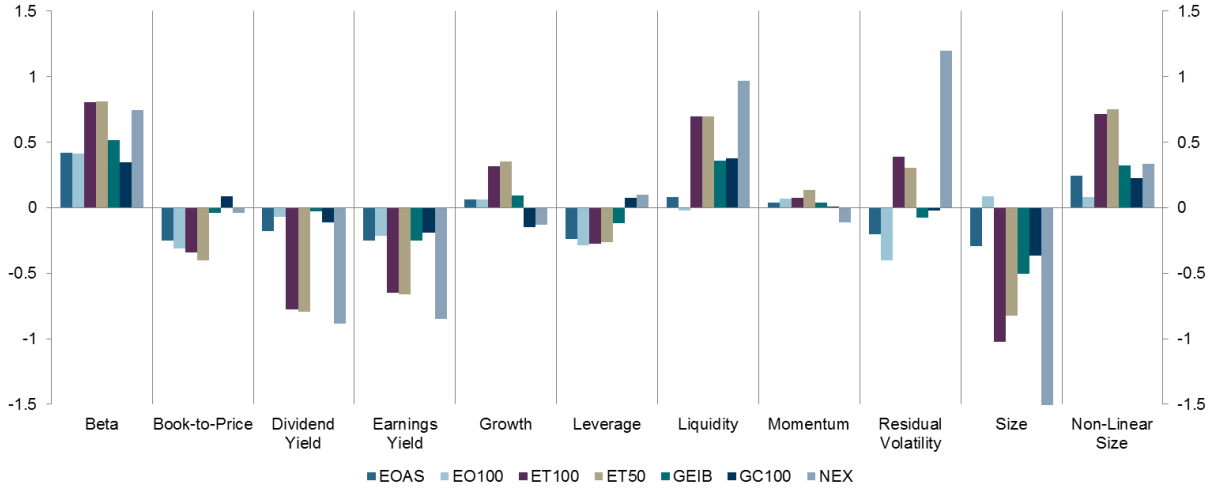
- **Beta:** This factor captures the market risk that cannot be explained by variation in the global market for equities.
- **Book-to-Price, Growth, Dividend Yield, and Earnings Yield:** These factors explain the return components attributable to specific value-related characteristics of companies, namely book-to-price ratio, sales/earnings growth, dividend payout and earnings relative to price.
- **Leverage:** This factor captures the return differences between high-leverage and low-leverage stocks.
- **Liquidity:** This factor describes return patterns to stocks based upon their relative trading activity, i.e. turnover percentage of shares outstanding.
- **Momentum:** This factor explains the return differences of stocks based on their recent relative performance.
- **Residual volatility:** This factor explains returns associated with high volatility stocks that are not captured by the beta factor.
- **Size:** This factor captures the return differences between large-cap stocks and small-cap stocks.
- **Non-linear size:** This factor describes non-linearities in payoff to the Size factor across the market-cap spectrum.

Figure 2.1 illustrates the Z-score obtained when comparing the style factors of each environmental index to the properties of an estimation universe defined by Barra, as a

proxy to the global equity market. A score of zero would indicate that the index' exposure towards the style factors does not deviate from that of the global equity universe, while negative or positive scores reflect whether the exposure is above or below the global mean for each of the enumerated characteristics, and by how many standard deviations. It is worth noting that the analysis concentrates on style factors for the various environmental indices, and that country and industry factors as drivers of return have not been taken into account.

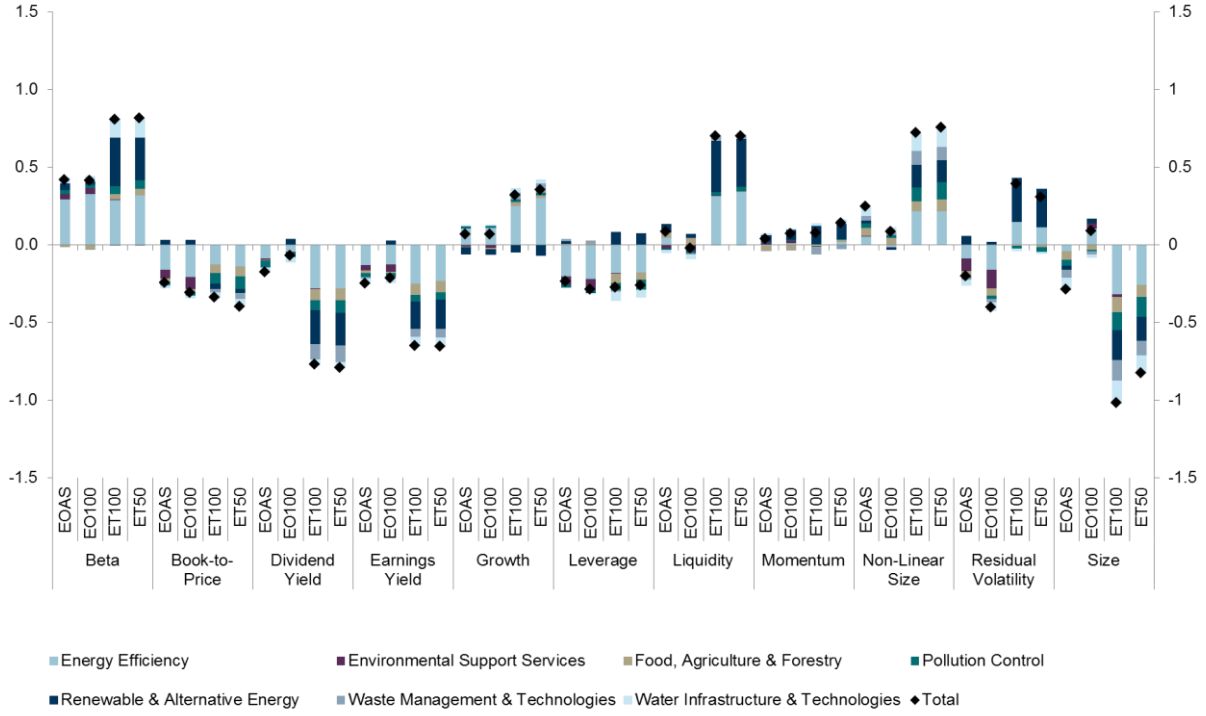
Not surprisingly, the analysis suggest that the more narrow the index is defined, i.e. the NEX index and the two FTSE ET indices, the greater the style deviation from the broad market. These indices load on the liquidity factor and the small-cap factor. As described, liquidity in this case is measured by the turnover percentage of shares outstanding, and can hence be interpreted as an indication that the stocks included in the indices are more frequently traded compared to their relative size. It is also worth noting that all the environmental indices seem to be characterized by higher betas than the global market portfolio.

Figure 2.1: Barra GEM3 style factor exposure for each of the environmental indices



The figure indicates the Z-score for each of the style factors, i.e. by how many standard deviations the index deviates from the broad market within each of the enumerated characteristics

Figure 2.2: Barra GEM3 style factor exposures for FTSE EO and ET indices by environmental sectors



The figure indicates the Z-score for each of the style factors, i.e. by how many standard deviations the index deviates from the broad market within each of the enumerated characteristics

Absolute and relative volatility

In this section we concentrate on the FTSE indices. We use the GPFG's strategic benchmark index for equities (denoted in Table 2.1 as GPGF Equity benchmark) as a benchmark in the tracking error calculations. The ET50 Index is used instead of the ET100 Index from the previous sections due to the availability of historical pricing data.

Table 2.1 shows absolute volatility and tracking error based on current index constituents. In Table 2.2 we calculate these measures based on historical constituent weights in the environmental indices, and current weights in the GPFG Equity benchmark as of June 30th 2014. Table 2.3 shows volatility and tracking error calculations based on historical weights in the environmental indices, and using the historical weights of the GEISAC as a proxy for a global market index.

In addition to measuring volatility and tracking error for the environmental indices over a 10-year and 3-year period, the panels also show the highest and lowest observed volatilities for each index based on a 3-year equal-weighted moving average during the past 10 years. The column "Current/Max" indicates the present 3-year volatility/tracking error of the index relative to the maximum observed volatility/tracking error based on a 3-year moving average

over the past 10 years.

The analysis clearly indicates that environmental indices had a higher absolute volatility when compared to the GPGF's strategic equity benchmark. Furthermore, the analysis also suggests that the indices within the Environmental Technologies universe have experienced higher volatility than those within the broader Environmental Opportunities universe. The same applies for the measured tracking error relative to the benchmark, estimated at 451 basis points for the EOAS market weighted index and at 814 basis points for the ET 50 Index respectively. Note that the estimated tracking error of the ET 50 Index increases to 1,261 when estimated using the historical constituents.

These variations may imply that the measured risk levels are largely company-specific, and will fluctuate over time depending on the constituents that enter and exit the index, rather than being directly related to the environmental investment focus of the indices.

Table 2.1 Risk measurements with weights as of June 30th 2014

	Volatility (per cent)					Tracking Error (basis points)				
Index code	10-year	3-year	3-year max	3-year min	Current/max	10-year	3-year	3-year max	3-year min	Current/max (per cent)
GPFG Equity benchmark	15.26	13.35	20.55	11.14	64.9					
EOAS-Mcap weighted	16.57	14.91	21.73	12.48	68.6	451	386	602	341	64.0
EOAS-Equal weighted	17.18	14.65	23.34	12.41	62.8	585	500	811	423	61.6
ET50	17.81	18.50	22.22	12.19	83.3	814	934	986	517	94.6

NOK as base currency

Both environmental indices and GPFG Equity benchmark weights based on figures as per June 30th 2014

Table 2.2 Risk measurements with historical weights for the environmental indices

	Volatility (per cent)					Tracking Error (basis points)				
Index code	10-year	3-year	3-year max	3-year min	Current/max	10-year	3-year	3-year max	3-year min	Current/max (per cent)
EOAS	17.38	15.37	23.15	13.87	66.4	556	434	737	434	58.9
ET50	22.58	17.31	32.81	16.24	52.8	1,261	835	1,843	835	45.3

NOK as base currency

Environmental indices based on historic weights, GPFG Equity benchmark based on weights as per June 30th 2014

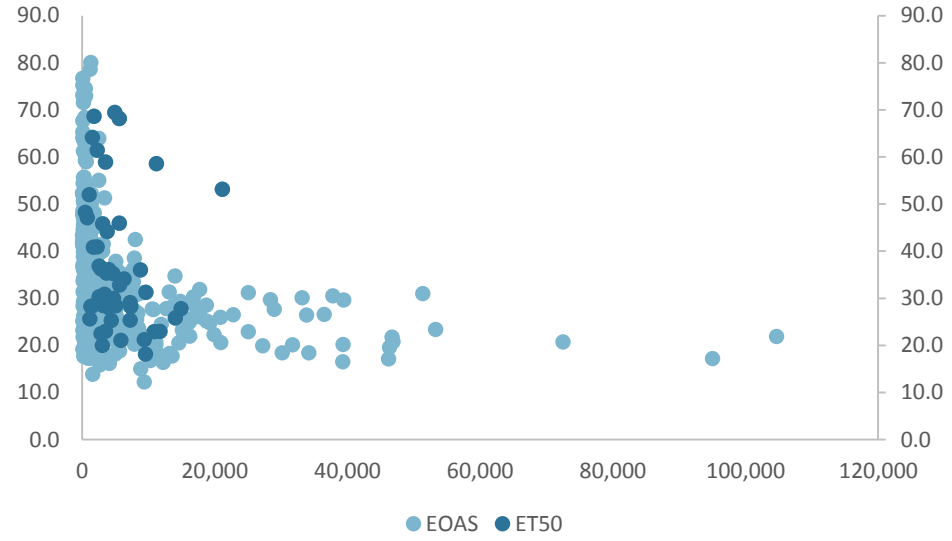
Table 2.3 Risk measurements with historical weights, GEISAC as a benchmark

	Volatility (per cent)					Tracking Error (basis points)				
Index code	10-year	3-year	3-year max	3-year min	Current/max	10-year	3-year	3-year max	3-year min	Current/max (per cent)
EOAS	17.38	15.37	23.15	13.87	66.4	514	480	665	445	72.2
ET50	22.58	17.31	32.81	16.24	52.8	1,276	826	1,885	826	43.8

NOK as base currency

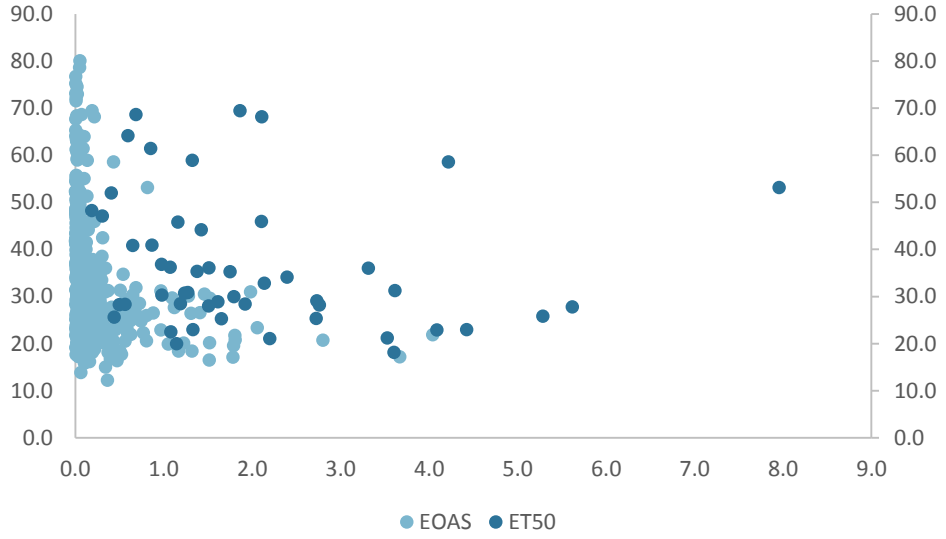
Environmental indices based on historic weights, historical weights of GEISAC used as proxy for global market benchmark index

Figure 2.3a: Distribution of 3-year volatility over market capitalization for constituents of EOAS and ET50



Market cap on x-axis, volatility on y-axis. Volatility in per cent, market cap in USD million.

Figure 2.3b: Distribution of 3-year volatility over index weight for constituents of EOAS and ET50



Constituent weight on x-axis, volatility on y-axis. Figures in per cent.

Figure 2.3 shows the distribution of 3-year volatility over market capitalization (panel a) and weight (panel b) within the EOAS universe. Smaller companies tend to have a higher volatility than larger ones, and that the constituents in the ET50 Index tend to have a lower market capitalization than those in the EOAS (panel a). Furthermore, we find that the higher volatility of the ET50 Index is related to the relatively lower number of constituents and the fact that these constituents generally have higher individual volatility (panel B).

The EOAS universe covers a wide range of environmental related activities. We study the properties of the different sub-indices/segments in more detail in Table 2.4. The segment

Renewable & Alternative Energy stands out as the one with highest absolute volatility and tracking error.

Table 2.4: Risk measurements by FTSE environmental sector for the EOAS

	Volatility (per cent)					Tracking Error (basis points)				
FTSE Environmental Sector	10-year	3-year	3-year max	3-year min	Current/max	10-year	3-year	3-year max	3-year min	Current/max (per cent)
EOAS Market-cap weighted	**16.57**	**14.91**	**21.73**	**12.48**	**68.6**	**451**	**386**	**602**	**341**	**64.0**
Energy Efficiency	18.78	16.86	25.27	13.80	66.7	693	621	915	524	67.8
Environmental Support Services	15.33	14.21	18.98	12.86	74.8	722	550	972	554	56.6
Food, Agriculture & Forestry	16.22	13.68	21.38	13.20	64.0	806	629	1,092	626	57.6
Pollution Control	17.31	14.98	23.34	13.21	64.2	793	630	1,073	625	58.8
Renewable & Alternative Energy	18.48	19.46	23.52	12.29	82.7	1,075	1,199	1,299	643	92.3
Waste Management & Technologies	16.78	14.97	21.73	13.80	68.9	845	725	1,122	711	64.6
Water Infrastructure & Technologies	15.48	13.96	20.13	12.71	69.4	636	594	826	492	72.0

NOK as base currency

Weights based on figures as per June 30th 2014

In Table 2.5 we examine the composition of the EO Renewable sub-index in more detail. We find a wide dispersion in both average market cap and volatility. The biggest segment, both in terms of market cap and number of companies, are companies classified as Renewable Energy Developers and IPP[3]s. These tend to be both bigger and less volatile than most of the other constituents in the sector. The second biggest segment, in terms of number of companies and market value, is the Solar Energy Generation Equipment with 30 companies. These companies generally tend to be smaller and more volatile measured in terms of both absolute and relative volatility.

Table 2.5: Risk measurements for the FTSE environmental subsectors within the Renewable & Alternative Energy-segment of the EOAS

FTSE Environmental (Sub-)Sector	Weight (per cent)	Number of constituents	Average Mcap	3-year volatility (per cent)	3-year tracking error (basis points)
EOAS Renewable & Alternative Energy	**100.00**	**92**	2,175	**19.46**	**1,199**
Biofuels	3.18	7	1,074	29.78	2,395
Diversified Renewable and Alternative Energy	0.25	1	584	46.94	4,246
Other Renewables Equipment	1.78	1	4,207	29.21	2,488
Renewable Energy Developer and IPPs	71.16	45	3,735	17.91	1,236
Solar Energy Generation Equipment	16.27	30	1,281	36.40	3,027
Wind Power Generation Equipment	7.35	8	2,170	45.77	4,051

NOK as base currency, market cap in USD million

Weights based on figures as per June 30th 2014

In Table 2.6 we move from the EO universe to the ET universe, and examine the risk characteristics of the different segments of the ET50 Index. The Renewable and Alternative Energy segment once again stands out as the most volatile, measured both in terms of absolute and relative volatility. The scatter plot in Figure 2.4 confirms that volatility varies significantly across the index.

[3] IPP: Independent Power Producer

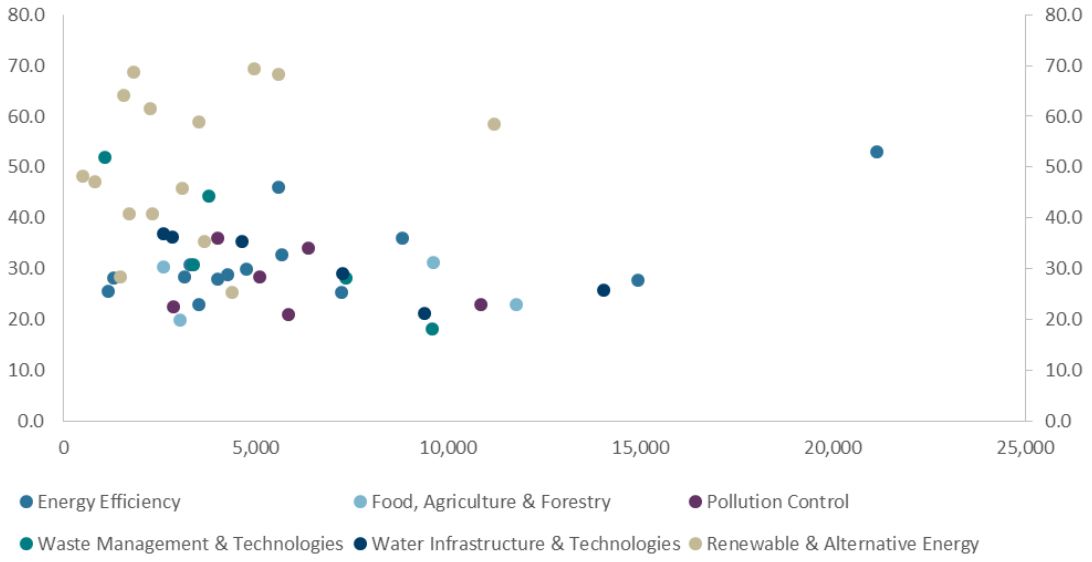
Table 2.6: Risk measurements by FTSE environmental sector for ET50

	Volatility (per cent)					Tracking Error (basis points)				
FTSE Environmental Sector	10-year	3-year	3-year max	3-year min	Current/max	10-year	3-year	3-year max	3-year min	Current/max (per cent)
ET 50 Index	**17.81**	**18.50**	**22.22**	**12.19**	**83.3**	**814**	**934**	**986**	**517**	**94.6**
Energy Efficiency	20.38	23.10	26.32	11.87	87.8	1,417	1,599	1,940	705	82.4
Food, Agriculture & Forestry	22.43	17.66	30.70	17.22	57.5	1,563	1,220	2,055	1,201	59.4
Pollution Control	23.99	18.51	35.19	16.93	52.6	1,441	912	2,180	926	41.8
Renewable & Alternative Energy	26.84	31.80	32.62	15.87	97.5	2,046	2,520	2,632	1,163	95.7
Waste Management & Technologies	21.62	17.92	27.94	17.93	64.1	1,730	1,255	2,342	1,262	53.6
Water Infrastructure & Technologies	18.51	17.12	22.31	16.17	76.8	1,344	1,097	1,624	1,024	67.5

NOK as base currency

Weights based on figures as per June 30th 2014

Figure 2.4: Distribution of 3-year volatility over market capitalization for constituents in the ET50, by environmental sector



Market cap on x-axis, volatility on y-axis. Volatility in per cent, market cap in USD million

FIXED INCOME - Green Bonds

Market size and composition

There is no agreed universal definition for “green” bonds. Bloomberg tracks bonds issued with a green bond label and estimates the market for green bonds to USD 43 billion as per the end of September 2014.

Bloomberg’s definition of green bonds covers a wide range of issues and issuers. It is however possible to distinguish between four broad types of bonds marketed under a green label[4]:

- **Green Use of Proceeds Bonds:** This is a standard recourse-to-the-issuer structure where the issuer specifically dedicates the financing obtained to green projects. In 2013, bonds amounting to USD 7.1 billion were issued by supranational bodies, to fund renewables and transmission projects, while USD 0.9 billion worth of bonds were issued by government agencies and municipalities. For 70 per cent of these issues, bond proceeds were “ring-fenced”, in the sense that they were kept in segregated accounts. Details on green investments were disclosed in regular reports for 78 per cent of these issues, and 56 per cent of these issues were subject to a third-party green verification[5].

- **Green Use of Proceeds Revenue Bonds:** This is a non-recourse structure where the repayment is tied to the pledged cash flows from specific revenue streams that go to related or unrelated green projects. The market for these instruments is small, with only a few early issues by supranational entities.

- **Green Asset-Backed Security:** This is a debt obligation where the repayment is tied to the cash flow of an underlying green receivable. Since 2013, USD 2.2 billion of these bonds has been issued where of USD 2.1 billion was issued in 2014[6]. The market is concentrated on the U.S., with a focus on consumer solar photovoltaic systems and energy efficiency assets.

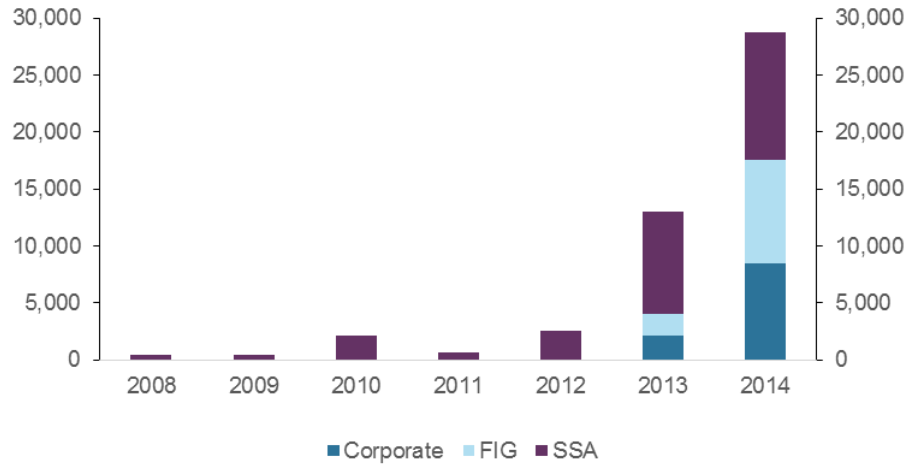
- **Green Project Bonds:** This is a debt obligation tied specifically to the cash flow

[4] Ceres: *Green Bond Principles*, January 2014
[5] Bloomberg Finance L.P.: *Green Bonds Market Outlook 2014*, June 2014
[6] Ibid.

from an underlying single-asset green project (primarily energy-related). A green project bond provides the investor with a direct exposure to the project. In 2013, USD 3.1 billion was issued within this segment[7]. Project bonds have generally been issued to fund longer dated projects in the higher end of the risk spectre, and investors in these bonds tend to be insurance companies with prior experience from project bonds investments.

The bulk of the green bonds currently issued have been so-called use of proceeds bonds. As illustrated in Figure 3.1 this market was until end 2012 dominated by issues from Sovereigns, Supranational and Agencies (SSA). This appears to have changed in 2013, when corporates and Financial Institutions Groups entered the market as issuers. Issuance of green use of proceeds bonds is expected to reach USD 30-35 billion by the end of 2014.

Figure 3.1 Annual and cumulative Green Use of Proceeds Bond issuance



Source: BAML, Bloomberg
Figures in USD million

The strong growth in issuance of green bonds over the past few years has surprised a number of market participants. An ongoing debate pertains to whether these new instruments are unlocking capital for environmental purposes, or whether they are merely a means for issuers to diversify their investor base and potentially gain access to cheaper funding. A highly relevant question is whether green bonds are more than a re-branding of a traditional bond that would have been issued anyway. This discussion is still unresolved.

Initial demand for green bonds came, according to the World Bank, from Swedish

[7] Bloomberg Finance L.P.: *Green Bonds Market Outlook 2014*, June 2014

institutional investors such as AP2, AP3, Gamla Livsforsäkringsbolaget and SEB Trygg Liv. The fair and simple explanation for this was that the green bond concept was “invented” by a Swedish commercial bank. Over the past years, green bonds have started attracting a wider group of investors.

Risk assessment

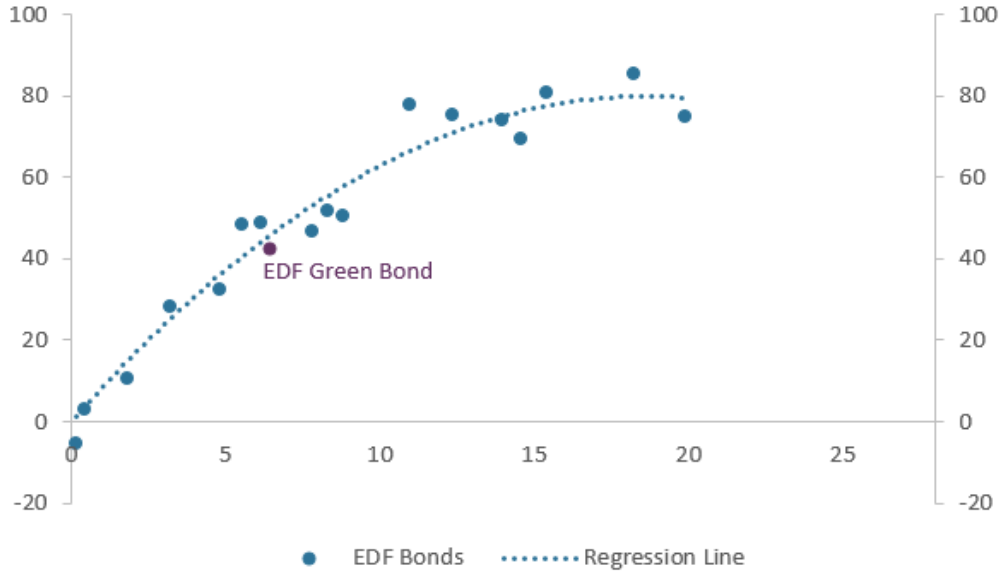
Investing in green bonds expose the investors to different types of risks, which again will vary with the type of green bond you chose to invest in. If you are investing in a use of proceeds bond, you are exposed to the same issuer risk as you would have been if you had invested in a regular bond issued by the same issuer. An investment in more specialized bonds, such as green project bonds or non-recourse bonds, expose the investors to different types of risk. It is also worth noting that due to smaller issuer sizes and an investor base consisting primarily of Hold-to-Maturity investors, green bonds tend to have lower liquidity than their non-green peers.

Table 3.1 Financial risks associated with different bond categories

Categories	Issuer risk	Asset	Credit risk	Market/Liquidity Risk
Use of Proceeds	Yes	Senior unsecured bond	Issuer default risk	HTM investors and smaller issuer size
Use of Proceeds Revenue	No	Revenue streams	Source of revenue	-
Securitized Bonds (ABS)	No	Financial receivables	Receivables	Non-matured market, lower liquidity
Project Bonds	No	Single-purpose industrial assets	Single specific project	Valuation issues, not priced in Bloomberg

When examining otherwise identical bonds, we find no significant differences in the pricing of green use of proceeds bonds and regular bonds. Figure 3.2 displays an example of a use of proceeds green bond issued by Electricité de France (denoted by the purple marker). The graph suggests that the pricing of this bond is similar to that of regular bonds from the same issuer, when taking into account spread and maturity.

Figure 3.2: Regression plot of spread versus maturity for bonds issued by Electricité de France



Source: Bloomberg, 21st November 2014

Option-adjusted spread on x-axis, years to maturity on y-axis

Green Bond Indices

Below we examine two of currently available green bond indices in more detail.

S&P Green Bonds Index

The S&P Green Bonds Index (GBI) was launched on 31st July 2014.

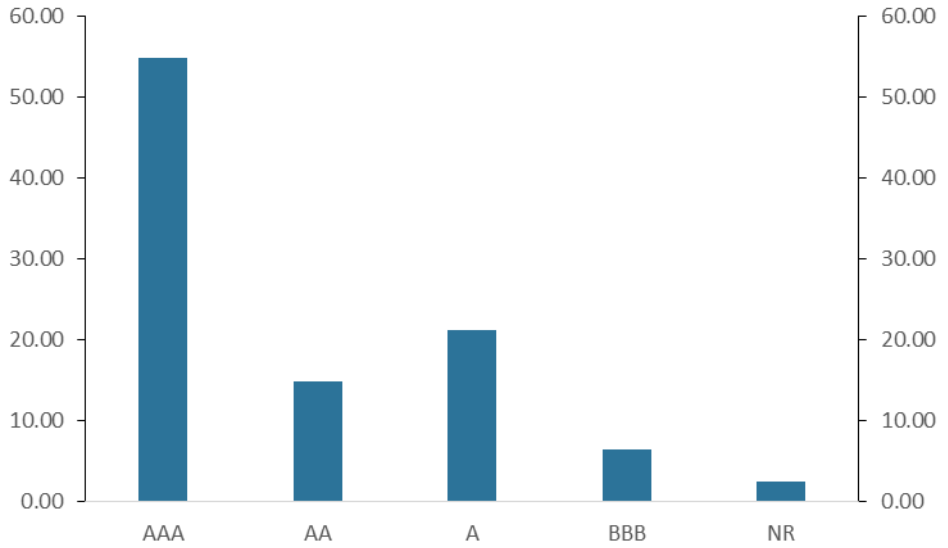
A bond is eligible to the index if[8]:

1. It is flagged "green" by Thomson Reuters and Climate Bonds Initiative (CBI)
2. The issuer indicate the bond's "green" label during its placement
3. The issuer publicly disclose the intended use of proceeds through credible, open sources

The index from S&P includes non-recourse structures, and does not require third party verification. As of September 1st 2014, the S&P Green Bond Index had a market value of USD 35 billion, and included 163 issuers. Close to 20 billion or more than 50 per cent in terms of value of the bonds included in this index had been issued with AAA-rating, see Figure 3.3.

[8]S&P Green Bond Index Methodology, July 2014

Figure 3.3: Credit Rating Distribution of the S&P Green Bond Index

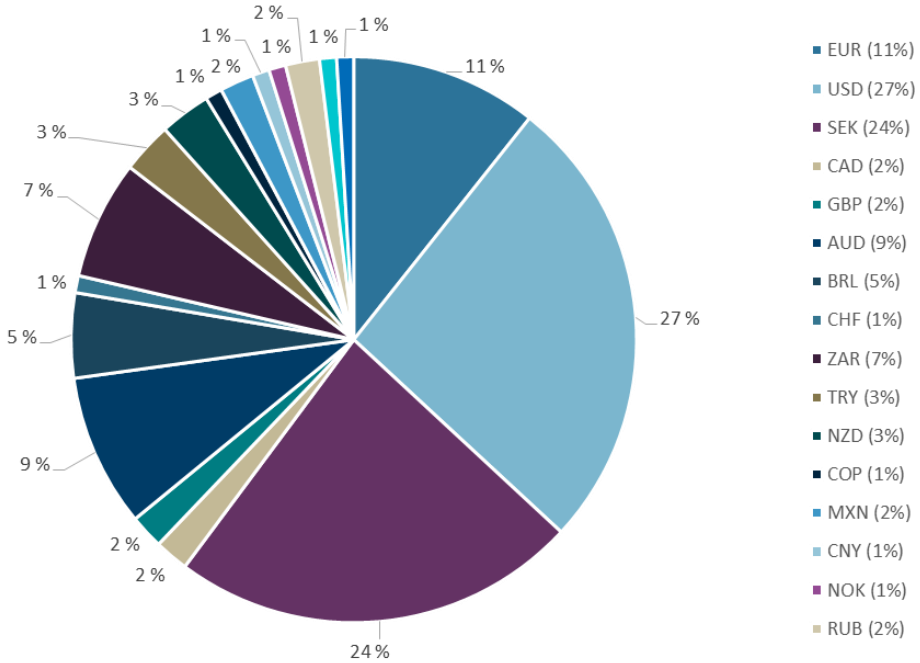


Source: S&P Dow Jones Indices – McGraw Hill Financial

Figures in per cent, based on market value as of Sept 1st 2014; (NR signifies "No Rating")

The currency composition of S&P's Green Bond Index is shown in Figure 3.4. Bonds issued in USD and SEK make up most of the index' market value.

Figure 3.4: S&P Green Bond Index Composition by currency



Source: S&P Dow Jones Indices – McGraw Hill Financial.

Figures based on market value as of Sept 1st 2014.

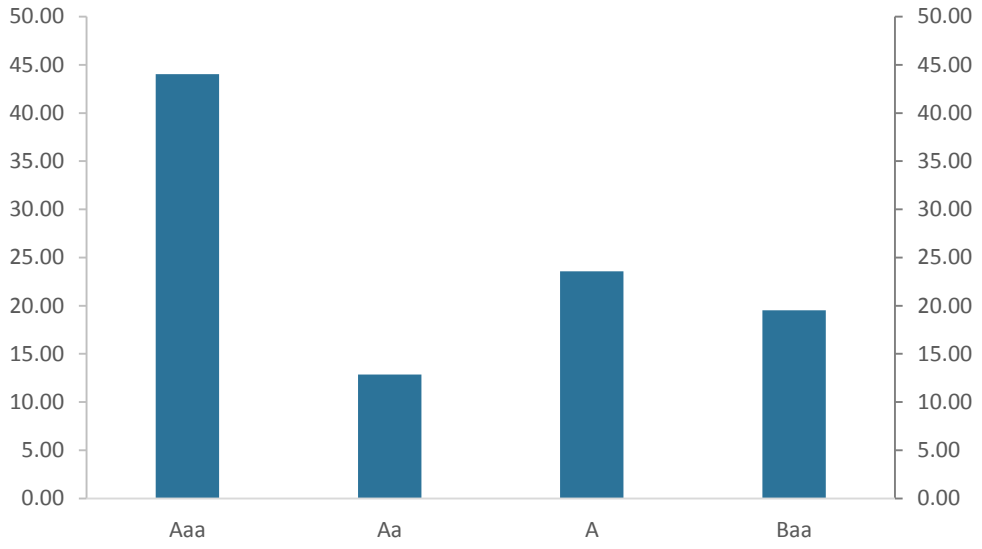
Barclays Green Bonds Index

Barclays appears to have chosen a different approach than S&P and only include bonds in their recently launched green bond index after an independent evaluation undertaken by MSCI ESG Research. In this evaluation, particular attention will be given to;

1. Stated use of proceeds;
2. Process for green project evaluation and selection;
3. Process for management of proceeds; and
4. Commitment to ongoing reporting of the environmental performance of the use of proceeds

The Barclays Green Bond Index includes only investment-grade bonds with a credit quality rating of Baa3/BBB- or higher, using the middle rating of Moody's, Fitch and S&P. As of September 2014, the market value of Barclays Green Bond Index was USD 32 billion, and included bonds from 41 issuers.[9] AAA-rated bonds made up 45 per cent of the index, see Figure 3.5.

Figure 3.5: Credit Rating Distribution of Barclays Green Bond Index



Source: Barclays

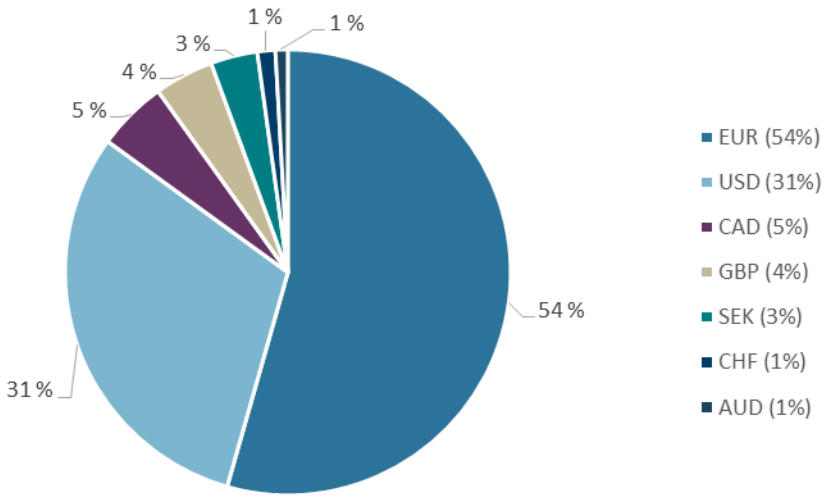
Figures in per cent based on market value in USD as of Sept 29th 2014

The Barclays Green Bond Index is a multi-currency benchmark that in principle could include local currency debt markets tracked by the Barclays Global Aggregate Index. The currency composition of the Barclays Green Bond Index as of September 2014 is illustrated in Figure

[9] Barclays MSCI Green Bond Indices: *Bringing clarity to the green bond market through benchmark indices*, September 2014

3.6. It is worth noting that the index currently comprises fewer currencies than S&P's Green Bond Index, and that the concentration in EUR and USD is also considerably higher.

Figure 3.6: Barclays Green Bond Index Composition by currency



Source: Barclays

Figures based on market value in USD as of Sept 1st 2014

Brief comparison of the available Green Bond Indices

When considering the two different green bond indices, the most notable differences between the two index providers include:

- **Defining Green Bonds:** Barclays requires annual reporting on the use of proceed and an independent evaluation following the Green principles for a bond to be labelled as green. Barclays does not require the bond to be labelled green by the issuer. S&P, on the other hand, seems to rely more on self-labelling, as they do not have an independent evaluation process similar to the one in place with Barclays.
- **Inclusion of "historic" bonds:** Unlike S&P, Barclays has adapted the rules of eligibility allowing them include older bonds not labelled "green" by the issuer at the time of issuance as long as these bonds are found to be eligible after an independent evaluation.
- **Inclusion of Green Project Bonds:** While S&P separates project bonds into a separate index, Barclays seems open to include them in the index for Green Bonds in general as long as they fulfil the general eligibility criteria. The number of project bonds in the Barclays index is, however, likely to be limited as most of these bonds are sub-investment grade issues.

APPENDIX –
A closer examination of the FTSE and MSCI indices

FTSE EOAS

Geographic composition

Table A.1 provides an overview of the regional and country-level composition of the EOAS and compares it to the GEISAC, a free-float adjusted global equity index. The table indicates that the EOAS has a lower weight in American companies and a higher weight in Asian and European companies compared to the global equity index.

Table A.1 Geographic composition in the EOAS compared to the GEISAC

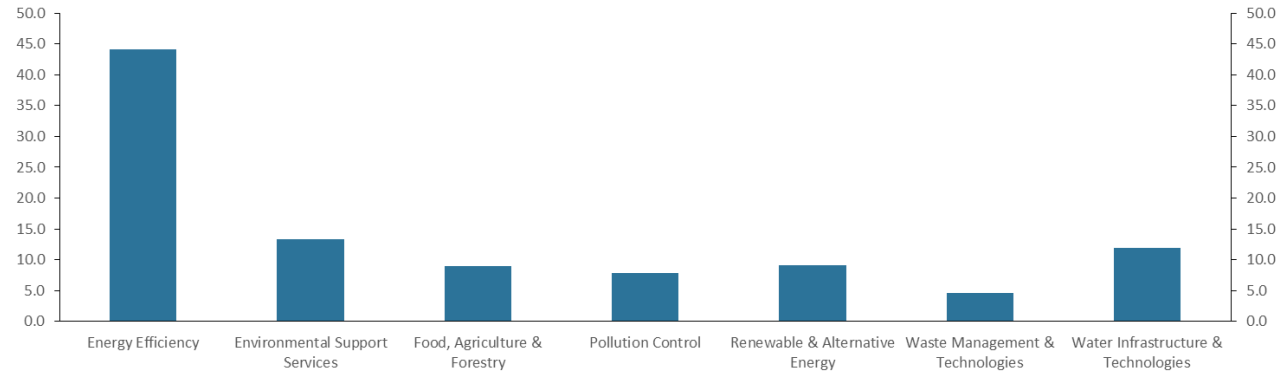
Country/FTSE Region	GEISAC	EOAS	Relative weight	Country/FTSE Region	GEISAC	EOAS	Relative weight
Americas	**54.98**	**45.91**	**-9.07**	**Europe**	**24.48**	**33.37**	**8.89**
United States	49.25	43.80	-5.45	United Kingdom	7.77	3.23	-4.54
Canada	3.80	0.58	-3.22	France	3.21	6.45	3.24
Brazil	1.15	0.92	-0.24	Germany	3.13	7.08	3.95
Mexico	0.50	-	-0.50	Switzerland	3.03	5.07	2.04
Chile	0.15	0.62	0.46	Spain	1.27	1.94	0.67
Colombia	0.09	-	-0.09	Sweden	1.11	2.57	1.46
Peru	0.03	-	-0.03	Netherlands	0.99	1.54	0.55
				Italy	0.99	2.00	1.01
Asia Pacific	**19.43**	**20.70**	**1.27**	Denmark	0.56	0.95	0.40
Japan	7.73	13.45	5.72	Russia	0.49	-	-0.49
Australia	2.79	0.37	-2.42	Belgium	0.45	0.22	-0.23
China	1.79	1.99	0.20	Finland	0.36	1.20	0.84
South Korea, Rep. of Korea	1.63	1.04	-0.59	Norway	0.35	0.10	-0.25
Taiwan	1.50	1.41	-0.09	Turkey	0.18	-	-0.18
Hong Kong	1.20	0.70	-0.50	Poland	0.16	-	-0.16
India	0.96	0.40	-0.56	Austria	0.12	0.29	0.17
Singapore	0.56	0.20	-0.36	Ireland	0.10	0.11	0.01
Malaysia	0.47	0.46	-0.01	Portugal	0.09	0.58	0.48
Thailand	0.27	0.02	-0.25	Greece	0.08	0.05	-0.03
Indonesia	0.25	0.19	-0.06	Czech Republic	0.02	-	-0.02
Philippines	0.16	0.36	0.20	Hungary	0.02	-	-0.02
New Zealand	0.09	0.10	0.01				
Pakistan	0.02	-	-0.02	**Middle East and Africa**	**1.11**	**0.02**	**-1.09**
				South Africa	0.79	-	-0.79
				Israel	0.22	0.02	-0.21
				UAE	0.06	0.00	-0.06
				Egypt	0.03	-	-0.03

Figures in per cent, as per 30th June, 2014

Sector distribution

Figure A.1 provides an overview of the sector composition of the EOAS index using FTSE's environmental sector classification. The chart indicates that the environmental sector Energy Efficiency is the biggest, in terms of market value.

Figure A.1 FTSE environmental sector composition of the EOAS



Figures in per cent, as per 30th June, 2014

Survivorship and turnover

On constituent level about 3 per cent of the index constituents on average are changed every second quarter. Our analysis suggests that turnover in the index has come down over the recent quarters.

The transition matrix in Table A.2 shows how the composition of the index has changed over time. 66.0 per cent of the constituents that were in the index at the end of 2008 were still in the index at the end of June 2014. Conversely, 62.0 per cent of the constituents that were in the index at the end of June 2014 had been part of the index since 2008.

Table A.2 EOAS survivorship, number of constituents – semi-annual snapshots

	Q4-08	Q2-09	Q4-09	Q2-10	Q4-10	Q2-11	Q4-11	Q2-12	Q4-12	Q2-13	Q4-13	Q2-14
Q4-08	100.0	95.5	92.5	90.8	86.3	81.8	77.1	73.7	71.4	69.0	67.9	**66.0**
Q2-09	94.9	100.0	96.8	95.1	90.7	86.2	81.3	77.9	75.2	72.6	71.5	69.2
Q4-09	92.9	97.9	100.0	98.1	93.3	88.8	83.9	80.3	77.3	74.2	73.2	70.8
Q2-10	89.3	94.1	96.0	100.0	95.0	90.3	85.1	81.5	78.4	75.2	74.2	71.8
Q4-10	85.2	90.1	91.8	95.4	100.0	95.1	89.7	85.9	82.7	79.5	78.5	76.4
Q2-11	77.7	82.4	84.0	87.2	91.5	100.0	94.7	90.7	87.0	83.6	81.9	79.5
Q4-11	76.0	80.6	82.3	85.3	89.5	98.3	100.0	95.4	91.4	87.8	86.1	83.4
Q2-12	74.8	79.6	81.1	84.2	88.3	97.0	98.3	100.0	95.7	92.0	90.2	87.4
Q4-12	73.2	77.6	78.9	81.8	86.0	94.1	95.2	96.7	100.0	96.1	94.3	91.4
Q2-13	67.4	71.4	72.2	74.7	78.7	86.0	87.1	88.5	91.4	100.0	98.3	95.2
Q4-13	64.9	68.8	69.6	72.0	75.9	82.4	83.5	84.9	87.8	96.1	100.0	96.5
Q2-14	**62.0**	65.5	66.3	68.7	72.7	78.7	79.5	80.9	83.7	91.6	95.0	100.0

Figures in per cent

Table A.3 shows the weight of the constituents that are no longer in the index. As shown in the table below, changes from one period to another can be substantial. 9 per cent of the index was replaced between December 2010 and June 2011, half of which can be explained by the removal of United Technologies from the universe at the semi-annual review in June 2011.

Table A.3 EOAS turnover, weights - semi-annual snapshots

	Q4-08	Q2-09	Q4-09	Q2-10	Q4-10	Q2-11	Q4-11	Q2-12	Q4-12	Q2-13	Q4-13	Q2-14
Q4-08	0.0	3.1	5.7	6.8	12.0	22.0	24.6	25.4	28.9	29.5	29.9	30.4
Q2-09	1.4	0.0	2.7	3.9	9.0	18.4	21.0	22.1	25.6	26.7	27.1	27.7
Q4-09	2.2	0.6	0.0	1.4	5.9	15.3	17.9	19.2	22.9	24.4	24.8	25.5
Q2-10	2.9	1.0	0.5	0.0	5.1	14.3	16.9	18.0	21.8	23.3	23.7	24.3
Q4-10	4.5	2.4	2.0	1.4	0.0	**9.0**	11.8	13.2	17.1	18.5	18.9	19.5
Q2-11	8.4	6.1	5.7	5.1	3.7	0.0	3.2	4.7	9.2	10.5	10.9	12.1
Q4-11	9.9	7.2	6.8	6.3	4.9	1.1	0.0	1.7	6.3	7.7	8.1	9.4
Q2-12	10.4	7.4	7.1	6.6	5.1	1.3	0.5	0.0	5.3	6.4	6.8	8.0
Q4-12	12.0	8.9	8.7	8.2	6.6	2.6	1.9	1.3	0.0	1.1	1.4	2.9
Q2-13	20.5	18.0	18.5	18.1	16.7	13.1	12.5	11.7	10.6	0.0	0.3	1.6
Q4-13	22.5	20.3	20.7	20.2	19.0	15.6	15.0	14.2	13.0	3.3	0.0	1.4
Q2-14	23.4	21.0	21.4	20.9	19.4	16.6	16.0	14.9	13.7	4.5	**1.7**	0.0

Figures in per cent

There are several factors that could contribute to higher turnover in the EOAS Index when compared to a global equity index. A key explanation for this is likely to be the eligibility criteria and thresholds defined by the index provider in order for companies to remain qualified as "environmental". A closer examination of the constituents that left the index between year-end 2008 and June 2014, shows that about 70 per cent were removed from the index because they no longer met FTSE's requirement that constituents cannot fall below 18 per cent in any of the following parameters:

- EO revenues/Total revenues
- EO invested capital/Total invested capital
- EO EBITDA/Total EBITDA

In addition to the aforementioned eligibility criteria that must be met in order to be part of the index, other factors explaining the turnover could be the underlying dynamics and relatively high risk levels that characterize the industries where environmental companies typically operate. A greater degree of entries and exits, as well as a more frequent restructuring of incumbent firms, will impact the turnover levels of an environmental index when compared to a global equity benchmark index.

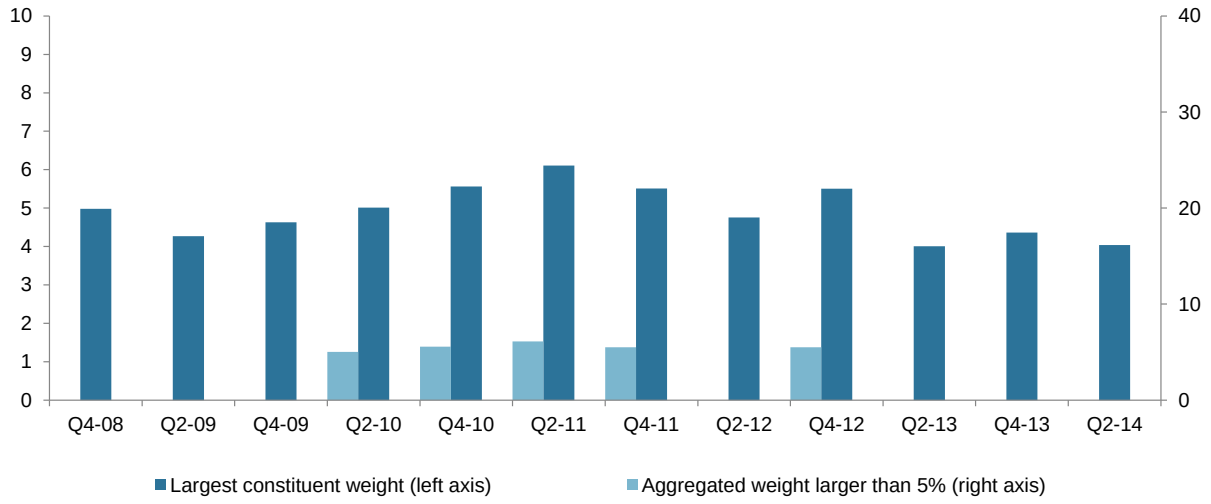
Concentration analysis

FTSE apply a capping rule to all of their EO and ET indices to limit concentration. The criteria for capping are:

- Maximum weight for any constituent is 10 per cent
- Constituents with individual weight above 5 per cent cannot make up more than 40 per cent in aggregate

FTSE have not had to cap the weight of any of the constituents in these indices during the period we have examined. Siemens AG is by far the biggest company (in terms of market weight) included in EOAS. Siemens' weight in the EOAS Index is shown in Figure A.2 (dark blue bar). Siemens was also the only company with a weight above 5 per cent, and henceforth the only contributor to the light blue in Figure A.2.

Figure A.2 Concentration in the EOAS index

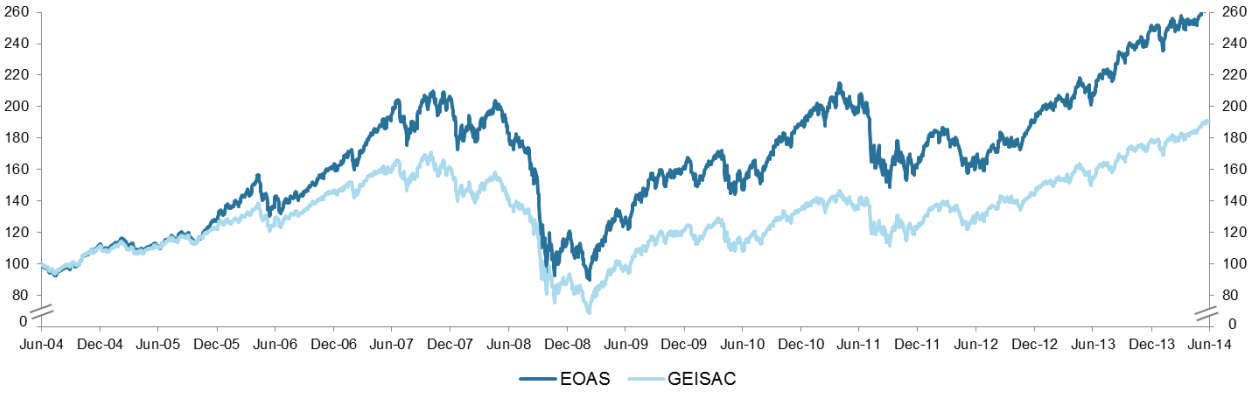


Figures in per cent

Historical returns

Figure A.3 shows the historical performance of the EOAS compared to the GEISAC.

Figure A.3 Historical performance of the EOAS compared to the global index



Source: Bloomberg

FTSE EORE

A number of investors have expressed an explicit interest to invest in renewables and alternative energy companies. Below we examine in more detail an index compromised of companies in the EOAS universe classified as renewable and alternative energy companies by the index provider. This subset of the EOAS is denoted using the index code "EORE" and had 231 constituents as per the end of June 2014.

Geographic composition

Table A.4 provides an overview of the regional and country-level composition of the GEISAC index and the EORE index, and the differences between the two indices. The table indicates that the EORE has higher weight in European constituents, and lower weight in American constituents, when compared to the global equity index.

Table A.4: Geographic composition in the EORE compared to GEISAC

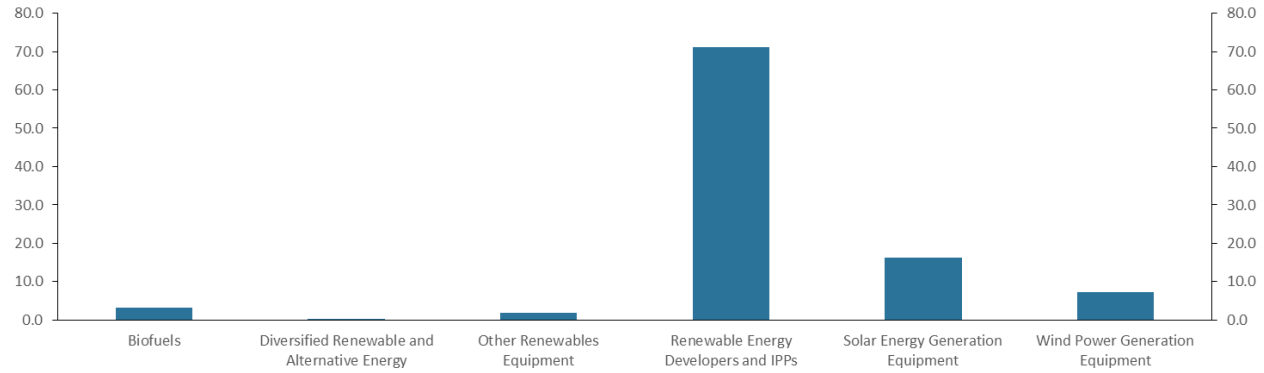
Country/FTSE Region	GEISAC	EORE	Relative weight	Country/FTSE Region	GEISAC	EORE	Relative weight
Americas	**54.98**	**23.77**	**-31.20**	**Europe**	**24.48**	**60.24**	**35.76**
United States	49.25	11.53	-37.72	United Kingdom	7.77	-	-7.77
Canada	3.80	0.95	-2.85	France	3.21	0.18	-3.03
Brazil	1.15	5.61	4.46	Germany	3.13	1.53	-1.60
Mexico	0.50	-	-0.50	Switzerland	3.03	0.75	-2.28
Chile	0.15	5.68	5.53	Spain	1.27	20.44	19.17
Colombia	0.09	-	-0.09	Sweden	1.11	-	-1.11
Peru	0.03	-	-0.03	Netherlands	0.99	-	-0.99
				Italy	0.99	17.95	16.96
Asia Pacific	**19.43**	**15.81**	**-3.62**	Denmark	0.56	4.75	4.19
Japan	7.73	2.80	-4.92	Russia	0.49	-	-0.49
Australia	2.79	0.05	-2.74	Belgium	0.45	-	-0.45
China	1.79	6.94	5.15	Finland	0.36	5.74	5.38
South Korea, Rep. of Korea	1.63	-	-1.63	Norway	0.35	0.57	0.22
Taiwan	1.50	1.29	-0.21	Turkey	0.18	-	-0.18
Hong Kong	1.20	0.34	-0.86	Poland	0.16	-	-0.16
India	0.96	0.59	-0.37	Austria	0.12	2.33	2.20
Singapore	0.56	-	-0.56	Ireland	0.10	-	-0.10
Malaysia	0.47	-	-0.47	Portugal	0.09	6.02	5.93
Thailand	0.27	-	-0.27	Greece	0.08	-	-0.08
Indonesia	0.25	-	-0.25	Czech Republic	0.02	-	-0.02
Philippines	0.16	1.22	1.05	Hungary	0.02	-	-0.02
New Zealand	0.09	1.10	1.00				
Pakistan	0.02	-	-0.02	**Middle East and Africa**	**1.11**	**-**	**-1.11**
				South Africa	0.79	-	-0.79
				Israel	0.22	0.17	-0.05
				UAE	0.06	-	-0.06
				Egypt	0.03	-	-0.03

Figures in per cent, as per 30th June, 2014

Sector distribution

Figure A.4 provides an overview of the sub-sector composition within the Renewable & Alternative Energy sub-sector using FTSE's classification for environmental sub-sectors. The majority of the EORE-companies are renewable energy developers and independent power producers (IPPs). These companies are generally involved in the production of electricity.

Figure A.4 FTSE environmental sub-sector composition of the EORE



Figures in per cent, as per 30th June, 2014

Survivorship and turnover

At month-end June 2014, more than 50 per cent of constituents had been in the sub-index since December 2008 (Table A.5). The constituents that had been removed from the index over this period represented slightly less than one fourth of the sub-index' adjusted market cap weight as per December 2008 (Table A.6). This indicates that the companies leaving the sub-index were on average smaller. At the latest review, semi-annual turnover was 3.1 per cent, which is higher than for the broader EOAS Index.

Table A.5: EORE survivorship, number of constituents - semi-annual snapshots

	Q4-08	Q2-09	Q4-09	Q2-10	Q4-10	Q2-11	Q4-11	Q2-12	Q4-12	Q2-13	Q4-13	Q2-14
Q4-08	100.0	100.0	100.0	100.0	100.0	98.7	90.9	81.8	77.9	72.7	72.7	68.8
Q2-09	93.9	100.0	100.0	100.0	100.0	98.8	91.5	82.9	78.0	73.2	73.2	69.5
Q4-09	88.5	94.3	100.0	100.0	100.0	98.9	92.0	82.8	78.2	72.4	72.4	69.0
Q2-10	83.7	89.1	94.6	100.0	100.0	98.9	91.3	82.6	78.3	72.8	72.8	70.7
Q4-10	78.6	83.7	88.8	93.9	100.0	99.0	90.8	82.7	78.6	73.5	73.5	71.4
Q2-11	73.8	78.6	83.5	88.3	94.2	100.0	92.2	84.5	78.6	73.8	73.8	71.8
Q4-11	71.4	76.5	81.6	85.7	90.8	96.9	100.0	91.8	85.7	80.6	80.6	77.6
Q2-12	67.7	73.1	77.4	81.7	87.1	93.5	96.8	100.0	92.5	87.1	87.1	83.9
Q4-12	67.4	71.9	76.4	80.9	86.5	91.0	94.4	96.6	100.0	94.4	94.4	89.9
Q2-13	65.1	69.8	73.3	77.9	83.7	88.4	91.9	94.2	97.7	100.0	100.0	94.2
Q4-13	61.5	65.9	69.2	73.6	79.1	83.5	86.8	89.0	92.3	94.5	100.0	94.5
Q2-14	**56.4**	60.6	63.8	69.1	74.5	78.7	80.9	83.0	85.1	86.2	91.5	100.0

Figures in per cent

Table A.6 EORE turnover, weights - semi-annual snapshots

	Q4-08	Q2-09	Q4-09	Q2-10	Q4-10	Q2-11	Q4-11	Q2-12	Q4-12	Q2-13	Q4-13	Q2-14
Q4-08	0.0	0.0	0.0	0.0	0.0	0.5	4.0	6.2	6.8	8.2	8.2	8.6
Q2-09	0.6	0.0	0.0	0.0	0.0	0.6	3.6	6.5	7.3	8.8	8.8	9.2
Q4-09	3.6	2.8	0.0	0.0	0.0	0.5	3.0	6.2	7.3	8.6	8.6	9.0
Q2-10	5.3	4.1	1.5	0.0	0.0	0.4	2.8	5.9	6.8	7.9	7.9	8.1
Q4-10	7.2	5.6	3.6	1.5	0.0	0.4	2.7	5.0	5.9	6.7	6.7	6.9
Q2-11	8.3	6.5	4.4	1.9	0.8	0.0	2.2	4.0	4.7	5.6	5.6	5.8
Q4-11	11.3	9.5	7.1	5.5	4.5	3.9	0.0	1.0	1.5	2.1	2.1	2.4
Q2-12	11.7	9.5	7.8	6.2	5.1	4.4	0.4	0.0	0.6	1.1	1.1	1.5
Q4-12	12.8	11.0	9.2	7.7	6.4	5.8	1.7	1.4	0.0	0.4	0.4	1.1
Q2-13	15.0	13.5	10.8	9.2	8.0	6.9	2.8	2.2	1.0	0.0	0.0	1.0
Q4-13	20.9	19.3	16.9	14.9	13.7	12.8	9.2	8.7	7.0	6.2	0.0	0.8
Q2-14	**22.1**	20.3	18.1	15.7	14.6	13.6	10.9	10.5	8.7	8.2	**3.1**	0.0

Figures in per cent

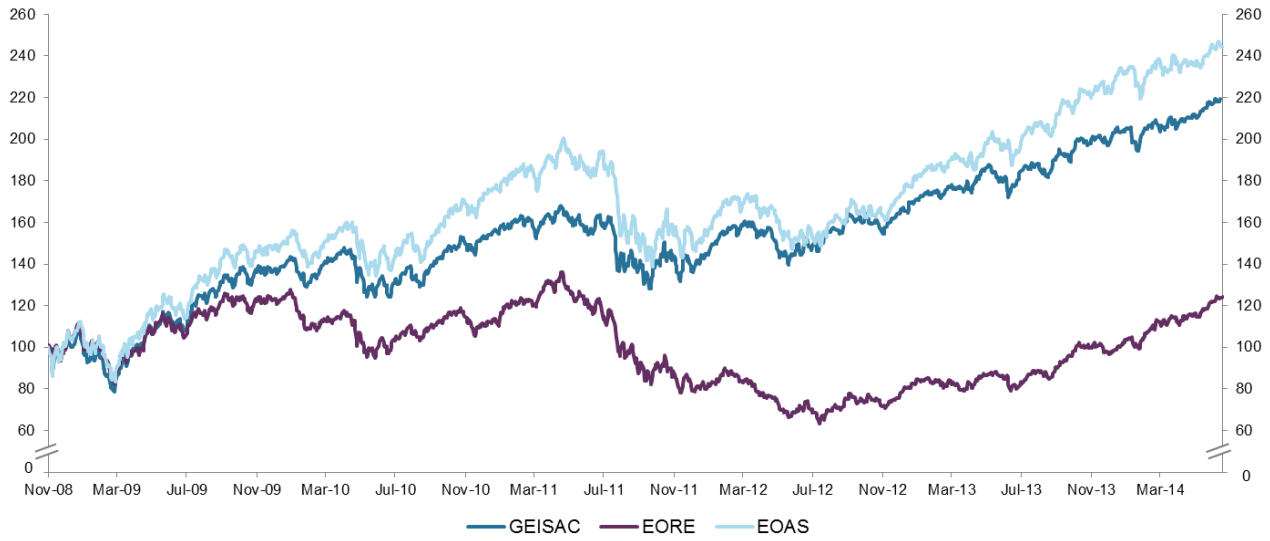
Concentration analysis

During the period of observation, the number of constituents within the Renewable-segment of EOAS ranges from 77 (at year-end 2008) to 103 (June 2011). The largest constituent during the period was the Spanish power producer Iberdrola S.A., which on average made up 18 per cent of the EORE. Note that the capping rules discussed previously are only applicable at the EOAS level, not at sub-sector level.

Historical returns

Figure A.6 shows the historical performance of EORE compared to both the broader EOAS Index and a global equity index (GEISAC).

Figure A.6: Historical performance of the EORE compared to the global index and to the EOAS



Source: Bloomberg

ET100

When comparing the ET and EO indices, the former have a lower share of constituents with a price history of 10 years or longer.

FTSE maintains a constant number of constituents in the FTSE ET50 and ET100 Index. New companies may be added to or excluded from the index at the periodical reviews, but the number of companies will remain at 50 and 100 respectively. FTSE does not publish an "overall" Environmental Technologies universe from which these eligible constituents are drawn.

Geographic composition

Table A.7 provides an overview of the regional and country-level composition of the GEISAC index and the ET100 index, and the differences between the two indices as of end June 2014. It is worth noting that just like the broader EOAS Index, the ET100 Index has a lower weight of American companies, and higher weight of European constituents than the global equity index.

Table A.7 Geographic composition in the ET100 compared to GEISAC

Country/FTSE Region	GEISAC	ET100	Relative weight
Americas	**54.98**	**53.97**	**-1.01**
United States	49.25	53.97	4.72
Canada	3.80	-	-3.80
Brazil	1.15	-	-1.15
Mexico	0.50	-	-0.50
Chile	0.15	-	-0.15
Colombia	0.09	-	-0.09
Peru	0.03	-	-0.03
			0.00
Asia Pacific	**19.43**	**16.76**	**-2.67**
Japan	7.73	3.79	-3.94
Australia	2.79	0.46	-2.33
China	1.79	5.63	3.84
South Korea, Rep. of Korea	1.63	5.30	3.67
Taiwan	1.50	1.15	-0.35
Hong Kong	1.20	0.14	-1.06
India	0.96	-	-0.96
Singapore	0.56	-	-0.56
Malaysia	0.47	-	-0.47
Thailand	0.27	-	-0.27
Indonesia	0.25	-	-0.25
Philippines	0.16	0.28	0.12
New Zealand	0.09	-	-0.09
Pakistan	0.02	-	-0.02

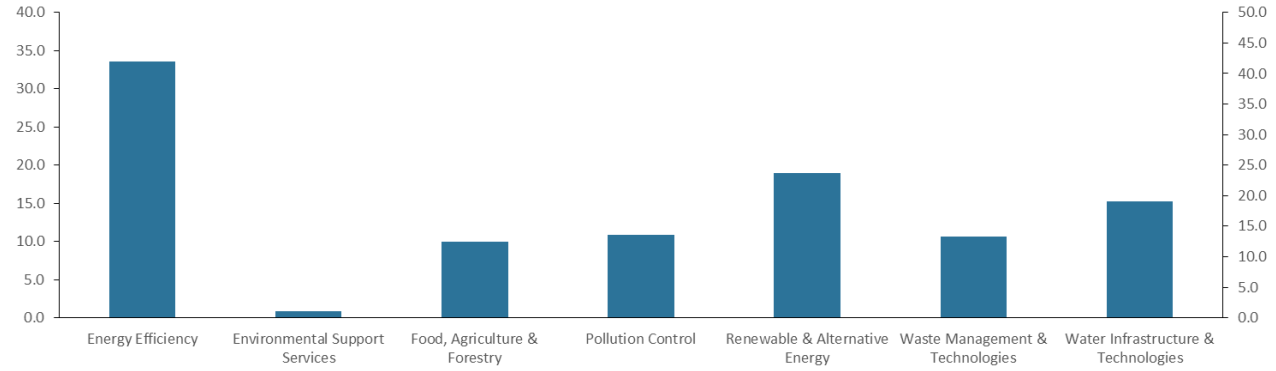
Country/FTSE Region	GEISAC	ET100	Relative weight
Europe	**24.48**	**29.28**	**4.80**
United Kingdom	7.77	6.32	-1.45
France	3.21	0.77	-2.44
Germany	3.13	4.26	1.12
Switzerland	3.03	0.92	-2.11
Spain	1.27	2.44	1.17
Sweden	1.11	0.53	-0.58
Netherlands	0.99	1.28	0.29
Italy	0.99	1.30	0.31
Denmark	0.56	7.13	6.57
Russia	0.49	-	-0.49
Belgium	0.45	1.51	1.06
Finland	0.36	0.36	0.00
Norway	0.35	0.75	0.40
Turkey	0.18	-	-0.18
Poland	0.16	-	-0.16
Austria	0.12	0.43	0.31
Ireland	0.10	0.84	0.74
Portugal	0.09	0.44	0.35
Greece	0.08	-	-0.08
Czech Republic	0.02	-	-0.02
Hungary	0.02	-	-0.02
			0
Middle East and Africa	**1.11**	**-**	**-1.11**
South Africa	0.79	-	-0.79
Israel	0.22	-	-0.22
UAE	0.06	-	-0.06
Egypt	0.03	-	-0.03

Figures in per cent, as per 30th June, 2014

Sector distribution

Figure A.7 provides an overview of the sector composition of the ET100 Index. Energy Efficiency is by far the biggest sub-sector followed by Renewable & Alternative Energy.

Figure A.7 FTSE environmental sector distribution of the ET100



Figures in per cent, as per 30 June, 2014

Survivorship and turnover

Our analysis of the composition of the index over time reveals that 77 per cent of the constituents that were in the index at the end of 2012 remained in the index as of June 30 2014 (Table A.8). The 23 per cent of the June 2012-constituents that had left the index by June 2014, represented only 7 per cent of the index market value as per June 2012 (Table A.9). This indicates that the bulk of the companies that have left the index have been smaller companies.

At the latest semi-annual review, the turnover for the ET100 index was about 5.7 per cent. This is significantly higher than the turnover for the EO indices. A plausible factor contributing to explaining the higher turnover could be the index' explicit focus on the technology sector, an industry which is typically more dynamic in that it has a higher rate of company entries and exits in comparison to more stable segments of the economy, such as utilities or basic materials.

Table A.8 ET100 survivorship, number of constituents - semi-annual snapshots

	Q4-12	Q2-13	Q4-13	Q2-14
Q4-12	100.0	91.0	83.0	**77.0**
Q2-13		100.0	91.0	85.0
Q4-13			100.0	93.0
Q2-14				100.0

Figures in per cent

Table A.9 ET100 turnover, weights - semi-annual snapshots

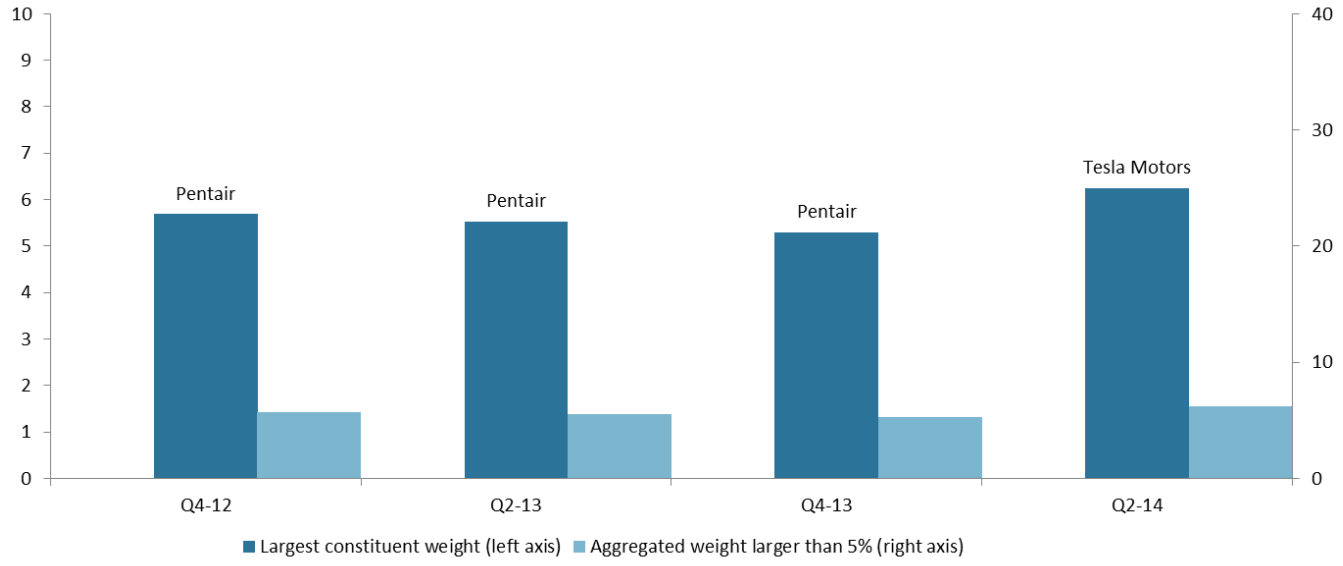
	Q4-12	Q2-13	Q4-13	Q2-14
Q4-12	0.0	2.4	4.7	**7.0**
Q2-13	7.5	0.0	2.8	5.0
Q4-13	16.3	9.1	0.0	1.9
Q2-14	21.4	14.5	**5.7**	0.0

Figures in per cent

Concentration analysis

The ET indices are subject to the same capping rules as the EO indices. None of these rules have been activated during the time period we have studied. Pentair was the biggest constituent in the ET100 Index from Q412 to Q4 13. At the Q214 review Tesla Motors replaced Pentair as the biggest constituent in the ET100. At this point, Tesla Motors' market cap had increased ten-fold since 2012, following its success with the production of the first fully electric sports car. In the semi-annual snapshots studied during this period, Tesla Motors and Pentair have been the only companies with an individual weight above 5 per cent, Pentair up to Q413 and Tesla Motors in Q214.

Figure A.8 Concentration utilization in ET100 index

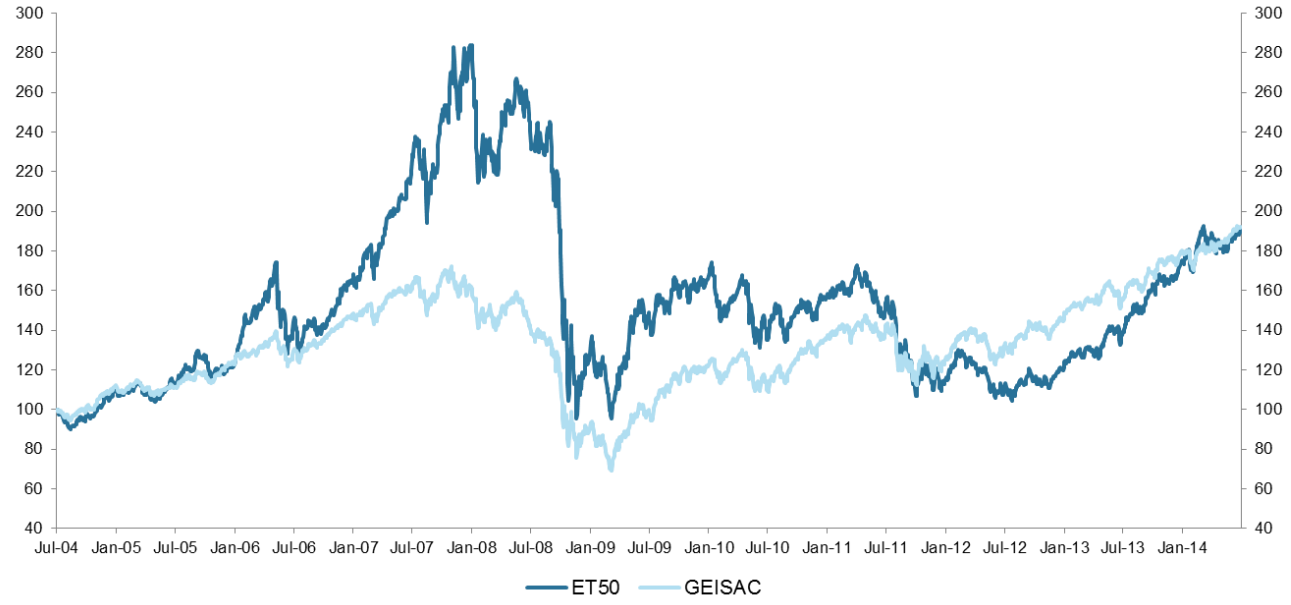


Figures in per cent, as per 30 June, 2014

Historic returns

Figure A.9 compares the historical returns of the ET50 index to a global equity index (GEISAC). The ET50 peaked in early 2008 after a four-year rally, before falling sharply during the financially turbulent autumn of 2008. The index touched new lows in late 2011, before starting what now appears to be a gradual recovery.

Figure A.9: Historic returns of the ET50 compared to the GEISAC



Source: Bloomberg

ET Renewable and Alternative Energy

27 of the 100 constituents in the FTSE ET 100 are classified as renewable and alternative energy companies, as per 30th June 2014. FTSE do not provide sub-indices of the ET100. For the purpose of this note we have examined the constituents of the ET100 within the renewable energy segment, and denoted this subset as ET Renewables in the subsequent graphs and tables.

Geographic composition

Table A.10 provides an overview of the regional and country-level composition of the ET Renewables and the GEISAC index. Denmark, China and Spain are all countries where the relative constituent weight is significantly higher than the global equity benchmark, while the US has a significantly lower relative weight. It is also worth noting that due to its concentration in China, the ET Renewables has a slightly higher relative weight in Asia as opposed to the slightly lower relative weight seen when comparing the ET100 Index as a whole to the global equity index.

Table A.10 Geographic composition in the ET Renewables compared to GEISAC

Country/FTSE Region	GEISAC	ET Renewables	Relative weight
Americas	**54.98**	**29.59**	**-25.39**
United States	49.25	29.59	-19.66
Canada	3.80	-	-3.80
Brazil	1.15	-	-1.15
Mexico	0.50	-	-0.50
Chile	0.15	-	-0.15
Colombia	0.09	-	-0.09
Peru	0.03	-	-0.03
			0.00
Asia Pacific	**19.43**	**23.27**	**3.85**
Japan	7.73	-	-7.73
Australia	2.79	-	-2.79
China	1.79	16.22	14.43
South Korea, Rep. of Korea	1.63	-	-1.63
Taiwan	1.50	-	-1.50
Hong Kong	1.20	0.75	-0.45
India	0.96	-	-0.96
Singapore	0.56	-	-0.56
Malaysia	0.47	-	-0.47
Thailand	0.27	-	-0.27
Indonesia	0.25	-	-0.25
Philippines	0.16	1.48	1.32
New Zealand	0.09	-	-0.09
Pakistan	0.02	-	-0.02

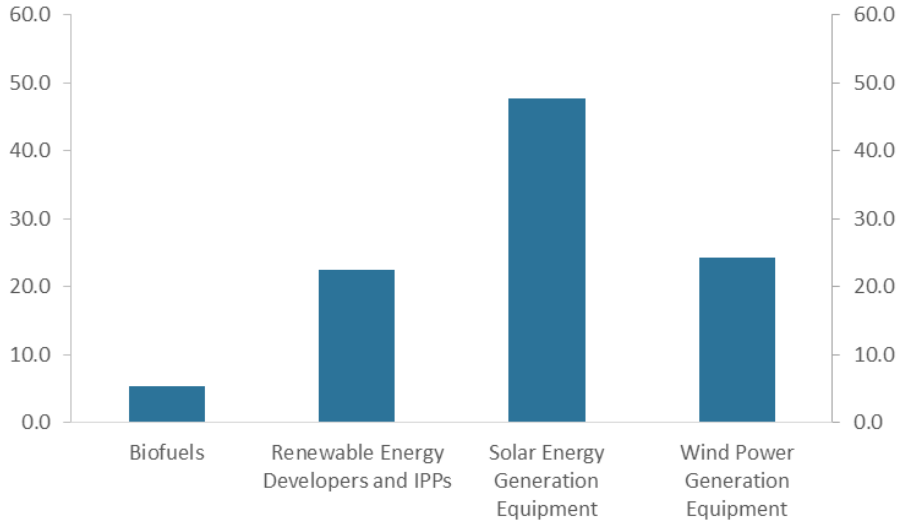
Country/FTSE Region	GEISAC	ET Renewables	Relative weight
Europe	**24.48**	**47.14**	**22.66**
United Kingdom	7.77	-	-7.77
France	3.21	-	-3.21
Germany	3.13	5.44	2.30
Switzerland	3.03	-	-3.03
Spain	1.27	12.91	11.64
Sweden	1.11	-	-1.11
Netherlands	0.99	-	-0.99
Italy	0.99	6.86	5.87
Denmark	0.56	17.51	16.96
Russia	0.49	-	-0.49
Belgium	0.45	-	-0.45
Finland	0.36	-	-0.36
Norway	0.35	2.09	1.74
Turkey	0.18	-	-0.18
Poland	0.16	-	-0.16
Austria	0.12	-	-0.12
Ireland	0.10	-	-0.10
Portugal	0.09	2.33	2.24
Greece	0.08	-	-0.08
Czech Republic	0.02	-	-0.02
Hungary	0.02	-	-0.02
			0
Middle East and Africa	**1.11**	**-**	**-1.11**
South Africa	0.79	-	-0.79
Israel	0.22	-	-0.22
UAE	0.06	-	-0.06
Egypt	0.03	-	-0.03

Figures in per cent, as per 30th June, 2014

Sector distribution

Figure A.10 provides an overview of the sub-sector composition within the Renewable & Alternative Energy sector. The chart indicates that the majority of the companies within this sector are involved in Solar Energy Generation Equipment.

Figure A.10: FTSE environmental sub-sector distribution of the ET100 Renewable & Alternative Energy



Figures in per cent, as per 30 June, 2014

Survivorship and turnover

Tables A.11 and A.12 examine survivorship and turnover within the ET Renewable segment. The tables indicate that turnover is somewhat lower than for the overall ET100 Index. However, it must be noted that the figures are not directly comparable, as the ET100 Index will always consist of exactly 100 constituents, while the exact number of constituents within ET100 assigned to renewable segment may vary (in our period of observation it ranges from 22 to 27 constituents).

Table A.11: Survivorship within the ET100 Renewable segment, number of constituents - semi-annual snapshots

	Q4-12	Q2-13	Q4-13	Q2-14
Q4-12	100.0	95.5	86.4	86.4
Q2-13	91.3	100.0	91.3	91.3
Q4-13	76.0	84.0	100.0	100.0
Q2-14	70.4	77.8	92.6	100.0

Figures in per cent

Table A.12: Turnover weights within the ET100 Renewable segment - semi-annual snapshots

	Q4-12	Q2-13	Q4-13	Q2-14
Q4-12	0.0	12.8	13.4	13.4
Q2-13	18.6	0.0	2.4	2.4
Q4-13	32.1	12.7	0.0	0.0
Q2-14	36.0	14.4	1.8	0.0

Figures in per cent

Concentration analysis

Since this is only a sub-sector of the FTSE ET100, the capping rules do not apply. The largest constituent during the fairly short period we have studied, from Q412 to Q214 is the Danish biofuels company Novozymes A/S. In Q412 it made up as much as 27.3 per cent of this sub-index gradually declining to 15.5 per cent at the last observation. During the period we have studied, the number of constituents with a weight above 5 per cent has declined from 7 to 4. This may indicate decreasing concentration.

MSCI GC100

Geographic composition

Table B.1 shows geographical composition of the GC100 compared to the global market index (MSCI ACWI IMI). We have for the purpose of this analysis used MSCI's regional classification system. This system deviates from the one used by FTSE's. The most notable difference is that European, Middle Eastern and African countries are grouped together in one region.

Compared to the global market index the GC100 has a significantly higher relative weight in the Americas (notably the United States), a slightly higher weight in Europe, Middle East & Africa (notably Germany and the U.K) and a notably lower weight in Asia-Pacific.

Table B.1 Geographic composition in the GC100 compared to ACWI IMI

	ACWI IMI	GC100	Relative weight
Americas	**48.59**	**55.01**	**6.42**
United States	41.94	54.18	12.23
Canada	3.62	0.83	-2.78
Brazil	1.67	-	-1.67
Mexico	0.71	-	-0.71
Chile	0.31	-	-0.31
Colombia	0.26	-	-0.26
Peru	0.08	-	-0.08
Asia-Pacific	**23.96**	**16.21**	**-7.75**
Japan	8.13	15.18	7.05
China	3.10	-	-3.10
Australia	2.41	0.23	-2.18
Korea	2.13	-	-2.13
India	1.94	-	-1.94
Taiwan	1.61	-	-1.61
Hong Kong	1.54	0.47	-1.07
Malaysia	0.79	-	-0.79
Singapore	0.77	0.34	-0.43
Thailand	0.61	-	-0.61
Indonesia	0.53	-	-0.53
Philippines	0.30	-	-0.30
New Zealand	0.09	-	-0.09

	ACWI IMI	GC100	Relative weight
Europe, Middle East & Africa	**27.44**	**28.77**	**1.33**
United Kingdom	6.63	8.69	2.06
France	3.89	4.85	0.96
Germany	3.30	6.76	3.46
Switzerland	2.72	2.89	0.17
Spain	1.48	2.20	0.72
Italy	1.26	0.17	-1.09
Sweden	1.15	0.79	-0.36
Russia	1.04	-	-1.04
Netherlands	0.90	1.00	0.10
South Africa	0.89	-	-0.89
Belgium	0.63	0.22	-0.41
Denmark	0.59	0.77	0.19
Norway	0.55	0.04	-0.51
Turkey	0.40	-	-0.40
Finland	0.35	-	-0.35
Poland	0.27	-	-0.27
Israel	0.25	-	-0.25
Qatar	0.22	-	-0.22
United Arab Emirates	0.20	-	-0.20
Austria	0.18	-	-0.18
Greece	0.15	-	-0.15
Ireland	0.14	-	-0.14
Portugal	0.13	0.39	0.26
Czech Republic	0.06	-	-0.06
Egypt	0.05	-	-0.05
Hungary	0.03	-	-0.03

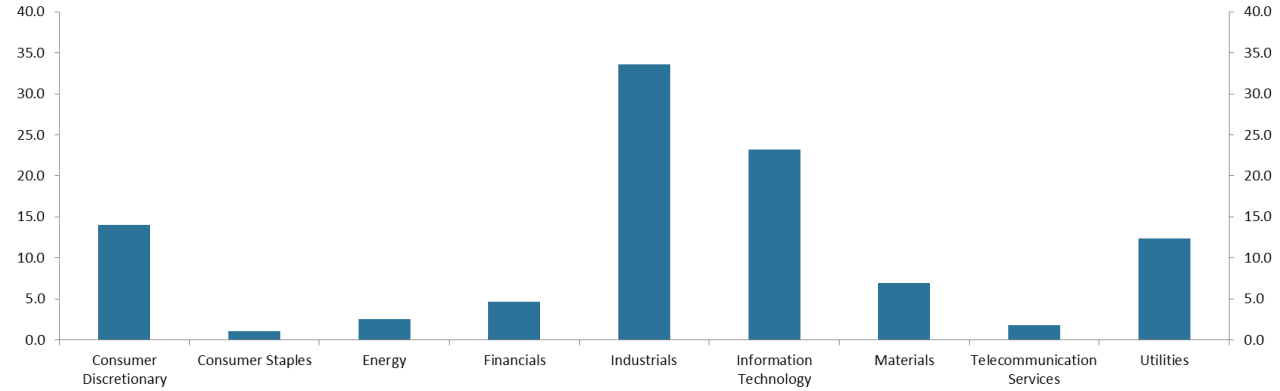
Figures in per cent, as per 30 June, 2014

Sector distribution

MSCI's indices uses the Global Industry Classification Standard (GICS), an alternative system to the Industry Classification Benchmark (ICB) applied by FTSE. FTSE has developed a separate standard for classifying companies that operate in environmental markets (EMCS – Environmental Market Classification System). MSCI classifies companies in the GEIB according to five environmental themes (alternative energy, clean technology, sustainable water, green building and pollution prevention). Figure B.1 shows

the GICS sector composition of the GC100. The industrial sector is by far the biggest sector, followed by information technology.

Figure B.1: GICS sector distribution of the GC100



Figures in per cent, as of 30 June, 2014

Historical returns

Figure B.2 indicates the historic returns of the GC100 when compared to the performance of ACWI IMI, a global equity index. Over this period, the GC100 has underperformed the broader global index by approximately 14 percentage points.

Figure B.2: Historical performance of the GC100 compared to the ACWI IMI

Source: Bloomberg

Constituent data for analysis purposes is not readily available prior to the middle of 2013. Analysis of survivorship and concentration has hence not been undertaken.

MSCI GEIB

Geographic composition

Table B.2 depicts the geographical composition of the GEIB compared to the global equity index. The GEIB has a significantly higher relative weight in Europe, Middle East & Africa (notably France, the UK and Switzerland), and lower relative weight in both Asia-Pacific and the Americas.

Table B.2 Geographic composition in the GEIB compared to ACWI IMI

	ACWI IMI	GEIB	Relative weight
Americas	**48.59**	**40.64**	**-7.95**
United States	41.94	39.58	-2.36
Canada	3.62	0.97	-2.65
Brazil	1.67	0.08	-1.59
Mexico	0.71	-	-0.71
Chile	0.31	-	-0.31
Colombia	0.26	-	-0.26
Peru	0.08	-	-0.08
Asia-Pacific	**23.96**	**14.25**	**-9.72**
Japan	8.13	8.86	**0.73**
China	3.10	0.34	-2.76
Australia	2.41	2.80	0.39
Korea	2.13	0.29	-1.84
India	1.94	0.47	-1.47
Taiwan	1.61	0.82	-0.79
Hong Kong	1.54	0.04	-1.51
Malaysia	0.79	0.02	-0.78
Singapore	0.77	0.11	-0.66
Thailand	0.61	0.04	-0.58
Indonesia	0.53	0.04	-0.48
Philippines	0.30	-	-0.30
New Zealand	0.09	0.41	0.31

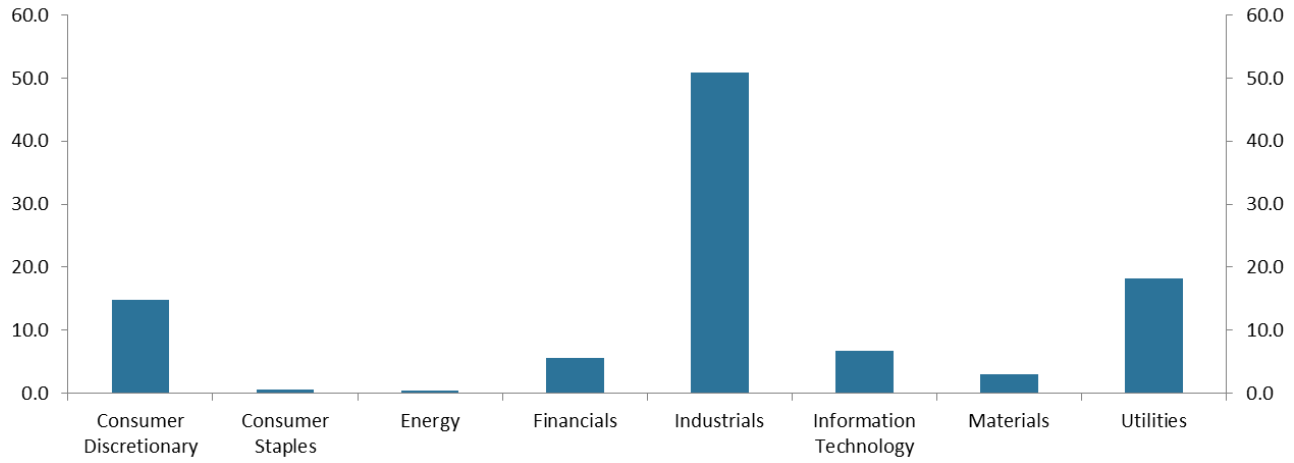
	ACWI IMI	GEIB	Relative weight
Europe, Middle East & Africa	**27.44**	**45.11**	**17.67**
United Kingdom	6.63	10.43	3.80
France	3.89	16.78	12.89
Germany	3.30	2.75	-0.55
Switzerland	2.72	6.65	3.92
Spain	1.48	1.93	0.45
Italy	1.26	0.69	-0.57
Sweden	1.15	1.06	-0.09
Russia	1.04	-	-1.04
Netherlands	0.90	0.15	-0.75
South Africa	0.89	-	-0.89
Belgium	0.63	0.66	0.03
Denmark	0.59	1.61	1.03
Norway	0.55	0.32	-0.23
Turkey	0.40	0.01	-0.38
Finland	0.35	-	-0.35
Poland	0.27	-	-0.27
Israel	0.25	0.06	-0.19
Qatar	0.22	-	-0.22
United Arab Emirates	0.20	-	-0.20
Austria	0.18	0.15	-0.03
Greece	0.15	0.02	-0.12
Ireland	0.14	0.32	0.18
Portugal	0.13	1.53	1.40
Czech Republic	0.06	-	-0.06
Egypt	0.05	-	-0.05
Hungary	0.03	-	-0.03

Figures in per cent, as per 30 June, 2014

Sector distribution

Figure B.3 illustrates the GICS sector composition of the GEIB. The largest concentration is within the Industrials sector, followed by Utilities and Consumer Discretionary.

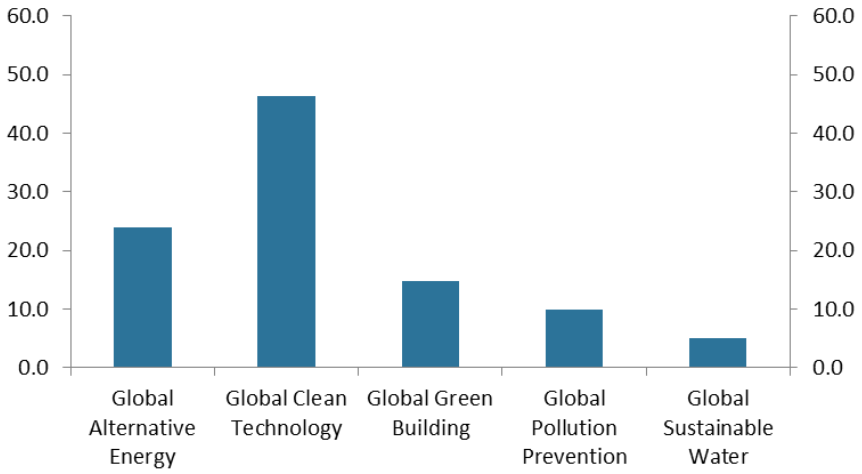
Figure B.3: GICS sector distribution of the GEIB



Figures in per cent, as per 30 June, 2014

Figure B.4 illustrates the weight of the various environmental themes in the GEIB, as defined by the MSCI. The largest concentration is within Global Clean Technology.

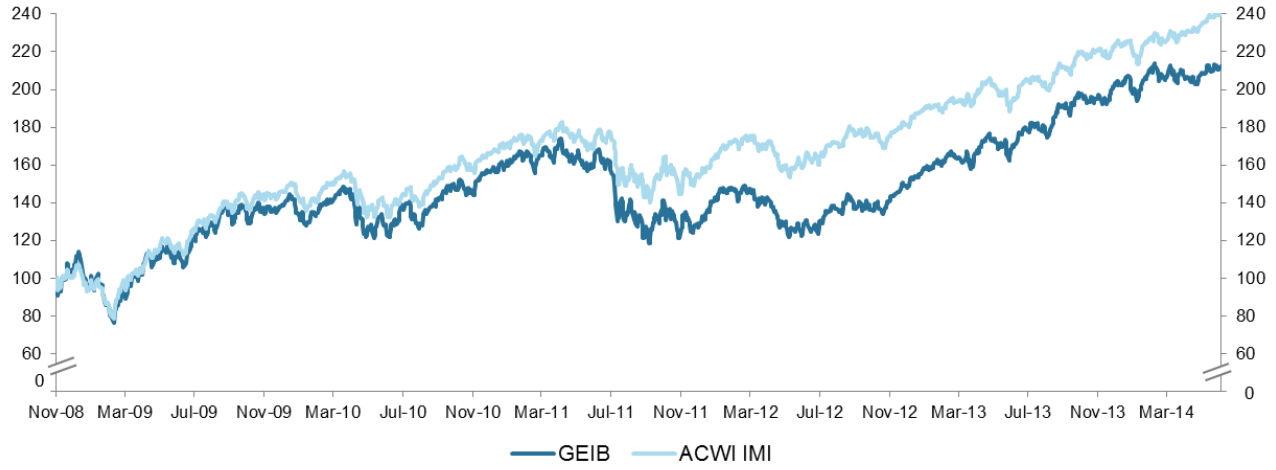
Figure B.4: Weight of the environmental themes defined in the GEIB



Historical returns

Figure B.5 illustrates the historical performance of the GEIB Index when compared to the ACWI IMI.

Figure B.5: The historical performance of the GEIB Index compared to the ACWI IMI



Source: Bloomberg

Constituent data for analysis purposes is not readily available prior to the middle of 2013. Analysis of survivorship and concentration has hence not been undertaken.