

Environmental theme bonds: a new fixed income asset class

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The past two years have seen the growth of a small 'green bond' market in Japan, Europe and North America anchored by nearly US\$1bn of agency issuance from the World Bank. This chapter argues that this nascent market heralds the arrival of a major class of theme bonds, driven by the demands of global carbon mitigation and adaptation programmes as institutional investors and governments devote capital to a product which both fulfils risk/reward expectations and signals their de-carbonisation efforts to their member and voter stakeholders. The potential is for a future market with notional issuance to compete with traditional fixed income sectors.

Shifting capital flows

The Copenhagen Accord² commits developed countries to a goal of "mobilising jointly US\$100bn per year by 2020 to address the (mitigation and adaptation) needs of developing countries". This agreement assumes that funding will come from public and private sources. Although funds from the private sector are already the main source of investment in renewable energy and energy efficiency (about 94% of the investment in sustainable energy in 2007 came from the private sector – source: UNEP and SEFI, 2008) the wide range of risks facing emerging clean technologies limit the volume of private capital flowing into these sectors. These risks include country and financial risks, policy risk, technical and project specific risk, and market risk, among others.

So while asset finance has become the most important form of new investment in clean energy, reaching US\$79.2bn of the US\$148bn in global alternative energy investment in 2007, present capital inflows are still small in comparison to the International Energy Authority's estimate³ of US\$10trn required over the next 10 years for "above business as usual" energy infrastructure investments. Because a significant number of power stations in developed countries will be coming to the end of their lives in the next 15 years, energy investments will already be at an unusually high level. On top of the transformation and renewal of existing infrastructure, growing economies in

South and East Asia will require a significant increase in generation capacity. In principle, funds are available. Assets of the global fund management industry totalled around US\$90trn⁴ at the end of 2008 (a fall of 17% on the previous year). As such, the challenge is not to create capital, but to shift what is a relatively a small portion of global capital. As the recent history of project finance shows, large capital intensive projects with long payback periods of 25–40 years have typically been funded with bonds. We expect that to again be the case.

21st century theme bonds

Green or climate bonds are ‘theme’ bonds, similar in principle to a railway bond of the 19th century, the war bonds of the early 20th century or the highway bond of the 1960s. In principle, green bonds might be designed to address a wide variety of environmental matters. Issuance to date has in practice been focused on climate change mitigation.

Climate theme bonds are designed to:

- ▶ Attract institutional capital – While this has been a niche socially responsible investment (SRI) area in the past, the last year has seen substantial moves by both institutional investors (e.g. ATP, Norwegian Global Fund, Skandia Life) and government Treasuries (notably California) to invest;
- ▶ Provide a means for governments to direct funding to climate change mitigation – This is done either by choosing to privilege qualifying bonds with preferential tax treatments (e.g. ‘clean renewable energy’ bonds in the US) or by providing government guarantees to non-sovereign issues;
- ▶ Send a political signal to other stakeholders – On purchasing US\$300m of World Bank green bonds in 2009, the California Treasurer allowed the announcement of their investment to be used to encourage other investors to support debt issuance related to climate change policy agendas.

Otherwise, for operational purposes, theme bonds largely function as conventional debt instruments. They are risk-weighted and credit-rated in the usual way based on the creditworthiness of the issuer, and are tradable in the secondary market, market conditions permitting. These instruments can theoretically be issued at all levels of the issuer universe, from sovereigns to corporate.

Theme bonds are also ready adopters of structured note technology, with payments linked to inflation or other underlying derivatives. Already the World Bank has issued green bonds with returns partly linked to an index of traded ‘green’ companies, and another linked to the successful achievement of certified emission reductions in projects receiving funds. More of these can be expected.

“Designating funds for climate change or for component policy areas, such as renewable energy or energy efficiency, is... potentially vexed”

The London Accord’s Professor Michael Mainelli has more recently promoted the issuance of index-linked government bonds⁵ with interest payments linked to the actual greenhouse gas emissions of the issuing country against published targets. A holder of this type of bond would receive an excess return if the issuing country’s emissions are above the government’s published target. The bond would thus provide a hedge against the issuing country’s government not delivering on its commitments or targets.

Liquidity subject to contingent definitions

Liquidity in financial markets is a function of confidence in standardised definitions and risk/reward, among other factors such as market size, transparency and disclosure. In this sense, the definition of what constitutes funding for climate change mitigation and adaptation is problematic. Arguably, historic theme bond asset classes had it easier: highway bonds were government bonds designated for a specific purpose, and railroad bonds were generally issued by railroad companies to build railroads and to develop related infrastructure. Designating funds for climate change or for component policy areas, such as renewable energy or energy efficiency, is, in contrast, potentially vexed.

Debates include, for example, the question of whether renewable energy bonds for European or US ethanol plants with dubious emissions profiles should be eligible for tax concessions. Descriptions inserted into the Waxman-Markey climate change bill at the behest of agri-business lobbyists imply they should. Other issues include questions around whether bonds to build highways, arguably lowering emissions by reducing bottlenecks that cause cars to produce excess emissions while idling in traffic jams, given the evidence that road building encourages car use over public transport. Is debt for energy efficiency refits for business buildings that reduce emissions – but at fractional levels – the sort of thing that should be supported by taxpayers? What level of emission reduction should qualify? The complex nature of these issues suggests that absolute definitions could remain illusive. The complexities of decarbonisation notwithstanding, liquidity will be essential to the success of climate bonds as a mainstream asset class.

As the infancy of the climate theme bond market illustrates, early issuance has been dominated by major governmental institutions that have both mandate and political will to label bonds, as well as the level of prestige and trust that gives investors confidence to report these fixed income holdings to stakeholders. In late 2009, Bloomberg’s definition of a green bond was based largely on the World Bank green bond:

“...a plain vanilla bond issued by a recognised supranational or sovereign institution where the proceeds are marked for global warming. The majority of the projects financed are climate mitigation projects.”

However, transparency and standardisation has been sub-optimal even in the SSA sector. When SEB was mandated to underwrite and place World Bank green bonds, the bank commissioned an independent audit of the product’s environmental claims as part of its labelling due diligence. The findings of this review drove the ring-fencing of capital expenditure programmes that gave the underwriter comfort to label the bonds as ‘green’. The World Bank, with the input of independent, Norway-based consultants CICERO,⁶ identifies specific activity programmes where it will apply the proceeds raised by climate bond issuance. The European Investment Bank (EIB) argues that it does the same with its Climate Awareness Bonds.

As private sector players and other shareholders enter the market, the question of agreed and credible definition becomes more urgent. To that end, more sophisticated descriptions are emerging. In their UNEP paper on investors and climate change, Mackenzie and Ascui⁷ define a climate bond and relate it to a definition of a green bond:

“[A climate bond is] an extension of the green bond concept. Green bonds are issued by a government or corporate entity in order to raise the finance for an environmental project. The issuing entity guarantees to repay the bond over a certain period of time, plus either a fixed or variable rate of return. Climate bonds would be issued by governments (or others) to raise finance for investments in emission reduction or climate change adaptation.”

Furthermore, ‘renewable energy bonds’ have emerged as an asset class to provide financing for energy projects, especially those taking advantage of renewable energy feed-in tariffs now operating in many countries. Issued either directly by renewable energy companies or by special purpose vehicles/funds, these instruments raise capital for entities engaged in the business of supporting, undertaking or investing in renewable energy projects. The underlying projects are subject to a certification mechanism to qualify for commercial advantages such as offtake price support offered by governments or regulators. The credit risk of the bonds may be directly enhanced by government-related entities or indirectly through regulatory support for the underlying project.

'Almost-green'

Over the past few years many companies have made greening claims. However, some companies, especially larger ones, have significant parts of their portfolios in relatively unsustainable assets. For these entities, the idea of ring-fencing assets to address labelling expectations is problematic. Doing so would mean identifying that a portion of their assets are *not* green, belying the public relations claims they have made in the less-regulated past. Issuing company green bonds without any qualification about their assets, on the other hand, risks embarrassing examination when asset criteria are compared with those of other bond issuers in the market. Investors who manage their portfolios in line with green or climate-related standards will require a reasonable verification mechanism.

The Climate Bonds Initiative proposes an international standard labelling scheme using a transparent 'transition' model for the labelling of issuance by companies that have both sustainable and non-sustainable assets in their portfolios. This could provide a framework that would allow some flexibility in the first years, diminishing to a stricter set of definitions.

This position will likely attract the criticism from non-governmental organisations (NGOs) that it supports businesses that are only sustainable when and where it suits them. However, a key precept behind the climate bonds idea is that it provides a path for carbon sector companies to take advantage of growing investor interest in climate change-focused investments. The issue is the asset being funded, not the project managers past or unrelated activities.

Drivers for a sustainable debt capital market

Growth of longer-term investment horizons

The past 15 years have seen a large increase in the proportion of global assets under management by institutional investors, notably pension funds and sovereign wealth funds, with a thirst for long-dated investment. This dynamic has a fundamental influence on global capital markets. As a result there has been growth in the variety and type of long-dated investment opportunities. Governments, for example, have contributed to the pool of investment opportunities by privatising infrastructure assets. Airports, energy grids and toll roads are all examples of an asset with price regulation that has become 'investible' and is keenly sought after by pension funds.

Re-weighting by institutional investors

In the UK, for instance, allocation to equities has dropped 15% since 2006 as more pension funds pursue de-risking strategies. Fixed-income allocations have increased by 5% over 2008 and now stand at 38% of net portfolio allocations, according to the National Association of Pension Funds (NAPF). Corporate bonds have seen a sizeable increase, with over 76% of pension schemes now investing in the asset class. The average allocation among these schemes is 19% and now represents the second largest asset class after UK equities.

A number of factors have driven this change, including the reduction of risk for pension schemes driven by asset liability modelling and accounting rules and the recent financial crisis. In the US many defined benefit funds have been spooked by the impact that reduced equity values have had on their ability to meet forward commitments and have made huge shifts in their weighting to bonds. While an ongoing shift cannot be guaranteed, it is likely that investors will continue to reassess the risk associated with equities and the risk associated with their liabilities.

Large investors taking an interest in carbon risk

The increasing recognition of the threat of climate change has led to a significant number of governments and institutional investors looking for climate change-related investments within their existing portfolio weightings. In Europe, the Norwegian 'Global' fund, one of the largest in the world, has been active in shifting funds away from investments regarded as harmful to the environment; Denmark's ATP pension fund has recently set up a billion dollar climate change investment fund; and Holland's APG asset manager claims to be integrating climate risk assessments across its whole portfolio of investments.

As Christina Kusoffsky Hillesøy, head of Communication and Sustainable Investments at AP3 (Third Swedish National Pension Fund), has commented: "For us as long-term investors, it is important to find responsible investments targeted at the global climate challenges."

California State Treasurer Bill Lockyer said in 2009 when announcing their US\$300m green bond purchase: "Buying these green bonds ... strengthens our portfolio's diversity while adding a sound investment with a triple-A rated issuer. And it tells the world that when it comes to battling climate change, California is prepared to contribute not just its policies, but its money, too."

The California State Teachers' Retirement System (US\$131.9bn in assets) recently went so far as to instruct its active equity and fixed-income managers

to incorporate climate risk into their investment analysis and corporate governance voting practices to ensure that climate-related risk was being consciously factored into investment decisions.⁸

Legislative and regulatory pressure

Governments have increased their green rhetoric. This trend was highlighted by the election of the Obama administration. The US has seen the introduction of a raft of policies aimed at creating jobs and stimulating investment in low-carbon industries; many EU countries have long been active in the area; and both Korea and China have devoted high proportions of their economic stimulus packages to low-carbon industries.

Constraints on public spending

There has been significant pressure to pay for both domestic and, in the case of richer countries, international mitigation efforts through taxation and recurrent revenue streams. However, the financial crisis has constrained the already limited ability of governments to fund mitigation efforts through tax revenues. However, many, if not most, mitigation efforts have the potential to be designed as long-term revenue generators. This is especially the case for assets open to price regulation, where governments have the power to provide long-term certainty of revenue to support capital market investment.

The failure of international governments at the end of 2009 to strike a global cap and trade deal, and the consequent deflation of expectations of an international carbon prices, has brought the issue of public funding into relief. Whatever their merits in advanced regions such as Europe and the US in slowing carbon intensity, carbon prices are unlikely to play any significant role in developing countries, where low energy prices are the prime means of development and a driver of international competitiveness. Climate bonds offer governments an alternative approach to financing the development of low-carbon assets. Large-scale energy efficiency measures, for example, could be funded by national borrowings against future energy savings; equally, low-carbon energy resources could be developed at scale using private sector capital leveraged with government price regulation. We expect government and climate change policy-makers to exploit debt market opportunities in the mobilisation of capital for low-carbon industry investment by offering incentives in the form of tax breaks, guarantees, price regulation and other support mechanisms.

Potential to become a significant fixed income asset class

Taken within the context of the global fixed income market, where new issues amounted to US\$2.4trn in notional terms in 2008 versus US\$3trn in 2007, we envisage a situation where the funding requirement to transition to a low-carbon global economy over the coming 10 years supports substantial

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climate bonds issuance making up a significant slice of the market. The depth of the market will develop as a means of channelling finance and savings towards renewable energies and energy efficiency measures, and accelerating their uptake. As such, we anticipate that themed green or climate bonds will become one of the most important debt securities to be found in the global financial system.⁹

UK funding

Assuming Professor Stern’s revised estimate of the annual cost of climate change mitigation of 1–2% of global GDP and current UK GDP levels of £1.4trn, if the UK were to shoulder its share of the funding requirement in proportion to its GDP it would need to invest between £14–28bn p.a. The UK pension industry has funded assets of about £1.8trn, about £1.7trn of which is held in the private sector. An asset re-allocation of just 1–2% p.a. into climate theme bonds would effectively shift £17–34bn into adaptation and mitigation and make a substantial contribution to the estimated cost.

A constant annual rebalancing of 1% p.a for 10 years would allow the pension fund sector to accumulate a 10% holding in climate-related theme bonds. We feel that a 1% p.a shift is small taken in the context of pension fund investment behaviour. According to Mercer consulting, between 2003 and 2007, UK pension funds reduced their equity holdings by 7% (source: Mercer). The required move of 2% toward the bonds sector is a relatively low shift in this context, and thus has a potentially high degree of likelihood, given current drivers for change.

This re-allocation faces two major obstacles: the willingness of trustees to move money into this area when they are more focused on tackling their deficits; and the availability of investment vehicles. The willingness of investors to move into climate-related investments is driven by a variety of factors, among which are the risk/return profile of the opportunity, the needs of the investor, in terms of their risk/reward profile, and potential legal and regulatory impediments or encouragements. The availability of investment vehicles is an issue that market participants and regulators must address.

Issuance review

Despite seed issuance in the green debt capital market by the World Bank, the EIB and other parties, volumes so far clearly go nowhere near the scale required. Most of the issuance has been limited to structured notes, a relatively less liquid market driven by bespoke product requests from buy-to-hold investors. Such as it is, previous supply serves to both illustrate potential directions for the market and provide a signal as to investor appetite.

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Indeed, secondary market performance data for the World Bank issues show that the new asset class has outperformed standard World Bank bonds, suggesting that investors are looking for otherwise scarce opportunities for climate change-related value differentiation.

Within issuing institutions and investment managers the development of green bonds has generally come about as a result of the initiative of internal champions. Most investment banks, for example, have invested little in developing the market. That seems to be changing now that we've seen a number of successful climate and green bond issues.

World Bank green bonds: 2007, 2008 and 2009

The first green bonds issued by the International Bank for Reconstruction & Development (IBRD) were relatively small in notional terms from retail investors. In December 2007 the IBRD issued euro-denominated, six-year 'Eco 3+ bonds', targeted at Benelux retail. The structured notes pay a floating rate annual coupon of at least 3% per year subject to the performance of the ABN AMRO Eco Price Return Index, an equity index that tracks the performance of companies that produce alternative forms of energy, engage in water and waste management, or are involved in the production of catalysts used to reduce pollution.

In June and again in September 2008 the IBRD launched US\$31.5m of five-year bonds linked to certified emission reductions (CER). The bonds pay a fixed rate coupon for an initial period and then a coupon linked to future CER market prices and the actual volume of CERs issued by a hydropower plant in China and a bio-energy project in Malaysia.

IBRD issued the first vanilla theme bond designed for institutional investors in November 2008. The SKr2.7bn (US\$350m) deal was issued through the Scandinavian bank SEB, with proceeds earmarked to support projects in client countries that meet criteria for low-carbon development; IBRD increased the issue by SKr150m in February 2009. Interest payable on the bond was 0.25% above current Swedish government bond rates, giving investors a yield of 3.15% p.a. Investors included Swedish National Pension Funds AP2 and AP3, Skandia Life and the United Nations Joint Staff Pension Fund.

A second, dollar-denominated bond issue of US\$300m launched in April 2009, with a maturity of three years, and was purchased by the State of California as a sign that California wanted to contribute tangibly to climate solutions. It paid a floating rate.

IBRD launched a third institutionally-targeted deal in early December 2009, raising US\$130m lead managed by SEB. The bond matures in December 2013

and pays a coupon of 2% p.a. The borrower quickly added by another US\$50m later in the month and a SKr600m tranche in February 2010. Among the investors participating in the deal were the New York Common Retirement Fund, the California State Teachers' Retirement System, the Swedish life insurance provider SEB Trygg Liv, and Swedish National Pension Funds AP2 and AP3.

In February 2010, Nikko Securities launched two World Bank green bond funds and, in tandem, the World Bank issued 10 new green bonds denominated in different currencies. By the end of February 2010 World Bank green bond issuance totalled US\$1.1bn.

According to Bloomberg data, World Bank green bonds have outperformed a euro-denominated IBRD vanilla offering with comparable maturity and liquidity.

European Investment Bank: Climate Awareness Bond 2007 and 2009

The EIB launched its first Climate Awareness Bond in 2007, a €600m five-year zero-coupon, underwritten by Dresdner Kleinwort. The funds raised have been used in EIB renewable energy and energy efficiency projects. In 2009 the EIB issued a second Climate Awareness Bond in Swedish krona, targeted at the borrower's Scandinavian investor base via Swedbank. The proceeds are being used for projects in the fields of renewable energy and energy efficiency.

Issued in fixed and floating rate format for a total amount of SKr2.25bn, the bonds mature on 17 February 2015. The SKr1.7bn fixed rate tranche will pay an annual coupon of 2.95%. The SKr550m floating rate tranche will pay a quarterly coupon of three-month Stibor +10bp.

US government clean renewable energy bonds

The US Treasury in its stimulus package of 2009 issued green bonds to a value of US\$2.2bn to generate financing for renewable energy initiatives. These are known as clean renewable energy bonds (CREBs) and function as low-interest loans to renewable project owners, providing them with an alternative to traditional sources of finance, many of which had dried up as a result of the recession.

The CREBs are similar to production tax credits awarded to renewable projects, and apply largely to the same projects. However, they differ in that they serve as a financing tool rather than providing post-implementation tax relief; they are intended to help get planned projects, such as wind or solar farms, into construction. Under the scheme, the borrower, in this case a government agency or a utility, issues the bond. The Federal government

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supports the borrower’s economic liabilities, paying ‘coupons’ to the lender in the form of a tax credit to the bondholder.

'Build America Bonds'

In 2009 the US government introduced a programme to encourage the issuance of municipal bonds as part of the fiscal stimulus. The government ‘topped up’ bond yields by 35%, leading to a boom in issuance, in many cases for local green energy projects.

Triodos Bank climate change bonds

In December 2009 Dutch bank Triodos launched a range of retail climate change bonds. The two-, three- and five-year bonds offered interest rates of between 2 and 3.25%.

Potential for new issuance

Potential new entrants include borrowers from a variety of credit sectors. However, given the premium on liquidity, climate theme bonds will generally come from sectors considered ‘risk free’. SSA credits will continue to play an anchor role in this with the issuance of top-rated green bonds. Issuance will also come from mainstream companies that wish to borrow money to install efficiency measures or for new companies setting up in the area of either low carbon power or efficiency measures. Indeed, in these times of bank credit-tightening, green bonds could provide an alternative financing avenue.

New aggregators

The disaggregated nature of investment opportunities is a significant barrier to capital inflows. This is especially the case with energy efficiency where, despite attractive payback periods of three to five years, institutional investment is still to gain critical mass. We expect to see the rise of aggregators in the form of long-term financiers, collecting portfolios of energy efficiency investments, to bridge this gap. They will be encouraged by governments to help tap institutional funds, and develop spontaneously in areas where energy efficiency paybacks are particularly attractive, such as in China. These aggregators will play a vital role as intermediaries that sit between projects and the bond investor market. On the asset side, they will have specialised skills and an ability to assess, manage and underwrite renewable energy project risk. On the liability side, they will be able to raise capital in currencies, terms to maturity and markets demanded by investors.

Accelerated development

The development of accepted standards to support market liquidity has typically evolved over time, as competing standards develop and then converge – as has happened in the area of credit ratings. However, the urgency of the

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need to address climate change means precludes the organic development of standards. Parties with an interest in growing this market must promote a proactive shift to an agreed set of international labelling standards.

In particular we believe that this shift will be driven by the following:

- ▶ Governments providing tax exemptions and regulatory price support for projects that help them meet their climate change policy objectives, and providing qualifying definitions;
- ▶ Banks and aggregators (long-term financiers) aiming to gain advantage with competitively rated bonds that have a climate change theme as a differentiator;
- ▶ Issuers wishing to ‘prove’ their labelling claims to climate change-sensitive investors will retain independent auditors;
- ▶ Government issuers will find that an internationally consistent approach to definitions will make it easier to offer theme bonds in multiple markets. A consistent approach will also be demanded by larger investors seeking to avoid having to grapple with and explain to their stakeholders the nuanced differences in various climate-related offerings.

Government policy agendas

The US government already provides preferential tax terms for its Renewable Energy Bonds programme. The US and some EU governments have also provided sovereign guarantees in support of selected climate change projects. We expect the UK government to introduce similar policies in the coming year. All three major UK political parties have canvassed the idea of green-themed bonds being issued by governments and similar private issuance being supported by government. The UK Conservative Party is also looking at classification of investment options for the purposes of their proposed tax-beneficial Green Individual Savings Accounts (ISAs). In some countries there have been calls for regulatory guidelines for the weighting of pension fund portfolios to include a percentage of assets being specifically allocated to ‘climate change’ investments. We believe that pressure on governments to find ways to encourage and support climate-themed bonds will grow in the coming year.

Looking to the future

After gaining early traction with both institutional and retail investors, the outlook for climate theme bonds ranges from ‘reasonable’ to ‘overwhelming’. The challenge for the market lies in the ability of its stakeholders to push it beyond the current state of supranational issuance into niche accounts. If theme bonds are to provide the scale of capital needed, as suggested by the IEA, then issuers will need to supply some US\$5–10bn per week on average during that time frame.

For the market to develop and be capable of producing and digesting such a supply of debt, stakeholders will need to work towards:

1. Collaboratively informing and educating capital markets participants;
2. Creating transparent and efficient regulatory processes for setting feed-in-tariffs for renewable energy projects;
3. Developing a road map for the financial infrastructure required in key jurisdictions to enable project risk to be funded and repackaged where necessary;
4. Facilitating the development of 'aggregators' well placed to manage project risk and obtain debt funding via banking and capital markets. These aggregators would also manage the mismatch between the term, interest rate profile and currency of underlying project-issued debt and bond market demand;
5. Support for banks in their role as financiers or guarantors during the underwriting and construction phase of projects, with longer-term refinancing carried out in the bond markets;
6. The consideration of regulatory support mechanisms such as tax relief, return enhancement or refinancing support for projects or aggregators;
7. Producing highly rated and liquid financial instruments that qualify for market index inclusion;
8. The potential for more complex instruments to emerge, including hybrid products that combine the potential for equity upside to traditional fixed interest returns.

The incentives to create this environment are strong for the key stakeholders: government support, where necessary, would facilitate private sector funding of a large, public concern with the benefit of attracting less 'headline' political risk in countries where such risk exists. The institutional investor market, meanwhile, benefits from diversified sources of supply, notwithstanding the fact that the quantum of supply may impact yields in the short to medium term. Intermediaries will benefit from the attractive profitability associated with opening new markets. Economies as a whole would benefit from a steep increase in project-related activities and, in the process, improve their resilience to climate change impacts.

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Christopher Flensburg has been working in the international banking industry for 21 years, of which the last six have been with Skandinaviska Enskilda Banken in Stockholm. Over his career in banking he has mainly focused on developing new products and developing business areas, the most recent example of which is the development of the World Bank Green Bonds.

Bryn Jones joined Rathbones in November 2004 and manages the Rathbone Ethical Bond Fund. Bryn has over 12 years of investment experience in both equity and fixed income markets, gained with organisations such as Merrill Lynch Investment Managers, Robert Fleming Investment Management, Coutts & Co. and Schroder Investment Management.

Footnotes

1 Thanks also to the assistance provided by Phil Preston, director, Seacliff Consulting and Simon Petley, director, Enviromarkets.

2 http://en.wikipedia.org/wiki/Copenhagen_Accord

3 International Energy Authority, 2009 World Energy Outlook

4 IFSL Fund Management October 2009

5 http://zyen.info/mediawiki/londonaccord/index.php/Index-Linked_Carbon_Bonds

6 Center for International Climate and Environmental Research – Oslo, Norway

<http://www.cicero.uio.no/>

7 Mackenzie, C and Ascui, F. *Investor leadership on climate change: an analysis of the investment community's role on climate change, and snapshot of recent investor activity*. Published by the UNEP Finance Initiative and UNPRI, 2009.

8 <http://www.pionline.com/apps/pbcs.dll/article?AID=/20100111/PRINTSUB/301119988>

9 The global bond market reached a level of US\$83trn in 2008, according to IFSL Research (International Financial Services London 2008). Climate bonds could be issued each year up to a level of US\$0.5trn for 20 years and still not exhaust the capacity of the global market.