

Greening China's Financial Markets

*Growing a Green Bonds Market in China:
Reducing costs and increasing capacity
for green investment while promoting
greater transparency and stability in
financial markets*

*Sean Kidney
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About the Greening China's Financial Markets Project

Greening China's Financial Market Reform is an initiative of the International Institute for Sustainable Development (IISD) working in partnership with the Development Research Centre of the State Council (DRC). Its goal is to identify how the reform of financial markets can be advanced in ways that channel capital towards the greening of China's economy.

A roundtable discussion joined by international and Chinese experts was held in Beijing October 15–16, 2013, to discuss key themes and issues on Greening China's Financial Markets. A series of papers was prepared as part of the initiative, and as inputs to the Beijing roundtable.

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Green Bonds

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Any errors or omissions remain the responsibility of the authors.

To give comments or for more information, please contact the project lead researcher, Dr. Simon Zadek. simon@zadek.net

Executive Summary

This paper provides an overview of the green bonds theme, innovative structures in the international market and potential applications in China. The paper has been prepared by the Climate Bonds Initiative (CBI), an investor-focused organization working to accelerate the transition to a green economy, for the Development Research Centre of the State Council and the International Institute for Sustainable Development.

The paper makes eight key points:

1. China's government has signalled its intent to reform financial markets, including to open bond markets, so as to:
 - a. Introduce greater transparency into financial markets and reduce the risk of systemic volatility.
 - b. Provide more financing options for non-state entities and to improve economic stability. For example, China's listed firms market has one the world's largest short-term debt ratios at 78 per cent, compared to 28 per cent for U.S. firms. A shift from that short-term to longer-term debt will improve economic resilience and stability.
 - c. Tap into the country's huge pools of domestic savings, currently the world's largest, that at present have limited opportunities for investment leading to a leakage of savings into unregulated investments.
2. Over the past 10 years, a range of programs has been developed around the world to use bonds to channel capital to investments important to addressing environmental challenges such as climate change. The CBI (2013) identifies some US\$346 billion¹ outstanding bonds relating to climate change solutions in 2013. Some \$18 billion have been marketed as green or climate bonds, with the bulk of issuance from development banks (CBI, 2014). Governments have developed a range of support measures that have seen a growth in green bond issuance in renewable energy, energy efficiency and transport sectors.
3. Under its 12th Five-Year Plan, China has ambitious plans to improve energy intensity, grow environmental industries and reduce environmental stress. This will require the mobilization of huge amounts of capital. In August 2013 the State Council announced plans to grow a corporate green bonds market in China as part of meeting the objectives of the 12th Five-Year Plan (State Council, 2013b).
4. This paper proposes a number of areas of action in China to implement the corporate green bonds market:
 - a. A program of government support for green bond issuance, from interest rate support and tax incentives to driving investor demand and regulatory support for bond structures such as bonds and green asset-backed securities.

Green bonds could be issued by corporate entities, for government and institutional investors, or as retail bonds for individual customers of a commercial bank.
 - b. Allowing selected state-owned companies and local governments to issue green bonds to initially develop the market.

Kick-starting any new bond market requires government support, typically in the form of initial liquidity and trading volume from government-backed bond issuance, or through other forms of credit support, until investors become familiar with opportunities. Developing a corporate green bonds market will need the same.

¹ All dollar amounts are in U.S. currency unless otherwise indicated.

State-owned corporations and state entities should be allowed to develop “demonstration programs” of green bond issuance that serve to illustrate the concept and, most importantly, to create trading volume and liquidity at a superior investment grade.

In particular, dual recourse green covered bonds can be used to introduce transparency to bonds offered by such entities; issuance can then shift to asset-backed bonds in the medium term.

- c. Helping build a domestic investor base by instituting a system of green bond certification against clear and transparent criteria for green investments. This will support integrity within a green bonds market by setting targets for green bond purchasing targets for public funds such as the National Social Security Fund (NSSF) and by encouraging green bond trading markets. Definitional work is already being done in Europe and could be adapted for China’s special situation.
5. There is also an important opportunity to:
- a. Use covered bonds to introduce greater levels of transparency—without risking instability—to assets financed at regional government and bank levels. Green covered bonds can bridge a market made up of bonds that are explicitly or implicitly government-backed to one that first introduces recourse to underlying assets, and eventually moves away from government guarantees. This would simply require refinancing green assets owned by state and semi-state actors to shift to using covered bonds, then move to full revenue-backed bonds, as in the U.S. municipal market or asset-backed securities. This approach could be especially useful in the local government sector.
 - b. Take a leadership position with the issuance of green bonds for the international market as a way to demonstrate China’s commitment to environmental improvements. This paper proposes opening a Foreign Direct Investment (FDI) window specifically for green bonds as part of China’s gradual enlargement of the Qualified Foreign Institutional Investor program. The window should be tailored to meet the needs of long-term institutional investors such as pension funds, sovereign wealth funds and insurance funds. These actors will help improve risk management practices and governance in the investment system and increase liquidity by introducing more buyers to secondary markets. To ensure a smooth process of uptake, this window would initially focus on offering green bonds from state-owned enterprises, including covered bonds, gradually allowing more offerings from corporate issuers.
6. Developing a green bonds program will require:
- a. Developing clear definitions for investments linked to bonds that will qualify as green, along with a government-endorsed system of providing assurance for both investors and regulators about the green claims of corporate bond issuers and to avoid “interpretation” of what is green to suit issuer needs.
 - b. Creating a large liquid market and avoiding “interpretation” of what is green to suit issuer needs.
 - c. A self-funding and self-policing verification and enforcement system that relies on common standards and criteria set at a central level and a requirement for verification of green claims. The verification review and policing process should be delegated to market actors.

7. State measures should be put in place to establish a market that:
 - a. Provides effective coordination of regulatory measures to promote a green bond market. Coherent regulation will ensure smooth growth.
 - b. Pilots green bonds through different issuer types, including policy banks, provinces/cities, state-owned enterprises and commercial banks.
 - c. Uses state-backed issuance to provide demonstration issuance and initial liquidity, along with selective state support for corporate issuance in the form of selective guarantees or first-loss incentives for companies whose majority of revenues come from green products.
8. The development of a green bonds market that provides a selection of improved yield opportunities for savers, also provides an opportunity to:
 - a. Increase the supply of low-cost capital for green industries.
 - b. Increase transparency to underlying assets within the financial system.
 - c. Channel household savings into a strong retail bond market by tapping into public desire for a greener environment.
 - d. Channel international foreign direct investment into long-term debt in line with green growth goals.
 - e. Ensure savings are invested responsibly to meet a country's environmental objectives.
 - f. Pilot the introduction of bond-market reforms in a limited fashion that is highly focused on government environmental policy priorities.
 - g. Gain international recognition for green growth and investment and the government's commitment to a sustainable economy.

Green bonds provide an ideal opportunity to pilot transparency measures in fixed income markets while helping achieve the 12th Five-Year Plan's environmental goals. They also provide an opportunity to demonstrate China's leadership position in addressing environmental protection challenges.

Table of Contents

1.0	Introduction	1
1.1	Drivers of Green Bonds in China	2
1.2	How to Read This Paper	5
2.0	Why Green Bonds	6
2.1	The Role of Green Bonds in Financing the Green Economy	6
2.2	Defining Green Bonds	8
2.3	The Challenges of Green Bonds	12
2.4	Components of a Green Bonds Market	13
3.0	Trends in the Green Bonds Market	15
3.1	The Emergence of Bonds Labelled “Green” or “Climate” Aligns Investor Appetite with Sustainability Goals	15
3.2	Demand for Green Bonds from Developed Country Investors Is Growing	16
3.3	There Already Exists a Market of Bonds That Are Related to Climate or Green Themes	16
3.4	Corporations are Beginning to Respond to Investor Demand for Green Bonds	18
3.5	Multiple Definitions of Green Bonds Are Converging in the Market	19
4.0	Policy Tools and Financial Instruments to Advance Green Bonds	21
4.1	Mature Bond Markets Respond to Policy Frameworks That Reduce Risks on Revenue Streams	22
4.2	Policy Can Also Target the Issuance of Bonds for Specific Public Needs	24
4.3	Public Finance Instruments and Tools Can Leverage Private Investors and Enable a Green Bond Market to Develop	28
4.4	Policy Can Direct Domestic Funds to Take on Green Bond Mandates	32
5.0	Sourcing Demand for Green Bonds in China	33
5.1	Domestic Retail Investors	33
5.2	Domestic Institutional Investors	34
5.3	International Investors	34
6.0	Developing the Supply of Green Bonds in China	36
6.1	Sovereign Bonds	36
6.2	Financial Institution Bonds	36
6.3	Local Government Bonds	37
6.4	Corporate Bonds	38
6.5	Securitization	40
7.0	Roadmap to a Green Bonds Market in China	43
	References	46

1.0 Introduction

This paper examines how to develop a green bonds market in China, and how this opportunity can introduce needed market transparency while allowing investors to channel their capital into green growth areas that secure a sustainable future for China's economy.

The paper has been developed by the Climate Bonds Initiative at the invitation of the Development Research Centre of the State Council (DRC) and the International Institute for Sustainable Development (IISD), as part of an investigation of how environmental and sustainability considerations can be taken into account in China's approach to financial market reform.

The *core aim* of the DRC/IISD collaboration is to:

- *Explore policy options for the Chinese government to align financial market reforms to sustainability considerations.*

A *broader aim* is to encourage practices that would be relevant internationally as efforts increase to ensure that financial markets can deliver against sustainable development challenges.

This paper provides an overview of international experience in advancing green bonds and reviews opportunities to catalyze green bonds in China.

About the Climate Bonds Initiative

The Climate Bonds Initiative (CBI) is an investor-focused, non-profit organization working to accelerate the transition to a green economy by mobilizing the \$80 trillion debt capital market. It works to support the development of green and climate bond markets to address environmental challenges through:

1. Definitions, standards and green bond verification programs.
2. Tracking and reporting of the green bond market and analysis of individual green bonds and related developments.
3. Education and training around the opportunities for corporate, retail and other green bonds.
4. Ideas for policy and regulatory steps governments can take.
5. Proposals for credit enhancements, tax credits and improved mechanisms for the leveraging of private sector capital by development banks.

The organization works with large institutional investors, investment banks and credit rating agencies, as well as international organizations such as the World Bank Group, the Organization for Economic Co-operation and Development and the United Nations Environment Programme.

1.1 Drivers of Green Bonds in China

China's low carbon/green economy transition needs huge amounts of funding.

China's environmental investment plans are enormous. The Development for Emerging New Industries, for example, requires CNY5 trillion (\$817 billion) in investment up until 2020 (People's Daily Online, 2010).

China has also announced that CNY1.7 trillion (\$275 billion)—twice the amount of the total defence budget for the same period—will be invested in improving air quality in the next five years (Economist, 2013).

China's financial markets can and should play a key role in this transition.

Urbanization is a macro trend leading to major environmental investments.

Urbanization, a key driver of China's rapid economic growth, heightens pressures on already crowded public infrastructure and services, exacerbating environmental problems that threaten public health.

Ensuring such public infrastructure provides clean water, clean air and facilitates a sustainable low-carbon economy is a key challenge for China's growth model.

On top of the macro trends of urbanization, infrastructure development and rapid economic growth that drive expansion in China, there are a number of trends in the financial markets cited below that provide an opportunity for bond market reform, particularly of a green nature, to capitalize on.

Small and medium-sized enterprise growth is hampered by the limited availability of financing.

Financial reforms seek to free up finance for small and medium-sized enterprises (SMEs) and private companies: as noted above, the finance sector is perhaps overly heavily dependent on banks as the key players. Positioned to take advantage of interest rate caps on deposits, lending is prioritized to large state-owned enterprises (SOEs) and local government investment companies due to the risk appetite being very low. This leaves SMEs and private companies, the new major contributors to economic growth, increasingly unable to access financing. Under government guidance, commercial banks issued RMB169 billion in SME bonds with proceeds targeted at lending to SMEs in 2012; however, there was limited disclosure on the eventual destination of such loans (China Central Depository Trust & Clearing Co., 2013).

High levels of household savings in China represent a demand opportunity...

Domestic investors are starved of yield due to the cap on interest rates: household savings in China, at 20 per cent of GDP, are higher than the total domestic savings of advanced economies (including financial, non-financial, household and government savings) (EDHEC Risk Institute, 2013).

Fifty-nine per cent of household savings are placed in bank accounts, but the search for yield has led to the emergence of a shadow banking sector estimated to range from RMB8.2 trillion to RMB21 trillion. The wealth management products offering 7-12 per cent returns with little disclosure on underlying assets or the economics of the investments could represent up to one third of all credit in China (Sender, 2013).

A vibrant retail bond market offers an opportunity to bring credit from these investors into an open and liquid platform.

... As does foreign investor demand.

International investors are eager for debt denominated in RMB. Positively, the supply of foreign direct investment (FDI) has continued unabated following the 2008 crash. FDI reached \$477 billion at the end of 2011, up 44 per cent over the pre-crash peak in 2007, with foreign companies establishing a presence in the Chinese market representing two thirds of the inflows (McKinsey, 2013a). Until recently, the ability of foreign investors to participate in the domestic bond market was somewhat limited under the Qualified Foreign Institutional Investors (QFII) quota program established in 2002. In the last two years, the China Securities and Regulatory Commission has increased the quota from \$30 billion to \$150 billion in order “to attract more long-term foreign investment institutions to China’s market and promote the development of the capital market” (Xi & Lim, 2013).

China’s finance sector is heavily dependent on banks, and financial instruments are relatively limited in availability.

Although the size of China’s equity markets rivals that of developed economies—being the third largest in terms of market capitalization—the bond market is relatively underdeveloped compared to those of advanced economies. At RMB22 trillion (\$3.6 trillion), it is equivalent to just 47 per cent of GDP in 2012. This compares with U.S. bond markets at 222 per cent of GDP, Europe at 190 per cent and Japan at 259 per cent. Globally, bond markets represent 138 per cent of GDP (McKinsey, 2013a).

Instead, financial markets are anchored by bank loans, which represent 132 per cent of GDP, higher than the advanced economy average of 123 per cent. Furthermore, this lending is unbalanced with 85 per cent of the RMB33 trillion (\$5.8 trillion) in loans since 2007 headed toward corporations.

Chinese listed firms have the largest short-term debt ratio in the world with 78 per cent of debt in tenors of 1 year or under, compared to 28 per cent for U.S. firms (Sorge, Zhang, & Koufopoulos, 2013). This reliance on short-term debt is a risk factor for stable economic development, and, as the economy becomes more diverse and complex, there is a need to rebalance towards longer-term debt to reduce this volatility risk.

The process of change has started, with Chinese bond markets beginning to attract significant amounts of capital. The corporate bond market has grown 45 per cent year-on-year since 2007, albeit from a low start, and bonds from financial institutions have grown 23 per cent (McKinsey 2013a). The offshore RMB bond market located in Hong Kong, where domestic and international issuers may issue RMB-denominated bonds for the international market, has grown from RMB69 billion in 2010 to RMB405 billion by the end of January 2013 (HSBC, 2013).

China is committed to reforming its bond market, as well as greening its financial system and introducing green bonds.

In the 12th Five-Year Plan (FYP) 2011–2015, the Chinese government signalled its intent to reform and broaden the domestic bond market as part of a series of measures to improve the financial system (CSRC, 2012). This objective has been reinforced in government announcements since August 2013.

In May 2013 the China Banking and Regulatory Commission introduced *Green Credit Guidelines*, which require banks to ensure environmental assessments are in place for projects using bank loans and requiring banks to develop green credit products that support the country’s environmental protection goals (Kidney, 2013).

From March 1, 2014, the Ministry of Environment will integrate environmental ratings into national credit ratings for companies in industries with heavy pollution or overcapacity based on their efforts to protect the environment (Bloomberg News, 2014). This will have a direct impact on their bond issuance.

In August 2013 the State Council reiterated the call for reform with a focus on the corporate bond market in particular. A key departure is that this call not only occurred in an announcement targeted at the financial sector (State Council, 2013a), but also in a strategy on accelerating the development of green industries to twice that of GDP growth targets (State Council, 2013b).

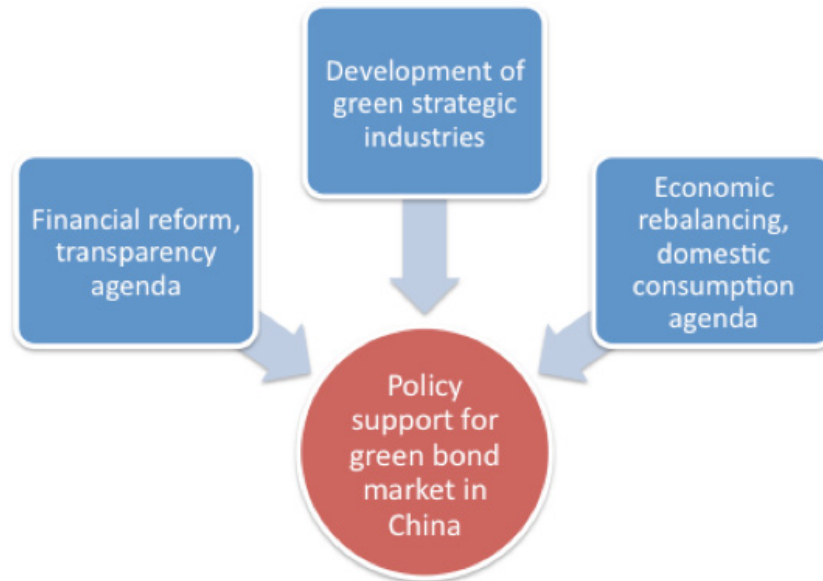


FIGURE 1: GREEN BOND MARKETS IN CHINA SUPPORT THE ACHIEVEMENT OF THREE KEY POLICY PRIORITIES

The Chinese government has recognized the need for increased transparency and disclosure in financial markets. This is important to manage risks within the financial system and provide new investment options to domestic households and foreign investors. It also needs to leverage as much private capital into its green transformation as possible to coincide with its own green growth investment drive.

With the bond markets in China undergoing rapid growth from a relatively low base and requiring deep reforms and increased transparency, the ability to shift to green bonds needs to dovetail with such change rather than rely on existing structures.

A key message of this paper is that such a green shift can assist in implementing and enforcing financial reforms that address imbalances in the financial system as much as provide a green benefit. Another key message is that providing support to kickstart a green bond market now can allow China to assume a global leadership role in developing capital markets financing for green growth.

1.2 How to Read This Paper

Section 2 outlines *the case for green bonds*, and presents its challenges and necessary components to grow a market. Section 3 provides an overview of the *trends in the green bond market*, its investors and issuers. Section 4 draws on international precedents in *policy tools in greening bond markets*. The focus of the paper then turns to China, with Section 5 and 6 outlining detailed recommendations. Finally, Section 7 provides a roadmap for growing the market in the short term.

2.0 Why Green Bonds?

This section outlines the case for green bonds, the challenges to overcome and the building blocks required to channel investment capital to green growth areas through the bond markets.

2.1 The Role of Green Bonds in Financing the Green Economy

Greening economies requires significant investment. The International Energy Agency (IEA) estimates that an additional \$36 trillion investment is needed out to 2050 to reduce energy-related carbon emissions in line with a 2°C scenario (IEA, 2012). The key word is “investment,” not cost. (This investment delivers \$100 billion in economy savings over the same period in avoided fossil fuel costs [IEA, 2012].) Another \$7 trillion to \$10 trillion is required for adapting to climate change in sectors such as agriculture, water, health and infrastructure (World Bank, 2010).

The global bond market, currently \$83 trillion in size, can provide much of the capital needed but remains chronically underutilized in financing our low-carbon transition (Bank for International Settlements, 2012). This is in stark contrast to how governments have previously engineered investments for economic transformation. Throughout history, governments have used bond markets to steer capital into new infrastructure, from sewers to railways to highways. They did this by using policy frameworks and public finance instruments to attract investment. In the 19th century, the U.S. federal government provided real estate concessions to railroad companies to connect the West Coast (Central Pacific Railroad Museum, 2013). More recently, in the 1990s, the German government tweaked regulation of the *Pfandbrief* covered bond market to promote bank lending to housing and public infrastructure projects in Eastern Germany (Damerow, Clenaghan, & Kidney, 2012).

These innovations illustrate how bonds are well suited to high capital expenditure/low operational expenditure investments of infrastructure projects that are found in any low-carbon transition, such as renewable energy, energy efficiency, sustainable transport and water management. They also illustrate the scale to which investment can be *steered*, given the appropriate market conditions. The aforementioned \$83 trillion in bonds currently outstanding is more than 1.5 times the size of the global equity market at \$50 trillion (McKinsey, 2013b).

2.1.1 Bonds are Primarily a Refinancing Instrument

Bonds are less a project finance tool than a refinancing instrument providing an exit strategy for corporations, project lenders and funders. Only 5 per cent of the \$350 billion in global project and infrastructure debt raised in 2011 were in bonds; the bulk was bank lending (Dealogic, as cited in Eckhart, 2013). Because of the risk assessment expertise required for pre-completion project lending, this is unlikely to change.

The balance sheets of many Western banks are currently constrained by a combination of recapitalization pressures post-financial crash and new regulations such as Basel III (Spencer & Stevenson, 2013). This means their allocations to long-term, higher-risk project financing have generally been reduced—at exactly the same time that the scale of environmental investment needed is ratcheting up.

In the past, banks have worked around this by securitizing mature loans. In this circumstance, an active refinancing pipeline through the bond markets allows greater velocity, or faster recycling, in that smaller pool of lending capital. Given the scale of investments required to meet environmental protection challenges, this will be crucial to maintaining the green lending levels required.

The same situation applies to public utilities required to renew aging infrastructure or expand existing capacity—for example, in new (clean) energy generation sources or water supply—with what are already constrained balance sheets. Asset-backed bond issuance allows the utilities to transfer effective ownership to long-term capital providers while using operating agreements to maintain long-term access to the assets and to recycle the capital into new projects.

Corporate bonds issued against new assets can be seen as working in a similar fashion: as balance sheets are strengthened with assets moving from development to operating phases of their lives, the subsequent lowering of corporate risk will allow bonds to be issued at an improved credit rating and thus at a lower capital cost.

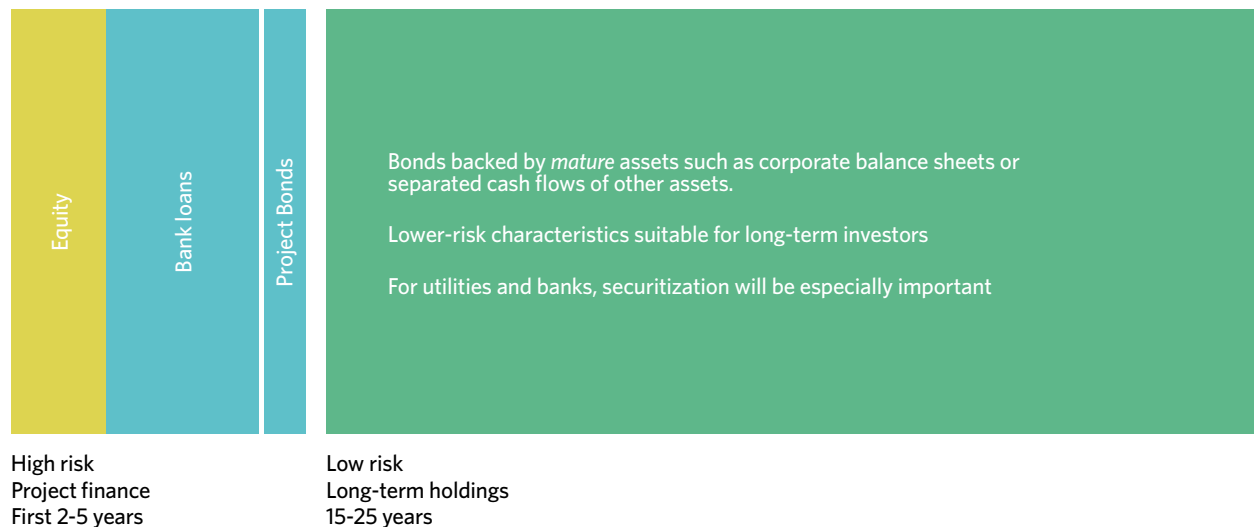


FIGURE 2: IN THE CAPITAL PIPELINE, BONDS ARE PRIMARILY A REFINANCING INSTRUMENT THAT ALLOW FASTER RECYCLING OF LIMITED POOLS OF EQUITY AND BANK LENDING.

This primary role of bonds as a refinancing instrument is a hallmark of well-developed capital markets, where a tradition of direct financing from bonds is prevalent. We expect bond markets in China to develop in a similar fashion as a response to financial reform.

2.2 Defining Green Bonds

Green bonds are defined as:

Bonds or debt securities specifically issued to finance environmental protection, sustainability or specific climate mitigation and adaptation measures.

Green investments include projects in areas ranging from renewable energy development and environmental investments that improve water supply, to low-carbon transport and energy-efficient buildings.

In practice, they can be no different from normal bonds in the wider market—the issuing entity guarantees to repay the bond over a certain period of time, plus either a fixed or variable rate of return—except that proceeds are transparently channelled for green purposes. How this is done is elaborated in Table 1 below.

Green bonds can be issued by governments, development banks, SOEs, commercial banks or corporations.

Transparency on use of proceeds is required for two reasons:

1. To ensure that investors can actively mandate “green bond” allocations in their fixed income portfolios.
2. To allow governments to support green bond issuance in the market that aligns with green growth policies through tax incentives, etc.

2.2.1 History of Green Bonds

The pioneer international issuers of “labelled” green bonds have been the European Investment Bank (EIB) with its “Climate Awareness Bonds” and the World Bank with its “Green Bonds.” In both cases proceeds have been earmarked for climate change-related loan programs.

Similar bonds have since been issued by the International Finance Corporation (IFC) the European Bank of Reconstruction and Development (EBRD), the African Development Bank (AfDB), the Nordic Investment Bank, South Africa’s Industrial Development Corporation, the Korean Export-Import Bank (Kexim), Netherland’s FMO and Norway’s Kommunalbanken.

Asset-backed issuance in the renewable energy, low-carbon transport and other green areas are also seen as green bonds.

In late 2013 we saw the beginning of corporate issuance modelled on the World Bank and EIB programs, where the use of corporate green bonds is limited to investment in green assets. Bonds along these lines were issued by Électricité de France (EDF), Bank of America Merrill Lynch and Sweden’s Vasakronan.

TABLE 1: TYPOLOGY OF POTENTIAL GREEN BONDS

BOND TYPE	ISSUER	DESCRIPTION	ASSET CLASS	EXAMPLES
Treasury-backed bonds (balance sheet of issuer) with proceeds linked to a pool of qualifying assets, goods, services	National Government	Bonds issued by governments. Seen as backed by the full faith and credit of the sovereign	Sovereign Bond	---
	Local Government/ Municipality	Municipalities and regional governments General Obligation bonds where proceeds are allocated to qualifying investments. These are essentially the same as sovereign bonds.	Municipal Bond	Three French provinces issued “sustainability” bonds in 2012. The U.S. State of Massachusetts and the City of Gothenburg in Sweden issued municipal green bonds in 2013, with proceeds earmarked for environmental projects.
	Development Bank	As above	Sovereign Bond, Financial Institution Bond	World Bank, African Development Bank and IFC green bonds; EIB Climate Bond; FMO sustainability bonds; Kommunalbank Norway green bond.
	Commercial Banks	A bank can issue a bond linked to a pool of qualifying loans: wind and solar energy, rail, green buildings. This could be in the form of: - A corporate bond for government and institutional investors, or - A retail bond for individual customers of the bank. For credit purposes, the bond is the same as a standard corporate treasury-backed bond, except that proceeds are only used to finance qualifying green investments.	Financial Institution Bond	Bank of America Merrill Lynch issued a \$500 million green bond in November 2013. An Australian bank has been certified under the Climate Bonds Standard to issue \$500 million in climate bonds, with proceeds allocated to a pool of wind energy loans.

BOND TYPE	ISSUER	DESCRIPTION	ASSET CLASS	EXAMPLES
Treasury-backed bonds with proceeds linked to a pool of qualifying assets.	Corporations	<p>Companies with substantial green assets on their balance sheets.</p> <p>A power company can issue a bond linked to its renewable energy assets.</p> <p>A car company can issue a bond linked to its electric vehicle assets.</p>	Corporate Bond	France's EDF issued a \$1.9 billion green bond and Sweden's Vasakronan issued a \$300 million green bond in November 2013.
"Dual recourse" bonds (covered bonds): the investor gets both a Treasury backing and recourse to the underlying pool of assets. If the issuer fails the investor owns the asset pool.	Commercial Banks	<p>The extra assurance of dual recourse allows banks to borrow at a lower rate than their usual bank credit rating, reducing their usual cost of funds.</p> <p>Most covered bonds are issued by banks operating under governing national legislation that provides assurance for investors.</p> <p>Asset pools are mostly made up of home mortgages, with loans for public sector buildings also included in Germany.</p> <p>The Climate Bonds Initiative has proposed including renewable energy assets in cover pools and a tiered risk-weighting structure to encourage green mortgages, where repayment risk will be reduced because utility bills will be lower.</p>	Covered Bond	The established covered bond markets is worth \$3 trillion. However, there are not yet any specific green covered bonds.
	Local Governments	Green assets could be re-financed with dual recourse bonds, providing credit transparency to what are often opaque assets.	Covered Bond	--
	Corporations	Utilities could issue structured covered bonds secured against renewable energy assets as a way to reduce their cost of capital.	Covered Bond	--

BOND TYPE	ISSUER	DESCRIPTION	ASSET CLASS	EXAMPLES
Cash flow-backed debt securities	Local Government	Revenue bonds: Local governments, special purpose infrastructure or transport entities, etc. In this case, the bond is backed purely by cash flows from the underlying asset. Revenues, such as minimum passenger revenues on a rail line, may be guaranteed by government.	Municipal Bond	Property-Assessed Clean Energy Bonds
"Dual recourse" bonds (covered bonds): the investor gets both a Treasury backing and recourse to the underlying pool of assets. If the issuer fails the investor owns the asset pool.	Finance Company	Companies seeking to refinance a mature (low-return, low-risk) portfolio of loans or assets so they can recycle funds into new lending or developments that have higher returns. Consumer loans for solar rooftops, electric vehicles. Aggregated property improvement loan bonds. Energy saving companies (ESCOs) issue bonds backed by energy performance contracts. Leasing companies - e.g., leases for electric vehicles. Insurers - Cash flows from renewable energy insurance.	Asset-backed securities Mortgage-backed securities	In late 2013 SolarCity in the U.S. issued a \$54 million asset-backed securitization of residential rooftop solar loans. More such bonds are expected in 2014. In 2011 Italy's €195 million Andromeda bond involved a securitization of solar energy projects. Green mortgage-backed securities An ESCO bond is being developed in Mexico by the Inter-American Development Bank.
	Special Project Vehicles (SPVs)	Project development company or SPV In energy sectors these are typically backed by cash flows guaranteed by a power purchase agreement with a blue-chip credit rating.	Project Bond	MidAmerican solar project bonds in the U.S. market

2.3 The Challenges of Green Bonds

2.3.1 A Large Pool of Potential Investors

For investors concerned about climate change, the opportunity to invest in bonds that meet their existing yield and risk requirements while also addressing green issues is generally seen as attractive. Internationally, this investor pool is large:

- A significant international pool of institutional investors has publicly stated their commitment to tackling climate change and sustainability. The 259 investors representing \$22 trillion in assets under management (AuM) are party to the Global Investor Coalition on Climate Change—an organization communicating the policy requirements to governments for low-cost, long-term investments.
- Over 1,200 investors, representing \$32 trillion in AuM, are signatories to the Principles for Responsible Investment, an organization seeking to integrate environmental, social and governance risk frameworks into investment decisions.
- On green bonds specifically, investors representing \$15 trillion in AuM have called for more green bond issuance to support their sustainability goals (ClimateWise, 2012; CBI, 2011).

Green bonds allow these projects to attract a wider pool of capital through its transparent green claim than would otherwise be the case. This can result in lower costs of capital for projects.

2.3.2 Overcoming Liquidity and Risk/Return Constraints

Many environmental investments carry a low credit rating, largely because rating agencies—who rely on credit history for guidance—have minimal historical information on credit performance. Investors are largely unable to compromise on their fiduciary duty to take lower returns or higher risk expectations for green investments. The immediate challenge in utilizing the bond markets for the green economy is meeting investor requirements in terms of deal size/liquidity and expected risk/return profiles.

Deal Size/Liquidity: The major players in the bond markets, such as pension funds and insurance companies, require benchmark-size deals greater than \$300 million to be comfortable with the liquidity of a fixed income investment. What are traditionally viewed as “green” investments are only beginning to regularly match these deals, but the size of the market remains small. For example, only \$9.3 billion in outstanding bonds in the wind and solar sector were issued in deal sizes greater than \$300 million.

Risk/return: Even when sufficient deal size is achieved by low-carbon projects, achieving investment-grade credit ratings is another obstacle. Policy instruments designed to deliver such returns across the economy, such as a carbon pricing, have not provided the certainty required to investors. Where such certainty has existed, such as in renewable energy markets, only a limited number of projects have been able to source investments from the bond markets at investment-grade ratings. Of the \$9.3 billion outstanding in the wind and solar power sector, only \$4.2 billion is rated at investment-grade from BBB to AAA.

2.3.3 Ensuring Market Credibility Requires Open Definitions and Transparent Use of Proceeds

Both governments and investors need to be assured that green bond funds are genuinely being invested in green assets. That will depend on clear and coherent definitions of “green” and on verification and monitoring systems being in place.

Green investing to date has been associated with methodologies that establish the environmental credentials of the underlying project—for example, Clean Development Mechanism (CDM) emission reductions or energy savings. These are tools where a common standard defining what is an eligible “green” investment is readily identified and an equity investor can make informed decisions and monitor performance of the project based on their environmental expectations.

In the bond markets, however, investors are normally one stage removed from having influence over the environmental performance of the underlying projects, as bonds are typically backed by the balance sheet of large corporations, banks or governments. Where specific use of bond proceeds are articulated, such as in municipal bonds or project bonds, investors do not yet have any mechanism that can control environmental performance through their bond investment. Moreover, institutional investors deploying large amounts of capital do not possess the in-house capacity to assess such credentials.

This leads to the need for new tools that allow for a common understanding of what are green or environmental assets linked to bonds and how their performance may be reported and verified. Given the commoditized nature of bond markets, a standardized and commoditized approach is required. The CBI, for example, has developed a Climate Bond Standards and Certification Scheme that provides a science-driven taxonomy of what investments qualify as green, and an arms-length verification system that provides a binary labelling scheme that can be used as a marker on bond trading platforms. That scheme is backed by a coalition of investors and other organizations. In the absence of such tools, the credibility of green bonds may be diluted if environmental gains are not delivered over time and the ability of investors to allocate capital to green investments is diminished.

2.4 Components of a Green Bonds Market

Green bonds are financial instruments that can access large pools of capital in support of green growth ambitions. They are both a marketing tool in channelling this capital to green projects and allowing investors to identify such projects, and a new and innovative source of financing, as these projects attract an expanded investor pool.

As illustrated in Figure 3, governments can support this capital steerage by incentivizing both demand and supply of bonds, as discussed further in Section 4. Investors require scale, steady deal flow and risk-adjusted returns to fulfill their investment mandates, while open definitions and transparent use of proceeds are needed to ensure the credibility of market claims. The costs of these market facilitation programs are eventually offset by the lower cost of capital available to green projects in the long term.

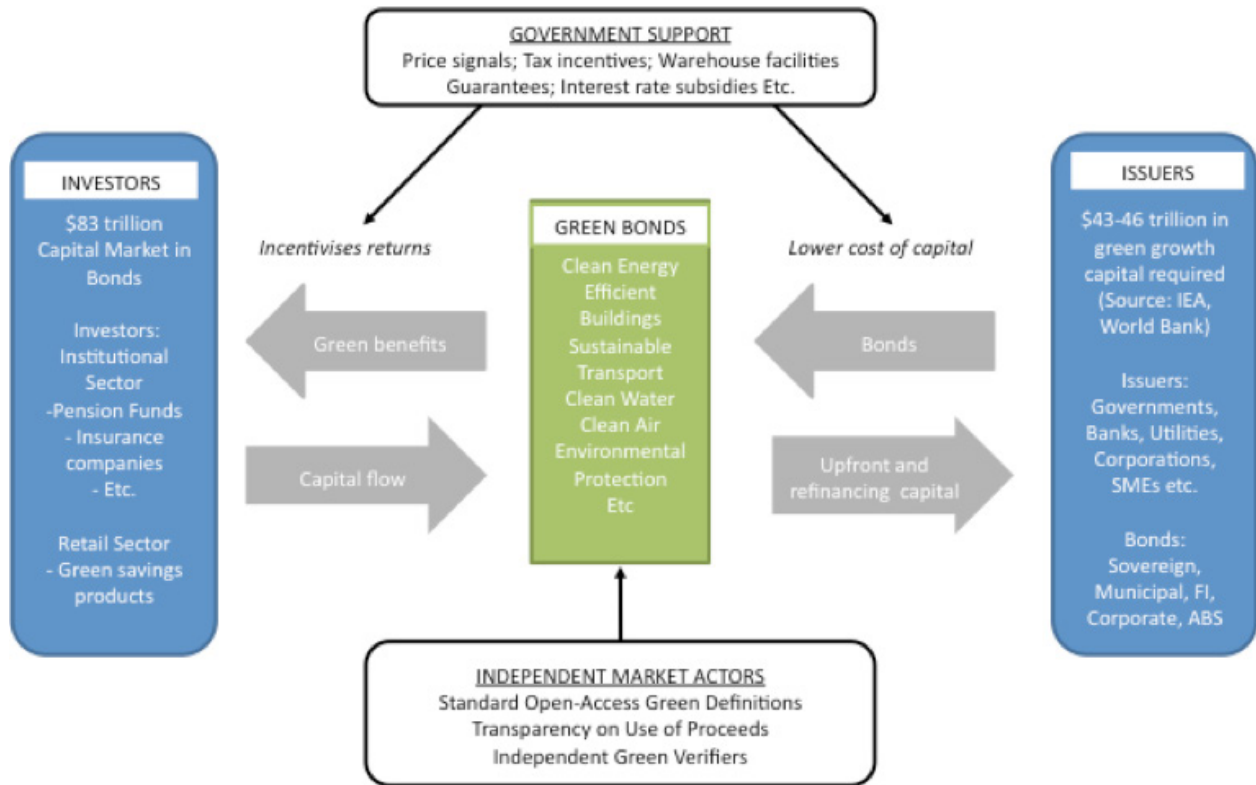


FIGURE 3: BUILDING BLOCKS OF A GREEN BONDS MARKET

3.0 Trends in the Green Bonds Market

This section describes the emergence of green bonds in the market to date, focusing on “labelled” green bonds issued by development banks, bonds that are related to green themes and new corporate bonds.

3.1 The Emergence of Bonds Labelled “Green” or “Climate” Aligns Investor Appetite with Sustainability Goals

The first climate-labelled bond was issued by the EIB in 2007. The five-year, €600 million AAA-rated Climate Awareness Bond was set aside for renewable energy and energy-efficiency projects that receive loans from the bank. The World Bank followed in 2008 with its inaugural SEK2.85 billion Green Bond that extended the use of proceeds to include waste, agriculture, forestry and adaptation investments (World Bank, 2013).

Since then, other multilateral institutions such as the Asian Development Bank (ADB), IFC, EBRD and AfDB, as well as national development finance banks such as Norway’s Kommunalbanken, South Africa’s Industrial Development Corporation and the Export-Import Bank of Korea (Kexim) have followed suit with green bonds that also include water and biofuel investments. More recently, we have seen corporate bonds, with the Électricité de France \$1.93 billion bond being the largest. In total, approximately \$18 billion in labelled “green” or “climate” bonds have been issued, with \$15 billion currently outstanding (CBI, 2013) .

In December 2013 there was \$15.34 billion in green-labelled bonds outstanding.

Total issuance to date amounts to \$18 billion.

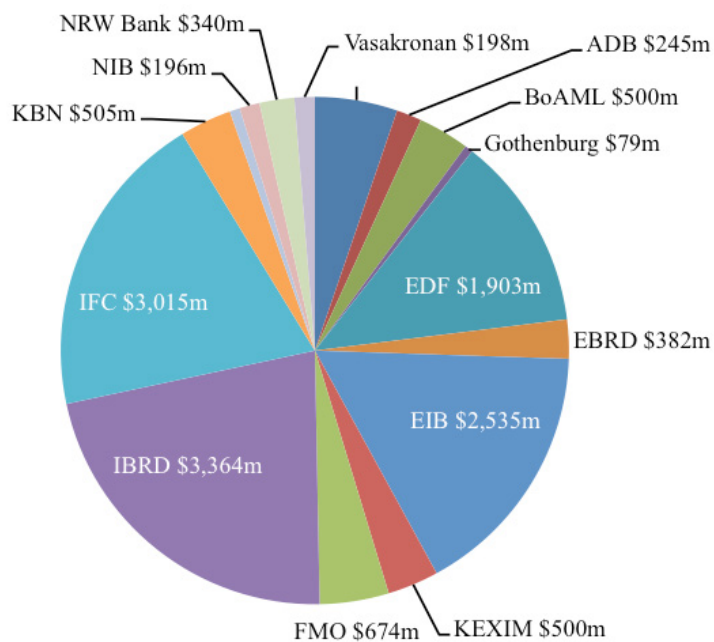


FIGURE 4: GREEN-LABELLED BOND ISSUANCE TO DECEMBER 2013 (CBI, 2014)

3.2 Demand for Green Bonds from Developed Country Investors Is Growing

Early issues were targeted specifically at eco-friendly Scandinavian investors and the Japanese Uridashi retail market interested in foreign denominated bonds.

BOX 1: THE URIDASHI MARKET

The Japanese Uridashi retail market was first established in the early 1990s in response to rock-bottom interest rates set by the Japanese Central Bank that depressed yields on bonds in Japan. Household investors, represented by the notional “Mrs. Watanabe,” were able to buy higher-yielding foreign issued bonds through local Uridashi agents. Most demand was for highly-rated (secure) bonds, issued in exotic foreign currencies in order to attract yield against benchmark rates. The market offered a mass-market distribution channel for highly rated international issuers such as AAA-rated multilateral development banks. The very low interest rates in recent years have led to increasing interest in AA-rated corporate bonds.

Dedicated green bond investment funds such as the Nikko Asset Managements World Bank Green Bond Fund and the State Street Global Advisors’ High Quality Green Bond Fund were established in 2010/2011. More recently, however, bond issuances have targeted more mainstream investors. The recent benchmark-sized issuances of \$1 billion from the AAA-rated IFC and \$500 million from the AA-rated Kexim had between 50 and 70 per cent of demand from mainstream investors in the United States and Europe such as Blackrock, CalSTRs, TIAA-CREF, 3M and Ford. In addition to its green label, these investors were attracted to a number of “plain” features of the bond such as its “vanilla” structure and benchmark size indicating liquidity.

3.3 There Already Exists a Market of Bonds That Are Related to Climate or Green Themes.

A bond does not have to be labelled as “green” or “climate” to finance such projects, although it does help investors who wish to allocate capital to those areas. Aside from development banks, there are many state-backed and corporate actors that are active in climate or green themes yet do not label their bonds as such. The CBI (2013) conducts an annual review of domestic and international bond markets to measure the current amount outstanding in bonds dedicated to climate or green investment themes based on the activities of the bond issuers. The review serves to broaden the mindset of the investment community, which may regard green bonds as niche, lacking scale or liquidity. The climate-themed bond market stands at \$346 billion as of March 2013. It is dominated by corporations in the transport theme, particularly railways, as well as renewable energy and nuclear issuers.

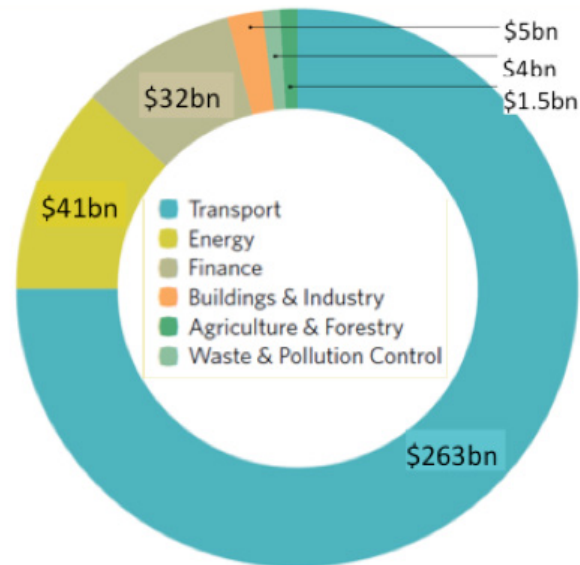


FIGURE 5: THEMATIC BREAKDOWN OF \$346 BILLION IN CLIMATE-THEMED BONDS IN THE GLOBAL MARKET

Source: *Climate Bonds Initiative (2013)*

Of the \$346 billion, \$163 billion of the bonds follow benchmark index-type rules for currencies, credit ratings and issuance sizes. China is home to the largest issuance of climate-themed bonds at \$127 billion, 92 per cent of which are bonds issued by the previous Ministry of Railways with 8 per cent for renewable energy manufacturers and nuclear operators.

Three findings in the review have notable relevance to the growth of a green bond market in China:

i) Public finance institutions are cornerstone issuers in the market.

Development banks already have substantial portfolios of green assets. Green bonds issued by the banks, for example the World Bank green bonds or European Investment Bank climate bonds, provide an early-stage opportunity for investors to signal demand toward green bonds, as well as support liquidity in the green bonds market. They also provide an example for potential corporate issuers.

Municipalities, local governments and specialist public sector “green” banks also have the potential to play significant roles in leading the market and educating investors as to the necessity of green investments:

- In the United States, Sweden and France, municipal green bonds have been issued where proceeds are ring-fenced for green environmental programs.
- A number of green banks have been established in recent years, from the U.K.’s Green Investment Bank and Australia’s Clean Energy Finance Corporation, to green banks in a number of U.S. states: the New York State Green bank, the Connecticut Energy Finance and Investment Authority (CEFIA) and the Californian Green Bank. These entities use state capital allocations to lend to clean energy and energy-efficiency projects; in some cases, they are either issuing green bonds or providing credit support for the issuance of commercial green bonds.

- A useful development has been the establishment of special-purpose aggregation facilities designed to package and refinance existing energy-efficiency loans to sell to investors as asset-backed securities—green bonds. The Pennsylvania HELP program, set up by the Pennsylvania state government in collaboration with commercial entities, and the U.K. non-profit Green Deal Finance Company, supported by capital investment from the U.K. Green Investment Banks and the European Investment Bank, are examples of this.

ii) Renewable energy bonds are scaling up.

Early forays into the bond markets by renewable energy projects were not immediately successful. The \$1.6 billion Breeze wind energy project-backed portfolio bonds, issued in Europe in 2006 and 2007, were later downgraded by credit rating agencies as a result of lower-than-expected wind strength and lower cash flows. Renewable energy manufacturers then began to tap the corporate bond markets with high-yield offerings or to restructure debt during the economic crisis.

However, since the Breeze bond, technology and wind strength estimating has matured, policy frameworks have become more certain, and renewable energy project bonds have grown in scale and demand. There are now \$5.2 billion in investment-grade wind or solar project bonds, issued mainly in North America. Perhaps the most prominent have been \$850 million and a \$1 billion bonds to finance solar photovoltaic projects, issued by MidAmerican Energy, a utility backed by Warren Buffet’s Berkshire Hathaway company (CBI, 2013). This example provides a useful precedent for Chinese renewable energy project developers looking to tap a more educated bond market for their projects.

iii) Greening existing infrastructure flows can kick start a market.

Attracting mainstream bond investors to a particular market requires scale and liquidity. Including existing infrastructure investments such as railways as green (low-carbon) investments provides a large pool of low-risk bonds that help deliver initial liquidity in the green bonds theme.

Investments in areas such as water and wastewater infrastructure, residential and commercial buildings, and waste management simply require standardized climate or green credentials to be included as part of a larger green bond asset class.

3.4 Corporations are Beginning to Respond to Investor Demand for Green Bonds

The corporate bond market has grown exponentially in recent years with the tightening of bank lending in both the United States and Europe. In a crowded market, issuers are seeking to differentiate their bonds from the market as much as possible and are turning to “sustainability” credentials to do so.

Air Liquide, an A-rated French chemicals and industrial gases company, issued a \$500 million bond targeted at responsible investors at the end of 2012. The “socially responsible investment” (SRI) bond was said to contribute to refinancing healthcare sector assets within the company, a feature that fit investors seeking social attributes as much as environmental credentials. The company was reviewed by a French responsible-investment research agency and earned an SRI rating of 43 per cent (Euroweek, 2012). The bond was oversubscribed by 6.6 times.

More recently, green corporate bonds have been issued by French utility EDF (\$1.95 billion), the Bank of America Merrill Lynch (\$500 million) and the Swedish property company Vasakronan (\$197 million).

3.5 Multiple Definitions of Green Bonds Are Converging in the Market

Green bonds have relied on differing definitions of use of proceeds depending on the issuer of the bonds. The multilateral development banks publish eligible project areas where funds raised will be allocated.

A key development in defining green bonds was the World Bank seeking third-party review of their Green Bond definitions from the Center for International Climate and Environmental Research in Oslo (CICERO). This established the principle of expert and independent review of inclusion criteria.

The CBI has established a certification and verification scheme that certifies bonds and includes reporting requirements for bond issuers to verify the use of proceeds based on eligible green project areas. The scheme is tailored to the needs of corporate green bond issuance, where investors consider assurance about the use of funds as important as the assets to which they get allocated. Under the scheme, bonds are certified after a straightforward third-party verification. Costs are born by issuers. A spot audit scheme sits above the program, policing correct verifier behaviour.



FIGURE 6: THE THREE-STAGE CLIMATE BONDS VERIFICATION PROCESS COULD BE ADAPTED FOR A GREEN BONDS MARKET

There is a broad array of policy areas under China’s 12th FYP where the labelling of green bonds could act as a performance metric of allocated capital and environmental benefit (e.g., in kilowatt hours or tonnes of carbon dioxide equivalent) related to targets assigned to local governments and SOCs. Table 2 below outlines the different definitions of what is eligible under green bonds that currently exist in the market and their crossover with targets under the 12th FYP.

TABLE 2: USE OF PROCEEDS BY GREEN BONDS IN THE MARKET

	WORLD BANK/ IFC GREEN BOND	EIB CLIMATE AWARENESS BOND	CLIMATE BONDS/HSBC BONDS AND CLIMATE CHANGE MARKET SURVEY	CHINA 12TH FYP GREEN GROWTH GOALS 2011-2015
Clean energy	Renewable energy	Renewable energy	Renewable	Property-Assessed Clean Energy Bonds
Energy efficiency	Buildings and industrial projects	Energy-efficiency projects with 20 per cent savings	Industrial energy-efficiency measures Green buildings Eco-labelled appliances	16 per cent reduction in energy intensity
Transport	Transport including fuel switching and mass transit	-	Rail, electric vehicle, mass transit	High-speed rail, urban transit system targets
Water	-	-	Water investments that reduce water usage in areas affected by climate change	Waste water infrastructure
Waste	Waste management	-	Recycling Circular economy measures	Solid waste infrastructure
Clean fuels	-	-	Biofuels excluding corn ethanol	Motor vehicle standards
Greenhouse gas reduction	New technologies	-	-	17 per cent reduction in carbon intensity
Adaptation	Flood protection, food security	-	-	-
Agriculture & Forestry	Sustainable forest management, avoided deforestation, reforestation	-	Certified sustainable forest management operations	Increase forest area by 12.5 million hectares

Given the appropriate common definitions, monitoring and reporting standards, there is potential for many different bonds from government, financial and corporate bonds to be recognized within the green bond thematic asset class. It is possible for policy frameworks and regulations to spur on these investments through some innovative structuring and incentives that will be discussed in the next section.

4.0 Policy Tools and Financial Instruments to Advance Green Bonds

Governments can leverage the bond markets to meet their public low-carbon and green development targets through pulling two specific levers. The first lever involves setting in place policy and *regulatory frameworks* that both reduce underlying project risks and support public/private issuance of green bonds that lead to market development. The second is in employing *public finance instruments and tools* that support private issuance in the scale, liquidity and risk/return profile necessary to allow the market to grow and mandates demand from public funds. In this section, we present these policy tools with case study examples.

TABLE 3: OVERVIEW OF POLICY FRAMEWORKS AND PUBLIC FINANCE INSTRUMENTS TO SUPPORT GREEN BOND MARKETS

Policy to reduce underlying risks	Clear green policy frameworks	Enabling private sector fundraising through long-term price signals for projects.
Public policies targeting bond issuance	Allowing general obligation bonds where proceeds are earmarked for green projects	Raising funds on their own full faith and credit (taxes) through general obligation bonds, but separating out a portion as qualifying green bonds and then reporting on allocation of earmarked funds.
	Introducing support for revenue bonds	Raising money for specific projects by pledging cash flows from those projects to back the bond. This often involves regulation of those revenues (for example, regulated transport charges or water rates) to reduce the risk they will not meet bond repayments, and so reduce the interest payable. In the United States, these bonds are also usually supported by tax credits (see below). Revenue bonds should be supported in tandem with covered bonds.
	Regulatory measures to support covered bond issuance	These dual-recourse bonds enable commercial banks and other private sector bodies to raise low-cost capital for priority areas They introduce credit transparency to assets while retaining treasury guarantees until the improved understanding of those assets can support single-recourse bond issuance.
Public policies targeting bond issuance	Backing consistent definitions of green across bonds types and across policy support measures	Public sector support for commoditizable definitions makes it easier for issuers to know what they can (and cannot) do and for buyers to compare green claims from different issuers. A policing or verification mechanism for green claims assures investors that proceeds will be used as promised. This is especially important at the corporate end of the market.

	Green banks	Raising money through public sector banks and infrastructure funds established to provide finance to green projects. A variation is special purpose “conduit entities” established for specific infrastructure investments, such as a mass transit system.
Financial instruments supporting issuance	Tax-based incentives	Tax credits or equivalent direct subsidies for bondholders can both attract capital and reduce financing costs for issuers
	Guarantees	Partial loan guarantees, performance guarantees, insurance products and bond wraps, introduced for a period that allows the market to become familiar with assets concerned and those assets to develop a stronger credit history, can allow innovative bonds to overcome novel risk perceptions to build a market
	First loss provisions	Bonds targeted at private investors can be enhanced by subordinated debt positions taken by public agencies or equivalent letters of credit/liquidity lines in project capital structure. This is especially important in getting the large-scale issuance that will attract mainstream investors.
Directives supporting demand	Requirements that public sector investment institutions allocate a proportion of capital to green projects	Directing pension, social security and other state funds to allocate a percentage of their fixed income budgets to green bonds, reflecting the relative priority of green investments in the FYP. Norway’s government does this with its \$500 billion Sovereign Wealth Fund by providing overarching responsible investment guidelines.

4.1 Mature Bond Markets Respond to Policy Frameworks That Reduce Risks on Revenue Streams

Within each class of bonds, a robust track record is required to support the creditworthiness of potential bonds and attract mainstream institutional capital. Fixed income portfolio allocation, typically subjected to more risk-averse constraints than equity allocations, is not a first-mover in financing new or disruptive technologies such as those required to enable a low-carbon transition. Instead, the role of bond markets is in scaling up proven technologies or public good infrastructure that operate in a policy environment that provides stable pricing signals. Green bonds therefore go hand in hand with other regulations and green credit instruments in channelling finance rather than replacing such initiatives.

Governments, however, have used a variety of policy tools in the past to enable economic transformation to provide growth and stability. This paper will focus on two types of policies that achieve this: policies that provide stable and regulated pricing for essential services to attract bond investors and policies that identify certain priority sectors of public policy to be eligible for government support.

4.1.1 Strong Price Signals

For essential public services, the regulation of assets and revenues through prices are integral to the ability of those operators, either private or public, to access bond markets. In services for clean water and wastewater provision, transportation, education, electricity, waste management, etc., there are minimum guaranteed payments to operators for the provision of an essential public service.

There are different models in countries to provide this certainty. Operators in the United States follow a rate-based model where special charges and rates by operators are allowed in order to ensure the provision of a public service at a minimum level. This is estimated to have resulted in up to \$40 billion in utility tariff bonds issued in the United States since 1995 (Fitch, 2007).

In the U.K. and Europe, a regulated asset base (RAB) model was adopted in the 1990s during the privatization of public services to ensure that service may be maintained and renewed in the absence of sufficient revenues. An in-depth examination of the intricacies of these policy frameworks is not the subject of this paper; rather, the authors wish to point to the stable price environment in important areas of public goods that provide assurance to bond investors.

Regulated charges are prevalent in water supply and treatment, road tolls, mass transit systems and electricity provision, which have enabled this infrastructure to be built in the post-World War II economy.

In green electricity, renewable energy feed-in tariffs have succeeded in most countries. The policy regimes, particularly in the United States, are now proven to the degree of enabling new projects to attract bond finance rather than seek long-term loans from commercial banks. With the aid of proven technologies in solar photovoltaic and wind power, and the emergence of “bankable” manufacturers and developers, some renewable energy projects are now capable of tapping bond markets for construction finance at investment-grade ratings. The key instrument, power purchase agreements, provide a “bankable” asset to allow bond issuance. Expanding their use would help grow a green bond market in China’s power sector.

BOX 2: FEED-IN TARIFFS

California’s Topaz Solar Farm, a 550 megawatt project, raised over \$1.2 billion from the bond market in debt capital at a BBB investment grade rating and a 5.75 per cent coupon. As stated by credit-rating agencies, the key determinants of the success of this bond issue were the 20-year power purchase agreement from an A-rated utility and the contracting of First Solar, a proven technology manufacturer and systems installer, to implement the project.

In other sectors of the green economy, such certainty in price signals is not as strong. Water conservation efforts require more differential rates between efficient and inefficient water use. Transportation rates require more support for green technologies such as electric vehicles. Energy-efficiency efforts in buildings and industry require more incentives than exist in the status quo to drive change.

Carbon pricing, as represented by regional carbon markets in Europe, the United States, Australia and those now being piloted in China, have the potential to provide this certainty. However, recent experiences in carbon markets have failed to reassure investors about volatility in prices and the market reliance on policy-driven demand signals in the form of artificial caps, as opposed to the provision of essential services. Until such demand signals can be copper-fastened, carbon pricing will not provide the necessary track record and stability required of bond investors.

4.2 Policy Can Also Target the Issuance of Bonds for Specific Public Needs

4.2.1 General Obligation Bonds Highlight Green Credentials of Government Programs

Governments have a long history of being proactive in targeting bond issuance for specific public policy needs. The \$3.7 trillion U.S. municipal bond market, equivalent in size to the total Chinese bond market (Chappatta, 2013), mostly consists of bonds issued by local governments where interest payments are tax exempt, creating a large amount of demand and lowering the cost of capital for issuers.

In discussing the role of public finance instruments and tools to attract private investment into green sectors, the cheapest and most cost-effective way of funding the transformation is rarely considered—government raising the funds itself.

Governments, of course, can issue bonds backed by tax revenues; to clearly signal their intent with the fundraising, they can market them as being allocated to specific efforts, such as Highway Bonds, War Bonds or Green Bonds.

In 2012 three regions in France—Île de France, Provence-Alpes-Côte d’Azur and Nord-Pas de Calais—issued “sustainability” bonds, which include social housing alongside environmental projects. They raised a combined total of \$550 million. In mid-2013 the first U.S. “green muni” bond was issued by the State of Massachusetts, followed later in 2013 by Sweden’s first green muni from Gothenburg.

BOX 3: MASSACHUSETTS PIONEERS MUNICIPAL GREEN BONDS

In June 2013, Massachusetts went to the bond market to raise \$1.1 billion in general obligation bonds. In a nod to the World Bank Green Bond Program, it labelled \$100 million of the issuance as green, targeted at clean water projects, energy efficiency in public buildings, environmental remediation, land acquisition, open space protection and habitat restoration projects. The proceeds are kept in an account separate from other bond proceeds, with quarterly reporting on their use and final projects funded on the municipality’s investor website.

A key driver for the initiative was attracting new investors. For example, 8-10 institutional investors who had previously not invested in Massachusetts did so due to the green aspect. Most importantly, the green tranche of the bond was oversubscribed 1.3 times in an hour while the “mainstream” bonds failed to reach their target, raising only \$575 million (Cherney, 2013).

4.2.2 Revenue/Assessment Bonds Internalize Value Captured in Green Projects

The ability of local and national governments to both continue debt-raising in this manner and maintain strong credit ratings is limited. Meanwhile, the needs of infrastructure renewal and environment-related services provision continue to grow, particularly for a low-carbon transition. These limitations are prevalent and well documented across developed countries as well as in China at a local level. But it is worthwhile to review ways in which local governments have developed other bond structures aimed at raising funds away from the balance sheet of the municipal revenue bonds.

The first revenue bond, with principal and interest derived exclusively from a project’s earnings, was issued in West Virginia in the United States in 1885 to finance a water and gas plant. Today, revenue bonds are the cornerstone of the municipal bond market with 68 per cent of the \$3.7 trillion market outstanding in this form (Bloomberg, 2013). They are used for transport, water, healthcare and housing infrastructure. Many of the bonds are issued by special agencies created for this purpose.

BOX 4: SUPPORTING LOCAL GOVERNMENT REVENUE BONDS

The Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF) are particularly useful revenue bond models for ensuring that state expenditure and revenues are aligned with societal goals.

Established in 1987, the CWSRF replaced a federal grant program with the aim to provide independent and permanent low-cost financing of water quality infrastructure. The grants were used to capitalize a fund in each state, with 20 per cent co-financing provided by the state for low-interest loans to wastewater and water quality projects.

Nationally, these funds exceed \$30 billion. An additional \$20.6 billion has been leveraged through tax-exempt revenue bonds using fund assets as collateral (U.S. Environmental Protection Agency [USEPA], 2012). The DWSRF was established in 1997, focuses on water supply infrastructure and has leveraged \$6 billion in bonds from \$15 billion of federal and state grants up to 2010 (USEPA, 2010).

Assessment bonds are where specialized property tax revenues are earmarked for a particular community-improvement project, as they mostly benefit the residents of that community. This model is the subject of efforts in the United States to promote residential and commercial building energy-efficiency upgrades through Property Assessed Clean Energy (PACE) bonds. Thirty-three states have enabling legislation in place for municipal revenue bonds backed by the property tax assessments on participating properties with 16 commercial building PACE programs underway.

The use of bonds varies from program to program. Most programs have open-market models where programs pair each project with a prospective funder such as the CaliforniaFIRST program, which has been authorized to issue \$14 billion in bonds. Other programs have one administrator providing finance, such as the Ygrene Energy Fund in the United States. There are relatively few programs that actively use municipal bonds as they await projects to achieve the scale necessary to justify transaction costs (Managan & Klimovich, 2013). In Toledo, Ohio, \$12 million has been issued to fund 50 commercial building projects, while Ann Arbor, Michigan, recently issued \$500,000 to fund projects (PACENow, 2013; Clean Energy Coalition, n.d.).

Programs targeting residential buildings were stalled due to a ruling by the Federal Housing Finance Agency, the body established after the financial crisis to oversee federal mortgage lenders, that no mortgages from properties with PACE assessments could be covered by Federal Housing Administration insured mortgages

Despite numerous legal challenges, the ruling remains and states are examining additional credit enhancements to deploy clean energy to householders and consumers.

BOX 5: CAPTURING LOW-RISK REVENUES TO SUPPORT HIGHER-RISK GREEN PROJECTS

In Hawaii, the government has passed legislation to enable the issuance of \$100 million Green Infrastructure Bonds to finance local clean energy upgrades (Clean Energy and Bond Finance Initiative, 2013). The bonds will be revenue bonds repaid by the loan repayments from households and businesses and excluded from the state's debt limitations and general obligation guaranty. Instead, the bonds are enhanced by the systems benefit charge mechanism—a surcharge on electricity bills that pays for public benefits in the system.

The ability to recover any shortfall in loan repayments through potential charges on all ratepayers allows the bonds to achieve investment-grade credit ratings. This mechanism is seen as adapting the utility tariff bond structures that have seen \$40 billion in investment-grade issuance by utility companies to finance various stranded asset costs, as mentioned at the beginning of this section.

4.2.3 Green Banks and Warehouse Facilities

Public sector finance institutions can play different roles in supporting a green bonds market. They can be:

1. *Issuers of green bonds.* These can provide initial market product pipelines and liquidity, engaging investors and educating them about the asset class.
2. *Sponsors of or investors in warehouses/conduit entities.* To tap bond markets, smaller loans and assets, including from SMEs, need to be aggregated and packaged appropriately. That may require special purpose institutions supported by development banks or guaranteed by the public sector. Junior or mezzanine debt from a development institution can enable green bond issuance from investors at a suitable investment grade to attract private capital.

Examples would be the Fannie Mae in the United States with housing loans, the Green Deal Finance Warehouse in the U.K. with residential energy-efficiency loans, or EuroFIMA in the EU with the financing of railroad rolling stock.

3. *Credit enhancers.* A wide range of guarantee and credit enhancement tools is available. For example, the European Investment Bank's Project Bonds Initiative provides credit enhancements for bond issuance addressing the policy objectives of the EU's Connect Europe program.

In the 1930s the United States established the first government-sponsored enterprises (GSEs) to tackle the lack of long-term mortgage financing for prospective house buyers. The agencies purchased bank mortgage loans on standardized terms and documentation in order to warehouse them for later bundling into debt securities that were large and liquid enough for the bond market. The resulting cheaper cost of capital and terms of the securities made mortgage provision and housing attainable for Americans. Other agencies were established to issue bonds for supporting the farming industry and SMEs.

In many ways, GSEs were precursors to special agencies established to provide lending in key areas of the economy not served by commercial banks. As mentioned in Section 3, many multilateral development banks, such as the World Bank and EIB, and national development banks, such as KfW and China Development Bank, now operate as green infrastructure banks in large part due to the proliferation of this model. However, in countries where such development bank activity is not present, dedicated green banks are emerging to bridge the public-private green investment gap.

Green banks have been established in the U.K., Australia, Connecticut, New York and California to provide loans to green sectors. For example, the U.K. government has capitalized the Green Investment Bank in the U.K. with £3 billion in funding to provide commercial lending to priority sectors such as waste, offshore wind and energy efficiency. The Green Bank is expected to be able to borrow through green bond issuance on the capital markets in 2015 (Harvey, 2013).

BOX 6: RAISING CAPITAL THROUGH BONDS AND WAREHOUSING GREEN ASSETS

The Connecticut Energy Finance and Investment Authority (CEFIA) was established in September 2011 as a clean energy bank. It has begun implementing multiple finance programs aimed at attracting private capital such as a commercial PACE program and a solar leasing program for households and businesses. Supplemental legislation passed in June 2012 allows CEFIA to issue \$50 million in bonds backed by a ring-fenced account in the state's Special Capital Reserve Fund (Berlin, Hundt, Muro & Saha, 2012).

These institutions are also offering a warehousing role similar to that of GSEs to attract private investment into green projects. The New York Green Bank and the Green Deal Finance Company in the U.K. are two such institutions where residential energy-efficiency loans are purchased, similar to mortgages, and bundled for access to capital markets.

4.2.4 Covered Bonds

Covered bonds are dual-recourse bonds, where the investor receives both a corporate or bank treasury guarantee and recourse to an assets pool underlying the bonds. Because of their doubly secured nature, they typically receive a credit rating higher than that of the issuer.

The largest covered bond market originated in 18th-century Germany when bonds were secured against real estate loans that had dual recourse to the estate as well as the landowner. Called *Pfandbriefe*, they were adopted by German mortgage banks and extensively used in financing post-war reconstruction as well as public infrastructure development during German unification in the 1990s.

The structure of a covered bond consists of a cover pool of financial assets that provides backing so that holders have a superior quality asset compared with unsecured creditors of the same issuing entity. These characteristics differentiate covered bonds from pure asset-backed finance where bondholders are reliant on the performance of a defined pool of assets that is owned by a special purpose vehicle.

Covered bonds can achieve higher credit ratings than the underlying bank issuer. Rating agencies examine the specific collateral in the registered cover pool, and the quality of these assets is a key factor in rating decisions.

The attractive features of covered bonds generally mean that investors are prepared to accept relatively low yields compared to other investments. The advantage for banks in issuing covered bonds is that, because the investor base is broad, they can access large pools of money easily and at better rates than in the case of unsecured borrowing. This enables them to make loans for eligible assets at a lower cost. Covered bonds have become an important funding option for banks in recent years as interbank lending and access to unsecured bond issuance have declined.

In most countries where covered bonds are issued legislation has been created to ensure the high quality of the assets eligible in the covered bond pool. Legislation defines the stringent requirements that a bank needs to meet in order to

be licensed to issue covered bonds, as well as the core concepts applied in structuring covered bonds. These concepts include: mortgage lending value, defined over-collateralization ratios, bankruptcy remoteness of the cover pool and detailed post-bankruptcy regulations.

In addition, as the use of secured borrowing increases, a greater portion of a bank's balance sheet is encumbered. This increases the risks borne by holders of unsecured debt, including depositors, and raises the cost of borrowing. As a result, some countries have introduced restrictions limiting total issuance of covered bonds (e.g., Canada limits to 4 per cent of a bank's assets). In other countries (such as Italy, Netherlands and Germany), total issuance thresholds are tied to the bank's equity. In Germany, under current legislation, outstanding covered bonds must not exceed 30 times equity.

All *Pfandbriefe* have a dedicated and dynamic cover pool of assets recorded in the cover register (*Deckungsstock*) under the supervision of an independent trustee operating within the regulatory framework. Because of these features, covered bond issuers typically enjoy funding levels at a relatively small premium to interest rate swaps.

The German *Pfandbrief* market has proven to be adaptable and innovative and has enabled issuers to on-lend to qualifying projects at attractive rates. Covered bond financing has now been adopted in many countries, including most of the EU, Canada, Australia, New Zealand and the United States. Typical maturities range from 2 to 10 years. More than $\text{€}2.5$ trillion (equivalent) was outstanding worldwide at the end of 2010. The market is supported by an international investor base that includes banks, central banks, mutual funds, pension funds and insurance companies. In Germany, the *Pfandbrief* market is also supported by retail investors.

The principles applied in developing legislation for new asset classes, including reporting and performance criteria, demonstrate the flexibility of the *Pfandbrief* structure, which could be further adapted to facilitate green financing. Green mortgages for energy-efficient buildings may be offered preferential treatment to normal mortgages. Renewable energy and low-carbon transport assets, backed by strong cash flows, may also be included as eligible assets in covered bond legislation.

4.3 Public Finance Instruments and Tools Can Leverage Private Investors and Enable a Green Bond Market to Develop

The existence of strong cash flows and credit characteristics of low-carbon investment does not, in and of itself, guarantee private finance investment at a comparatively low capital cost. Perversely, the increased transparency a "green" or "climate" label may provide in promoting low-carbon investments and attracting a wider investor base may also scare off mainstream investors who perceived "new" or "unproven" low-carbon investments as risky or simply do not regard labelled bonds as eligible in their asset allocation strategy, despite the identical or improved risk/return differentials green bonds may offer.

Government intervention has been necessary to kick start markets for renewable and energy-efficiency investments, and this is also the case when it comes to kick starting green bond markets. Highlighted below are public finance instruments and tools available to policy-makers in the early stages of a green bond market to overcome the barriers highlighted in Section 2.

4.3.1 Tax Credits/Interest Rate Subsidies for Investors

Tax credit bonds have been a huge part of the development of bond markets in the United States. Notably, they have driven capital into oil and gas industries for 100 years and helped underwrite their expansion. In the area of clean energy, the U.S. federal government has used Clean Renewable Energy Bonds (CREBs) and Qualified Energy Conservation Bonds (QECBs) programs as part of its post-financial crash stimulus package. The program allows for the issuance of taxable bonds by municipalities for the purposes of clean energy and energy conservation, where 70 per cent of the coupon from the municipal is provided by a tax credit or subsidy to the bondholder from the federal government.

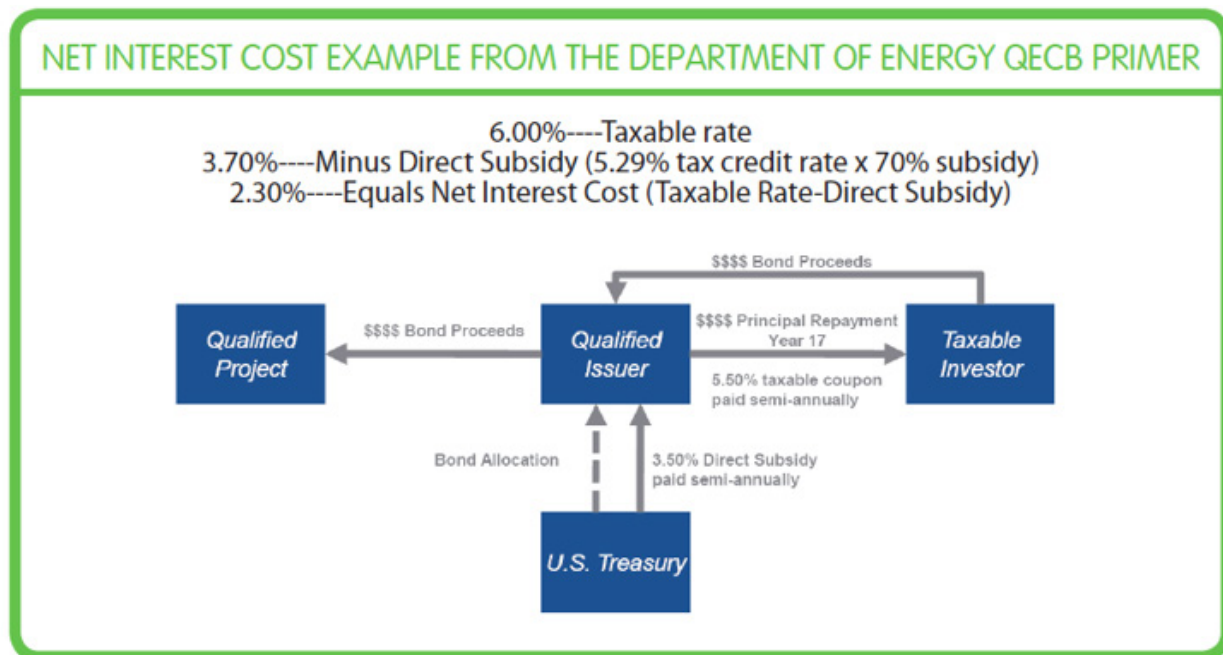


FIGURE 7: SUBSIDY REGIMES FOR CREB AND QECB BONDS

Source: Energy Programs Consortium (2012)

As many bonds using this subsidy are part of multi-tranche issues (with both tax-exempt and taxable bonds) or are privately placed, it is difficult to get an accurate figure on the precise amount of bonds outstanding. It is estimated that over \$430 million in CREBs and \$729 million in QECBs have been issued since 2009. This compares to the \$2.4 billion and \$3.2 billion the federal government had allocated to each program by competitive open application (CREBs) and by state population (QECBs). This low uptake in allocations is partly due to prohibitive transaction costs due to the small local level of allocations, for example at the town level rather than on a more aggregated basis, and a lack of awareness and capacity in bond issuance (Energy Programs Consortium, 2012). Any replication of this type of program would need to provide adequate capacity-building measures and ensure issuing bonds are at the necessary scale attractive for investors.

4.3.2 Guarantees

Guarantees can be used as part of the project financing structure that then facilitates low-cost bond issuance or as part of the bond issuance itself to provide assurance to bondholders. In terms of project-based guarantees, the U.S. Department of Energy Loan Guarantee Program facilitated the issuance of over \$2 billion in wind and solar project bonds. The *partial loan guarantees* were provided to four projects, which were then each able to channel different tranches for refinancing project debt to different investors. Short and medium terms were refinanced with bank lenders while the guarantees allowed long-term fixed-rate bonds to be targeted at institutional investors with a guaranteed AAA bond and a non-guaranteed BBB- at an 80/20 tranche size ratio. The successful sale allowed institutional investors to become familiar with such transactions at this scale and paved the way for more non-guaranteed project bond issuances such as the \$1.25 billion in Topaz Solar Farm bonds and the \$253 million in Mount Signal Solar Farm, among others.

Green projects may also be enhanced by *performance guarantees* that facilitate bond issuance. This is particularly relevant to energy-efficiency services where performance guarantees by Energy Service Companies (ESCOs), or Energy Management Contract companies (EMCs) as they are known in China, play an important role. In 2011 the Delaware Sustainable Energy Utility—a state agency to finance upgrades in public buildings, issued \$70 million on AA+-rated bonds. The public agencies receiving the funding from the Delaware Sustainable Energy Utility provided general obligation guarantees on the repayments of funds, while the agencies themselves entered into Guaranteed Energy Savings Agreements with the ESCO contractors they had employed to carry out the work. While the general obligation on the part of the agencies was probably a more important factor to the bond issuance, the ESCO guarantees were crucial for political support and as a market lead-in to investors for this type of product.

BOX 7: PARTIAL-RISK GUARANTEES TO SUPPORT NEW ASSET CLASSES

Guarantees for bond repayments are referred to as wraps and are a primary tool in kick starting a specific market for green bonds. Before 2010 there had been no rated projects bonds in Italy. The refinancing of the 44 megawatt Montalto di Castro solar park in two bond tranches of €97.6 million showed how a guaranteed bond could attract institutional investors and increase interest in the solar project space. One tranche was provided with a 75 per cent guarantee by the SACE, the Italian state-owned guarantee agency and a 5.715 per cent coupon attaining an AA2 rating. The second tranche was purchased by the EIB at a non-commercial rate of 4.839 per cent. The support of the bond by the EIB meant that the increased return in the tranche targeting institutional investors could cover the guarantee fee and risk premium for investing in a new asset class. This bond illustrates the need to support green bond issuances directly to overcome perceived risks of institutional investors in a new asset class.

More recently, a similar approach has been adopted for residential energy-efficiency loan portfolios in New York. Residential energy-efficiency loans are such a new asset class that insufficient data on payment performance of portfolios are available to be rated to an investment-grade level by rating agencies. The New York State Energy Research and Development Agency was seeking to securitize its \$26 million loan portfolio to replenish its loan fund under the residential program. In order for the bond sale to go ahead, the Clean Water State Revolving Fund was permitted by environmental authorities to provide a guarantee on bond payments due to the reduction of local water pollutants that is carried out by the action. The AAA rating on the bonds will allow sufficient data at scale to be gathered for energy conservation loan portfolios to be understood by bond investors. More importantly, the bonds were also issued as QECS where a 3.21 per cent coupon over 6.8 years is subsidized to 70 per cent by the federal government, allowing a real interest rate of 0.48 per cent to the loan agency that may be passed as low rates to householders and consumers carrying out the work (New York State Energy Research and Development Agency, 2013).

4.3.3 First-Loss Provisions

Public finance institutions also support green bond issuance through taking first-loss provisions in portfolios or projects. This usually takes the form of a subordinated debt position at an amount sufficient to allow senior debt to be issued at a higher rating to attract private investors. Alternatively, the first-loss subordinated debt position could take the form of a liquidity credit line, guarantee or construction financing to allow the project to overcome risk hurdles during construction.

As evidenced through the case examples presented in this paper, project and infrastructure bonds are more prevalent in the U.S. market than in Europe. With tightening regulation on bank lending (the traditional source of long-term capital for European infrastructure) threatening Europe's new infrastructure financing, the European Commission and EIB are undertaking a Project Credit Enhancement Bond Initiative to kick start a project bond market in Europe. In order to do this, the initiative must help to overcome concerns over the depth and liquidity of the market, as well as the complexity of the projects construction phase at an early stage.

BOX 8: FIRST-LOSS PROVISIONS TO UPGRADE SENIOR DEBT

The pilot phase of the Europe 2020 Project Credit Enhancement Bond Initiative leverages a €230 million injection from the European Commission to attract institutional investors. Each qualifying infrastructure project, including transportation, energy and information communication technology projects, is able to use subordinated debt or a letter of credit from the EIB to the value of 20 per cent of the proposed senior debt (project bond).

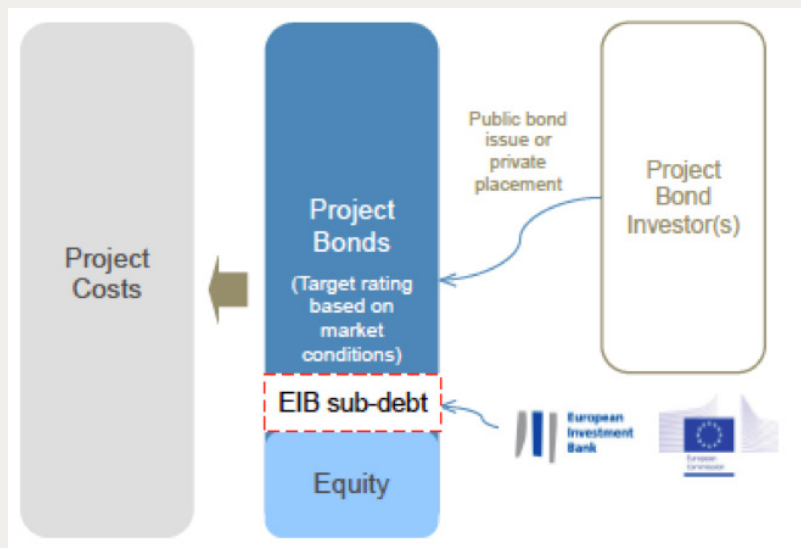


FIGURE 8: THE ROLE OF SUBORDINATED FIRST-LOSS PROVISION IN EUROPE'S PROJECT BONDS INITIATIVE 2020

Nine energy and transport projects have been approved eligible for the facility, including U.K. and German offshore wind grid connections. The first bond, a €1.4 billion bond issue for the Castor underground gas storage facility in Spain is reaching financial close in July 2013. The project availed of a €200 million liquidity and the EIB as anchor buyer of €300 million in project bonds. The second credit-enhanced bond, issued in November 2013, was a £300 million issue to finance the purchase of an offshore wind transmission line in the U.K.

Source: European Commission (2013)

4.4 Policy Can Direct Domestic Funds to Take on Green Bond Mandates

The achievement of transition plans is important to creating a sustainable economy in which investments for pensions and other long-term needs will be able to provide secure returns. Governments regularly provide guidance to state investment funds, sovereign wealth funds and the like about investment filters that will support a sustainable economy. The same can apply to green investments. Norway's government, for example, does this with its \$550 billion sovereign wealth fund by providing overarching responsible investment guidelines.

China could consider directing pension, social security and other funds to allocate a percentage of their fixed income budgets to green bonds, reflecting the relative priority of green investments in the FYP. This need not be a direction requiring a sacrifice of yield; funds should be given an incentive to work proactively with industry and government to ensure an adequate quota of green investments is available to meet targets.

5.0 Sourcing Demand for Green Bonds in China

Many of the most successful international precedents in green bonds in the United States and Europe involve the tweaking of well-understood and proven bond structures (development banks, municipal and utility issuance) to support a green purpose. This approach makes use of the long track record data and rating methodologies in place that rating agencies and investors can rely on while allowing investors to shift to green finance flows.

In Sections 5 and 6, we outline ways that policy-makers in China can support the development of a green bond market from a) the demand side with domestic and international investors and b) the supply side from issuers.

Banks are the dominant investors in the Chinese bond market, with a 75 per cent market share at the end of 2011. Insurance companies (7 per cent), mutual funds (4 per cent) and securities dealers and other financial institutions (14 per cent) make up the rest of the investor profile (ADB, 2013).

In the short term, investors in green bonds will not change from these actors dramatically, but there are steps the government can take that allow a green bond market to be easily recognizable and tap into new sources of capital from domestic retail, institutional and international investors.

5.1 Domestic Retail Investors

As noted in the first section, household savings assets in China are generally deposited in low-interest regulated products from banks. However, savings are increasingly seeking yield, despite risk, and capital has been flowing to gold, property and increasingly into the wealth management products offered outside the regulated banking system. This shift into areas of minimal regulatory oversight is leading to concerns around asset inflation and the potential for financial instability. Some investors, through mutual funds, may have access to bond markets; however, these funds remain heavily weighted to equities with only a 22.5 per cent share in bonds (ADB, 2013).

In many countries, retail investors seeking yield for household savings are naturally attracted to environmentally friendly assets such as green bonds. Perhaps the best example of this has been the success of MDB Green Bonds in the Japanese Uridashi market. Such investors are often more aware of both the need and benefits that investments in the environment offer than mainstream institutional fund managers. Retail investors can visibly assess the importance of clean water, clean air and green growth on their local area and, given adequate incentive, would align their investments with such priorities also.

Such an initiative may leverage a ready pool of household capital that is needed to rebalance the economy to consumption-based green growth, while improving transparency, customer service and competition in commercial banks and reducing the growth of the shadow banking sector.

BOX 8: DIFFERENTIAL INTEREST RATES FOR GREEN RETAIL PRODUCTS

The government can incentivize banks to target green bond retail investors and create green wealth management products based on green bond portfolios or green savings bonds by allowing higher interest rates than existing deposit caps. This could be achieved by proposing higher differential central bank interest rates to commercial banks based on green use of proceeds or allowing banks to include the locked-in green capital in their capital adequacy ratios, as they would be accompanied by state-backed credit enhancement. Retail investors, in turn, would be able to use tax credits based on a proportion of the interest gained. This would filter back to the bank, which may offer subsidized lending rates to green projects under green credit lines and incentivize further lending.

5.2 Domestic Institutional Investors

China's domestic institutional investors could support a green bond market through green mandates in bond portfolio allocation. Pension funds such as the National Social Security Fund (NSSF), urban and rural social insurance schemes and corporate schemes (enterprise annuities) have a combined total of \$522 billion in assets under management as of 2011, although it is unknown to what extent they are exposed to bonds (EDHEC Risk Institute, 2013). Insurance companies house \$749 billion in assets with a 19 per cent weighting towards locally issued bonds.

BOX 9: GREEN BOND INVESTMENT MANDATES

As a lead example of such an initiative the government could direct the NSSF to align its exposure to green investments—both bonds and equities—to government GDP targets for green industries within the national FYs.

Adjusting bank capital adequacy ratios

As China moves to domestically implement bank and insurance sector regulation models similar to Europe's Basel III and Solvency II, consideration needs to be given to the potentially negative impact on demand for long-term green bonds and long-term capital in general.

Existing approaches to capital ratio requirements under Basel III and Solvency II significantly limit the ability of banks and insurers, in the interests of safeguarding liquidity, to hold long-term debt. In fact, they introduce adverse incentives for long-term investment, because of the "risk weighting" applied to such lending. This affects the availability of capital for all infrastructure projects, but renewable energy projects are particularly vulnerable because they involve higher upfront capital costs than alternative energy investments, offset by lower operating costs.

An option for Chinese regulators would be to allow debt in the high priority policy green area—green bonds—to be treated differently for capital ratio purposes. The rationale is that investment weighted to green will deliver a more robust economy, making for more robust banks. A very modest weighting in favour of green bonds, knowing green bonds are subject to a strong supervisory regulatory regime, would drive demand among those entities.

5.3 International Investors

Although quotas for FDI in the Chinese capital markets have yet to be reached, it is likely that demand will increase in line with improvements in transparency and further market reforms undertaken by the government. It is believed the vast majority of the quota is invested in equities in large part due to administrative barriers. According to investor surveys conducted by the ADB (2013), these barriers include the mandate that at least 50 per cent of the quota be spent on equities, a non-freely convertible RMB and registration requirements for forex transactions.

Despite these headwinds, the current low-return global investment environment conspires to support significant demand for RMB-denominated assets due to the expected natural appreciation of the currency.

BOX 10: GREEN BOND FDI WINDOW

The government could support the channelling of FDI flows into green bonds by streamlining administrative barriers for green bond investment under the Qualified Financial Institutional Investor regime. As part of the government's announced plan to slowly expand quota limits, priority could be given to an extension for green-specific areas.

The benefits of supporting such a window are clear:

1. A more diversified institutional investor base helps promote the secondary market and liquidity.
2. International investors with investment practices in risk management procedures and asset/liability management strategies will set a standard in the bond market that demands quality information disclosure, due independent rating and due diligence that will serve to strengthen the robustness of the bond market as it reforms.

Initial demand would be met with green bonds from SOEs and other state-linked entities, shifting to corporate green bonds as investors become more familiar with the markets and as corporate bond issuing practices and governance improve.

6.0 Developing the Supply of Green Bonds in China

There are many “easy wins” for promoting green bond issuance in China. This section outlines potential structures for sovereign, local government, financial institution, corporate and securitized bonds in China.

6.1 Sovereign Bonds

Given the emerging state of the green bond market globally, there are some fixed-income asset classes where China has the opportunity to lead. Although multilateral development bank (MDB) bonds such as those from the World Bank are often assigned to sovereign portfolio allocations, a national government sovereign green-labelled bond has yet to be issued.

BOX 11: CHINA SOVEREIGN BOND FOR DOMESTIC POLICIES

China has many avenues open to justify this labelling of a sovereign bond as for a green purpose. Domestically, the government’s planned RMB4.15 trillion investment in renewable energy, energy saving and emission reduction policies and programs to 2015 could be linked to sovereign bond issuance allowing international institutional investors to include such bonds in their green allocation portfolios in similar ways they are including MDB green bonds (Du, 2013).

China sovereign bond for overseas development aid

Sovereign green bonds could also be used to support China’s overseas development assistance and official aid with a green and sustainable benefit. Contributions to the Green Climate Fund from China or programs such as the environmental components of loan programs for Africa may be partly recognized through the capital markets as green investments. While such labelling may not provide additional flows to green areas than would otherwise occur, it assists the development of a market on a number of fronts:

1. It allows investors in government bonds to signal demand toward green bonds.
2. It provides a market example on increased transparency and use of proceeds on bonds.
3. It quantifies China’s leadership role in promoting green growth at home and abroad.

6.2 Financial Institution Bonds

Financial institutions in China issued RMB2.5 trillion in bonds in 2012, 44 per cent of all listed on the China Central Depository Trust Clearing house. Of these, 85 per cent were from China’s state-owned policy banks such as the China Development Bank, the Export-Import Bank of China and the Agricultural Development Bank.

As their main objective, it is clear these institutions are aligned to government investment and spending priorities as a whole, but it is unclear how lending is prioritized for green-themed areas across its portfolio. An analysis of lending amounts for China Development Bank shows that 22 per cent of outstanding loans are channelled to sectors such as energy saving and environmental protection projects, railways, agriculture, forestry and water projects. However, it is unclear how green these measures are or indeed the amount loaned towards other areas such as clean energy and urban transit (China Development Bank, 2013).

As state-owned institutions, large commercial banks have developed green credit offerings in line with the China Banking and Regulatory Commission’s green credit banking guidelines. For example, the Industrial and Commercial Bank of China provided RMB593.4 billion in loans to green projects and industries in 2012 (Industrial and Commercial Bank of China, 2013).

BOX 12: BONDS SUPPORTING GREEN CREDIT LINES

An opportunity exists for China’s policy banks and state-owned commercial banks to develop green bond programs similar to those of MDBs. The Export Import Bank of Korea set an example in February 2013 with a \$500 million green bond issue. Such an issuance by Chinese state-owned banks could highlight financial support provided to green projects and provide the transparency needed for ensuring new public infrastructure projects do not harm the environment, providing a boost to public confidence.

It would also provide an example to the private commercial banking sector in “ring-fencing” green mortgages, SMEs and project loans for transparency purposes, before the development of a securitization market.

6.3 Local Government Bonds

Local governments in 2012 issued RMB27.9 billion in bonds, representing 4.3 per cent of those listed on the China Central Depository Trust & Clearing Co. (2013). Since 2009 the Ministry of Finance has issued bonds on behalf of local governments. In 2011 four local governments—Shanghai, Zhejiang, Guangzhou and Shenzhen—were permitted to pilot bond issues directly to the market and have more recently been joined by Shandong and Jiangsu provinces.

However, that is not the limit of bonds linked to local governments in the Chinese market. The China Central Depository Trust & Clearing Co. (2013) estimates that RMB636.79 billion in bonds were issued by asset management, infrastructure and investment companies owned by or implicitly linked to local governments in 2012—a 148 per cent increase from 2011. Local government debts are estimated at approximately RMB12 trillion by the National Audit Office. In addition to the issue of local government debt is the need to ensure adequate financing and oversight over the low-carbon or eco-city development plans of 133 cities in China stated to have adopted such targets (Zhou, He, & Williams, 2012).

BOX 13: LOCAL GOVERNMENT GREEN COVERED BONDS AND GREEN CITY BONDS

Policy-makers can turn the uncertain nature of local government debt levels into an opportunity to prioritize and reward green growth investment. A covered bond regulatory initiative to refinance local government debt would allow pools of performing assets with strong revenue cash flows to be identified and assessed by the market, introducing transparency without greater risk.

Local governments would ring-fence green assets and debt from their own balance sheets as well as local government investment vehicles identified under the audits of the National Audit Office. Bonds issued to refinance these debts and assets would be structured to have dual recourse to both local government balance sheets and the green assets themselves. These green local government covered or structured bonds could be, if necessary, enhanced by the central government through tax credits for investors or a national first-loss fund.

Central government policy-makers would define assets eligible for green covered pools (definitions are discussed elsewhere in this paper) and disclosure requirements for local governments around the credit aspects of those assets. Central government oversight would, as happens in Germany, provide investor confidence in the pools.

This proposal would address the mismatch of short-term financing of long-term local government assets and infrastructure, and improve transparency for investors, while concurrently rewarding and incentivizing green growth investment. A pilot could involve a demonstration of structured covered bonds, leading to legislative support if the pilot is successful.

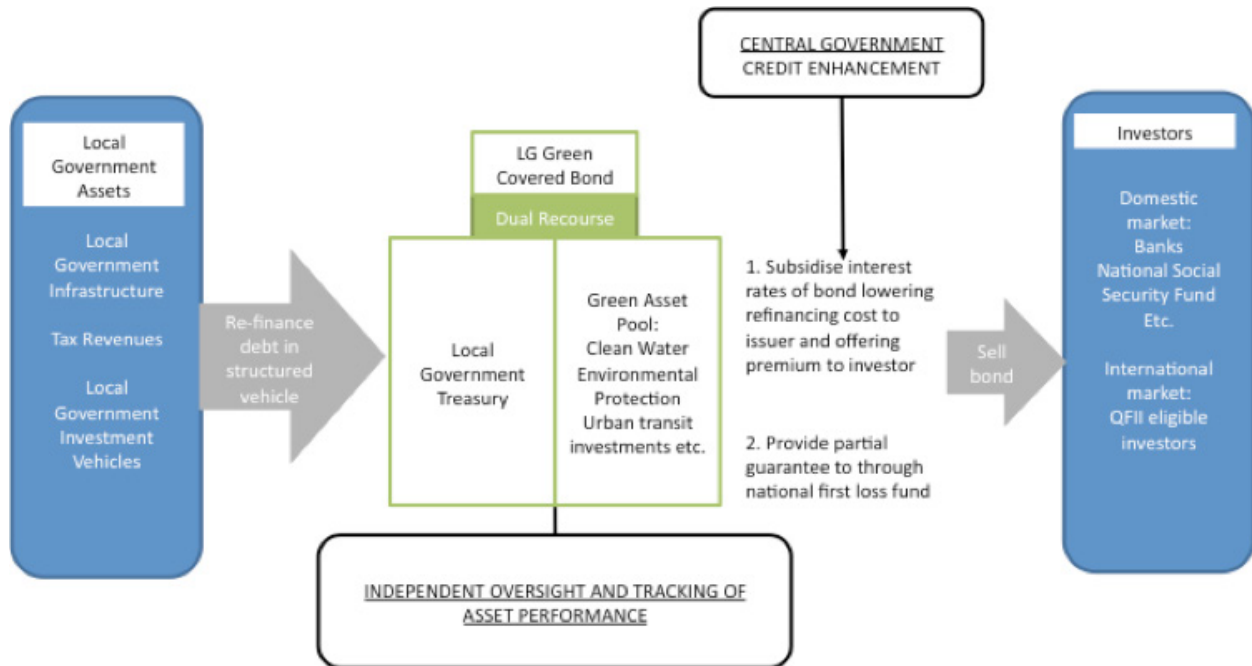


FIGURE 9: OVERVIEW OF LOCAL GOVERNMENT GREEN COVERED BOND STRUCTURE

6.4 Corporate Bonds

There are approximately \$7.8 billion in corporate bonds outstanding from China linked to green themes (Carbon Bonds Initiative, 2013). Many of these are high-yield notes or convertible bonds issued by solar photovoltaic and wind turbine manufacturers. These are by no means the largest or most important corporations active in China’s green sectors, but they are the only ones whose proceeds are clearly linked with green projects. State-owned companies, large private corporations and SMEs are active in deploying green technologies and solutions that may be recognized and supported through green bonds.

In Korea, the government has supported the certification of 1,245 green technologies, 102 green products, 29 green enterprises and 153 green projects, all of which are eligible to receive support from a range of public financial instruments to enable growth. Enterprises under the program that are certified are those with sales of over 30 per cent of green products (KIAT, 2013).

The effect of supporting a corporate green bond market may have on the overall financing cost of China’s green transition is potentially substantial. The world-leading gains made so far in clean energy deployment has been facilitated by large state-owned companies with cheap access to capital investing in project development, often at unprofitable levels. Manufacturing companies in the supply chain, often private enterprises that struggle to tap into bank lending, have managed to reduce capital costs for technologies over time; however, it has come gradually and with strong demand from overseas and domestic markets.

If similar green companies, now recognized as members of strategic industries, can access bond markets at an early stage, then their cheaper operating costs would filter into cheaper technology costs and facilitate a more cost-effective

deployment of green technology solutions in the overall economy. This will be particularly important as China’s green revolution shifts from the deployment of large infrastructure such as wind farms, solar parks and high-speed rail that is facilitated by the state-owned companies, to more consumer-oriented products such as solar photovoltaic rooftops, electric vehicles and building energy-efficiency measures.

Bond investors remain unfamiliar with the performance of such technologies, but would respond to bonds from corporations that receive partial state-backed guarantees and operate in a stable policy framework as exists in China.

BOX 14: STATE COUNCIL PROMOTION OF CORPORATE GREEN BONDS

In its recent plan for developing green industries, the State Council has identified the need for “qualified” energy saving and environmental protection enterprises to issue corporate bonds and other debt instruments. This has the potential to create the first corporate green bond market in the world.

As in Korea, the government could provide specified tax-based guarantees or first-loss incentives to support this market by registering companies with a percentage of revenues from green products as qualifying enterprises. Most importantly, however, would be to ensure the bonds from these companies are fully linked with expanding these green product lines or greening existing product lines to be credible as green bonds. A policy-driven green bond market will depend on mechanisms for assurance about the green credentials of *investments* and assets linked to specific bonds. This is more important than the credentials of the actual issuer.

Corporate green bonds that are linked to investments and assets open up the potential of green bonds to be issued from any enterprise, not just green enterprises—as long as the use of proceeds of the bond are linked to qualifying green projects and there is appropriate transparency and disclosure on performance.

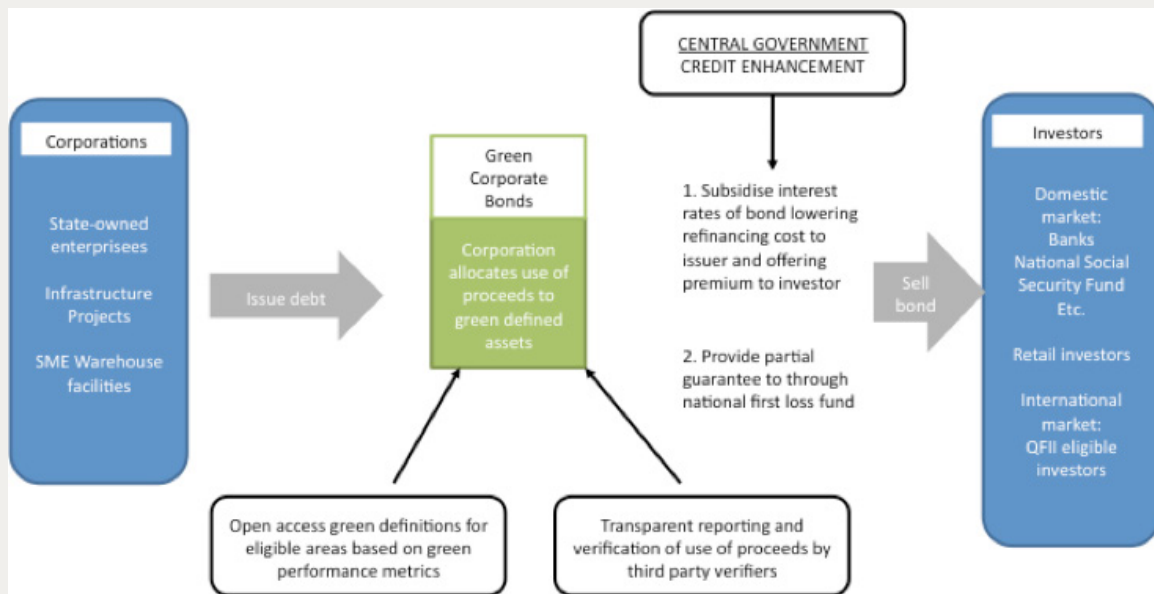


FIGURE 10: MARKET STRUCTURE FOR CORPORATE GREEN BONDS

6.5 Securitization

Even in the United States, the most advanced bond market in the world, securitizing green cash flows into asset-backed debt instruments is a relatively new development. In China, the State Council has identified green mortgage-backed securities as a useful way of expanding green credit. However, the market for such securities is still relatively weak and information disclosure requirements need strengthening (China Central Depository Trust & Clearing Co., 2013).

In a more market-oriented financial system, securitization of assets will be essential for commercial banks and corporates looking to grow their lending and investments without over-stretching their own balance sheets. This is especially important with environmental protection investments because of the scale and speed with which China wants to see change.

We see a number of areas of potential:

i) Credit enhancement by development banks

A readily available green securitization market may also be tapped through the loan guarantee programs of MDBs in China. For example, the IFC China Energy Financing Project (formerly known as China Utility-based Energy Efficiency Financing Program) has worked with local banks since 2006 in partially guaranteeing \$783 million in energy-efficiency and clean-energy loans. A new phase of the program will focus on SMEs with a \$558 million guarantee pool.

Domestic development banks could, of course, provide similar facilities that directly support the securitization of qualifying green assets. A range of credit enhancement tools can be explored with the support of the IFC and others. We propose that this be part of pilot project development. Credit enhancement will be important in the early years of establishment of a viable green securitisation market.

ii) Warehouse facilities and green asset-backed securities

A major challenge for securitization of green investments is their fragmented nature—energy-efficiency loans in particular are usually small in bond-market terms, as are many renewable energy programs, such as for residential and small business applications. Bank lending is generally spread over numerous institutions.

Achieving scale adequate for green securitization requires aggregating loans and assets, often across multiple institutions. While commercial banks can be expected to eventually take on such a role, growing green investments quickly will require interventions to support market development.

In the United States, a key instrument has been the “non-profit warehousing facility.” This is an entity dedicated to buying up loans that meet its criteria and packaging them at a scale and rating suitable for the bond market. It provides a collective good by allowing small as well as large banks to efficiently recycle their green lending pools and tap wholesale markets.

In the area of green investing, a number of examples exist where the public sector is playing the central role:

- a. In the U.K., the setting up of the Green Deal Finance Warehouse has depended on capital injections from the U.K. Green Investment Bank and European Investment Bank, and the government's legislated Green Deal residential financial program.
- b. In Pennsylvania, the Keystone program to securitize energy-efficiency loans has been created by the state government working with commercial partners.
- c. The IFC and the European Investment Bank are developing a shared international warehousing facility to securitize green loans.

A key role for a warehousing facility is to drive standardization of contracts and features of loans by setting out minimum requirements for securitization. Bond markets thrive on standardization and commodization; by forcing the pace of standardization, a warehouse acts as a bridge to a developed market, where multiple securitization options become available.

The government could work with local banks in providing a non-profit warehousing facility, to standardize, package and issue securities backed by these loans of the size and scale needed to attract institutional investors.

iii) Green mortgage-backed securities

Buildings with significant energy-efficiency improvements or that have installed renewable energy on the premises have lower energy bills than other buildings. As the US Energy Efficiency Mortgage Program explains, lower energy costs mean that building owners are more able to repay mortgages—and they are a better credit risk (U.S. Department of Housing and Urban Development, 2013). Banks could be encouraged to recognize this in lending to building owners by offering, for example, a 25 basis-point advantage for green mortgages. Such loans could then be preferentially treated for capital ratio purposes, or securitized and sold as green bonds with an improved credit rating compared to “ordinary” mortgages.

The government could support the issuance of green mortgage-backed securities by large home mortgage lenders such as the China Construction Bank. Under specified green performance criteria for buildings associated with a green mortgage or home loan scheme, such securities may be credit-enhanced by the central government to reassure investors as to the strong cash flows. Initially the securities could be structured as covered pools similar to the *Pfandbriefe* market in Germany.

iv) Carbon bonds

China's carbon credit market is one of the most developed in the world due to the widespread experience with the United Nations Framework Convention on Climate Change Clean Development Mechanism. A major new source of demand for emission reduction projects in coming years will come from the various provincial emissions trading systems being piloted.

The role of bonds and securitized cash flows in such markets are twofold:

- a. Green corporate bonds may be issued by emission market operators to finance projects that reduce their demand for credits.
- b. Outside investors may take advantage of demand for credits by investing in carbon credit securities that provide a strong cash flow from emission reduction credits purchased by market operators over time.

However, such products are greatly dependent on a deep and liquid emissions trading system yet to emerge, so we see this as an opportunity in the latter part of China's next FYP.

In all these potential areas of securitization, clear and practical definitions of what are qualifying "green" assets and investments will be essential, as will be verification and review of green claims.

7.0 Roadmap to a Green Bonds Market in China

This paper has provided an overview of the green bonds theme, innovative structures in the international market and potential applications in China.

The benefits of introducing green bonds to China are manifold. They include:

- Gaining international recognition for green growth and investment and the government's commitment to a sustainable economy.
- Developing the world's first corporate green bond market in a credible and transparent manner.
- Reducing capital costs to the economy of green growth by fast-tracking bond finance into green projects.
- Promoting greater transparency in financial markets by providing incentives linked with green asset areas.
- Channelling household savings into a strong retail bond market by tapping into public desire for a green environment.
- Channelling international FDI into long-term debt in line with green growth goals.

In the short term, there are four steps the government should take to explore the potential of the market and test its viability.

1. Define eligible green investments.

Across many different projects, the definition of what is green is important to provide credibility to the market as well as achieve the public policy objectives of the government to justify the incentives provided. It is important that green definitions follow *performance-based metrics* to ensure that transparency and understanding of use of proceeds in bonds is maintained after the money has been raised by the issuer.

Definitions would involve identifying the *types* of investments necessary with green cities, clean water, environmental remediation, low-carbon transport, energy efficiency and, of course, clean energy. In developing definitions for the national market, China has the opportunity to build and improve on work already being done by the CBI and other bodies on defining green investments.

Definitions can then provide the foundation for the development of a standardized certification system for qualified enterprises and projects, funded by the market and using existing credible actors as verifiers.

2. Direct regulators to incorporate regulatory provisions needed to establish a green bond market.

Three authorities responsible for different bond-types in the market oversee China's bond market. The promotion of an open and transparent green bond market requires coordination and agreement with all regulators to promote credibility.

"Tweaks" to the regulatory framework required would include:

- Rules for disclosure on the use of green bond proceeds and a requirement for adequate reporting platforms for post-issuance monitoring of use of proceeds.
- A framework for the introduction and supervisions of covered bonds, including criteria on asset quality and type for local governments and commercial banks.
- Tax-based incentives for green bonds in retail and corporate sectors.

The State Council could direct existing regulators (People's Bank of China, China Securities and Regulatory Commission, and National Development and Reform Commission) to incorporate regulatory provisions needed to establish a green bond market. Alternatively, the State Council could decide to establish a cross-ministerial committee that aligns central government, regulatory agencies and local government stakeholders to promote the market as was undertaken during the introduction of the Clean Development Mechanism in China.

3. Establish investor green bond roundtables domestically and internationally to prepare demand.

The government should support the establishment of investor roundtables to prepare major domestic and international investors for green bond products originating from the Chinese market. Domestic and international roundtables would act as feedback platforms on investor requirements and interest in different green bond products, for example as outlined in this paper, and provide input into issues of broader governance of the market. Informal discussions have shown there would be investor interest in such activity. As an example, the Global Investor Coalition on Climate Change, representing \$22 trillion in investments, could facilitate at an international level.

4. Pilot green bonds through different issuer types—policy banks, provinces/cities, SOEs, commercial banks.

There are current bond issuers in the Chinese market where a green bond issue may be piloted to gauge investor demand at home and abroad. These include:

- Policy banks: The China Development Bank should be encouraged to pilot a green bond issuance on offshore markets to gauge international investor demand.
- Provinces/cities: The six local governments issuing pilot bonds may be permitted to issue green bonds linked to low-carbon development.
- SOEs and large private companies may be encouraged to issue green bonds to support energy-saving and emission-reduction investments
- Commercial banks should follow recent SME bonds with green bonds with increased transparency and reporting requirements.

TABLE 4: OVERVIEW OF POTENTIAL PROOF-OF-CONCEPT GREEN BONDS IN CHINA

BOND TYPES	ISSUER	REVENUE STREAMS	GREEN PURPOSES
Sovereign bonds	Central government	Treasury	Green domestic policies and investment programs, e.g., FITs, grant schemes Overseas development aid
Local government bonds	Local governments	Treasury and covered bond pools	Low-carbon infrastructure assets
Financial institution bonds	Policy banks or state-owned commercial banks	Treasury or covered asset pools	Low-carbon loans, infrastructure development
	Private commercial banks		Green mortgages, loans across sectors
Corporate bonds	State-owned corporations	Treasury with green use of proceeds articulated	Clean energy, energy efficiency, etc.
	Private corporations		
Securitization	Warehouse facilities	Green mortgages ESCO savings Carbon credit flows	Energy efficiency in buildings, clean energy, emission-reduction projects

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