

• POLICY NOTE 2016:01

Green Bonds and Environmental Integrity: Insights from CICERO Second Opinions



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Abstract: This policy note shares insights from CICERO's experience in producing over 60 second opinions. Insights on the environmental integrity of green bonds include: 1) Management that is aligned for climate risk can give greater confidence in a green bond, 2) Internal dialogue with environmental experts can benefit from issuing a green bond and obtaining a second opinion, and 3) Best practice is emerging for certain project types. Issuers are more often incorporating life cycle analysis to understand the full environmental impact of the projects they finance, e.g. in renewable energy projects, as well as of their corporate activities including supply chains and subcontractors. Sustainable buildings are more likely to include an energy efficiency target in addition to building certifications. Multilateral development banks and municipalities are more likely to include adaptation components in their green bonds. In some cases, environmental experts are gaining veto power in the project selection process. Regular reporting on green bond projects is becoming the norm, with increasing interest in working towards impact reporting.

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Executive Summary

The transition to a low-carbon climate-resilient economy requires a shifting of financial capital towards greener solutions. Green bonds are financial products that can support this transition and provide an opportunity for investors to minimise their climate risk, provided they have high environmental integrity. Green bonds are simply bonds whose proceeds are invested in green or climate change solutions. To date, the market has been characterised by rapid growth and diversification of issuer types. Yet green solutions can involve a wide range of projects and activities, and there are no universally agreed definitions in the green bond market, resulting in a confusing array of green labelling.

Second opinions are one form of environmental assurance. These are reports to investors on the potential climate and environmental risks of green bonds, provided at the time of bond issuance. Since the inception of the green bond market, CICERO has been a leading provider of second opinions. CICERO's method reviews the project types included in the green bond framework for their potential climate risk, as well as the governance and transparency of the issuing institution in relation to fulfilling the environmental objectives of the green bond. Ultimately, a Shade of Green is assigned to indicate how well the bond aligns with a low-carbon and climate-resilient future.

Looking back at trends over eight years of experience in the green bond market, this policy note reveals CICERO's insights for how green bonds can support a low-carbon, climate-resilient society:

Management that is aligned for climate risk can give greater confidence in a green bond

In a changing landscape of climate policies, trends, and physical impacts, the governance of an institution becomes more important. Corporate level policies and goals, and how they are integrated, can help guide a company or institution towards a low-carbon climate-resilient future, and improve confidence that the environmental objectives of a green bond can be fulfilled. Transparency on the use of proceeds, including reporting on impacts to the extent possible, can also increase the issuer's environmental integrity.

Internal dialogue with environmental experts can benefit from issuing a green bond and obtaining a second opinion

Improved environmental dialogue within an institution is an additional benefit to issuing a green bond and obtaining a second opinion. To develop a green bond framework, treasuries and financial experts must cooperate with environmental and corporate social responsibility experts. The process of obtaining a second opinion from CICERO involves a discussion to clarify terms

of the green bond framework that typically involves financial and environmental experts, where they can learn about potential environmental and climate impacts of their decisions.

Best practice is emerging for certain project types

As the green bond market has developed, a clear vision of best practice is emerging. Issuers are more often incorporating life cycle analysis to understand the full environmental impact of the projects they finance, e.g. in renewable energy projects, as well as of their corporate activities including supply chains and subcontractors. Sustainable buildings are more likely to include an energy efficiency target in addition to building certifications. Multilateral development banks and municipalities are more likely to include adaptation components in their green bonds. In some cases, environmental experts are gaining veto power in the project selection process. Regular reporting on green bond projects is becoming the norm, with increasing interest in working towards impact reporting.

1 Scaling-up Green Investment

In December 2015, 195 countries adopted the Paris Agreement at the UN climate change conference, setting clear aspirations to limit global warming to well below 2 degrees Celsius and pursue efforts to limit warming to 1.5 degrees Celsius by 2100. The implied greenhouse gas (GHG) emissions pathways to meet these global aspirations requires a significant tightening of climate policies and regulations. The Agreement also provides a clear signal for future investment patterns.



An additional US\$ 14 trillion is necessary to build renewable energy and other low-carbon and climate-resilient infrastructure. Photo: Energy community Særbeck in Germany, Greenpeace.

Over the next 15 years, it is estimated that US\$ 90 trillion of global capital investment in infrastructure will be needed. To build new infrastructure for a low-carbon and climate-resilient society an additional US\$ 14 trillion is necessary (Global Commission on the Economy and Climate, 2014). Low-carbon and climate-resilient infrastructure, what can be called green infrastructure, can have higher capital needs in the short-term, but may provide higher dividends in the long-term. Considering the massive investment needs, financial flows will be required from both public (government) *and* private (commercial) actors. Institutional investors (large-scale public and private investors, such as insurance companies, pension funds and sovereign wealth funds) can help fill these financial gaps. Estimates of the asset value of institutional investors in OECD countries amount to US\$ 83 trillion (Kaminker et al., 2013).

Tightening climate policies and behaviours are one facet of climate risk that investors face, which can result in a price on carbon that ‘strands’ fossil fuel-based infrastructure. The adjustment towards a low carbon economy represents financial risks for investors but may also reveal opportunities.

The risk of physical climate change impacts can affect financial bottom lines. Recent estimates indicate that US\$ 2.5 trillion of global financial assets is at risk of physical climate change impacts (Dietz et al, 2016). Carbon extractors and emitters could further face compensation complaints in the future, that potentially could hit their insurers hard (Carney, 2015). In recent years, investors have become more aware of climate risk as well as other environmental, social and governance (ESG) factors that can affect their investments. For instance, members that have committed to the UN Principles for Responsible Investment (PRI) increased from 20 in 2006 to over 1400 members in 2015, currently representing approximately US\$ 59 trillion in assets under management (PRI, 2015). Focusing on climate risk, the Global Investor Statement on Climate Change¹ has over 400 signatories, which note their interest in low-carbon investment opportunities. Many other green finance initiatives exist, and high-level financial fora and institutions such as the Bank of England have raised concerns about climate risk.

Despite growing environmental engagement by institutional investors, the decisive factor for the increased uptake of green investments will be the risk-adjusted financial returns of the investment. The green aspects can be considered a supplement to the underlying financial returns of an investment opportunity.

Green bonds are one of the financial instruments that could enhance the involvement of institutional investors and give greater access to these large capital pools, provided the underlying financials of the bond are similar to comparable investment opportunities. A bond is as a debt instrument where an investor loans money to an entity for a defined period at a variable or fixed return, or coupon, rate. Bonds, as fixed-income assets, are attractive for institutional investors as they can in some cases offer long-term maturities with the returns on investments being relatively stable (as compared to other asset classes such as equity). Bonds are dominant in portfolio allocations for pension funds (OECD, 2012).

¹ <http://www.iigcc.org/publications/publication/2014-global-investor-statement-on-climate-change>

2 What are Green Bonds?

Green bonds are a way for investors to proactively deal with climate and environmental risks. Green bonds are “plain vanilla” or ordinary bonds with proceeds earmarked for green assets or projects. Any entity that is able to issue standard bonds can also issue green bonds: commercial banks, municipalities, private corporations, and multilateral institutions like the World Bank, African Development Bank, etc. The World Bank in cooperation with Skandinaviska Enskilda Banken (SEB) spearheaded the development of green bonds beginning in 2007.

2.1 Market Overview

The rapid growth in green bond issuances reflects an increasing interest of institutional investors in green investments. In 2015, the amount of labelled green bonds increased to US\$ 42 billion from US\$ 37 billion in 2014. By February 2016, the total outstanding value was over US\$ 100 billion. Despite this booming growth, green bonds remain only a small fraction of the total bond market, approximately 0.1%. A huge growth potential remains.

While development banks dominated as issuers in the early years, companies and municipalities now also play a leading role. Multilateral development banks (MDBs) were the only issuers of green bonds until 2012. Since then, corporations, municipalities and municipal institutions, export credit agencies, and national development banks have played an increasingly important role in issuing green bonds. As illustrated in Figure 1, multilateral development banks and corporations together have issued more than half of the value of green bonds to date.

Cummulative Issuance Value by Issuer Type

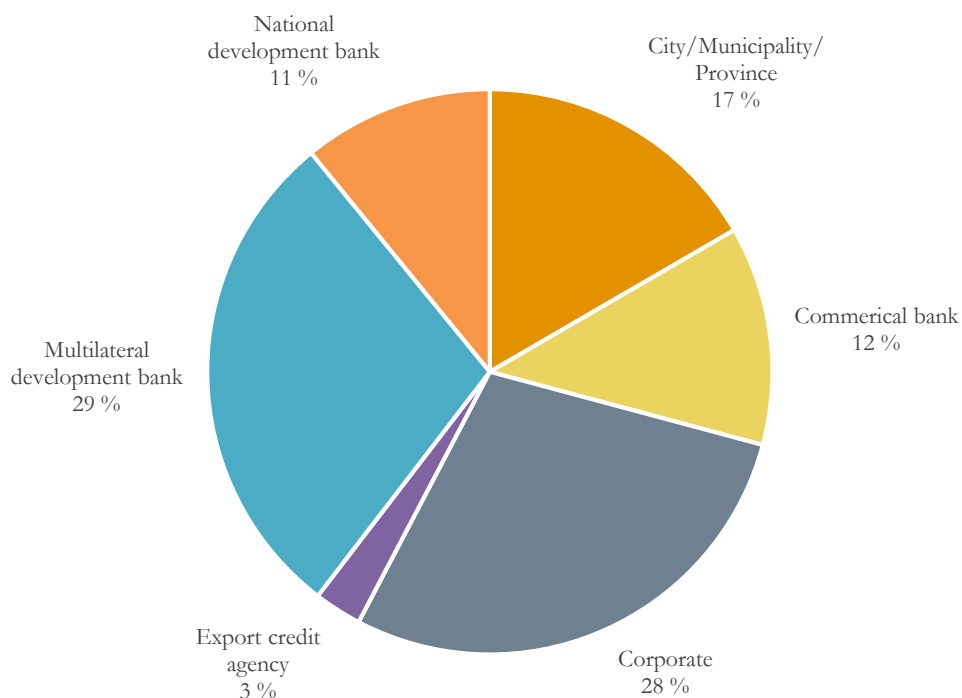


Figure 1: Cumulative issuance value by issuer type (2007-2016 to date). Data source: CBI (2016).

Besides the international financial institutions, most issuers (and purchasers) come from Europe or North America. However, a significant share of green bonds finances projects in developing countries (CICERO & CPI, 2015). Multinational and national development banks together have raised approximately US\$ 40 billion in financing that largely supports climate change projects in developing countries, accounting for 40% of the value of green bonds issued to date. National development banks have been influential in mobilizing greater activity in the green bond market as they are able to act as intermediaries between government and the private sector. Moreover, NDBs have a primarily development focus and are therefore able to direct finance to sectors which face the greatest challenges in developing countries.

In recent years, green bonds have been growing in emerging markets with a cumulative value of US\$ 10 billion (see Figure 2). The China Industrial Bank and the Agricultural Bank of China have issued the largest green bonds in the last few months. The green bonds growth in emerging markets reflect some potential for scaling-up green bonds in developing countries, across all issuer types. However, there are specific challenges and barriers to scaling up in emerging and developing markets, including a lack of financial market maturity and transparency or, more generally, a lack of awareness of green bonds (Clapp & Pillay, 2016).

Emerging Market Green Bond Issuance (Cumulative 2007-2016 to date)

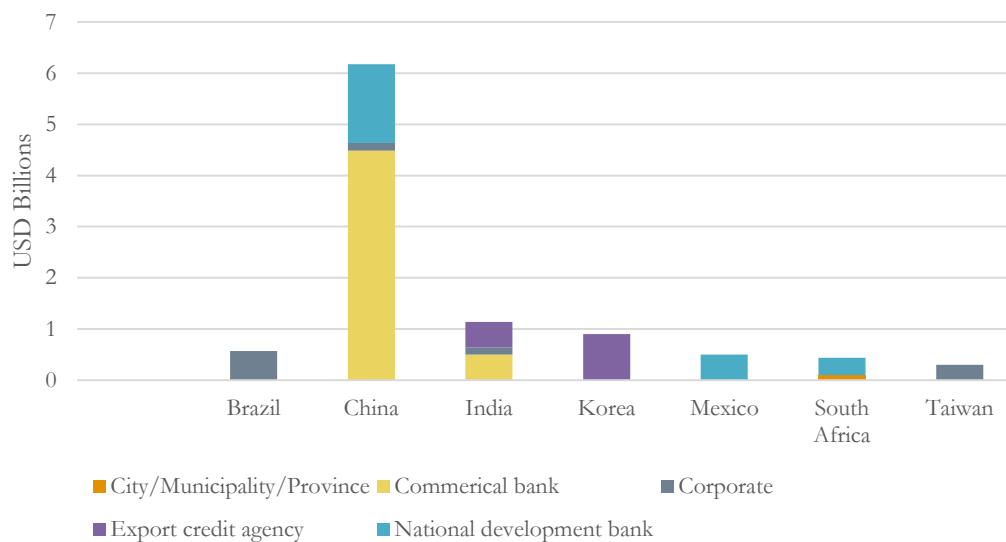


Figure 2: Emerging Market Green Bond Issuance (Cumulative 2007-2016 to date). Data source: CBI (2016).

The vast majority of proceeds from green bonds (96%) finance climate change mitigation projects, with the primary focus on renewable energy, energy efficiency, and transportation projects (CBI, 2015a). The proceeds of green bonds issued by the multilateral development banks have mainly financed renewable energy projects (BNEF, 2014). However, several municipalities and development banks also include climate adaptation projects in their green bond frameworks, often focusing on water management (Clapp & Pillay, 2016). Yet there may be less opportunity to grow adaptation projects with a bond structure, as they require a fixed financial return over time. Some adaptation projects, e.g. resilient crops, do not easily provide a steady financial return.

To date, green bonds do not have a significant price differential from traditional bonds. This could change as the market matures and if investors place a premium on climate and environmental impacts. As environmental externalities, including climate risk, are priced into the market, e.g. via carbon prices, this could also drive price differentials in the green bond market.

Do green bonds raise new financing for climate action?

This has been an issue of concern in relation to the international climate negotiations, where the concern is whether climate finance is ‘new’ and ‘additional’ to previous flows of finance for climate activities. It is very difficult to determine if green bonds are simply a case of re-labelling existing financial flows, in part due to the lack of comprehensive data including baselines and issues of attribution to climate change.

Traditional bonds are often used to re-finance existing projects, and this is true in the case of green bonds as well. Re-financing is important for on-going projects, and can help increase investor confidence in the market. This could ultimately lead to additional green projects, however that is difficult to discern in the early stages of the green bond market (CBI, 2014a).

There is anecdotal evidence that issuers of green bonds have diversified their investor base. The World Bank and the IFC expanded their investor base to include institutional investors with specific sustainability or responsible investment objectives that have not previously purchased bonds from these institutions (World Bank, 2015a). Yet this does not necessarily indicate new financing for climate action (CICERO & CPI, 2015).

2.2 Green Definitions

Ensuring the environmental integrity of each green bond issued is of vital importance to increase investor confidence. Robust green bond definitions can help avoid the risk of “greenwashing” and are important to allow for comparisons between bonds. In the current market, there is no consensus on a universal definition or criteria for green bonds.

At investors’ demand, several initiatives push for common standards against which the greenness of green bonds could be measured (CICERO & CPI, 2015). The Green Bond Principles are voluntary guidelines as a first step towards market coordination on definitions and transparency (see text box). Over 25 investors have signed a Statement of Investor Expectations for the Green Bond Market that pledges to additional due diligence when evaluating environmental impacts of bonds, and note expectations for annual impact reporting (Ceres, 2015). At the Paris climate negotiations, 27 investors also signed the Paris Green Bonds Statement, with common aims to grow the market and calling for greater transparency and standards (CBI, 2015b).

In the absence of universal definitions, the current market practice is to incorporate independent reviews, or ‘second opinions’ at the time of issuance. Currently, approximately 60% of green bond issuances undergo some sort of external review (CBI, 2015a), which can be described as an assurance process of the environmental integrity of the bond. However, these second opinions can use a variety of approaches and methodologies to assess an issuer’s green bond framework. Some simply assess whether the issuer adheres to the Green Bond Principles (see text box), or use other ESG frameworks for comparison. Others, like the Climate Bond Standard, develops stricter technical standards for categories of projects and assets against which they verify a green bond. Several stock exchanges now have separate green bond listings, including Oslo Børs, which was the first exchange to initiate this practice, all requiring second opinions.

Green Bond Principles: voluntary guidelines for the green bond process

The Green Bond Principles were developed in 2014 (and updated most recently in March 2015, see ICMA, 2015) as a set of voluntary guidelines focusing on the design and reporting of green bonds. The Principles focus on the use of proceeds for green assets rather than for green “issuers”; establishing sound management processes; and the use of independent reviewers of both environmental credentials and robust reporting practices. While the Principles do include broad categories for which green project types can be financed by green bonds, they do not provide detailed criteria or further guidance on what is green.

China is the first country to develop a national green bond standard. In December 2015 the People’s Bank of China released a list of standards by sector for screening green bonds.

Implied definitions are also emerging through green bond indices, although each index follows different logic for which green bonds can be included. For example, the Barclays MSCI green bond index excludes green bonds that finance large hydro projects.

2.3 CICERO's Second Opinions and 'Shades of Green' Methodology

When deciding what bonds to purchase, investors primarily consider the financial characteristics. In the case of green bonds, they may also consider the environmental attributes at some level. For investors, it may be difficult to compare green bonds with similar financial characteristics.

CICERO has been involved with providing second opinions on green bonds since the start of the green bond market in 2008, when we were requested by SEB (Skandinaviska Enskilda Banken) to provide an independent view on the 'greenness' of the World Bank's first green bond. As an independent non-profit climate research organization, issuers consider us as a trusted reviewer to provide insights to investors on the potential environmental impacts of the green bond.

Since then, CICERO has been the leading global second opinion provider, providing 70% of the second opinions in the market to date. All types of issuers have used CICERO Second Opinions, including multilateral development banks, national development banks, export credit agencies, cities, municipalities and municipal institutions, commercial banks, and corporations.

Second opinions review potential environmental impacts at the time of issuance, and do not provide any assurance or validation as to the actual impacts of the projects after the investments are made. While non-compliance criteria could strengthen the governance of the bond framework, this legal aspect is beyond the scope of CICERO Second Opinions.

CICERO uses the latest climate and environmental science to guide definitions and assurance of green bonds (Clapp et al., 2015). This science-based scrutiny comes with as little regulatory overhead as possible for the issuer. Through dialogue with the issuer and with emphasis on the issuer's governance structure for green bond financing, CICERO Second opinions indicate the potential climate and environmental impacts to investors. The assessment also addresses transparency and reporting as additional key concerns.

CICERO takes a long-term view on activities that support a low-carbon and climate-resilient society. In some cases, activities or technologies that reduce near-term emissions may result in net increase in accumulated emissions due to prolonged use of high-emitting infrastructure in the end. CICERO strives to avoid locking-in of emissions through promoting careful infrastructure investments and moving towards low- or zero-emitting infrastructure.

After discussing with several investors what might be helpful in their decision-making process, CICERO developed the Shades of Green methodology, allowing for a simple comparison across green bonds. CICERO Second Opinions are graded dark green, medium green or light green, reflecting the climate and environmental ambitions of the bonds as well as the robustness of the governance structure of the green bond framework, see Figure 3. The grading depends on a broad qualitative assessment of the bond's contributions to building a low-carbon and climate-resilient society. For further information on CICERO's methodology, see our Second Opinion Framework (CICERO, 2016. Available at <http://www.cicero.uio.no/file/2/CICERO%20Second%20Opinion%20Framework%20280416.pdf/download>).

Dark green	Projects and solutions that realise the long-term vision of a low-carbon and climate-resilient future already today. Typically, this will entail zero-emission solutions and governance structures that integrate environmental concerns into all activities. Example projects include renewable energy projects such as solar or wind.
Medium green	Projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Example projects include sustainable buildings with good (but not excellent) energy efficiency ratings.
Light green	Projects and solutions that are environmentally friendly but are not by themselves a part of the long-term vision. Example projects include energy efficiency improvements in fossil-based industry that result in short-term reductions of greenhouse gas emissions, and diesel-fuelled buses.
Brown	Projects that are in opposition to the long-term vision of a low carbon and climate-resilient future.

Figure 3: Shades of Green categories

To expand regional and sectoral competence and presence, CICERO established the global Expert Network on Second Opinions (ENSO) in 2014, a network of independent non-profit research institutions on climate change and other environmental issues. CICERO works confidentially with other members in the network to enhance the links to climate and environmental science, building upon the CICERO model for Second Opinions. In addition to CICERO, ENSO members currently include the Basque Center for Climate Change (BC3), the International Institute for Sustainable Development (IISD), the Stockholm Environment Institute (SEI), and Tsinghua University's Institute of Energy, Environment and Economy.

Other initiatives and frameworks exist for environmental integrity in the green bond market, such as those developed by Ceres, Bloomberg, FTSE, Moody's, FSB, S&P, etc. Other second opinion providers in the market such as Oekom and Vigeo have developed their own methods. The Climate Bonds Initiative (CBI), an environmental non-governmental organisation, has also played an important role in promoting the green bond market by developing a standard and establishing working groups with a variety of stakeholders, including industry and environmental watchdogs, to improve definitions and classification of green bonds.

CICERO's second opinions go further than the Green Bond Principles and differ from other approaches in several ways. CICERO's approach is embedded in climate science, having taken root in an academic non-profit organisation independent of market influences, focusing on the definition of 'green' to reveal potential climate and environmental risks. The approach is dynamic, without fixed definitions, developing as science and the market evolves. Each green bond framework is reviewed in a tailored manner, with respect to its specific context, including geographical region and issuer type.

3 Insights from Second Opinions

CICERO has produced over 60 second opinions since 2008, of which around 20 have received a Shade of Green. Approximately half of the opinions produced by CICERO in 2015 were shaded Dark Green. Yet it is worth noting that many of the issuers that request a second opinion from CICERO are those that have some experience in understanding environmental impacts. CICERO's experience in working with issuers has given us insights about the importance of good management for climate risk, the benefits of environmental dialogue, and what best practice can look like.



Best practice in green bonds. Photo: Pixabay, Unsplash.

3.1 Governance matters

Besides information on the green bond framework, CICERO second opinions also evaluate the issuer's ability to implement the framework. When an issuer applies good governance practices and provides information on how the bond framework will be implemented, the risk of greenwashing is reduced and investments will be better protected against climate risk. For example, an underpinning of environmental criteria in project selection and measuring and reporting procedures can give investors confidence that the issuer can fulfil the environmental objectives of the green bond framework.

Different issuers have different mandates and management structures to address climate risk, and to govern a green bond. For example, multilateral development banks like the World Bank

have detailed procedures for understanding climate and environmental impacts since these themes closely relate to their mandate in development work. On the other hand, commercial banks may have less environmental experience in-house and may outsource some environmental analysis. Municipalities focus more on adaptation projects as they immediately feel the physical impacts of climate change on their utilities and infrastructure. Interestingly, financial institutions serving municipalities in Sweden and Norway with financial competencies and resources are now expanding their activity to provide high-level environmental assessment services to municipalities. This cooperative model may serve well also in a developing country setting.

In general, good governance encompasses setting targets, integrating planning processes, and reporting:

- **Environmental goals** – Some issuers have climate change target, e.g. reducing their carbon footprint or improving their energy efficiency, or have an overarching vision of how their institution fits with a low-carbon and climate-resilient future. For instance, Örebro municipality in Sweden has as an overarching aim to reduce the direct and indirect climate footprint of its activities measured per capita by 90% before 2050 and by 40% before 2020 (CICERO, 2014d). Another example is the City of Oslo in Norway that has strict standards for their subcontractors and supply chains (CICERO, 2015). These types of targets can support cohesive decision making in relation to environmental impacts, and is especially important for sectors and institutions that are vulnerable to climate change impacts or changing policies and technologies. In relation to a green bond, an institutional environmental vision can guide the project selection and the reporting on the use of proceeds. In order to be best in class when handling climate risks, we foresee more stress testing against different climate scenarios. Environmental goals and plans are even more important when green bonds are used to finance general corporate activities. For example in the case of HSBC's green bond, green businesses (in addition to green projects) are eligible for lending when a business derives greater than 90% of its revenues from activities in eligible sectors. This allows for the proceeds to be used by the business for general purposes, so long as it does not expand into activities outside eligible sectors. Green lending is also subject to an eligibility review by the Sustainability Group (CICERO, 2015b).
- **Procedures for project selection and evaluation** - Many issuers include environmental experts, along with treasury representatives, in their project selection process for green bond financing. For example, Kommuninvest – a cooperative organisation in Sweden helping municipalities to improve the market conditions for local government loan financing – lets eligible project be reviewed and approved by consensus vote in the Green Bonds Environmental Committee. The Green Bonds Environmental Committee consists of representatives from the environmental function of two or more member municipalities/county councils, environmental experts from other relevant public sector organizations/academia/NGOs, as well as Kommuninvest's Management (CICERO 2016a). It has turned out to be a very useful platform for knowledge sharing and increased understanding of both environmental and financial concerns related to local government financing. Other issuers go further to include criteria for environmental impact or life-cycle analysis in the project selection process, e.g. Örebro municipality in Sweden (CICERO, 2014d), while others give environmental experts veto power in the selection process. Defining rules for environmental analysis and involvement of environmental experts in the project selection process increases confidence in the environmental outcomes of the green bond. International financial institutions tend to have more developed procedures for environmental screening of projects. For example, the Nordic Investment Bank (NIB)

screens all eligible projects for environmental risks, including a review for a lack of transparency on environmental issues (CICERO, 2014c).

- **Integrated mitigation and adaptation planning** – For many issuers that invest in infrastructure, typically municipalities, both reducing GHG emissions and considering the potential physical impacts of climate change are important. Municipalities typically invest in improved resilience in water management, both drinking water and wastewater, in addition to activities to reduce emissions from energy production, transport and housing. Robust governance requires integrated planning that covers both climate change mitigation and adaptation. Integrated planning may help municipal issuers to prioritise mitigation and resilience criteria in a range of sectors. In contrast, we have also seen adaptation projects that contradict mitigation (e.g. support for more drilling outside of hurricane season).
- **Transparency and impact reporting** – Annual reporting of the projects financed by a green bond is a key component of transparency, and has become a widespread market practice. Reporting on impacts is an important next step on understanding climate and environmental risk and impacts. The World Bank has been a market leader in impact reporting, listing expected impacts from projects on their website and highlighting selected project impacts in their annual green bond newsletter. Reported impacts include GHG reductions but also other indicators such as land area covered by sustainable agriculture practice (World Bank, 2015). To date, only a few issuers have agreed to verification of *ex-post* environmental impacts. Some of the building standards used by many municipalities and building corporations include requirements of ex-post follow up when it comes to energy efficiency. Verification is important for the realised environmental impacts of a green bond, but can be complex depending on the project type and the type of impacts.

3.2 Benefits of increased internal dialogue

Through the process of obtaining a second opinion from CICERO, issuers have a dialogue with climate change experts and learn about areas where they can tighten their internal procedures to safeguard against negative climate and environmental impacts. In many cases, this promotes an internal dialogue between financial and environmental departments within the issuing institution. The dialogue usually increases the environmental awareness in the financial decision-making process of the issuing institutions, while at the same time enhancing CICERO's knowledge of the main concerns of the issuer. Thanks to this dynamic process, both green bond frameworks and the process of writing a second opinion have improved. The dialog with climate experts has also led some issuers to further refine eligible project types and in some cases to conduct environmental analyses (such as a life-cycle analysis) more often.

3.3 Best practice...and some pitfalls

Over time, we have seen an increasing willingness from issuers of green bonds to take on board issues and concerns that will reduce climate risks and secure the greenness of the projects and activities financed through these bonds. More and more often, the issuer will incorporate life cycle analyses to take account of the wider environmental repercussions of their activities. Also environmental control of subcontractors is becoming more common, especially for municipal issuers, where in particular a number of Swedish municipalities are implementing best practices. This is important as the green bonds issued by municipalities often cover a wide range of

activities and projects. Increasingly, in-house or external experts, through collaboration with universities or other research organisations, get veto power when it comes to selecting which projects will be financed by green bond proceeds. Finally, transparent and accessible reporting of the impacts of the green projects are on the way in, but then more often in connection with well-defined and single purpose projects, typically in the building sector.

Looking across the second opinions that CICERO has produced according the Shades of Green methodology, some project types lend themselves more readily to climate change objectives, such as renewable energy, while others such as clean transportation require further details to understand potential environmental impacts and risks. Figure 4 shows the Shades of Green assigned to different project types in recent second opinions. The initial trend shows that renewable energy, adaptation, and water management were assigned the greatest number of dark green shades. Renewable energy projects generally align well with a low-carbon future. For categories such as transportation, buildings and waste, more medium green shadings were assigned, due to further concerns for environmental impacts. Looking across all of the second opinions from CICERO, we can discern some best practice trends in these sectors.

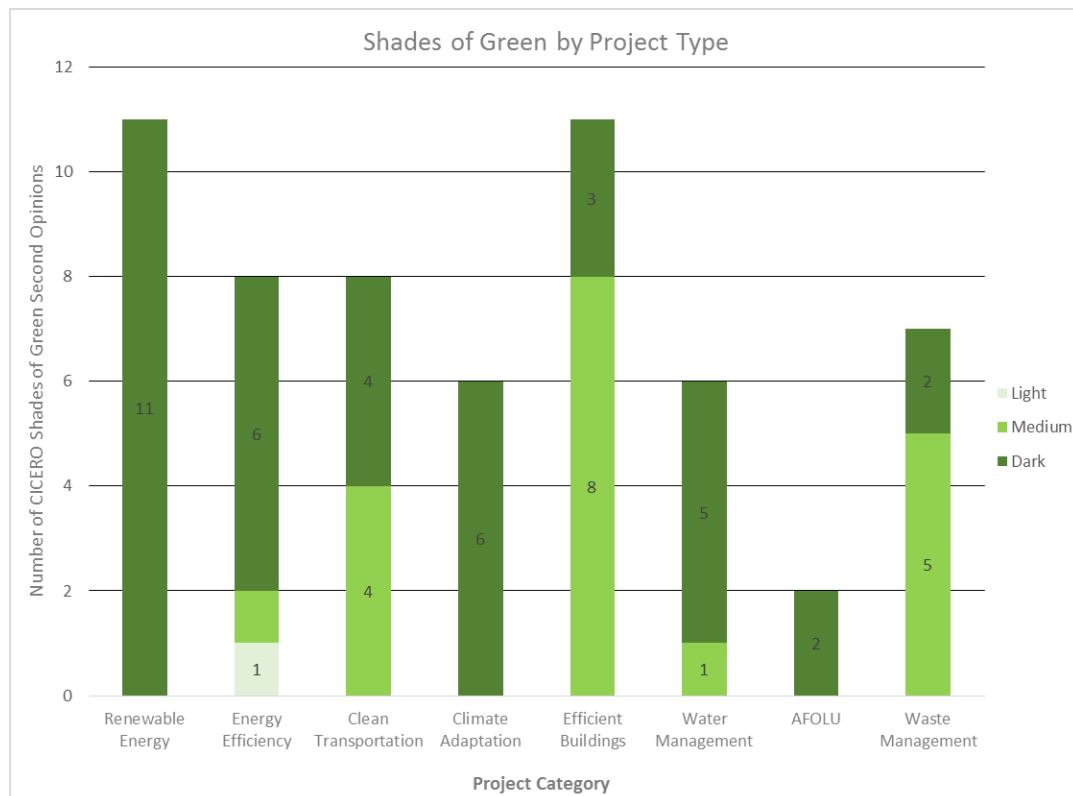


Figure 4: Number of CICERO second opinions by Shade of Green for each project type

- Renewable energy** – While most renewable energy projects are in line with climate change objectives, it is important to review projects for potential local environmental impacts including impacts on biodiversity. This is particularly important for hydro projects. Best practice for biofuels projects incorporates life cycle analysis and typically relies on waste from forests. Again, several Swedish municipalities provides examples of best practices. Other sources of biofuels may require more care to make sure that they deliver a zero or net negative emission solution.

- **Energy efficiency** – Energy efficiency projects can apply to a number of sectors, but the climate benefit is limited if a project prolongs GHG emissions even though annual emissions may be reduced. There is also an inherent danger of rebound effects associated with efficiency improvement. While for instance energy use per square meter in buildings may go down, the number of heated square meters may increase when the cost of energy per square meter is lower. The same goes for efficiency improvements in transport, where the amount of kilometres driven may increase as fuel costs decrease. Best practice will drive efficiency improvements towards zero emission solutions and not only marginal improvements in technologies not able to deliver final zero emission solutions.
- **Clean transportation** – A focus on public transportation is important, but public transport can still be fossil fuel-based. Best practice in this area includes powering public transport by renewable energy and improving cycling and pedestrian conditions, as seen in the City of Oslo green bond (CICERO, 2015), and in Kommuninvest's green bond (CICERO, 2016a).
- **Climate adaptation** – Adaptation projects are primarily included in green bonds issued by development banks and municipalities. Best practice in adaptation projects aims for implementing 'final solutions', i.e. solutions that can be expected to be sufficient for physical and regulatory conditions in the long-term, e.g. 2050. The best adaptation projects are also integrated with emission reductions to avoid any negative trade-offs for the climate. Several municipalities show best practice in this regard, but also a company like Latvenergo includes adaptation measures in its green bond framework (smart grids, flood protection and other water management measures) (CICERO, 2015a).
- **Efficient buildings** – Because of the long lifetime of buildings, we should strive for maximum energy efficiency and low- or zero-carbon footprints, to avoid locking in future emissions, especially in new buildings. Global and national building certifications can be a first step towards understanding environmental impacts, but will typically not guarantee against locking in GHG emissions. Best practice is to supplement high certification levels (e.g. BREEAM Excellent or Outstanding) with additional energy efficiency reductions. Issuers should also be aware of possible rebound effects, i.e. tenants in energy efficient buildings using more electricity. While this is not always the building owner's responsibility, some forward-looking real estate companies like Vasakronan, the first corporate issuer of a green bond, have programs to work with building tenants to reduce their environmental footprint (CICERO, 2014a).
- **Water management** – An integrated approach of mitigation and adaptation is important for water projects. An example of best practice is the holistic approach taken by the Nederlandse Waterschapsbank (NWB), a bank that provides finance to the regional Water Boards in the Netherlands (CICERO, 2014b). This approach includes considering water management, flood protection, and biodiversity impacts.
- **Agriculture, Forestry and Other Land Use (AFOLU)** – In this project category, best practice means adhering to international standards and certifications, as demonstrated by the green bond issuance by HSBC (CICERO, 2015b). For forestry, the most recognised standards are the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC), while for agriculture, the Roundtable on Sustainable Palm Oil (RSPO) or Roundtable on Responsible Soy (RTRS) certifications are acceptable. When funding Payment for Ecosystem Services (PES) schemes such as Reduced Emissions from Deforestation and Forest

Degradation (REDD+), one should be cautious to avoid issues related to governance and leakage. In such cases, it may be beneficial to include other criteria related to the protection of biodiversity and local communities.

Waste management –Incineration with energy recovery is a sound environmental and climate-friendly practice to reduce landfilling. However, a country or municipality with a big incineration capacity might be tempted to prioritise waste incineration for energy purposes over recycling. Hence, best practice for waste projects focuses on recycling fossil-fuel waste such as plastics into new materials. Other best practices are methane capture and destruction from landfills, and development of organic waste treatment facilities using bio-methane generation and composting.

4 Looking ahead

Going forward, connections between climate change information and investors should be strengthened. Investors need clear and tailored information to enable climate-smart financial decisions.

Clear and consistent environmental labelling is one tool to help steer investments to a low-carbon and climate-resilient future. Frameworks and procedures for green bonds should become more similar and transparent to increase investor confidence in environmental outcomes. This would help the further development and branding of green bonds as a well-specified financial instrument, reduce transaction costs and facilitate comparison and evaluation across issuers, projects, sectors and technologies.



Investors need clear and tailored information on green investments. Photo: Pixabay, thoz.

Understanding the realised environmental impacts of projects financed through green bonds is an important next step. Investors are increasingly calling for impact reporting, e.g. through the Statement of Investor Expectations for the Green Bond Market (Ceres, 2015). The Green Bond Principles stipulate that reporting should include the use of proceeds and performance indicators (qualitative or quantitative) that can measure environmental impact of a particular investment (ICMA, 2015). Impact reporting is required under the Climate Bonds Standard. To date, only a few issuers are reporting the impacts of projects financed through a green bond, but we expect more to follow, especially as the World Bank continues its efforts to harmonize

reporting. It is important that impact reporting reflects a range of indicators, and not focus solely on carbon mitigation at the expense of other projects with valuable impacts e.g. on water security. Verification of *ex-post* impacts is a logical next step after impact reporting becomes more widespread in the market.

Looking beyond green bonds, CICERO is also considering ways to build upon our experience in environmental due diligence and our Shades of Green classification system. Further work could explore potential future applications to urban infrastructure. For example, the exposure of infrastructure to extreme weather and other climate change impacts could be indicated by shades of green. Also municipalities could be reviewed to take into consideration how well their management is aligned for a low-carbon climate-resilient future. This could be useful for municipal planners, investors that have direct ownership in infrastructure projects, or insurance companies to consider their climate-related risk. Further work could also include analysing the climate risk exposure of other green financial products or indices. CICERO is working closely with the financial sector to offer expertise and scientific research that can help investors secure the value of their portfolios better against climate change risk.

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CICERO (Center for International Climate and Environmental Research - Oslo)

CICERO (Center for International Climate and Environmental Research - Oslo) was established by the Norwegian government in 1990 as a policy research foundation associated with the University of Oslo. CICERO's research and information helps to keep the Norwegian public informed about developments in climate change and climate policy.

The complexity of climate and environment problems requires global solutions and international cooperation. CICERO's multi-disciplinary research in the areas of the natural sciences, economics and politics is needed to give policy-makers the best possible information on which to base decisions affecting the Earth's climate.

The research at CICERO concentrates on:

- Chemical processes in the atmosphere
- Impacts of climate change on human society and the natural environment caused by emissions of greenhouse gases
- Domestic and international climate policy instruments
- International negotiations on environmental agreements

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