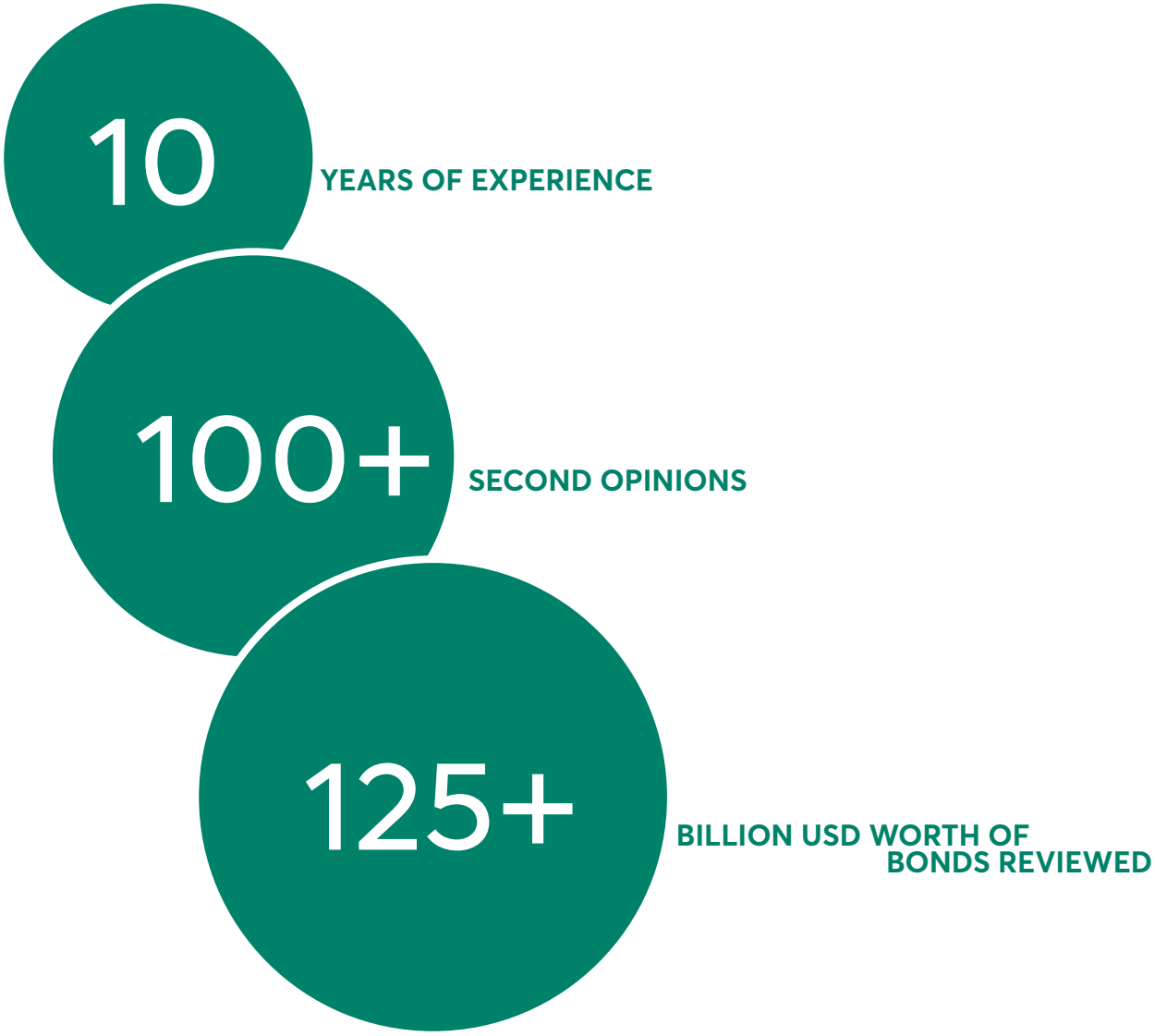
REPORT 2018:11

CICERO MILESTONES 2018

A PRACTIONER'S PERSPECTIVE ON THE GREEN BOND MARKET



CICERO
Center for International
Climate Research

GREEN BOND SECOND OPINIONS AND THOUGHT LEADERSHIP

Ten years ago, CICERO provided the first second opinion on a green bond framework for the World Bank and has maintained a leading presence in the green bond market since then. To date, CICERO has worked with 100 issuers across Europe, Asia, Africa and North America to produce bespoke Green Bond Second Opinions. The resulting green bonds are valued at over $125 billion USD issued in 30 currencies that span every continent. CICERO has helped to push the market in new and innovative directions, taking on many market landmarks, including:

- ✓ 1st green bond (World Bank)
- ✓ 1st municipal green bond (Gothenburg)
- ✓ 1st corporate green bond (Vasakronan)
- ✓ 1st green sukuk (Tadau Energy)
- ✓ 1st Asian sovereign green bond (Republic of Indonesia)
- ✓ 1st pension fund (CPPIB)
- ✓ Largest green bond issuer (Fannie Mae)
- ✓ Largest commercial bank green bond (ICBC)

At the heart of CICERO's approach to green bond external reviews is a commitment to reflecting the latest climate science, protecting the environmental integrity of the voluntary green bond market, and promoting transparency on climate risk. The TCFD (Task Force on Climate-Related Financial Disclosures)'s 2017 recommendations called on financial markets to recognize not just the impact we have on the climate, but also the impact that climate change is having on our economy. Climate risks have become financial risks. As more financial actors and companies come up the learning curve and respond to the recommendations, our green bond ratings can help provide investors with the environmental and sustainability insights they need to make informed decisions.

CICERO established and leads the Expert Network on Second Opinions (ENSO) to connect to four other research institutes: the Basque Center for Climate Change (BC3), the Stockholm Environment Institute (SEI), the Institute of Energy, Environment and Economy at Tsinghua University, and the International Institute for Sustainable Development (IISD). Based on CICERO's methodology, **this research network offers issuers in-depth expertise in environment and sustainability issues for Second Opinions on Green Bond and Sustainability Bond Frameworks, in addition to broad language and regional competence around the world.**

CICERO's Shades of Green rating included in our Second Opinions helps investors understand the climate risk and potential impact of green bonds and encourages a race to the top. We have seen issuers develop creative solutions and best practices, raise the bar for environmental performance, and build on each other's success to reach ever-higher green ambitions. As the market continues to develop standards and definitions, we hope our Shades of Green can encourage not just a race to the top, but also a thoughtful, holistic approach to climate risk.

We see new and unique approaches with each Second Opinion as issuers' targets for and understanding of environmental issues evolve. As the green bond market grows and expands into new regions, CICERO is committed to advancing environmental integrity and transparency in the market.

Kristin Halvorsen
Director

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Head of Second Opinions

METHODOLOGY

CICERO introduced the Shades of Green methodology in 2015, which is rooted in and developed to apply CICERO's climate science to the green bond market. This climate-science based rating method, focused on avoiding lock in of greenhouse gas emissions over the assets' life time and promoting transparency on resiliency planning and strategy, is what sets our Second Opinions apart. Green bond projects have environmental strengths, weaknesses and pitfalls and require the issuer to have effective governance procedures to deliver the desired impact. Our second opinions take a long-term view on activities that support a low-carbon and climate resilient society. Through them, we assess green bond frameworks, and communicate them in a way that is useful to investors. We do this by reviewing frameworks for the following:

- ✓ Project-specific environmental strengths, weaknesses, and pitfalls, with a focus on avoiding locked-in emissions over the lifetime of the asset and resiliency planning.
- ✓ The issuer's governance procedures that support implementation of the environmental ambitions of the framework
- ✓ Alignment with ICMA Green Bond Principles (and other principles or standards when relevant)

We use three shades of green to rate green bond frameworks, signaling to investors the potential environmental impact that projects under the given framework may have, as well as the projects' potential exposure to physical and transitional climate risk. An overall shading is assigned to the entire framework, based on the ratings of the individual project categories and considerations of governance and transparency. Governance procedures and expected allocation of funding between project categories can be the determining factors for a final shading.

CICERO Shades of Green

Dark green is allocated to projects and solutions that correspond to the long-term vision of a low carbon and climate resilient future. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Ideally, exposure to transitional and physical climate risk is considered or mitigated. *Examples include wind energy projects with a strong governance structure that integrates environmental concerns.*

Medium green is allocated to projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Fossil-fueled technologies that lock in long-term emissions do not qualify for financing. Physical and transition climate risks might be considered. *Examples include bridging technologies such as plug-in hybrid buses.*

Light green is allocated to projects and solutions that are climate friendly but do not by themselves represent or contribute to the long-term vision. These represent necessary and potentially significant short-term GHG emission reductions, but need to be managed to avoid extension of equipment lifetime that can lock-in fossil fuel elements. Projects may be exposed to the physical and transitional climate risk without appropriate strategies in place to protect them. *Examples include efficiency investments for shipping technologies where clean alternatives are not available.*

Investments in all Shades of Green – light, medium, and dark – and in all sectors are necessary in order to successfully implement the ambition of the Paris agreement. We have already seen many good examples of Medium and Dark Green bonds in expected sectors like renewable energy, green buildings, energy efficiency, and clean transportation. Opportunities for light green projects abound and are necessary buildings blocks to pave the way towards a low carbon, climate resilient future.

CICERO'S PORTFOLIO OF SECOND OPINIONS

Over the past ten years, CICERO has completed over 120 second opinions (including updates) for 100 unique issuers around the globe. These issuers are corporations, financial institutions, multilateral development agencies,

and public-sector entities with headquarters in Europe, Asia, Africa, and North America. Following CICERO's review of green bond frameworks, they have issued green bonds worth over 125 billion USD equivalent in 30 currencies spanning the globe. Figure 1 shows the issuers CICERO has worked with by their headquarters. As of 2018, the majority of issuers are headquartered in Europe, followed by Asia and North America. Figure 1 also illustrates the use of proceeds for CICERO-reviewed frameworks. CICERO has seen a marked concentration in renewable energy, green buildings, energy efficiency, and clean transportation – in that order. Both of these observations are generally consistent with trends in the broader green bond market in 2017: Europe led the market with $61.4bn USD, followed by North America with $56bn USD and Asia with $25bn USD[1]. Renewable energy (25%) and energy efficiency (22%) are the most common use of proceeds.

While the vast majority of issuers align frameworks with the voluntary ICMA Green Bond Principles, some issuers also refer to regional or other principles or standards such as the ASEAN Green Bond Principles or country-specific green regulations. We are now also seeing frameworks align with the Green Loan Principles, or issuers that develop green financing frameworks that aim to capture a broader range of financial instruments.

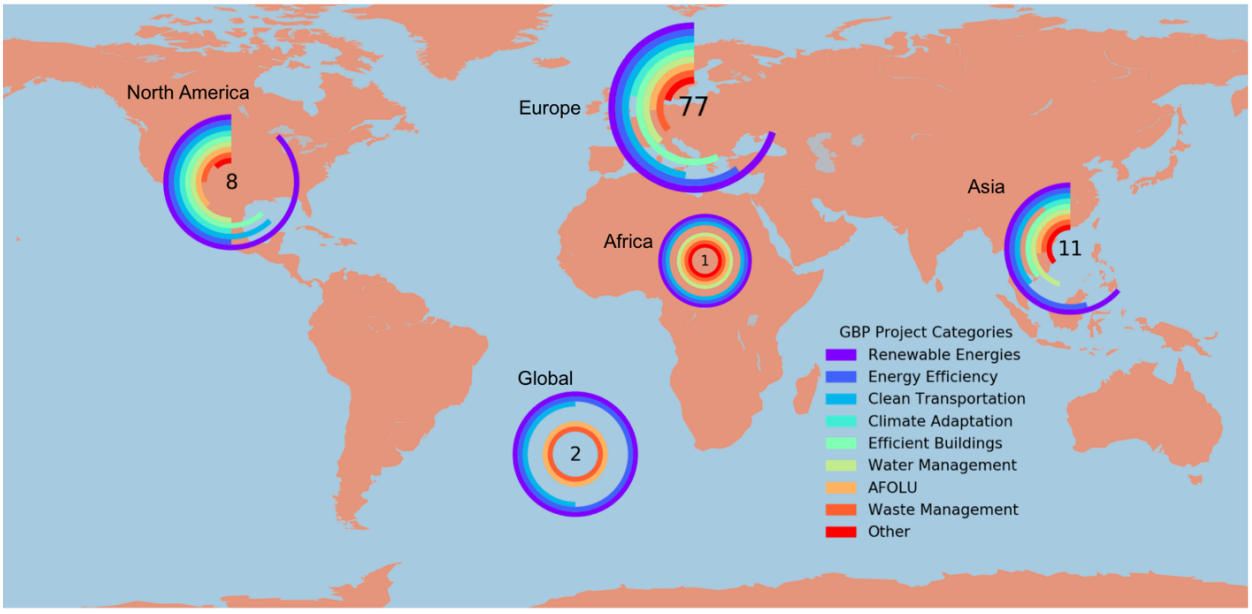

Figure 1: CICERO's absolute number of reviewed green bond frameworks per region (2008-2018) and use of proceeds by sector (July 2018).

CICERO reviewed the green bond frameworks for 79 percent of issued green bonds (by number of green bonds issued, and 30 percent by value) in 2017[2]. This is up from 48 percent (by number) and 21 percent (by value) of issued green bonds in 2016. The marked growth from 2016 is largely due to Fannie Mae's entry into the market and CICERO's recent completion of a Second Opinion for their Green Mortgage-Backed Security (MBS) framework. Fannie Mae is the single biggest issuer of green bonds by value (more than $40bn USD), representing 60 percent (by number) and 11 percent (by value) of the total green bond market. Figure 2 shows the green bond market's cumulative issuances from 2008 to 2018 by Second Opinion provider. CICERO has assessed 29 percent of the total cumulative value of bonds; 15 percent of the value has been issued without a Second Opinion.

[1] https://www.environmental-finance.com/assets/files/Green%20Bonds%20Review%20of%202017.pdf
[2] Data source: Climate Bond Initiative (2018) database and the average annual currency exchange rates.

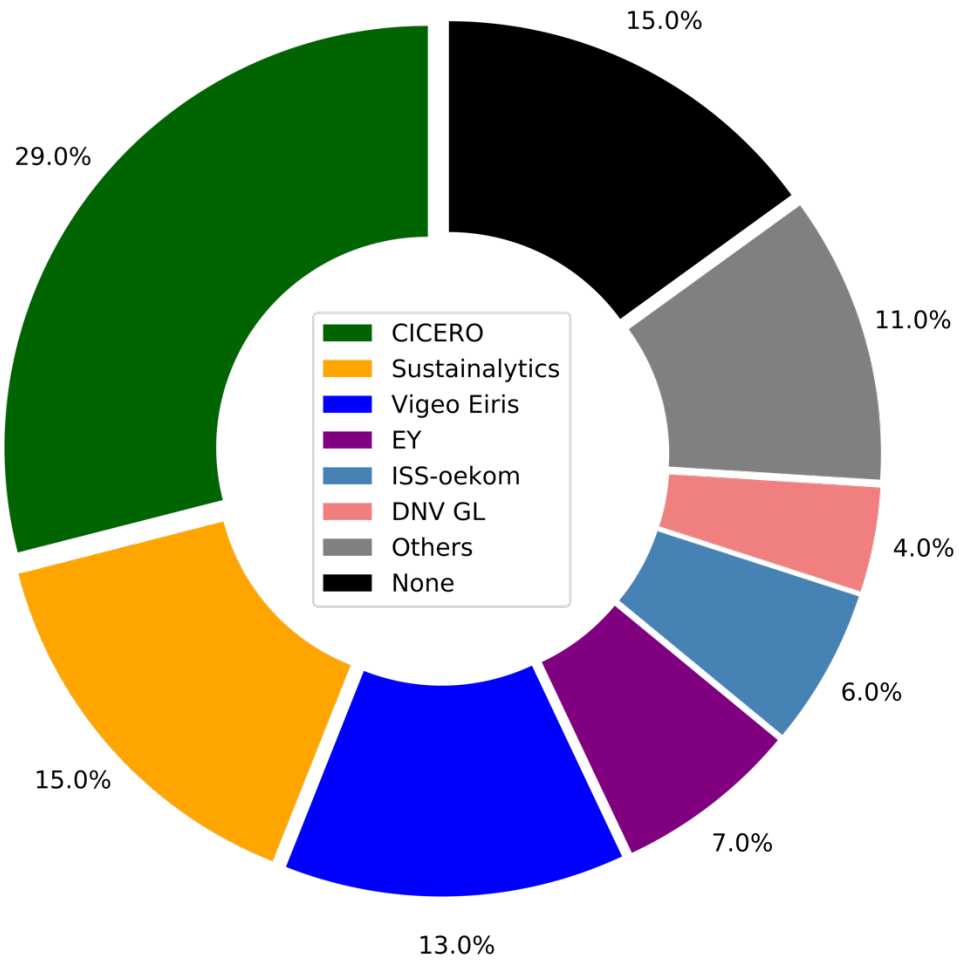

Figure 2: Market Shares of External Reviewers by cumulative value of bonds issued from 2008-2018. Data from CBI (July 2018).

CICERO has worked with a broad range of issuers. Figure 3 shows CICERO's issuers by type and overall green shading. Of the 100 issuers CICERO has worked with, approximately two thirds are corporates or financial institutions, including development finance institutions. Among the variety of public issuers CICERO provided second opinions for are sovereign governments (Republic of Indonesia), municipal banks in all the Nordic countries, and municipal and regional governments around the world such as in US, Canada, Sweden and Norway.

The largest sector representation among the corporates is real estate developers or property managers followed by the energy sector. We have also worked with a few forestry-focused entities, such as Södra Skogsägerna and the Landshypotek Bank, transportation companies (ADIF), and manufacturing companies (Stenametall).

Financial institutions include commercial banks, export credit agencies, development banks and pension funds. CICERO has provided the Second Opinion for the first pension fund (CPPIB) and the largest commercial bank ICBC, whose framework focuses on the Chinese Belt and Road Initiative. We have also worked with many of the major multilateral development institutions, including the World Bank, EBRD, AfD, IFC, ADB, and KFW. We recently completed a second opinion for Indonesia's national development and infrastructure bank, PTSMI and to the Nederlandse Waterschapsbank (NWB) that lends out to regional water authorities.

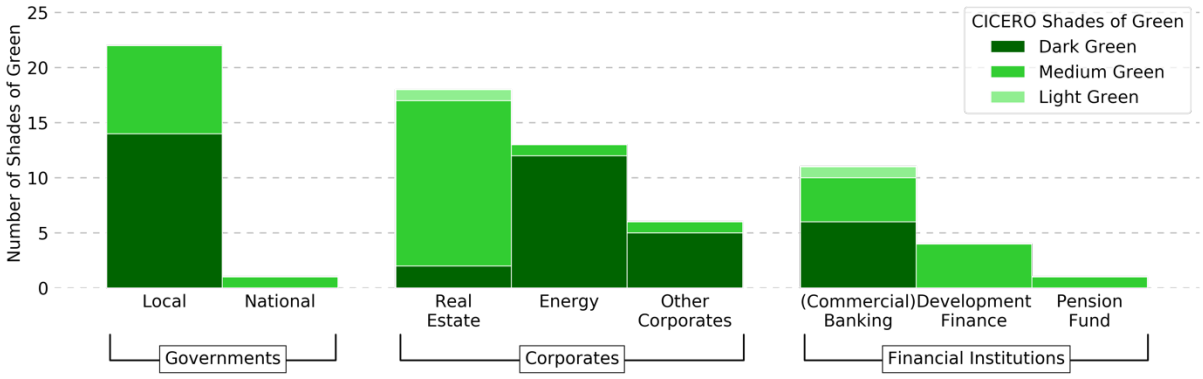

Figure 3: Number of Assigned Shades of Green (2015-2018) per Issuer Type (local governments include municipality banks) (July 2018).

BEST PRACTICES FOR GREEN INTEGRITY

Since we introduced our Shades of Green methodology, we have assigned a green shading to 76 green bond frameworks, providing an opportunity for reflecting on best practices. Figure 4 represents cumulative CICERO shading by use of proceeds categories relative to how often these categories occur in the green bond frameworks. As illustrated in Figure 4, approximately half of the frameworks CICERO has reviewed have been considered dark green overall, with almost the entire remainder considered medium green. This reflects issuers' focus on renewable energy, green buildings, energy efficiency and clean transportation projects.

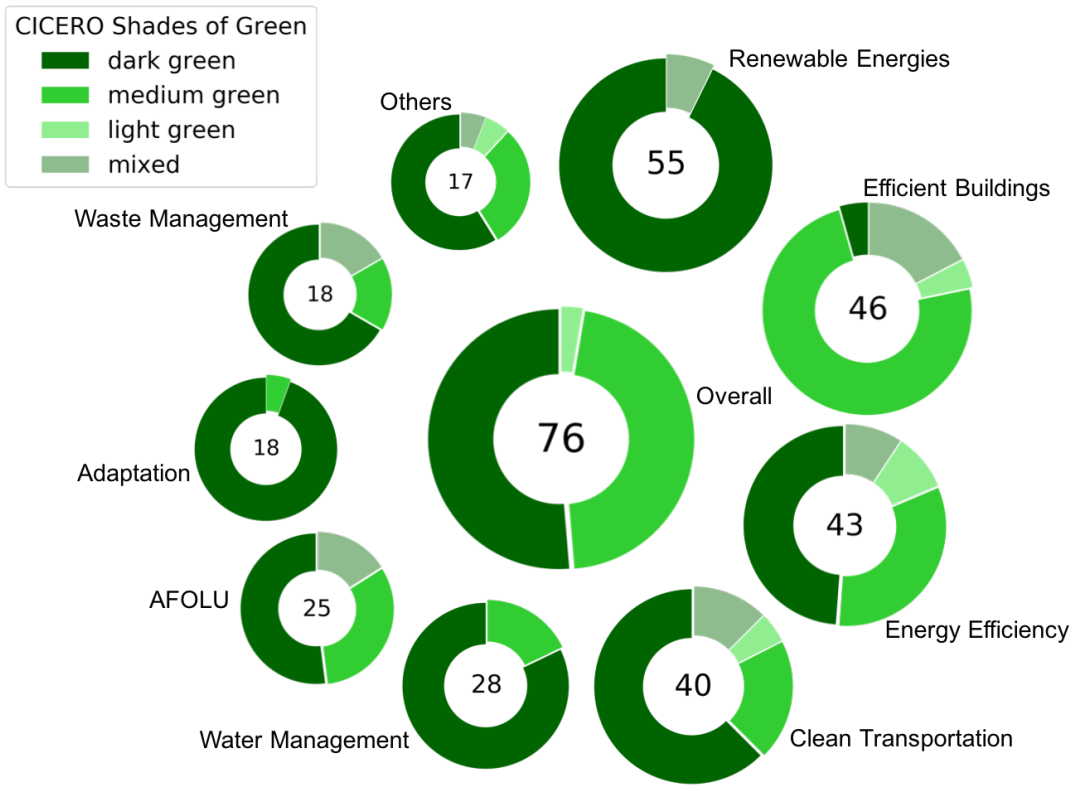

Figure 4: CICERO's Assigned Shades of Green (2015-2018) per Project Category and overall (July 2018).

PROJECT CATEGORY CONSIDERATIONS

Below, we include examples that demonstrate how our methodology has been applied at the project category level noting sector trends and common concerns and highlighting best practices.

We reference the International Energy Agency's (IEA) World Energy Outlook (WEO) scenarios for sector context in several project categories. These WEO scenarios are widely used to assess transition risk across various industries. However, it is important to note that alignment with the WEO Sustainable Development Scenarios (SDS), which is the 2-degree scenario from the WEO report, only gives us a 50 percent change of limiting global warming to 2 degrees. Considerations beyond 2040 need to be taken into account from climate models, such as those developed by the IPCC.[3]

The list of considerations presented for each project category is not comprehensive, but is intended to illustrate how we apply our methodology. Each project category highlights a brief best practice example from our own second opinions; these best practices should be considered within the context of the complete second opinion. *Our second opinions are available here*[4].

Did You Know?

CICERO compiles science updates for investors. These science updates cover the latest developments on climate change such as *the increasing occurrence of heat waves and their impact on food supply in the summer of 2018*.

Understanding climate impacts and transition pathways can provide a solid foundation for developing a climate risk strategy. We offer courses on climate science and risk for investors that want to better understand the scientific underpinnings of climate risk and scenarios.

For questions about science updates and courses, please reach out at greenbonds@cicero.oslo.no

RENEWABLE ENERGY

In 2017, renewable electricity generation grew 6% and reached a quarter of global power output, thanks to the continued growth of solar PV and wind technologies. Despite these positive trends (especially with PV), additional efforts are needed in renewable power generation to meet the targets set out in the IEA's SDS. According to the IEA, the share of renewables in global electricity generation must reach 47% by 2030, up from 25% in 2017.[5]

- ✓ While renewable energy is generally low-carbon, local environmental impacts such as on biodiversity and landscape, and lifecycle emissions from construction and operation are concerns for these projects. We also consider resilience to climate change, for example the impact of flooding or drought on hydro projects.
- ✓ Large constructions such as *large hydropower* plants that includes dams are of concern both when it comes to lifecycle emissions and local impacts.
- ✓ For *bioenergy*, we consider type and source of feedstocks. Peat is not considered a renewable energy source.
- ✓ For *large-scale geothermal*, we ask for emissions data as well as consider broader impacts, such as the potential for heavy metal pollution.

Issuer Spotlight: Tadau Energy is a Malaysian company with the special purpose of constructing and operating solar projects. The Dark Green rated green sukuk framework highlights solar projects while mitigating local

[3] https://www.cicero.oslo.no/en/posts/news/scientists-demystify-climate-scenarios-for-investors
[4] https://www.cicero.oslo.no/en/posts/single/cicero-second-opinions-list
[5] http://www.iea.org/tcep/power/renewables/

environmental impacts. A process for site selection includes considerations of local environmental impacts of the project as well as the construction phases.

GREEN BUILDINGS

In a low carbon 2050 perspective, the energy performance of buildings is expected to be improved, with passive house technology becoming mainstream and the energy performance of existing buildings greatly improved through refurbishments. The building sector accounts for over 40% of primary energy consumption in most countries. Efficiency of building envelopes needs to improve by 30% by 2025 to keep pace with increased building size and energy demand – in addition to improvements in lighting and appliances and increased renewable heat sources.[6] Energy efficiency improvements in buildings are thus important building blocks towards reaching the 2°C goal.

- ✓ Although voluntary environmental certifications such as LEED and BREEAM or equivalents can measure or estimate the environmental footprint of buildings and raise awareness of environmental issues, they fall short of guaranteeing an environmentally-friendly building. They do not guarantee a reduction in GHG emissions nor necessarily include considerations of resiliency.
- ✓ In addition to certifications we consider
  a) Energy efficiency targets that exceed regulations.
  b) Low carbon transportation solutions.
  c) Construction phase concerns.
  d) Resiliency. Flooding risk, in combination with extreme weather and sea level rise, has been observed in almost all regions in the world.[7] Flood risk for properties, is of particular concerns in vulnerable geographic regions, i.e. Europe, coastal regions of North America, and Central and South America.

Issuer Spotlight: Vasakronen is the largest property company in Sweden. The Dark Green rated framework outlines a holistic approach to climate-friendly investments in new and existing green buildings. Vasakronen's framework stipulates high building standards for new construction and ambitious energy saving goals for refurbishment together with good waste and water management targets.

ENERGY EFFICIENCY

Recent improvements in energy efficiency have partly been achieved through regulations, such as fuel-economy standards, building energy codes and industry targets. Efficiency improvements are also delivered by price effects, technological change and advances in energy management in the industrial and buildings sectors. In order to meet the 2 degree target, additional improvements must be made in this project category. The impact of energy efficiency improvements for different fuels depends on the sector under consideration. On a global level, we need to make things more energy efficient at a rate of 3.2% per year through 2040, which is double the rate in the period 2000-2016, in order to be in line with the SDS scenario."[8]

- ✓ Energy efficiency investments, such as smart technology aimed at reducing energy consumption, are key to reducing emissions. Smart grids and grid upgrades are necessary to manage and increase the share of intermittent and decentralized renewable energy. Grid upgrades need to consider the amount of renewable energy connection.

[6] http://www.iea.org/tcep
[7] https://www.cicero.oslo.no/no/publications/internal/2871
[8] https://www.iea.org/weo2017/

- ✓ Be aware of lock-in of obsolete technologies when proceeds are allocated to efficiency in fossil fuel infrastructure. Efficiency improvements can prolong the lifetime of fossil-fueled technology, thereby possibly increasing accumulated GHG emissions in the long term. Therefore, consider emission grid factor for district heating and electricity for energy efficiency projects. Infrastructure upgrades (such as new pipes) directly associated to fossil fuel energy productions, such as coal, need to be considered against alternatives.
- ✓ Efficiency improvements may lead to rebound effects. When the cost of an activity is reduced there will be incentives to do more of the same activity.

Issuer Spotlight: Fingrid is a Transmission System Operator company in Finland. The Medium Green rated framework provides a sound approach for energy efficiency projects. The framework defines energy efficiency investments for the development, construction and reconstruction of transmission networks to decrease network losses as well as to enhance demand-supply balancing, transmission capacity for clean energy and grid connections to neighboring countries. Although Fingrid does not have control over the energy mix in the electricity grid, it aims to promote the increased share of renewables in the Finnish energy mix through the development of its transmission networks, specifically through connections to renewable energy sources and strategic connections with neighbors that have a higher renewable energy share.

CLEAN TRANSPORTATION

Global transport emissions grew by only 0.6% in 2017 (compared to 1.7% annually over the past decade), as efficiency improvements, electrification and biofuels helped limit the growth in energy demand. To meet the SDS goals, direct transport emissions must peak around 2020 and then fall by more than 9% by 2030.[9]

- ✓ The largest amount of carbon savings come from switching from inefficient modes of transport (e.g. private cars) to mass transit.[10] Consider the potential macro-impacts of investments that might alter transportation patterns or travelers in favor of lower emissions options like riding public transportation, walking or cycling.
- ✓ For projects aimed at like-for-like replacement of transport infrastructure, the improvements in environmental performance depend on the fuel type and efficiency. We consider public transport projects that include fossil fuel elements such as hybrid buses as bridging technologies, and not a long-term solution.
- ✓ While electric modes of transportation are preferable to those that directly use fossil fuels, we should nevertheless be aware of the indirect GHG emissions stemming from the production and use, and strive to keep increasing their efficiency. Also observe complex impacts of some biofuels. Consider life cycle emissions, and avoid negative impacts on biodiversity.

Issuer Spotlight: ADIF – Alta Velocidad is a state-owned public high-speed railway corporate entity in Spain. The Dark Green rated framework promotes a transition to low-carbon society by investments into an electrified high-speed rail network. Investments under the framework include projects for new rail lines as well as maintenance, upgrades and energy efficiency of the rail system. Currently only about a third of Spain's electricity generation is renewable, while the rest is fossil fuel based or nuclear. However, it is reasonable to expect that in the future Spain's energy mix will continue to become less carbon intensive which reinforces the potential benefits of investing in rail transport.

[9] http://www.iea.org/tcep/transport/
[10] https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter8.pdf

WATER MANAGEMENT

The impact of climate change on the hydrological cycle can lead to risks such as increased vulnerability to water-related hazards, water quality, decreased water supply or increased demand.[11] Water risk concerns both water scarcity and overabundance; it is necessary to respond to those risks while planning ahead for a low-carbon and resilient society.

- ✓ Consider environmental impacts of projects involving large construction projects.
- ✓ Consider the geographic context and its implications for expected (and unexpected) drought and flood.[12] In areas with high levels of water scarcity, initiatives that reduce loss of water along distribution pipes and that increase access to potable water are a strength. In coastal areas or flood plains, consider initiatives for resiliency planning for flooding and sea level rise.
- ✓ Be aware of possible lock-in emissions from construction and operation materials such as pipes and infrastructure that may depend on fossil fuel.

Issuer Spotlight: Kommunalbanken Norway (KBN) is a municipal bank that finances public services in Norway. The Dark Green rated framework exemplifies good resilience and impact reporting policies and describes lower interest rates for green investments in water management infrastructure. Comprehensive environmental screening processes are in place to ensure the sustainability of projects to upgrade systems of water and wastewater, water treatment and energy and heat recovery from waste water.

AGRICULTURE AND FORESTRY

Avoiding deforestation and forest degradation combined with afforestation will play an important role in reducing GHG emissions and sequestering carbon to counterbalance emissions from other sources. The two most common approaches of using forests in a climate perspective are to protect and sequester carbon or manage forests sustainably, which will provide raw materials and goods, such as biofuels and building materials, for the low-carbon economy. Emissions from land use change averaged 12 percent of total global emissions between 2007 and 2016.[13] These emissions are driven primarily by the meat and dairy sector, and global meat consumption is growing. [14] Emissions can be substantially lowered through changes in consumption patterns, adoption of energy savings measures, dietary change and reduction in food wastes.[15]

- ✓ Sustainable forest management should not deplete existing terrestrial resources; consider protected areas and biodiversity concerns. Regional context is an important consideration for agriculture and forestry, in particular around tropical forests.
- ✓ We consider if forest management requirements are equal to certifications such as the Programme for the Endorsement of Forest Certified (PEFC) and/or stricter than environmental standards required by law.

[11] https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap3_FINAL.pdf
[12] https://www.ipcc.ch/pdf/technical-papers/ccw/chapter3.pdf and https://www.cicero.oslo.no/en/publications/external/5809
[13] http://www.globalcarbonproject.org/carbonbudget/17/presentation.htm
[14] https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/research/clf_reports/2015-12-07e-role-of-diet-food-waste-in-cc-targets.pdf;
[15] https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

- ✓ Irrigation projects for agriculture can overdraw fresh water supply, thereby threatening drinking water sources and fragile ecosystems. Measures to assess and protect potable water systems and availability should inform and accompany irrigation projects.

Issuer Spotlight: Landshypotek Bank focuses on providing financial service to the agricultural and forestry sectors in Sweden. The Dark Green rated framework drives innovation during construction and operation for a resilient low-carbon society and sustainable forest management. Investments include acquisition of land as well as forest planning and management fertilization, harvesting, roads and conservation.

WASTE MANAGEMENT

Apart from the direct climate impact, waste recycling strategies are crucial for environmental and social wellbeing. The waste sector contributes almost 5% of global GHG emissions mainly from landfill and wastewater methane and nitrous oxide as well as CO_2 from waste incineration.[16]

- ✓ Waste incineration with energy recovery is a sound environmental and climate friendly option to divert waste away from landfills. Waste incineration is however best combined with ambitious recycling policies.[17] When the capacity for waste incineration is high, it might be an incentive to prioritize incineration of waste for energy purposes over recycling, which is counterproductive.
- ✓ A potential pitfall of waste incineration projects could be the transportation of waste over long distances to the incineration point.

Issuer Spotlight: Stena Metall is a recycling company for a large variety of waste products. The Dark Green rated framework covers an essential part of a green transition by limiting raw material use and reducing associated greenhouse gas emissions for a recycling center in Halmstad, Sweden. The recycling center supplies ferrous and non-ferrous metals to smelters around the world and is one of the first in the world to meet the EU's 95 percent target for recycling end-of-life vehicles.

ADAPTATION

Physical climate change such as extreme events and flooding are affecting all sectors and regions already. Due to historical emissions, we are locked in for approximately 1.5°C global warming.[18] Given today's policy ambition, the world is most likely heading toward 3°C warming in 2100 which implies accelerated physical climate impacts.[19] For near-term physical risk, investors and companies must consider the probabilities of physical events and resiliency measures to plan for and protect against the worst impacts. Adaptation options exist in all sectors, but their context for implementation and potential to reduce climate-related risks differs across sectors and regions. Some adaptation responses involve significant co-benefits, synergies and trade-offs. Increasing climate change will increase challenges for many adaptation options.[19] Adaptation projects may require construction, which can introduce greenhouse gas emissions onsite and from the supply chain. Beware of locked in emissions.

- ✓ Adaptation projects may require construction, which can introduce greenhouse gas emissions onsite and from the supply chain. Beware of locked in emissions.
- ✓ Consider resiliency of all infrastructure projects.

[16] https://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf
[17] https://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf
[18] https://www.cicero.oslo.no/en/posts/news/scientists-demystify-climate-scenarios-for-investors
[19] https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

Issuer Spotlight: Agence Français de Développement (AFD) is the bilateral Development Bank of France. The edium Green rated framework highlights investments in development focusing, among others, on climate co-benefits such as adaptation. The framework outlines water and waste management projects as eligible to limit or reduce the vulnerability of assets, people and ecosystems to the consequences of climate change.

Are the shades of green consistent across all regions?

Dark green should be comparable in all regions and markets. Both medium and light green projects should represent improvements vis a vis status quo and consider regional "best practices" in specific project areas. Since this status varies among regions and markets, what is judged medium or light green in an emerging market may not be rendered green at all in more developed regions. Thus, a housing project in a developing country could be medium or light green, while the same project in e.g. Sweden could be assessed as not green, due to the already high building standards and regulations already in place in Sweden. Other relevant factors include grid factors, physical climate risks, and topography, to mention some.

In summary: dark green projects and activities are judged against the same standards globally; medium and light green assessments depend on development status of the region when it comes to quality and quantity of environmental protection and adaptation practices.

TRANSPARENT AND EFFECTIVE GOVERNANCE

Both environmental impact and climate risk management can be managed via sound governance structures. As part of our methodology, we review internal governance procedures using criteria in three categories that are indicative of good governance and facilitate sound project identification, selection, management, and reporting. The three categories we consider are Policies, goals and implementation, Selection, and Reporting. The baseline assumption is that processes comply with the Green Bond Principles.

POLICIES, GOALS AND IMPLEMENTATION

A part of our assessment is to understand how the issuer's core activities are aligned to a low carbon and climate resilient future. Information like climate and environmental policies (goals) and achievements are used to better understand the context in which the framework operates within the organization of the issuer.

- ✓ CICERO looks for clearly defined environmental and sustainability policies and targets that are relevant to the issuer and the sector in question; these are important tools to structure green initiatives.
- ✓ Best practice includes progressively increased standards and targets with relevant metrics and timeframes.

Issuer Spotlight: Ørsted is a Danish based energy company. The Dark Green rated framework features ambitious climate policies as Ørsted has adopted the strategy of completely phasing out the use of coal and replace it with sustainable biomass by 2023. Ørsted aims to cut the emission intensity of its operations by 96% in 2023, compared to 2006.

SELECTION

The selection process is a key governance factor in the Green Bond Principles. We typically look at how climate and environmental considerations are taken into account when evaluating whether projects can qualify for green bond funding. The broader the project categories, the more importance CICERO places on the governance process.

- ✓ Consider whether there is an established green bond committee and its composition. Is there environmental competence on the selection committee?
- ✓ Consider the process and criteria whereby environmental risks and impact are included in project identification and selection such as considerations of supply chains, life cycle analysis, rebound effects and resilience.
- ✓ Is there a process to remove projects from a portfolio in the case of underperformance?

Issuer Spotlight: Handelsbanken is one of the major publicly traded Swedish banks. The Dark Green rated framework outlines a thorough selection process by incorporating overall environmental benefits, standardized evaluations of assets as well as responses to studies of climate risks. The members of a Green Finance Committee, which is responsible for the corporate sustainability strategy as well as the review and approval of projects, have to undergo mandatory sustainability trainings.

REPORTING

Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green bond programs. Procedures for reporting and disclosure of green bond investments are also vital to build confidence that green bonds are contributing towards a sustainable and climate-friendly future, both among investors and in society.

- ✓ GHG emissions are an important indicator, however, other indicators might be relevant as well, depending on project type, for example to indicate resiliency contributions.
- ✓ Impact indicators can be kept simple for projects with clear positive climate benefits. However where potential environmental impacts are more ambiguous, more detailed reporting is helpful.
- ✓ Issuers are encouraged to provide full transparency on the applicable impact reporting methodology and assumptions, including for measurement baselines.

Did You Know?

ICMA is developing *sector specific guides for impact reporting that list possible reporting metrics*. Guides are now available for renewable energy, energy efficiency, water and wastewater management, waste management and clean transportation.

The *Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting* offers practical suggestions for issuers too.

Issuer Spotlight: Fannie Mae's Green Mortgage Backed Securities (MBS) Business Framework received a Light Green shading overall. In our Second Opinion, the governance and reporting processes in place were noted as a key strength. Property owners and borrowers in the green MBS business are required to report energy and water use performance data annually to qualify for preferential interest rates for energy and water efficiency investments, green building certification, and renewable energy. This data is made publicly accessible. Fannie Mae offers opportunities to reward high environmental performance with financial incentives in the form of preferential interest rates.

CICERO ON FREQUENTLY ASKED QUESTIONS IN THE GREEN BOND MARKET

In the constantly evolving green bond market, recent topics of discussion include climate risk, standards and impact. In this section CICERO highlights and answers three of the most pressing questions on these issues.

DO GREEN BONDS SHIELD INVESTORS FROM CLIMATE RISK?

Many physical impacts that scientists had originally anticipated over a much longer time horizon are being observed today across the globe. This is the case for sea level rise, which is also complicated by interactions with extreme weather events like windstorms, sea-surges, floods, droughts and heat waves. The financial sector is taking note of the risks and opportunities implicit in these changes.[20]

Investing in green bonds can be part of a climate risk strategy, but these investments are not a substitute for integrated climate risk planning throughout a portfolio or institution. All assets and sectors are exposed to transition or physical climate risk, either directly or indirectly (please see Figure 5).

The TCFD recommends scenario stress testing and disclosure on climate risk for all financial actors and companies. Our Shades of Green rating from CICERO provides transparency on exposure to both physical and transition climate risk that the investor can use to inform decisions.

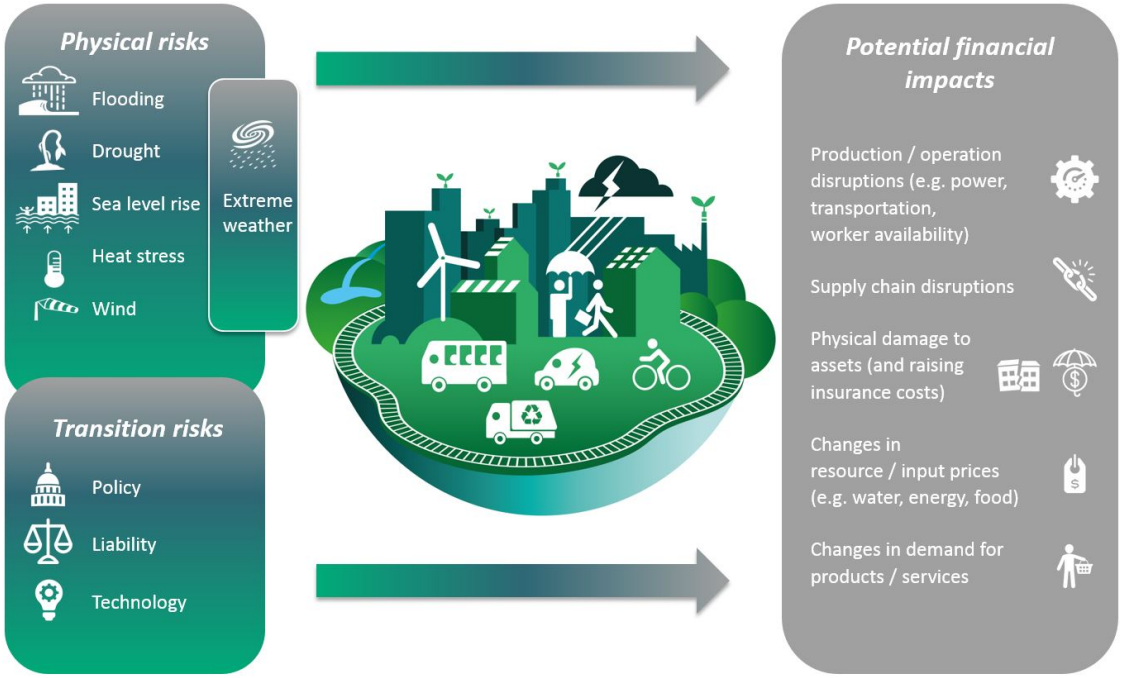

Figure 5: Physical and transition risks and their potential financial impacts.

Consider a green bond that finances sustainable buildings in northern Europe. Using CICERO's Shades of Green methodology, we would consider not only the energy efficiency and carbon emissions of the building, but also ask questions about resiliency to flooding, which has been observed to increase in severity in that region. Investors can use the information presented in our second opinions to decide whether the climate risk implicit in that particular green bond is in line with their investment objectives and risk tolerance.

Green bonds do not actively shield investors from the effects of climate change, but – in tandem with objective second opinions and careful assessment of the shade of green – they do provide the insight necessary to navigate

[20] https://www.cicero.oslo.no/en/posts/news/scientists-demystify-climate-scenarios-for-investors

climate risk and make informed long and short-term investment decisions. Ultimately the climate effect depends on the realized impact of the project the bond finances (CICERO does not verify impacts after issuance).

REGULATIONS AND STANDARDS: HOW MUCH IS TOO MUCH?

The Green Bond Principles are the starting point for most issuers today. As the market has grown, different regulatory practices have evolved to help issuers and investors build a general consensus on the definition of green. Several countries, including India and Indonesia, have designed their regulations to be compatible with the GBP, adding requirements or clarifications for the local market. The ASEAN countries issued a joint Green Bond Standard in 2017 that explicitly excludes fossil fuel energy generation. Policy makers in Europe have begun the process to develop an EU a green bond taxonomy. China has taken a different approach, requiring issuers to verify projects against a detailed catalogue of eligible green assets.

Policy makers have an important role in enhancing comparability and transparency, but it is important to step back and consider what goal we are trying to achieve in this push towards standards. The overarching aim should be to improve transparency on climate risk while encouraging new issuers to come to market to meet increasing demands. Policy should motivate a race to the top, not burden issuers with unnecessary regulations and requirements that could discourage market participation and the information provided should be relevant and read by investors.

Based on our 10 years of experience in the green bond market, we propose three principles for harmonizing approaches that can finance the green technologies of tomorrow:

1. **Allow for creative solutions and technological development.** Many projects do not fit well within a traditional taxonomy, which may not capture new technological developments or consider cross-cutting issues such as resiliency considerations in mitigation projects.
2. **Reflect exposure to climate risk.** A grading system is more appropriate than a binary check box in providing transparency on the relative levels of climate risk.
3. Encourage new issuers' participation by **keeping transaction costs for environmental due diligence low**.

DO GREEN BONDS REALLY HAVE AN IMPACT?

Accurate labelling in the green bond market builds capacity of the financial sector to identify and address climate risks and communicate effectively about it. Getting the green labelling right can also help issuers identify new green projects. The green bond market provides a communication tool that issuers, reviewers, and investors can use to better understand investments' exposure to climate risk and potential impact on the environment, as well as future opportunities. Most of the green bonds in the market are used for refinancing; in the future, "additional" green financing can be facilitated if we get the labelling right now.

In our experience, green bond investors are becoming more and more competent on green issues. If you are not well prepared when issuing a green bond, you risk being exposed by investors. Having said that, many investors would like to see more issuers to come to the market. They fully understand that issuing a green bond is a capacity building exercise for issuers as well.

Without the financial sector's correct pricing of climate risks there is no way we will succeed in the necessary transformation towards a low carbon and climate resilient future. The goal is that ALL investors consider and understand climate risk when they make investment decisions. However, in order to reach our climate goals, we still need policy makers to substantially step up their efforts in strengthening climate policies.

A LOOK AT THE MARKET – PAST AND PRESENT – WITH KNUT ALFSEN

You wrote the first Green Bond Second Opinion for the World Bank ten years ago. How has the growth of the green bond second opinion market surprised you since then?
I have been positively surprised on two fronts. First, the eagerness by which issuers have embraced the second opinion process and products. Time and again we have had meaningful exchanges with issuers that helped us understand constraints and priorities and helped them understand the relationship between their work and climate science. Second, on the investor side I have been positively surprised at the demand for green bonds driven both by risk factors as well as a desire to be seen as a "good citizen." With positive attitudes both on the supply and demand side, combined with CICERO's focus on balancing scientific rigor, bureaucracy, and market practicalities, it should perhaps not be surprising that we have seen strong growth in the green bond market.

What are three ways you expect the second opinion market to change in the coming ten years?
I expect stronger competition in the second opinion market, with provision of second opinions becoming mainstream business for the rating agencies and other professional consultant firms. So far CICERO has done very well with outstanding academic credentials and a market friendly approach. To stay relevant and competitive in the future will require continued alertness towards investor needs and continues update of the science basis. A second way the market will change is a greater reliance on quantitative impact measurements. While welcome in principle I will nevertheless warn against overburdening green investments with complicated measurement regulations, many of which may be not that relevant to the future long-term global development and our vision for a zero GHG emission and resilient economy. We should be careful not to miss the transformative potential in our quest for quantitative measurements. Finally, a third way the market will change is by broadening the scope to include social and other sustainable development concerns. This will increase the challenges for the second opinion providers as trade-offs between the various types of targets and goals become more acute. A single one-dimensional shade of green will not suffice to capture all the nuances of this broader setting. All in all, the future looks challenging but also inspiring for an academically-based organization like CICERO!

What project categories are trickiest to shade and why?
Some categories are trickier than others, but none are really easy. Adaptation is tricky because of uncertainty about how much and what type of adaptation will be enough for a warmer and wilder Earth. It is also difficult to quantify expected impacts of building projects, which may include heavy construction that introduces emissions and disruptions in fragile ecosystems, and often overlaps with proposed activities in other categories. And who could tell what a good or even optimal building should look like in a wildly different climate?

Knut Alfsen is a Senior Research Fellow at CICERO. He has formerly held the positions of Director at CICERO, Research Director at the Institute of Energy Technology, and Director of Research at Statistics Norway. Knut is a Member of the International Science Advisor's group to China Council on International Cooperation on Environment and Development (CCICED). He has written numerous journal and magazine articles on a range of topics including sustainable development, technological change, and the climate change negotiations. He was a Lead Author in the IPCC 4th Assessment Report. Knut has been active in CICERO's green bonds work since 2007, and wrote the second opinion for the first green bond for the World Bank. He holds a PhD in theoretical physics from University of Oslo.

USEFUL RESOURCES

Climate risks:

[1] https://cicero.oslo.no/en/publications/external/3759 *for CICERO climate scenario guide for investors (2018)*

[2] https://www.cicero.oslo.no/en/publications/internal/2871 *for CICERO report on flood risks for investors (2018)*

[3] https://www.cicero.oslo.no/en/climateriskreport *for CICERO report on climate risks for investors (2017)*

[4] https://www.fsb-tcfd.org/publications/final-recommendations-report *for TCFD recommandations for disclosure*

Market principles and standards:

[1] https://www.icmagroup.org/green-social-and-sustainability-bonds *for ICMA bond standards*

[2] http://www.theacmf.org/ACMF/upload/ASEAN_Green_Bond_Standards.pdf *for ASEAN green bond standards*

[3] https://ec.europa.eu/info/publications/180308-action-plan-sustainable-growth_en *for European Comission action plan on financing sustainable growth (2018)*

Green bond market overview:

[1] https://www.climatebonds.net/cbi/pub/data/bonds *for CBI database of bonds labelled as "green" by the issuer*

[2] https://www.environmental-finance.com/assets/files/Green Bonds Review of 2017.pdf *for a review of green bonds in 2017*

CICERO is Norway's foremost institute for interdisciplinary climate research. We help to solve the climate problem and strengthen international climate cooperation by predicting and responding to society's climate challenges through research and dissemination of a high international standard.

GET IN TOUCH

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Environmental Finance Green Bond Awards 2017 Winner
Best external review provider

Environmental Finance Green Bond Awards 2018 Winner

Green Bond Awards 2017
Climate Bonds Initiative