Green Bonds for Adaptation and Resilience of Urban Development

Transformation, Adaptation and Mitigation for a 1.5 degree Global Warming
Bilbao
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The Message from Climate Science and the Paris Agreement

Emissions must go to zero within a few decades,

OR

we need large-scale negative emissions (with the associated risk) to compensate
Center for International Climate Research in Oslo (CICERO)  

CICERO is one of the world’s foremost institutes for interdisciplinary climate research.

- Contributor to the IPCC since 1992
- A pioneer of climate finance research
- 10 years of experience in the green bond market
- Over 100 issuers and 175 USD Billion of bonds reviewed
- New company established CICERO Shades of Green
Climate Risks: Expect more financial risks!
Climate Scenarios

6-8 degrees warmer in the North

Kilde: Global Carbon Project.
Bilde: Olav Olsen / Aftenposten
Investors Expect Increased Losses from Physical Impacts of Climate Change

- Global losses from extreme weather rose by 86% from 2007 to 2017

- Over 50% of total flood costs studied in the US and Nordic region were not covered by insurance

- All sectors can be impacted by flooding risk and extreme weather, e.g. via electricity and transportation outages

“Shifts in our climate bring potentially profound implications for insurers, financial stability and the economy.”

Mark Carney, Governor – Bank of England, 09/2015

“PG&E: The First Climate-Change Bankruptcy, Probably Not the Last”

Wall Street Journal (May, 2019)

Climate Risks are now Financial Risks

**Physical risks**
- Flooding
- Drought
- Sea level rise
- Heat stress
- Wind
- Extreme weather events

**Transition risks**
- Policy
- Liability
- Technology

**Financial risks**
- Production / operation disruptions (e.g. power, transportation, worker availability)
- Supply chain disruptions
- Physical damage to assets (and raising insurance costs)
- Changes in resource / input prices (e.g. water, energy, food)
- Changes in demand for products / services
Financing Local Adaptation and Resilience: Green Bonds
Transition to Sustainable Economies Provides Investment Opportunities
What is a green bond?

Green bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible Green Projects and which are aligned with the four core components of the Green Bond Principles.

Same underlying mechanisms as regular bonds

Main difference is that only pre-defined projects can be financed

Green Bond Frameworks ensure that green projects are defined and that the issuers deliver on their promise.

Source: SEB
Green Bond Principles (GBP)

Voluntary principles for issuing a green bond. The vast majority of international issuers align with the GBP. High level principles with four core components:

1. Use of Proceeds
2. Process for Project Evaluation and Selection
3. Management of Proceeds
4. Reporting

ICMA is the GBP secretariat, the principles can be downloaded from their resource center: https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-social-and-sustainability-bonds/green-bond-principles-gbp/
Who Defines Green?

- **Voluntary principles** for issuing a bond that the vast majority of issuers align with across all markets
- **Country level** guidelines in some markets
- **Stock exchange** criteria for listing
- **Green bond indices and funds** inclusion criteria
- **External Review providers**
Sustainable Debt Market is Growing

Global sustainable debt annual issuance, 2012-2018

- $ billion
- Global sustainable debt annual issuance, 2012-2018
- Other, Sustainability-linked loans, Green loans, Social bonds, Sustainability bonds, Green bonds

Source: BloombergNEF, Bloomberg L.P.; Note: ‘Other’ includes labelled blue bonds

Sovereign and corporate issuance is rising

- 100%
- 80%
- 60%
- 40%
- 20%
- 0%
- 2014, 2015, 2016, 2017, 2018
- Loan, Sovereign, Government-backed entity, Development bank, Local government, Development bank, Non-financial corporate, Financial corporate, ABS

Source: CBI, 2018 Green Bond Market Summary
Creating a Common Language on Green

Issuers -> External Review Providers -> Green Bonds -> Investors
# CICERO Green Rating on Climate Risk

## CICERO Shades of Green

<table>
<thead>
<tr>
<th>Shade</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark green</td>
<td>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.</td>
<td>Wind energy projects with a strong governance structure that integrates environmental concerns</td>
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<tr>
<td>Medium green</td>
<td>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.</td>
<td>Bridging technologies such as plug-in hybrid buses</td>
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Governance Score

I. Policies and goals of relevance to the green bond framework

II. Selection process used to identify eligible projects under the framework

III. Reporting on the projects to investors
Number of Assigned Shades of Green (2015-2018) per Issuer Type (local governments include municipality banks) (July 2018).
CICERO's Assigned Shades of Green (2015-2018) per Project Category and overall (July 2018).
Green Bond Principles Project Categories

- **Renewable energy**
- **Energy efficiency**
- **Pollution prevention and control**
- **Environmentally sustainable management of living natural resources and land use**
- **Terrestrial and aquatic biodiversity conservation**
- **Clean transportation**
- **Sustainable water and waste water management**
- **Climate change adaptation**
- **Ecoefficient and/or circular economy adapted products, production technologies and processes**
- **Green buildings**
- **Early warning systems**
- **Drip irrigation and flood/drought resistant seeds**
- **Urban sea walls, drainage systems for flash flood mitigation, and waterproofed communication networks**
- **Preventative measures for forest fires**
- **Melting roads, flooded run ways, eroded roads & rails**
- **Water saving products and production technologies saving resources**
- **Fires = bad air quality**
- **Flood zone screening and heat resilient building materials**
- **Effects of drought/flood on hydro, extreme weather on wind**
- **Extremely heat increases use of AC**
- **Effects of drought/flood on hydro, extreme weather on wind**

CICERO
Traditional Approach to Mitigation and Adaptation

Mitigation Projects (80%)
- Measureable
- Short-term returns
- Revenue generating
- Proven impact
- Existing regulation

Conclusion: bankable

Adaptation Projects (20%)
- No clear metrics
- Long-term returns
- Cost avoidance
- Uncertain impact
- Uncertain regulations

Conclusion: not bankable
Mitigation and Adaptation are Interdependent

REALITY

- Hydropower is hurt by droughts
- Electric trains can’t run under water
- Green buildings can flood
- Protected forests can burn

Mitigation Projects
Are your mitigation projects climate resilient?

Adaptation Projects
Are your resilience projects low carbon?
Case study I: City of Reykjavík

- First issuer of green bonds in Iceland to be listed on Nasdaq Iceland’s sustainable bond market. (1)

- Reykjavík’s Green Bond was an ISK denominated 4.1 billion (approx. USD 35 million) indexed 30-year maturity bond issued on 17 December 2018. (1)

- Broad range of project categories can be funded. (2)

- Reykjavík has carried out climate risk mapping as a basis for its Climate Adaptation Plan

Sources:
(1) Circular Solutions
(2) City of Reykjavík green bond framework
Case study I: City of Reykjavík

Broad framework including, e.g.,
Mainly green buildings (20-40%) and clean transport (45-60%),
energy efficiency, waste management, adaptation

Mitigation categories explicitly include adaptation:
- **green buildings**: general resilience and climate risk screening incl. flooding
- **Sustainable land-use / environmental management**: wetland reclamation and forestry, biodiversity screenings and preservation, urban densification
Case Study II: City of Oslo

Project Category: Water management and clearing facilities

Eligible Project Types: New and expanded water clearing plant at Bekkelaget by 2020, to increase capacity due to population growth, and as an adaptation to climate change (reduce flooding risk, prevent decreased water quality of Oslo fjord)

General Assessment: ✓ Water management projects are important from a climate adaptation and resilience perspective
 ✓ Consider utilizing green infrastructure when possible
 ✓ Enhanced capacity to handle flooding is an important adaptation measure for water management, given climate change scenarios and higher frequency and intensity of extreme weather conditions

Similar Cases: City of Gothenburg, Kommuninvest, (Sweden), Kommunekredit (Denmark)
Case study III: Stockholm

Project categories:

• Renewable Energy (20%)
• Green buildings (20%)
• Clean transportation (40%)
• Energy efficiency
• Waste management and circular economy
• Water and wastewater management
• Sustainable landuse and environmental management
• Adaptation measures
Case study III: Stockholm

Additional observations regarding green buildings:

✓ The County Council already invests in adaptation and resilience for its buildings and facilities by using GIS analysis of heavy rain and flooding patterns,

✓ selecting resilient construction materials,

✓ using green roofs for water storage and run-off,

✓ considering impacts on biodiversity.

✓ Investing in strategies to reduce the environmental impact of construction of new buildings and retrofits, which include calculating and reporting life cycle emissions from materials and equipment.

Full second opinion: [https://www.cicero.green/](https://www.cicero.green/)
Case study IV: Örebro municipality

Governance assessment

- Örebro has in place strong environmental goals and targets, good mitigation plans, a sound selection process and comprehensive and transparent reporting.
- Nevertheless, we note that Örebro does not seem to carry out climate scenario analysis or risk assessment in alignment with the methodology recommended by TCFD. Also, we do not find much on resilience and adaptation needs in current plans and strategies.

Full second opinion: https://www.cicero.green/
Key Takeaways from the last 10 years

- Municipalities are at the forefront of financing adaptation.
- The green bond market has contributed to building environmental capacity among investors and municipalities.
- Transparency on environmental attributes can facilitate an environmental “race to the top”.
- Climate science tells us that we need all Shades of Green to move towards carbon neutral technologies.
- What qualifies as a bridging technologies depends on the regional context.