Climate services to upscale climate finance

*Financing a resource efficient and resilient economy at the local level*

Sophie Dejonckheere
Senior Adviser, Climate Finance
Center for International Climate Research – Oslo (CICERO)

CICERO is an interdisciplinary climate research institute.

- Contributor to the IPCC since 1992; 6 authors for Assessment Report 6 (AR6) including new Climate Finance chapter
- A pioneer of science-based climate finance research for investors
- New company established CICERO Shades of Green
CICERO Climate Finance – financial services for the transition

- Green financing framework
- Sustainable Edge – Shades of Green for equities
- ClimINVEST – physical climate risk assessment tools and transparency
- Green Asset Wallet – blockchain solutions for impact reporting

Today

Green financing

2050
CICERO Shades of Green

- 10+ years of experience in the green bond market
- Over 120 issuers and 175 USD billion of bonds reviewed across 5 continents
- Green and sustainability bond reviews
## 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>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>
</tr>
<tr>
<td>Medium green</td>
<td>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>
</tr>
<tr>
<td>Light green</td>
<td>Is allocated to projects and solutions that are climate friendly but do not 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.</td>
<td>Efficiency investments for fossil fuel technologies where clean alternatives are not available</td>
</tr>
<tr>
<td>Brown</td>
<td>Is allocated to projects and solutions that are in opposition to the long-term vision of a low carbon and climate resilient future.</td>
<td>New infrastructure for coal</td>
</tr>
</tbody>
</table>
Sustainable Edge: How are corporate activities contributing to the transition?

“We need a common taxonomy to help financial markets rigorously identify environmental outperformance and to direct investment accordingly. The EU’s green taxonomy and the green bond standard are good starts, but they are binary (dark green or brown). **We need 50 shades of green.**”

- Mark Carney, Governor – Bank of England
Draft communication templates

**Investments**

![Investments Diagram]

**Revenue**

![Revenue Diagram]

**Key analyst questions**

- 1. How does your company plan to increase its share of production using bio-based technologies such as NO2 catalyst technology for this product?
- 2. Do you anticipate a significant increase in the production of bio-based products in the future?
- 3. Have you considered the potential impact of climate-related regulations on your business?
- 4. What are the key trends and challenges facing your industry in the coming years?

**Key sector metrics**

- **Gross Income**: Gross income / Total sales
- **Gross Profit**: Gross income / Total revenue
- **Earnings before Interest and Taxes (EBIT)**: Net income / Total income
- **Total Debt to Equity (TDE)**: Total debt / Total equity

**Climate Risk Awareness and Management**

- **Use of scenarios**: Climate analyses in this document are based on four potential future scenarios:
  1. Historical trend analysis (baseline scenario)
  2. Current level of emissions analysis (business-as-usual scenario)
  3. Best case scenario (no climate change)
  4. Worst case scenario (significant climate change)

- **Risk management**: Climate-related risks and opportunities in the sector.
The **Green Assets Wallet** is a technology innovation that injects efficiency and trust into the green debt market.

- **Trust**: Building credibility and trust for investors and issuers
- **Impact**: Simplified reporting on green impact of investments
- **Validation**: Cost effective and immutable validation of green investments

The Green Assets Wallet targets the bottleneck between supply & demand.
Investors expect increased losses from physical impacts of climate change

→ Global losses from extreme weather rose by 86% from 2007 to 2017 (EU Commission)

→ Over 50% of total flood costs studied in the US and Nordic region were not covered by insurance (CICERO, Flood Risk for Investors)

“PG&E: The First Climate-Change Bankruptcy, Probably Not the Last”
Wall Street Journal (May, 2019)
FSB’s TCFD recommends disclosure of climate risk
Physical climate risk service providers:
Physical climate risk =

\[ f(\text{hazard} \times \text{exposure} \times \text{vulnerability}) \]

- **Climate hazard**
  - Climate data:
    - Chronic versus acute hazards
    - Climate models, resolution, scenarios
  - Probability:
    - Climate projections

- **Exposure**
  - Asset location and hazard distribution:
    - Climate hazard maps

- **Vulnerability**
  - Sector materiality, asset sensitivity and adaptive capacity:
    - Impact chains
    - Building materials, soil subsidence, topography
    - Insurance coverage, early warning systems, rainwater or flood management systems
ClimINVEST objectives

Help investors responding to TCFD – physical risk.
• Climate, physical and financial indicators
• Sector materiality
• Impact chains linking climate with finance

Shed light on climate risk assessment services.
• Transparent methodology
• Publicly available data
• Disclosure of uncertainties and constraints
Better tools for climate-proofed investments

**ClimINVEST**

**MONITORING & EVALUATION**
- USER GROUP: institutional investors (e.g., pension funds, asset managers, banks, and insurance companies)
- TAILORED INFORMATION: on physical climate risk

**COMMUNICATION**
- CONTINUOUS FEEDBACK LOOP

**SCIENTISTS**: social scientists, economists, natural scientists

**Research consortium**

- Norway
- France
- Netherlands

**2017**
- Understanding user needs and identifying gaps

**2018**
- Co-design relevant indicators on climate risk

**2019**
- Mapping and visualizing risk for investors

**2020**
- Evaluate, synthesize and raise awareness
Phase 1 results: user needs and existing approaches

*Physical Climate Risk: Investor Needs and Information Gaps, 2019 – conclusions*

**Take aways:**
- Publicly available approaches only water scarcity
- **Scenarios.** WRI and Carbone 4 give scenario options over multiple time horizons
- **Time horizons.** WRI, 427 and Trucost include 10 year time horizon
- **Hazards.** 427, Carbone 4 and Acclimatise include chronic changes
- Limited disclosure of climate data, asset vulnerability, and methodologies

°CICERO
# Phase 2: Identify, calculate and map climate hazard indicators

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Average temperature per day/night for winter/summer (winter = December, January, February. Summertime = June, July, August)</td>
</tr>
<tr>
<td>Cold temperature trends</td>
<td>Frequency of days where max temp is under absolute threshold (0 D) (Ice Days)</td>
</tr>
<tr>
<td>Hot temperature trends</td>
<td>Frequency of days where minimum temperature is over absolute threshold (35 C)</td>
</tr>
<tr>
<td>Heat/cold wave – duration</td>
<td>Heat/cold wave duration (in days) - CSDI and WSDI</td>
</tr>
<tr>
<td>Heat/cold wave – magnitude</td>
<td>Heat/cold wave magnitude (in days) (max or min temp of the heat/cold wave and length)</td>
</tr>
<tr>
<td>Heat/cold wave</td>
<td>HDD – heating degree days</td>
</tr>
<tr>
<td>Heat/cold wave</td>
<td>CDD – cooling degree days</td>
</tr>
<tr>
<td>Flood / storm surge – chronic</td>
<td>Frequency of very wet days (&gt;20mm) expressed in percentile (95th)</td>
</tr>
<tr>
<td>Flood / storm surge – chronic</td>
<td>Frequency of extremely wet days (&gt;20mm) expressed in percentile (99th) R99p</td>
</tr>
<tr>
<td>Flood / storm surge - acute</td>
<td>Consecutive number of extreme wet days (CWD) - RX5day</td>
</tr>
<tr>
<td>Flood / storm surge - acute</td>
<td>Maximum daily rainfall RX1day</td>
</tr>
<tr>
<td>Flood / storm surge - acute</td>
<td>Maximum daily rainfall over 5 days (RX5day)</td>
</tr>
<tr>
<td>Flood / storm surge - chronic</td>
<td>Total wet day precipitation PRCPTOT</td>
</tr>
<tr>
<td>Droughts – acute</td>
<td>Consecutive dry days CDD</td>
</tr>
<tr>
<td>Droughts - chronic</td>
<td>Maximum length of dry period - # of dry days (NDD) and # of wet days (NWD)</td>
</tr>
</tbody>
</table>
**e.g. mapping intensity of extreme precipitation over time in Europe, BAU (RCP 8.5)**

- **Climate hazard:** extreme rain bursts
- **Probability:** high

**e.g.** Norway - summer seasons will be drier overall, but have more very intense short bursts of rain

- **Exposure:** (depending on asset location)

- **Vulnerability:** X

Source: CICERO and Climate Adaptation Services

*Year is the middle of the 20 year span, so 1990 = 1981-2000, 2020=2011-2030, 2040=2031-2050*
e.g. Heatwave impacts

Hot spot regions

Russo, Sillmann & Sterl, 2017, Nature Scientific Reports
Projects: ClimateXL & CiXPAG
Heat impacts on worker productivity

Orlov, Sillmann, Aunan, Aaheim etc. 2019 (sub. in GEC)
Project: ClimINVEST & EXHAUSTION
Impact chains for vulnerability assessment

Climate hazard
- Changes in hazard indicators

Physical impacts
- Physical impacts on markets, operations or suppliers
- Soil erosion, decreased production
- Higher water level in reservoir

Financial impacts for counterparties
- Financial impacts on sales, OPEX or CAPEX
- Decreased sales, income

Financial impacts for investors/AM
- Impact on credit risk rating or other financial performance indicators
- Increased probability of default

Example for “increased storm surges”
- Agriculture
  - Storm surge and flooding
- Energy (hydropower)

Source: Carbone 4 and CICERO
Vulnerability continued -

**Climate hazard**
- Storm surge and flooding

**Physical impacts**
- Soil erosion, decreased production of crops
- Higher water level in reservoir
- Strained sewer system, flooded cellars
- Runways / rails under water - service disrupted

**Financial impacts for counterparties**
- Decreased sales, income
- None
- Cost of damages and repair
- Decreased sales, income

**Asset sensitivity**
- E.g. Building materials, topography, rainwater or flood management systems

**Adaptive capacity**
- E.g. Insurance coverage, early warning systems

Source: Carbone 4 and CICERO
What’s next

• **Climate hazard maps** - business as usual and best case scenarios for EU

• **Impact chains.** Link climate hazard to financial impact

• **Suite of fact sheets and case studies**
  – Calculating climate risk
  – Time horizons
  – Impact chains and sector materiality
  – Key concepts and indicator dictionary
  – Droughts, heat stress, flooding and storm surges

• **Investor feedback workshops in Oslo, Rotterdam, Paris**
Interim take aways

• Translation services between scientists and investors are needed.

• Existing services are not transparent and raise questions about coverage.

• Climate hazards should be weighted according to materiality / sensitivity.

• Investors want decision support and user friendly tools.

• **Ethical question raised:** are we climate redlining?
Thank you

For more information see: https://www.cicero.oslo.no/en/climinvest