Advancing TCFD Guidance on Physical Climate Risks and Opportunities
TCFD Guidance

Source: Adapted from TCFD Recommendations

Transition Risks
- Policy and Legal
- Technology
- Market
- Reputation

Physical Risks
- Acute
- Chronic

Opportunities
- Resource Efficiency
- Energy Source
- Products/Services
- Markets
- Resilience

Risks

Strategic Planning Risk Management

Financial Impact

Income Statement
Cash Flow Statement
Balance Sheet
Assets & Liabilities
Capital & Financing

Source: Adapted from TCFD Recommendations
What metrics for physical climate risks and opportunities?

Core Elements of Recommended Climate-Related Financial Disclosures

- Governance
- Strategy
- Risk Management
- Metrics and Targets

How to integrate climate intelligence into business strategy and financial planning

Identify physical climate risks & opportunities metrics
Metrics for physical climate risk management and disclosures
Murray Birt, DWS
How climate change affects corporate value chains

Impact on corporate performance

Impact on credit risk

Adaptive Capacity (Quality of Management)

Supply chain

Operations

Markets

First order impacts
- Acute or chronic climate hazards that affect directly corporate operations, supply chain or markets.
- Includes extreme precipitation, heat stress, water stress, cyclones, sea level rise, cold snaps, and winter storms
- Can be measured in physical terms and estimated in financial terms

Second order impacts
- Climate hazards that affect the broader economic, human or natural environment corporations depend upon
- Transmission pathways from climate hazards to corporations may include ecosystem collapse, migrations, social license to operate, impacts on human health, etc.
- Impacts on the corporate value chain are difficult to predict and quantify

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Sensitivity to climate impacts vary by industry

<table>
<thead>
<tr>
<th>GICS Sector</th>
<th>GICS Industry Group</th>
<th>Storms &amp; Cyclones</th>
<th>Extreme rainfall &amp; flood risk</th>
<th>Extreme heat</th>
<th>Variability in precipitation</th>
<th>Variability in temperature</th>
<th>Water stress</th>
<th>Sea level rise</th>
<th>Other climate hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Discretionary</td>
<td>Automobiles &amp; Components</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>Degraded air quality</td>
</tr>
<tr>
<td>Consumer Staples</td>
<td>Food &amp; Staples Retailing</td>
<td>HIGH</td>
<td>HIGH</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>Soil degradation, Ocean acidification, Icemelt, Permafrost melt</td>
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<tr>
<td></td>
<td>Food &amp; Beverage</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
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<tr>
<td>Energy</td>
<td>Energy</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>HIGH</td>
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<tr>
<td>Financials</td>
<td>Banks / Diversified Financials</td>
<td>HIGH</td>
<td>HIGH</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>HIGH</td>
<td>Hall storms, Landslides, Wildfires</td>
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<tr>
<td></td>
<td>Insurance</td>
<td>HIGH</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>HIGH</td>
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Assess impacts over lifetime of assets or instrument

Assess climate risks over duration of asset lifetime or lifetime of financial instrument

Consider climate impacts over the following time horizons:

1. Assess changes in asset performance over the past 5-10 years (or longer) attributable to extreme weather events or climate variability to detect possible impacts from climate change.

2. Assess impacts over the expected lifetime of the asset and/or over the lifetime of the investment or loan.

<table>
<thead>
<tr>
<th>Recommended timeframe</th>
<th>Approach for first order impacts</th>
<th>Approach for second order impacts</th>
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<tbody>
<tr>
<td>Short term</td>
<td>3-5 years</td>
<td>Probabilistic</td>
</tr>
<tr>
<td>Medium term</td>
<td>5-20 years</td>
<td>Probabilistic</td>
</tr>
<tr>
<td>Long term</td>
<td>20+ years</td>
<td>Scenario analysis</td>
</tr>
</tbody>
</table>
3. Disclose critical facilities’ location

Heat Stress risk – European Power Utility
Recommendation #4 – Provide detailed information on financial impacts of recent extreme weather events

Corporations should provide in their financial filings detailed information on historical impacts of extreme weather events, including metrics related to days and costs of business interruptions, cost of repair or upgrades, fixed asset impairment, supply chain disruptions, and lost revenues.

Recommendation #5 – Disclose impacts of weather variability on value chain

Corporations with medium or high sensitivity to temperature and precipitation variability should identify and disclose whether and how changes in temperature and precipitation have materially affected their performance.

Recommendation #6 – Assess forward-looking climate-related risks

Corporations should disclose 1) their assessment of the types of climate-related risks they may be exposed to in the future due to the geographic exposure and 2) the estimated financial impacts from the risks they have identified as material.

Metrics for projected impacts may include a combination of:

- Number of sites and business lines exposed to relevant climate impacts
- Projected change in production, revenues, OpEx or CapEx due to climate change
- Value-at-risk from probabilistic estimates (e.g. 1:100 or 1:200) extreme weather event disruption on operations or production, key suppliers, customers, or markets
- Annual average losses from projected climate impacts.

Recommendation #7 - Describe risk management processes for physical impacts of climate change

Corporations should describe their processes for identifying, assessing, and managing physical climate risks, as noted by the TCFD. For the physical impacts of climate change, aspects of particular interest to financial institutions and banks include risk management processes, insurance coverage, planned facility moves or retrofit, corporate adaptation strategy, and engagement with local authorities to build climate resilience locally.
Metrics for physical climate opportunities
Simon Connell, Standard & Chartered
Opportunities: a taxonomy

Three broad types:

1. Opportunities related to managing existing physical climate risks
2. Opportunities to respond to new emerging risks
3. Opportunities to adapt to market shifts and cater to new market needs
Risk creates opportunities

NCEI climate and weather data is being used to strengthen America’s economy

Here is how it helps corn growers increase profits while decreasing environmental impacts by optimizing nitrogen fertilizer use:

- The approximate number of acres of corn grown in the U.S. is Roughly the same as the entire state of Montana (90 million).
- 97% of all corn grown in the U.S. is fertilized using a commercial nitrogen fertilizer.
- 50% of nitrogen used to fertilize corn crops is lost due to poor management and is leached into the waterways or escapes into the atmosphere as a potent greenhouse gas.

NCEI climate and weather data powers the ADAPT-N tool to help farmers apply just the right amount of fertilizer more efficiently.

- NCEI climate and weather data
- Crop model simulation
- Nitrogen recommendations provided by Adapt-N
- Nitrogen fertilizer used more efficiently
Opportunities: Time horizons

Segment 2
Responding to New emerging risks in the short term 2-5yrs

Segment 3
Responding to market shifts 5yrs plus

Segment 1
Managing existing risks already affecting current financial performance

Scenarios
(strategic business tool providing plausible views of the future)
## Recommendations for disclosures

<table>
<thead>
<tr>
<th>10. Level</th>
<th></th>
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<tbody>
<tr>
<td>• Disclose business opportunities at the segment level</td>
<td></td>
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<tr>
<td>• Disclose resilience benefits at the facility-level for critical facilities</td>
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<thead>
<tr>
<th>11. Metrics for resilience benefits</th>
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<tbody>
<tr>
<td>• Disclose benefits from resilience investments using same metrics as risk disclosures</td>
<td></td>
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<tr>
<td>• Whenever possible, assess and disclose public co-benefits from resilience investments</td>
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<tr>
<th>12. Metrics for business opportunities</th>
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<tbody>
<tr>
<td>• Disclose qualitative information relative to lifecycle of new commercial opportunity</td>
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</tbody>
</table>
Scenario analysis for physical climate risks and opportunities
Greg Lowe, AON
Explore different GHG pathways and their impacts
Macroeconomic impacts from climate change

**Labor**
- Labor productivity declines from heat stress
- Amount of labor changes from migrations

**Consumption**
- Changes to consumption patterns from rising prices (inflation); Changes to supply and demand

**Investment**
- Higher costs of capital if companies must take on additional leverage from losses

**Savings**
- Changes to savings from changing consumption patterns

**Government Spending**
- Increased spending on disaster recovery; deteriorating fiscal resilience

**Capital Stock**
- Damage from severe weather
- Damage or loss from sea level rise

Economic Output (Gross Domestic Product)
Cascade of Uncertainty

Source: Adapted from Wilby and Dessai (2010)
**Recommendations (excerpt)**

<table>
<thead>
<tr>
<th>14. Motivation</th>
<th>Integrate physical climate risks scenario analysis into existing planning processes to ensure strategic, flexible and resilient businesses and investments</th>
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<tbody>
<tr>
<td>15. Scenario building</td>
<td>Avoid standardised scenario analysis to have a more comprehensive range of outcomes</td>
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</table>
| 18. Scenario analysis disclosures | Disclose qualitative information that is relevant for the company and its investors  
Consider physical climate risk and opportunities scenario analysis as an initial step towards building resilience |