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IACPM and RMI
Climate stress test – complexity & solution

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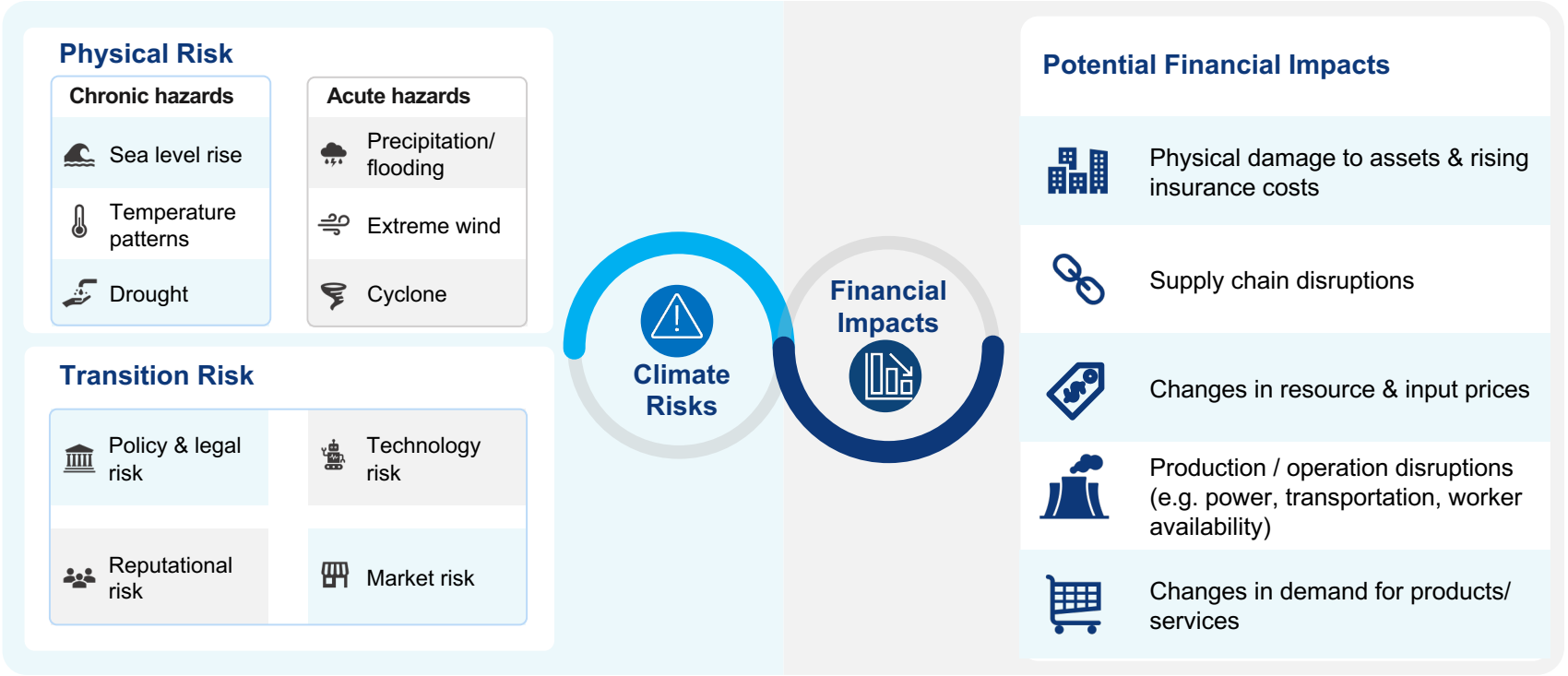
Frankie Phua

Managing Director, Group Risk Management

UOB

Growing recognition of the potential financial impact from transition and physical risk…



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…has spurred increased regulatory expectations on climate stress testing

"Stress testing is **a very useful tool to assess the impact of** the physical and transition risks associated with **climate change**."

– Mr. Ravi Menon, Managing Director, Monetary Authority of Singapore (MAS)

Regulatory Developments

MAS's Guidelines on Environmental Risk Management **requires banks to conduct stress tests** to **assess** the impact of material environmental risk on their **risk profile** and **business strategies** and **explore resilience to financial losses under a range of outcomes.**

Under *BCBS's proposed Principles for the Effective Management and Supervision of Climate-related Financial Risks*, **banks should make use of scenario analysis, including stress testing, to assess the climate resilience of their business models and strategies.**

Observations

Results of completed climate risk stress tests (ECB, HKMA) show serious **consequences for financial stability if FIs fail to transition**, with projected losses rising substantially under a hot house world scenario due to physical asset damage.

Objectives of stress testing & common misconceptions

✓ **Information collection** to understand FI's resilience and preparedness under climate scenarios, and adaptive strategy

✓ **Exploratory learning exercise** to understand how best to quantify and manage climate risks, particularly over long-term horizons

✗ **A prediction of actual future impact,** with scenarios and parameters derived from preliminary research

✗ **A representation** of government policies (i.e. what countries' governments are doing or will do) but a suggestion on policies that should be pursued to limit global warming to 2°C or 1.5°C.

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Complexities of stress testing and challenges to overcome

Most of the climate risk stress tests conducted globally refer to scenarios published by the Network for Greening the Financing System (NGFS) in partnership with academia. By providing a common reference framework, this helps ensure consistency and comparability between FIs.

Expectations & Challenges

30 years **vs.** **1-3** years
for traditional stress test

Higher degree of complexity and uncertainty from longer time horizon to account for long-run build-up of climate impacts

+ Various climate scenarios

Require climate-adjusted macro economic variables representing different transition paths ("orderly transition", "disorderly transition" and "hot house world")

+ Multiple sector responses

Additional variables representing differentiated impacts on different sectors, for examples Fossil Fuels, Utilities, Heavy, Industries, Transportation, Agriculture, Building & Construction, Banks/ FIs, Sovereign, Mortgage, Retail Auto, etc.

+ Bottom-up analysis

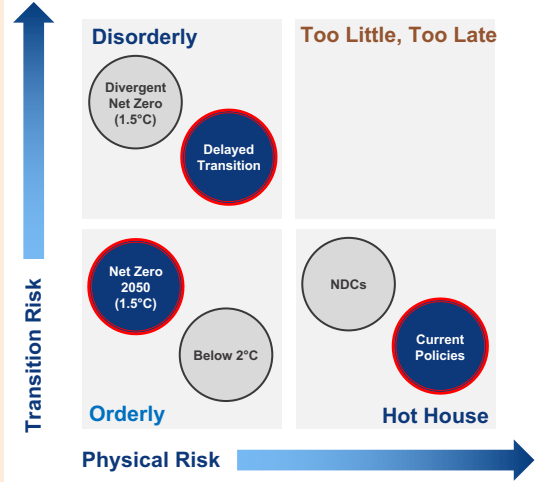
Granular data from each counterparty (including SMEs) required, such as financial performance, production outputs, business mix, detailed locations, etc. as well as 3rd party scientific data such as geospatial climate vulnerability maps.

+ Physical risks

Effects of physical risks are more difficult to simulate, especially for acute physical hazards (typhoon, heatwave, etc.) and require intensive data collection effort (exact location and type of assets)

Solutions

NGFS



Common scenarios selected by supervisory bodies.

NGFS has come up with **six** global, harmonized set of transition pathways, physical climate change impacts and economic indicators.

Bank

- Procure external data sources, and collect information from customers to build up its own climate database
- Develop pathways from climate scenarios to economic drivers (with partnership with external consultants)
- Leverage on industry experts/ coverage bankers to assess/ validate economic drivers for each sector
- Downscale NGFS scenarios into own operating geographies where possible
- Integrate borrowers' climate-adjusted financials into existing rating & ECL models (incl. **rating migration over 30 years**)

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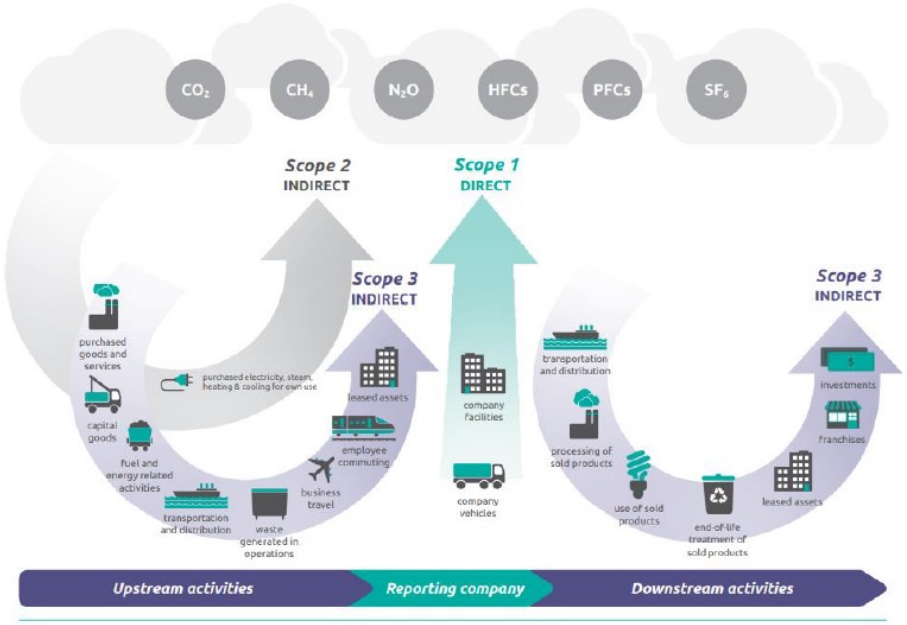
The emission approach estimates climate risk impact using information on company level scope 1, 2 and 3 emissions

Overview of GHG emission scopes[1]



Scope 1	**Direct emissions** from revenue-producing processes or combustion of fuel
Scope 2	**Indirect emissions** released in the production of electricity, steam, heating, or other **energy consumed but not directly produced by the company**
Scope 3 up-stream	**Indirect emissions** produced within the company's **supply chain**
Scope 3 down-stream	**Indirect emissions** occurred when the company's **products are used or disposed**

1. Source: GHG Protocol

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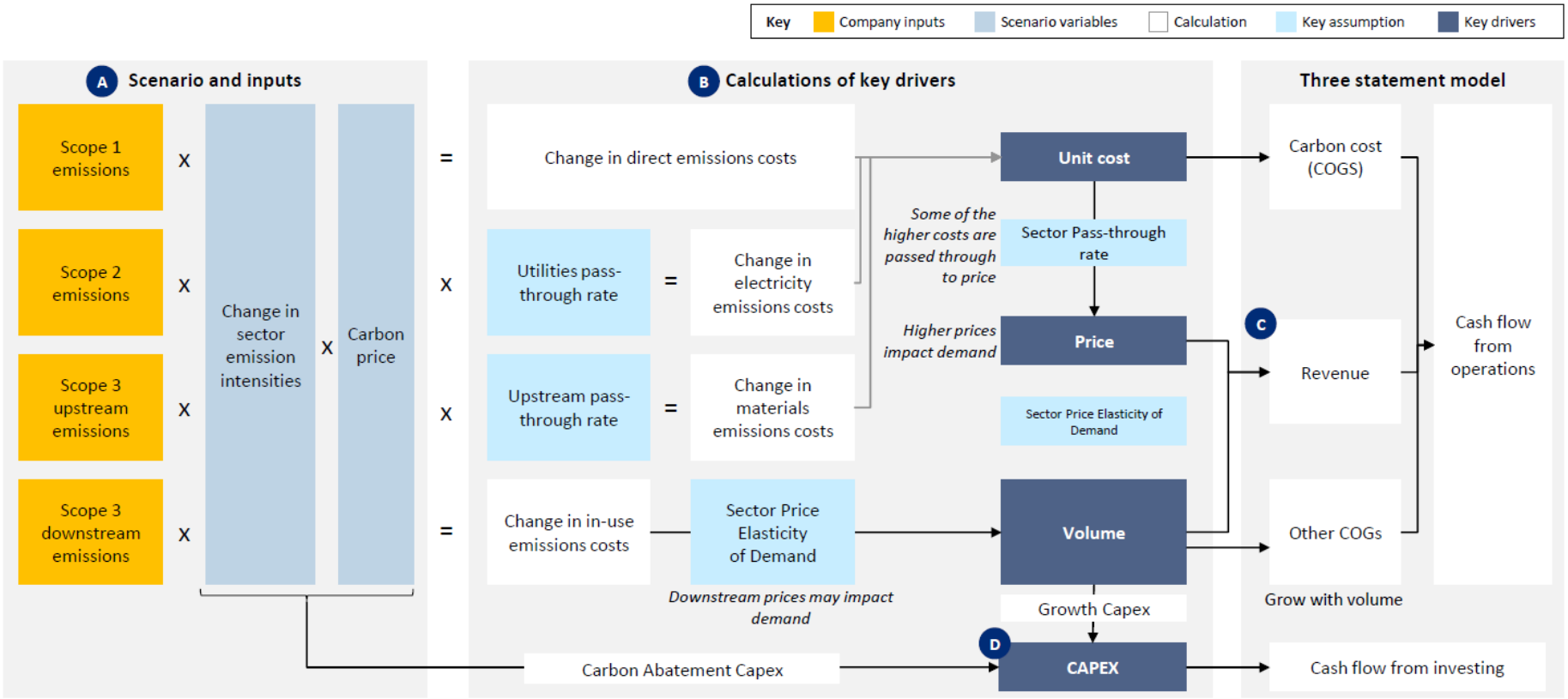
Emission-based model methodology



Source: Oliver Wyman

Balance sheet strength influences the ability to transition

“‘Are we using stress test like a drunkard using a lamppost, more for support rather than illumination?”

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Q & A

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