2023 INTERNATIONAL CONGRESS OF ACTUARIES

BRIDGE TO TOMORROW

28 MAY – 1 JUNE 2023 · SYDNEY

Actuaries Institute Australia

IAA AAI International Actuarial Association
Association Actuarielle Internationale

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Lights, camera, action

The time to quantify climate risk is now

© Richard Yee & Joseph Hoang-Luu, KPMG Australia

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Qualitative vs Quantitative

Qualitative

- Not necessarily linked to validated data sources.
- Coarse output. E.g. RAG
- Limited ability to inform business decisions
- Quick to implement
- Easy entry for any organisation
- Can equally be delivered by Non-Actuaries and Actuaries

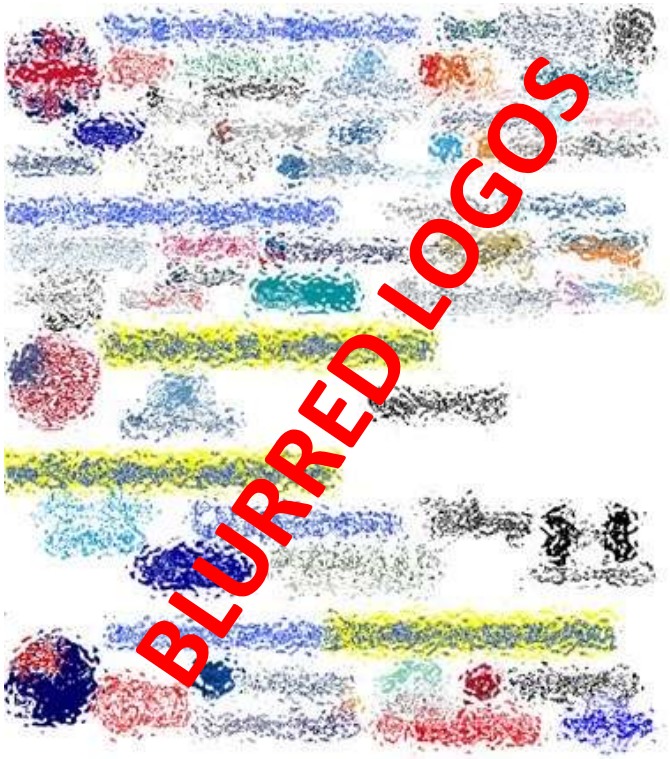
Quantitative

- Grounded in evidence and science / engineering / economics
- Potentially granular outputs
- Informs a wide array of business decisions
- Requires an uplift in organisational understanding of climate risk
- Actuaries are well placed to deliver this

Credentials

KPMG's Climate IQ has been delivered across the globe since 2021.

KPMG Australia employ Actuaries solely dedicated to climate risk assessment.



Our clients range across sectors including consumer goods, food, infrastructure, energy, services and transportation.

The Time is Now

Prepare yourself with KPMG's lessons learnt

Buy-In	Language	Capability	Entrepreneur

Getting Buy-In

Client ----------> <---------- KPMG

Hi Joseph,
Our organisation is climate pro, I even remove the plastic film on coffee cups to recycle.

Hi Valued Client,
That's amazing! That's going a step further than the average client.

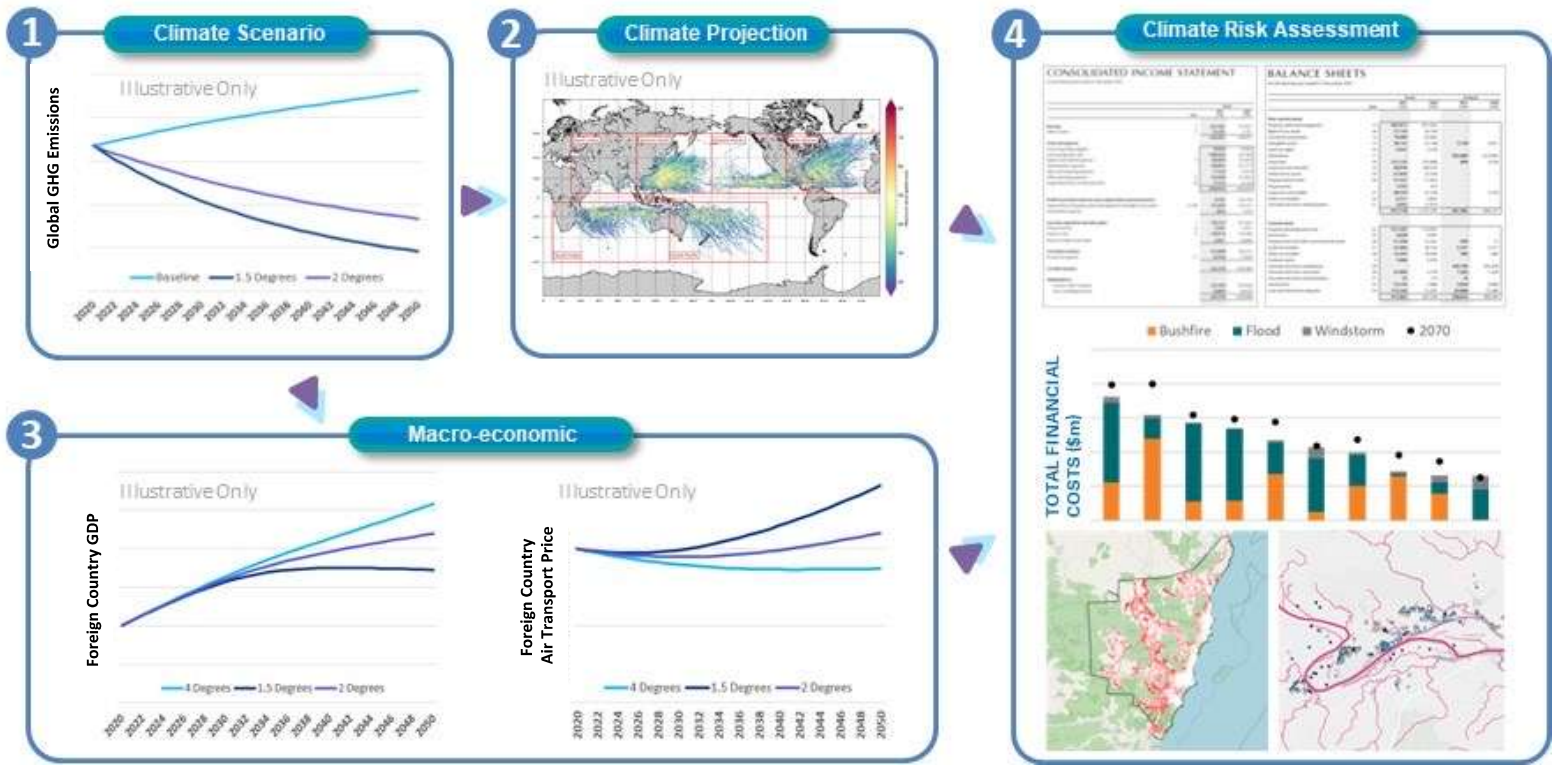
Getting Buy-In

Client ----------> <---------- KPMG

So, we already do our part for the community. Thanks for your offer of assistance.

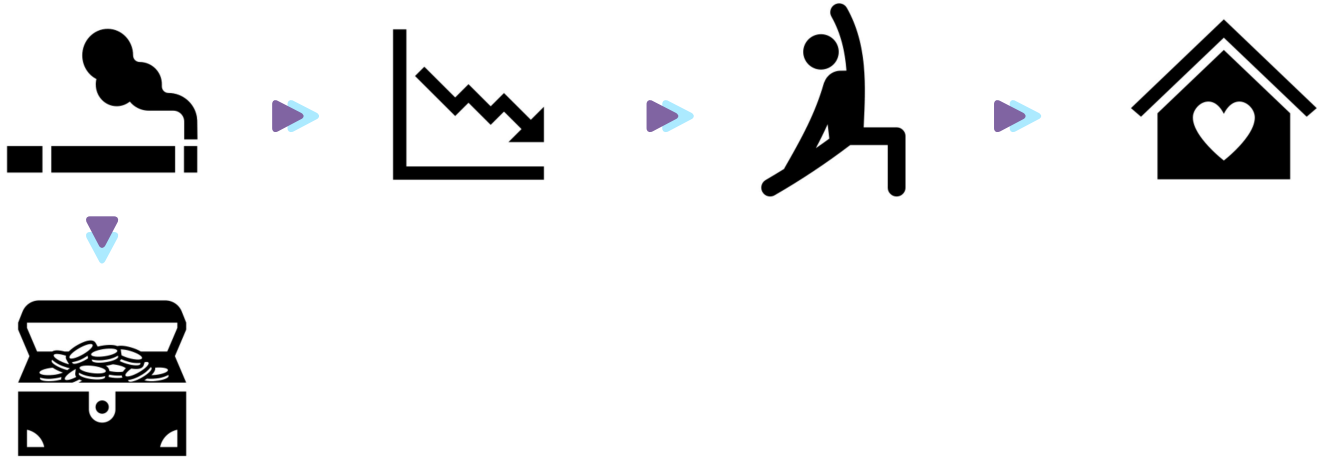
We can assist with more than meticulous recycling though. Did you know that…

Baby Steps


1
Climate Scenario
Illustrative Only
Global GHG Emissions
Baseline
1.5 Degrees
2 Degrees
2
Climate Projection
Illustrative Only
3
Macro-economic
Illustrative Only
Foreign Country GDP
4 Degrees
1.5 Degrees
2 Degrees
Illustrative Only
Foreign Country Air Transport Price
4 Degrees
1.5 Degrees
2 Degrees
4
Climate Risk Assessment
CONSOLIDATED INCOME STATEMENT
BALANCE SHEETS
Bushfire
Flood
Windstorm
2070
TOTAL FINANCIAL COSTS ($m)

Common Language

When explaining a heavy tail catastrophe distribution, we can use the analogy of a dice with one side having 100 score.



Common Language

A carbon tax may produce widespread economic impacts that are not immediately obvious. However, incremental linkages may be intuitive.

Leverage Capability

Digital twin models

- **What was the capability?**

  An electricity distribution client already had an operational digital twin of all their physical assets and the relationship of each asset's electrical dependency within the network.

- **How was it leveraged?**

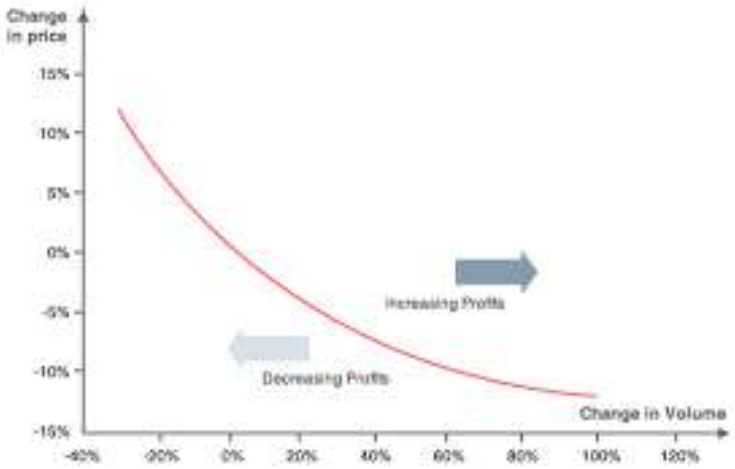
  The digital twin was embedded within the stochastic simulation of natural catastrophes on each individual asset. This identified a more realistic de-energisation of the network due to catastrophes.

- **What was the impact?**

  Accurately identified de-energisation hotspots.

Leverage Capability

Demand-elasticity curves



- **What was the capability?**

  An agriculture client produced goods, for which existed well documented analysis on its demand elasticity. The demand-elasticity curves were produced for multiple variations of the goods.

- **How was it leveraged?**

  The demand elasticity was incorporated into the calculation of projected income statements.

- **What was the impact?**

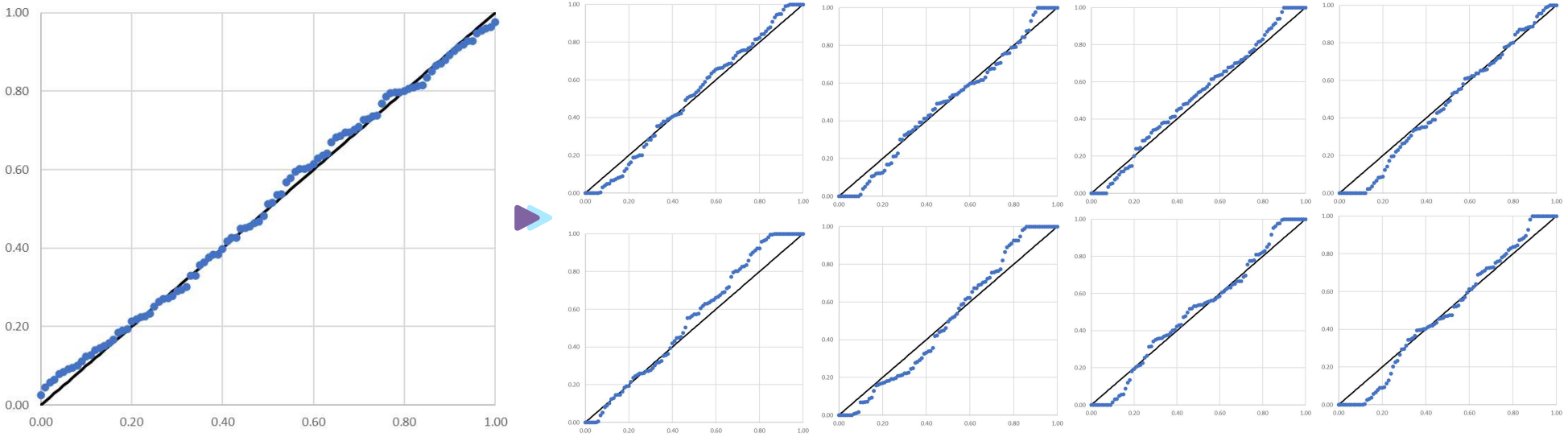
  The income statements reflected more product specific responses to price changes.

Entrepreneurial Clients

Client ----------> <---------- KPMG

Hi Joseph,
Can you please provide the climate risk analysis at an individual asset level?

Hi Valued Client,
Yes, I can, but please consider the following…



Considerations for the Entrepreneur

Generally, analysis is parameterised to reflect outcomes at the highest level. Additional parameterisation is required to allocate outcomes appropriately to lower levels. If parameterisation was not performed at lower levels, then outcomes assessed at lower levels should be considered with care.

Entrepreneurial Clients

Client ----------> <---------- KPMG

Hi Joseph,
I noticed that the model did not explicitly allow for shark attacks that may occur due to rising sea-levels. Can we please add this?

Hi Valued Client,
Yes, I can, but please consider the following…

A%

B%

C%

D%

Considerations for the Entrepreneur

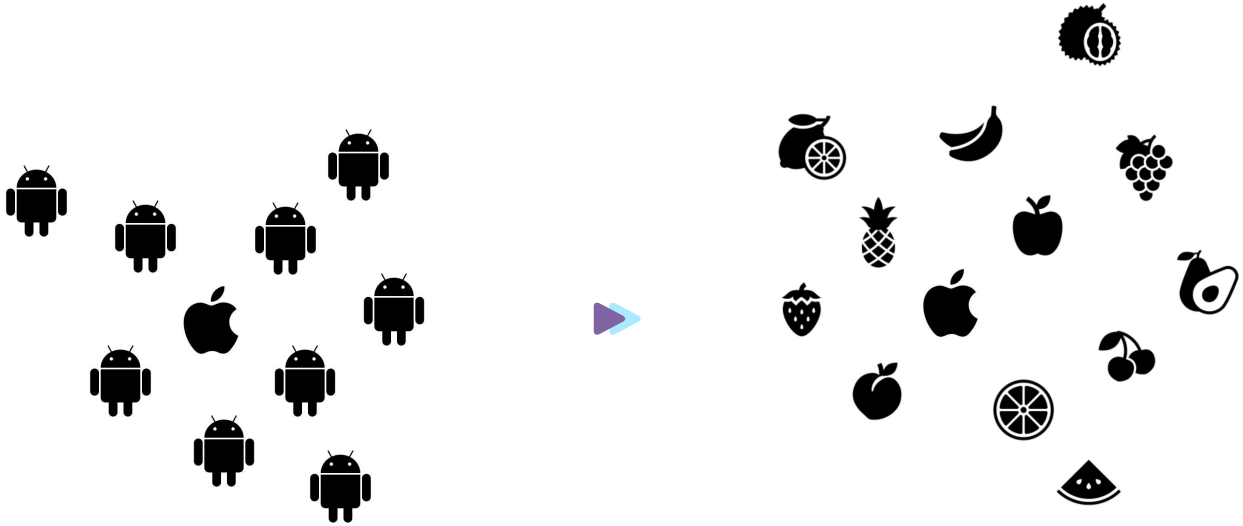
Models attempt to capture the fundamental mechanisms that influence the output under scrutiny. There should be a limit to how many real-world phenomena are included based on the materiality to the output.

Entrepreneurial Clients

Client ----------> <---------- KPMG

Hi Joseph,
The CGE model projects a reduction in our product sales price. Can the model allow for an increase in prices at the expense of sales volume?

Hi Valued Client,
Yes, I can, but please consider the following…



Considerations for the Entrepreneur

A CGE model is a macro-economic model, which projects how regions and sectors will perform in the future. An individual organisation may set itself apart, but how can this be defended?

Closing Comments

Richard ----------> <---------- Joseph