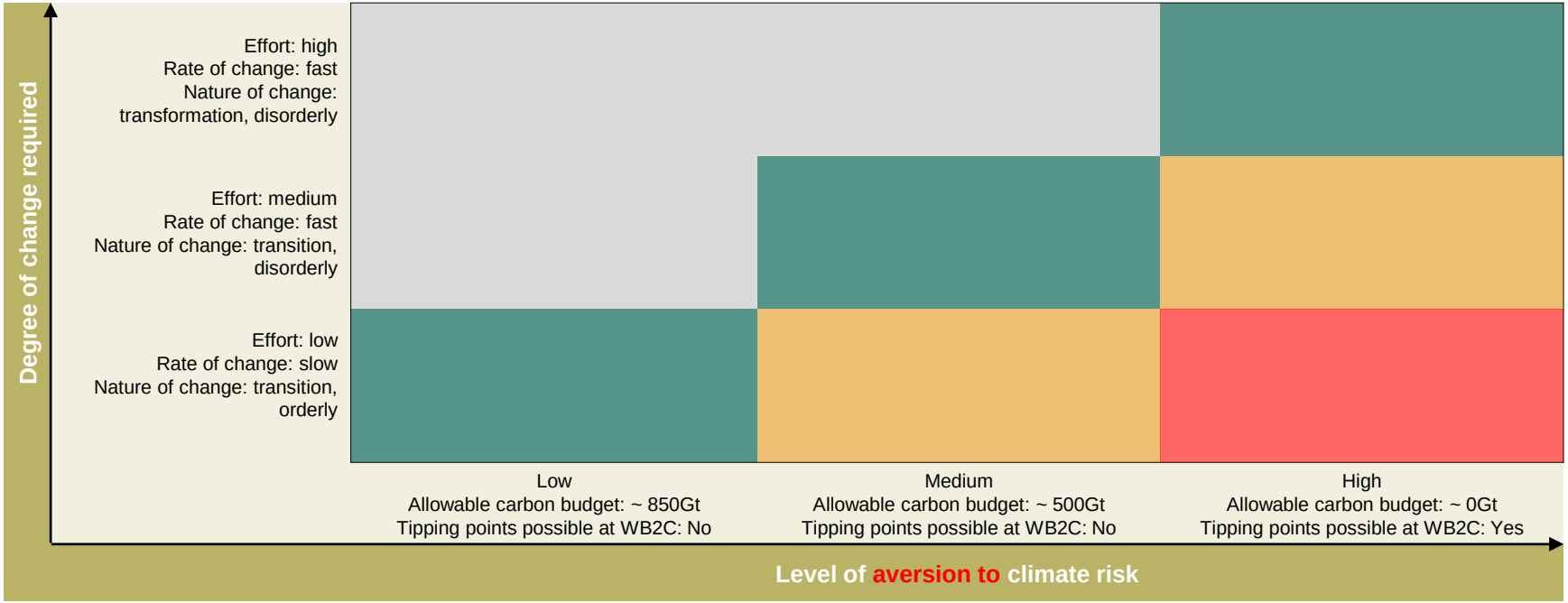
A tool to assign ‘now’ probabilities to 2050 scenarios

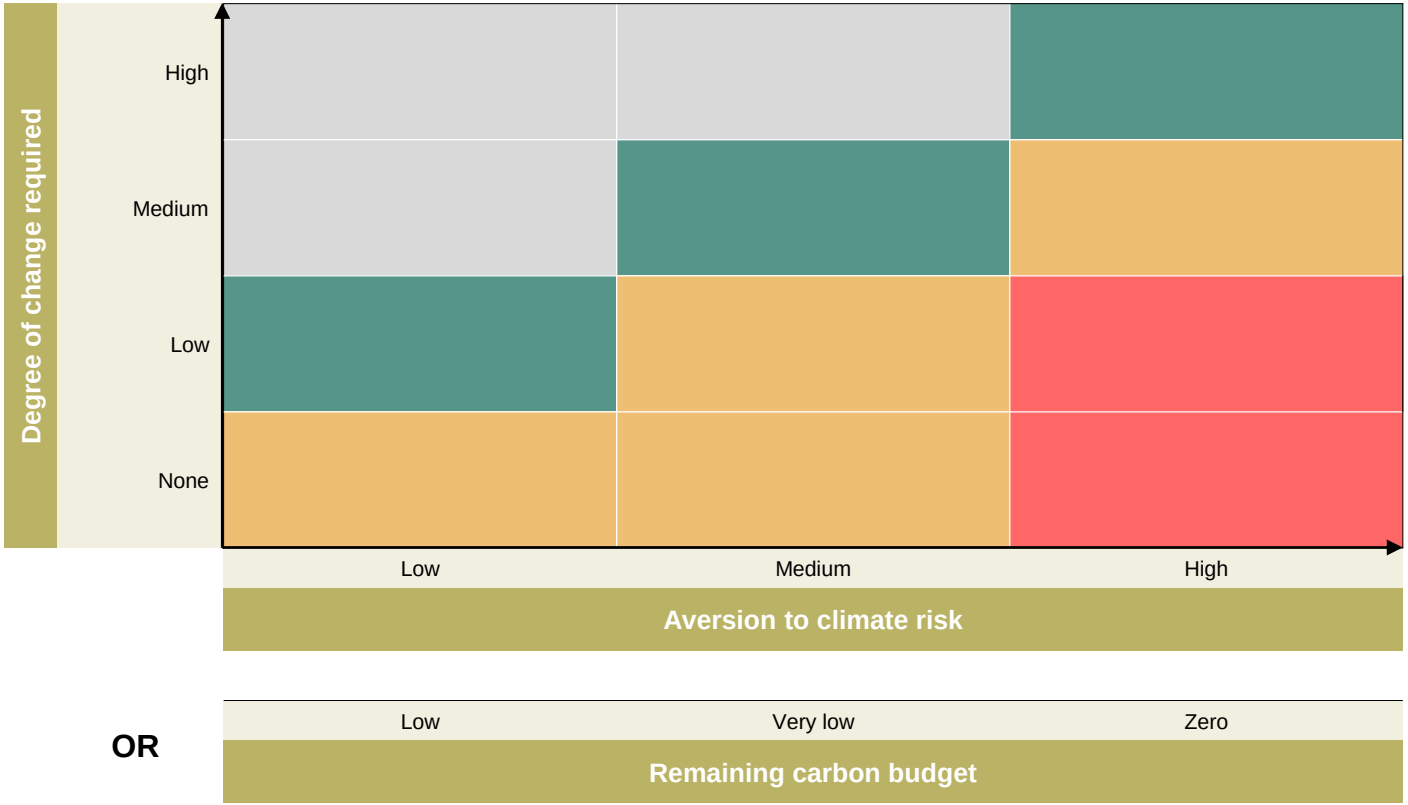
IFT Macro working group

Thinking Ahead Institute
An innovation network founded by WTW

Scenario framework from WG3



Probability of scenario (cell) delivering WB2C by 2050 (and associated financial losses)



Is one version of x-axis better than other?

Or a personal choice?

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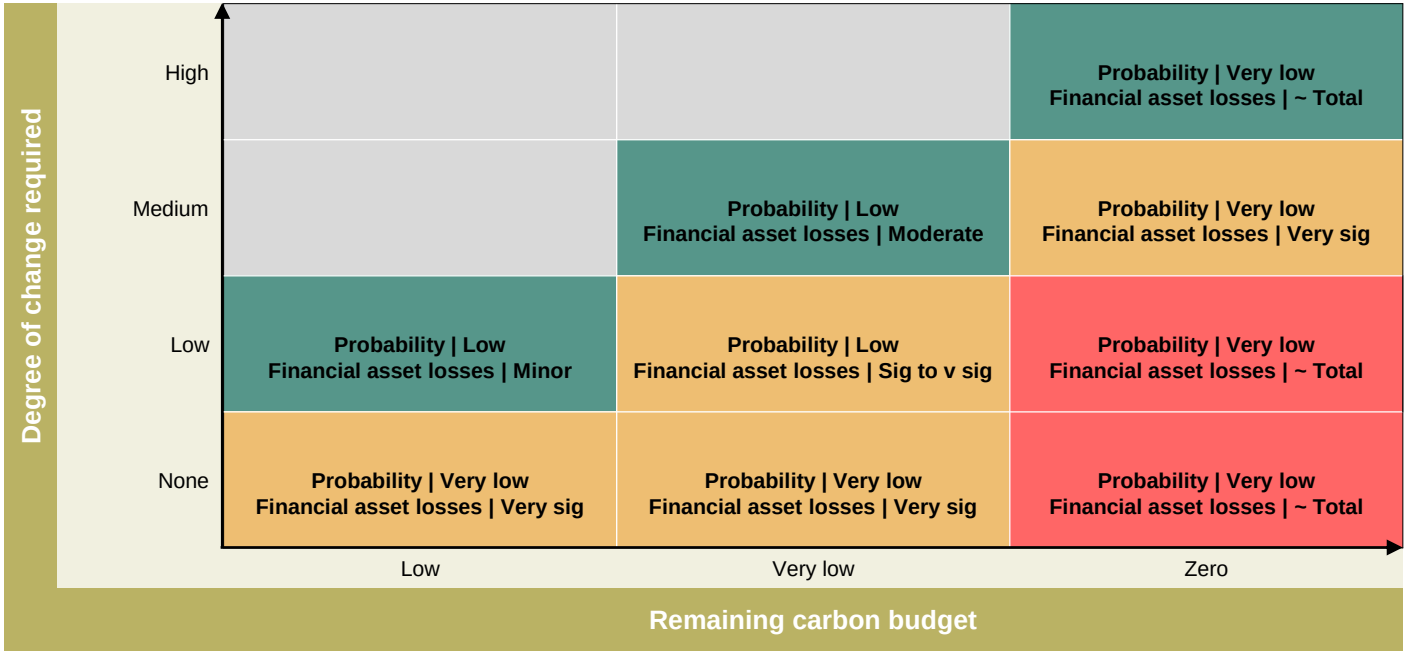


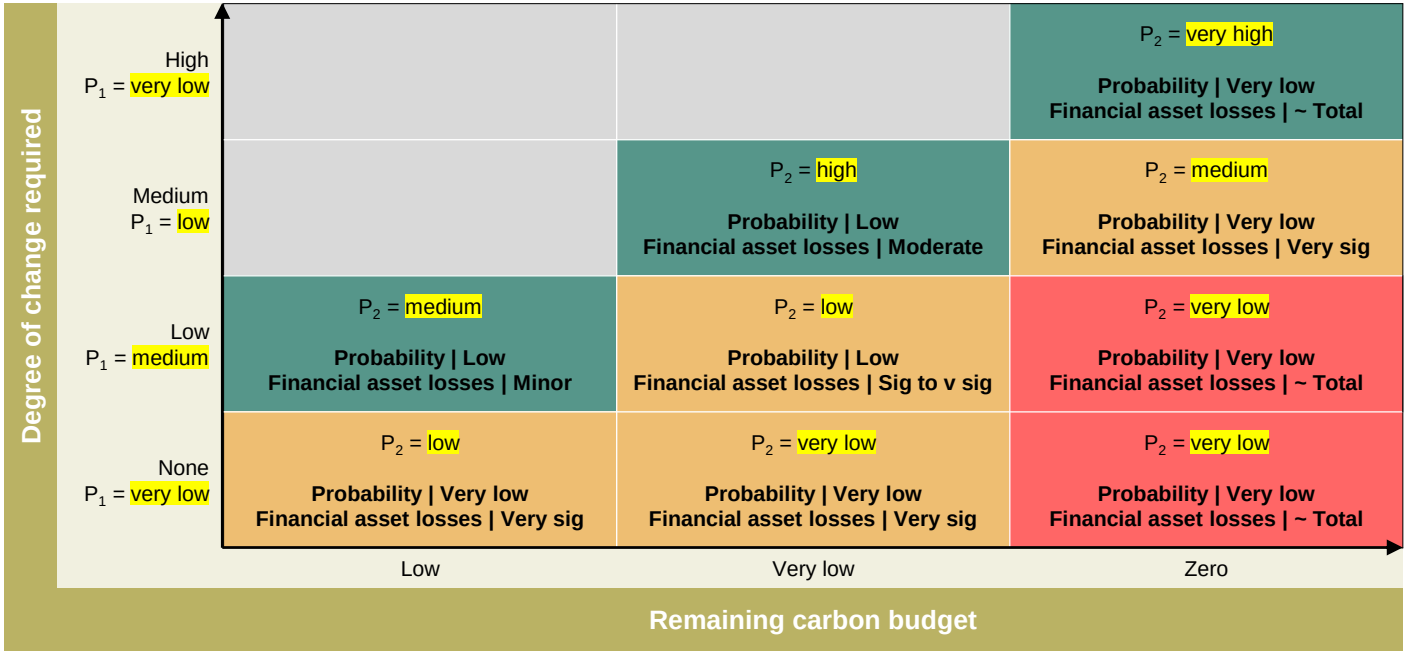
Key

Probability	
Very low	0-20%
Low	20-40%
Medium	40-60%
High	60-80%
Very high	80-100%

Financial asset losses	
None	<10%
Minor	10-25%
Moderate	25-50%
Significant	50-75%
Very significant	75-90%
~ Total	>90%

Carbon budget	
Low	~ 850Gt
Very low	~ 350Gt
Zero	~ 0Gt

Derivation of probabilities



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xyz = user input

P1 = probability of level of change occurring

P2 = probability of warming remaining <2C given economic change

Probability of scenario / cell (level of change and warming <2C) = P1 * P2

Scenario framework | delivering WB2C by 2050

What does this matrix show?

- Each cell of the matrix can be considered a scenario, which combines a different level of change and a different remaining carbon budget
- The ‘change’ is a combination of political, social, likely legal, and economic changes
- The level of change is currently undefined and subjective. If we believe the system is complex and adaptive then, technically, no change (‘none’ on the y-axis) is not possible. At the upper end of the y-axis, we have defined ‘high’ within this working group to be transformational change, which could include the replacement of capitalism etc
- All scenarios aim to limit warming to **well below 2C by 2050**. Our probability of the success of achieving this aim is given in the cell, and is calculated by multiplying two underlying probabilities:
  - **P_1**: assessment of the probability of the level of change
  - **P_2**: assessment of the probability of keeping warming to below 2C supposing the level of change happened
- Users can / should substitute their own probability assessments for P_1 and P_2. We suggest that the P_1 probabilities should sum to 100% (the middle points of our ranges sum to 100%). The P_2 probabilities are conditional (on the level of change) and so will not / need not sum to 100%
- Investors with higher aversion to climate risk should act as if they believe in a lower remaining carbon budget, so for the same level of change P_2 is lower for higher levels of aversion (lower remaining carbon budget)
- We also show **our expectations of financial asset losses** for each transition scenario

Scenario framework | delivering WB2C by 2050

Reasoning for our selected P_1, P_2 and financial asset losses

- P_1, High change | Very low (0%-20%)
  This is a transformational degree of change, including an overhaul of regulations, fiscal policy, international cooperation and investors' mindsets. We see very little evidence of this occurring – even the most significant climate action proposed by countries remains within the current 'rules of the game'

- P_1, Medium change | Low (20%-40%)
  This is the most ambitious pace and degree of transition in current policy proposals. We think there is a low probability that there will be the requisite political support and institutional capability to deliver it. However, as technology and the transition advance, this degree of change may become more achievable

- P_1, Low change | Medium (40%-60%)
  This degree of change is both feasible and could bring the global economy to, or very close to, NZE by 2050. Although current plans do not reach NZE by 2050, future policy commitments should make up the gap in required emissions reductions. Technological advances in energy storage and generation will support this change.

- P_1, No change | Very low (0%-20%)
  This degree of change sees no further action taken towards a low carbon transition. We believe this is very unlikely because of the cost and strategic benefits of renewable over non-renewable energy, and because of political pressure due to increasingly apparent climate change.

Investor action planning framework (timeframe: 2050, warming: <2C)

Reasoning for our selected P_1, P_2 and financial asset losses (cont)

- Our chosen P_2 are subjective assessments – how likely we believe it will be to achieve WB2C given the level of change contemplated. For the same degree of change (y-axis), the probability decreases as we move right along the x-axis given the smaller remaining carbon budget

- Our P_2 increases as the extent of transition increases (moving up the y-axis). Given the temperature goal is the same for all scenarios, more extensive change makes achieving the temperature goal more likely

- Financial asset losses are affected by two climate risks:
  - Physical risk: the impact of changes to climate (eg heat or changed rainfall patterns affecting harvests or consumption patterns) and natural catastrophes on financial asset valuations
  - Transition risk: the impact of adaptation towards a low-carbon economy on financial asset valuations (eg currently valuable assets become 'stranded')

- The financial asset losses figures are expected values, and are extrapolated from TAI's work in *Pay now or pay later?* given our beliefs. The losses are contingent on the characteristics of the individual scenario (how hot is it likely to get, how wrenching the change etc). In general, the losses increase the lower the remaining carbon budget is assumed to be (moving across x-axis), and reduce as the degree of change increases (moving up the y-axis). As an exception, the transformational change in the top right of the matrix results in such severe transition-related losses to financial assets (eg potential replacement of capitalism) that we expect losses would be close-to-total

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