

INVESTING IN A TIME OF CLIMATE CHANGE

CONSTRUCTION AND BUILDING INDUSTRY
SUPER (CBUS)
PORTFOLIO CLIMATE RISK ASSESSMENT

August 2015

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Executive Summary

Construction and Building Industry Super (Cbus) recently partnered with Mercer and 17 other participants in a research study (“the Study”) to gain further insights into the investment implications of climate change.

The timing is no coincidence: 2015 is a critical year, with global governments meeting in Paris in December to negotiate a new global climate change agreement.

Climate change is an environmental, social and economic risk, expected to have its greatest impact in the long term. But to address it, and avoid dangerous temperature increases, change is needed now. The extent to which this change will occur is an open question. Climate change is an important theme that impacts on all ESG factors - environmental, social, and corporate governance – but is primarily environmental.

To seek to quantify the risks and opportunities which arise in a time of climate change, and appropriate actions as a result of them, the Study has brought together a cross-section of the global investment industry including asset owners, investment managers, insurance companies and private banks. The Study also benefitted from the input of an advisory group comprised of renowned experts in the fields of investment and climate finance. Appendix C provides a list of participants.

The public report – *Investing in a Time of Climate Change* – provides a comprehensive review of the Study’s research, methodology and findings. This report includes a short overview of the Study, but is focused on the key findings and implications for Cbus.

The recommendations for Cbus consider an example portfolio, the Growth option, solely from a climate change perspective, based on the Study’s findings. Other factors, which Cbus would take into account in full strategic reviews, would need to be incorporated before implementing portfolio changes e.g. objectives, liquidity, fees, current valuation views etc.

CBUS – ACTIONS AND MOTIVATIONS

Cbus has already taken a number of steps in developing its approach to the management of ESG risks and opportunities. Cbus has:

- Been a signatory to the UN backed Principles for Responsible Investment (PRI) for many years, and participates actively in other industry initiatives, such as the Investor Group on Climate Change.
- An established ESG and proxy voting policy, with explicit references to climate, including a climate change Q&A.
- Allocated specific ESG resourcing within the investment team. The skill set being sought for the new ESG hire (to replace Louise Davidson), including company and portfolio management experience, is also consistent with the findings of the Study.

The motivations for joining the Study were to:

- Gain a broader understanding of climate risk and opportunity, and how these interact with the asset classes and sectors to which Cbus has exposure.
- Determine portfolio specific climate positioning for Cbus funds, identifying relevant risks and opportunities.
- Evolve the investment approach in the context of climate change, in order to optimise risk-adjusted returns for members over the long term.
- Work collaboratively with others to progress an approach to climate risk and opportunity - a topic too rich and complex to solve as a single organisation.

KEY FINDINGS FOR Cbus

This report provides the estimated return implications under the four climate scenarios and four climate risk factors, modelled between 2015 and 2050, with commentary on the implications for Cbus. The return estimates are for a total portfolio, at the asset class and industry sector levels.

The four climate change scenarios and the four risk factors are explained in detail in Appendix D but can be summarised as follows:

Scenarios:

1. *Transformation*: More ambitious climate-change mitigation action that puts us on a path to limiting global warming to 2°C.
2. *Coordination*: Policies and actions are aligned and cohesive, keeping warming to 3°C.
3. *Fragmentation (Lower Damages)*: Limited climate action and lack of coordination result in warming rising to 4°C.
4. *Fragmentation (Higher Damages)*: As above, coupled with assumed higher damages.

Risk Factors:

1. *Technology*: Broadly defined as the rate of progress and investment in the development of technology to support the low-carbon economy.
2. *Resource Availability*: Defined as the impact on investments of chronic weather patterns (e.g. long-term changes in temperature or precipitation).
3. *Impact*: Defined as the physical impact on investments of acute weather incidence/severity (i.e. extreme or catastrophic events).
4. *Policy*: Broadly defined as all international, national, and sub-national targets; mandates; legislation; and regulations meant to reduce the risk of further man-made or “anthropogenic” climate change.

The key findings from the Cbus portfolio analysis, using a snapshot in time, were as follows:

1. The approximately 50% exposure to equities could be better positioned under a Transformation scenario¹.

- Both global developed market equities and Australian equities are expected to be negatively impacted (-0.82%pa and -0.94%pa over ten years).
- Emerging markets are expected to be positively impacted (+0.50%pa over ten years). We understand Cbus targets an allocation to emerging market equity managers of 17.5% of the sector (i.e. 3.8% of the Growth accumulation option).

2. Cbus’ active overseas developed equity and Australian equity managers are relatively well positioned against their benchmarks to the industry sectors expected to be the most negatively impacted by climate. However, the overweight exposures to Materials for both overseas and Australian equities, and to Energy for Australian equities, should be well understood.

- Cbus should ensure that the underlying holdings within these industry sectors, together with Consumer Discretionary and Consumer Staples, are well understood internally and discussed with appointed investment managers, given the potential risk in these sectors.
- Underweight positions to Energy and Utilities and overweight to IT are positives from a climate perspective for overseas equities.

¹ This is the most ambitious climate policy scenario, which is intended to keep temperature increases to within 2 degrees above pre-Industrial levels by 2100.

3. The actual return impact on the combined approximately 24% current exposure to real estate and infrastructure is subject to scenario variability and would depend on the underlying location exposures, with differing impacts expected for each of the four climate risk factors over various time periods.

- The impacts of climate change would be region specific, but overall, we would expect positive Policy and Technology responses in a Transformation scenario.
- Resource Availability and Impact are, however, expected to have negative impacts under the other scenarios, particularly Fragmentation (Higher Damages) over time.

4. Fixed income assets are expected to be relatively climate resilient, however, under a Transformation scenario the first ten years could see negative return impacts.

Cbus should be aware that:

- We assigned a negative sensitivity to the Policy risk factor for Australian sovereign debt, given the heavy reliance of Australian economic growth on resources (and resulting susceptibility of the economy to a global or regional policy shock).
- We expect credit markets to have a similar, albeit a less-sensitive profile to that of global equities and there may be impacts within the multi-asset credit exposure where climate risks could make companies more susceptible to potential downgrade or default.

5. Total portfolio climate impacts on return for the Cbus Growth option range from -0.04%pa to -0.33%p.a. for different scenarios over 10 and 35 years.

The Growth option is reasonably well positioned under the Coordination and Fragmentation scenarios, but is potentially vulnerable under a Transformation scenario over the coming decade – where there could be a -0.33%pa impact on returns. The portfolio is less adversely affected under the other scenarios, but even the Coordination scenario, which has the least impact, is still expected to be -0.07%pa over ten years.

Over a 35 year period, the Transformation impact is reduced to -0.17% pa but remains the highest impact scenario.

Fragmentation (Higher Damages) is expected to have a -0.14% pa impact on median returns over the 35 year time period, which is expected to become more significant beyond 35 years (as physical impacts increase).

If a Transformation scenario eventuates, the cumulative impact over ten years for every \$1 billion could be a \$56million reduction. This assumes an annual expected return for the current allocation of 6.19%pa and a starting value of \$1 billion, over ten years (\$1.82 billion with a 6.19%pa expected return versus \$1.77 billion with an expected return of 5.86%pa (i.e. 6.19% minus 0.33%)).

RECOMMENDATIONS FOR Cbus

The Study recommends integrating climate considerations to achieve sustainable growth within the investment process, following a Beliefs, Policies, Processes and Portfolio framework. This report captures which of the Study's action recommendations Cbus has already addressed, and where, given the findings, Cbus could focus its next actions.

The recommendations for Cbus consider how climate considerations will impact an example portfolio, the Growth option. Other factors that Cbus would take into account during full strategic reviews would need to be considered before implementing portfolio changes.

We believe the following should be a near term priority for Cbus to consider as you increasingly incorporate climate considerations as standard within your governance, strategy and portfolio decision making processes.

- **Beliefs, Policy and Processes:** Recognise climate explicitly within: existing Investment Beliefs; voting and engagement; and stakeholder reporting. Also finalise the current review process for adding the Montreal Pledge to the current industry initiatives that Cbus participates in.
- **Portfolio Risk Assessment:** Cbus could commission carbon analysis for equities, to provide additional insights at an industry sector and company level. We also recommend an environmental and climate resilience assessment of real estate and infrastructure holdings (directly, or by requesting the manager undertake this).

This is particularly important for any new investments that will have ten year plus time horizons.

- **Portfolio Risks and Opportunities:**
 - o Open a dialogue with managers on the potential risks identified as priorities in the Mercer TRIP analysis, e.g. Materials, plus Energy for Australian equities, together with any carbon footprinting for equities, ESG ratings or other sources, to identify where risk reduction may be implemented through appropriate ESG and climate due diligence and voting/engagement processes.
 - o Passive Equities: Consider reallocating a portion of the passive equities exposure to a low-carbon alternative. See Appendix A.
 - o Active equities: Consider thematic strategies focused on sustainability. Opportunities cover both mitigation and adaptation themes, including low-carbon investments, clean energy, water, agriculture, and broad sustainability themes. See Appendix B.
 - o Review whether current exposures to emerging markets could be increased, at the expense of domestic equities, or take other steps to further diversify equity exposures.
 - o Niche exposures: A potential increase in the current allocation/establish an allocation to insurance-linked securities and catastrophe bonds, with the timing to take current valuations into account.

2

Analysis & Key Findings

Mercer has reviewed the climate risk exposures for Cbus using our TRIP factor framework and considering the portfolio impacts under the four climate change scenarios.

CURRENT STRATEGIC ASSET ALLOCATION

Asset allocation details were provided for the Cbus Growth option, given this reflects the majority of Cbus member investments.

Table 1:
Cbus Growth Option Asset Allocation

Asset Class	Cbus Growth Option
Global Equity	21.50%
Regional Equity (AUD)	26.50%
Real Estate (AUD)	13.00%
Private Equity	2.00%
Infrastructure	11.00%
Hedge Funds	5.00%
Multi-Asset Credit	6.00%
Developed Market Sovereign Bonds (AUD)	12.00%
Cash	3.00%

KEY FINDINGS

The key findings from the Cbus portfolio analysis were as follows:

1. The approximately 50% exposure to equities could be better positioned under a Transformation scenario².

Given the scale of response required to transform the economy onto a low-carbon pathway, the impact of the TRIP factors, particularly Policy, on investment portfolio returns is strongest under the Transformation scenario. Under this scenario:

- Both global developed market equities and Australian equities are expected to be negatively impacted (-0.82%pa and -0.94%pa over ten years).
- Emerging markets are expected to be positively impacted (+0.50%pa over ten years). We understand Cbus targets an allocation to emerging market equity managers of 17.5% of the sector (i.e. 3.8% of the Growth accumulation option).

For the other three scenarios, developed market equities remain negatively impacted and emerging markets also become negatively impacted under the Fragmentation scenarios, although at times with a lower impact than developed market equities

2. Cbus' active overseas developed equity and Australian equity managers are relatively well positioned against their benchmarks to the industry sectors expected to be the most negatively impacted by climate. However, the overweight exposures to Materials for both overseas and Australian equities, and to Energy for Australian equities, should be well understood.

- Cbus should ensure that the underlying holdings within these industry sectors, together with Consumer Discretionary and Consumer Staples, are well understood internally and discussed with appointed investment managers, given the potential risk in these sectors.

² This is the most ambitious climate policy scenario, which is intended to keep temperature increases to within 2 degrees above pre-Industrial levels by 2100.

- Underweight positions to Energy and Utilities and overweight to IT are positives from a climate perspective for overseas equities.

3. The actual return impact on the combined approximately 24% current exposure to real estate and infrastructure is subject to scenario variability and would depend on the underlying location exposures, with differing impacts expected for each of the four climate risk factors over various time periods.

- The impacts of climate change would be region specific, but overall, we would expect positive Policy and Technology responses in a Transformation scenario.
- Resource Availability and Impact are, however, expected to have negative impacts under the other scenarios, particularly Fragmentation (Higher Damages) over time, with drought having the greatest impact.

4. Fixed income assets are expected to be relatively climate resilient, however, under a Transformation scenario the first ten years could see negative return impacts.

Cbus should be aware that:

- We assigned a negative sensitivity to the Policy risk factor for Australian sovereign debt, given the heavy reliance of Australian economic growth on resources (and resulting susceptibility of the economy to a global or regional policy shock).
- We expect credit markets to have a similar, albeit a less-sensitive profile to that of global equities and there may be impacts within the multi-asset credit exposure where climate risks could make companies more susceptible to potential downgrade or default.

5. Total portfolio climate impacts on return for the Cbus Growth option range from -0.04%pa to -0.33%p.a. for different scenarios over 10 and 35 years.

For the purposes of quantifying potential total portfolio impact, we assessed the aggregate impact of the TRIP factors under each climate scenario.

The Growth option is reasonably well positioned under the Coordination and Fragmentation scenarios, but is potentially vulnerable under a Transformation scenario over the coming decade – where there could be a -0.33%pa impact on returns. The portfolio is less adversely affected under the other scenarios, but even the Coordination scenario, which has the least impact, is still expected to be -0.07%pa over ten years.

Over a 35 year period, the Transformation impact is reduced to -0.17% pa but remains the highest impact scenario.

Fragmentation (Higher Damages) is expected to have a -0.14% pa impact on median returns over the 35 year time period, which is expected to become more significant beyond 35 years (as physical impacts increase).

If a Transformation scenario eventuates, the cumulative impact over ten years for every \$1 billion could be a \$56 million reduction. This assumes an annual expected return for the current allocation of 6.19%pa and a starting value of \$1 billion, over ten years (\$1.82 billion with a 6.19%pa expected return versus \$1.77 billion with an expected return of 5.86%pa (i.e. 6.19% minus 0.33%)).

ASSET CLASS IMPACTS

The circle charts on the following pages illustrate where asset classes are expected to experience a gain or reduction in returns, when considering climate risk.

The black circle represents a total portfolio, with the width of each asset class section representing the respective percentage weighting.

Asset class sections that are expected to experience a reduction in returns under a specific scenario will move towards the centre of the circle, and asset class sections that are expected to experience additional returns will move outwards from the circle.

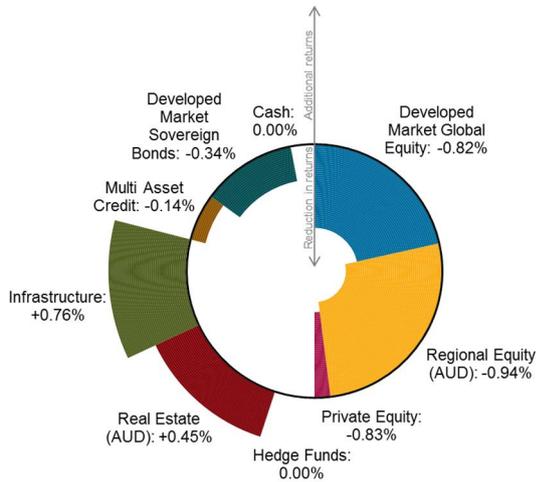
ASSET CLASS IMPLICATIONS – CBUS GROWTH OPTION (DATA OVER 10 YEARS and 35 YEARS)

- **The Cbus Growth option could be better positioned for a Transformation scenario.** This is driven by the combined approximately 50% exposure to developed market global equity and Australian equities, which face negative return implications of -0.82%pa and -0.94%pa respectively over 10 years (-0.42%pa and -0.60%pa over 35 years). Developed market sovereign bonds are also impacted by -0.34%pa over ten years (this neutralises during the 35 year timeframe). These losses will be partly offset by potential gains in infrastructure (+0.76%pa), and real estate (+0.45%pa) and the emerging markets exposure (+0.50%pa), within the developed market equities, under this scenario over ten years.
- **The Coordination scenario sees less significant annual reductions**, with global equities (still -0.30%pa) more negatively exposed to return reductions than Australian equities under this scenario, partly offset by infrastructure (+0.15%pa).
- **The Fragmentation scenarios have greater negative impacts than Coordination** for the majority of Cbus' asset exposures, with variability between higher and lower damages scenarios and the 10 and 35 year timeframes. For equities and real assets exposures the negative return impacts range from -0.07%pa to -0.37%pa over ten years and +0.04%pa to -0.29%pa over 35 years.
- No climate impact on return is expected for the current hedge fund allocation and there are minimal impacts to the remaining smaller allocations.

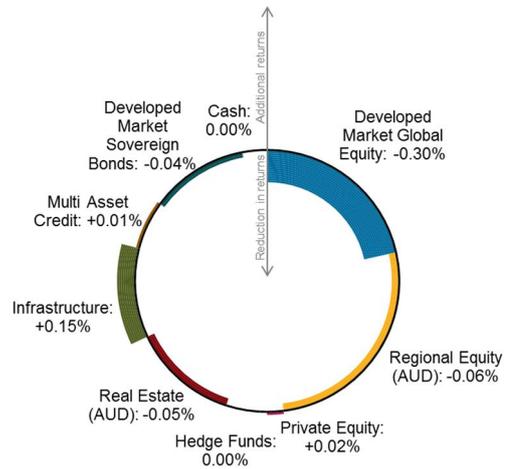
Refer to the Figure 1 circle charts on the following page. Given the importance of the Emerging Markets exposure, particularly under a Transformation scenario, additional circle charts have been provided to illustrate the positive difference expected within the Cbus developed market allocation.

Figure 1:
Cbus Asset Allocations
Cbus Growth Option (data over 10 years)

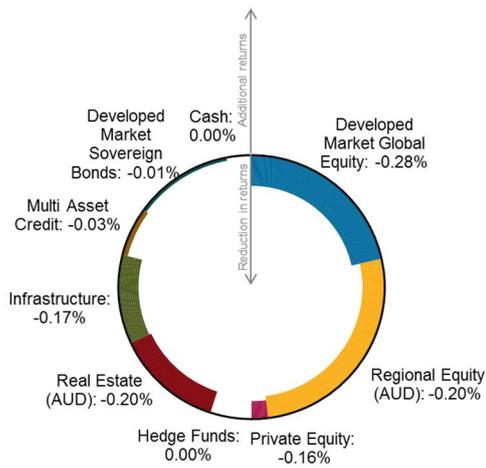
Transformation



Coordination



Fragmentation – Lower Damages



Fragmentation – Higher Damages

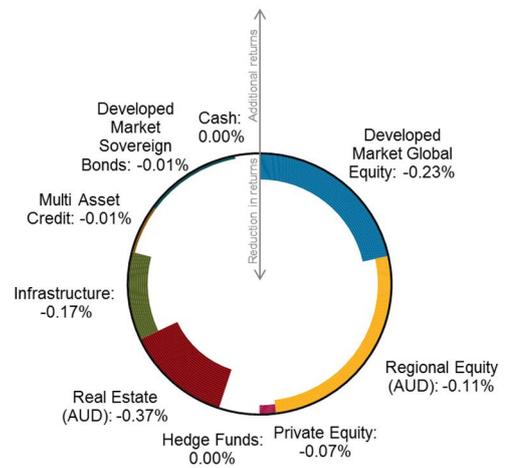
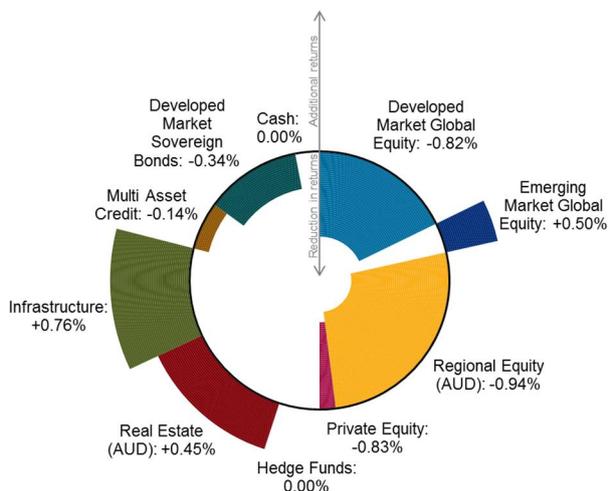
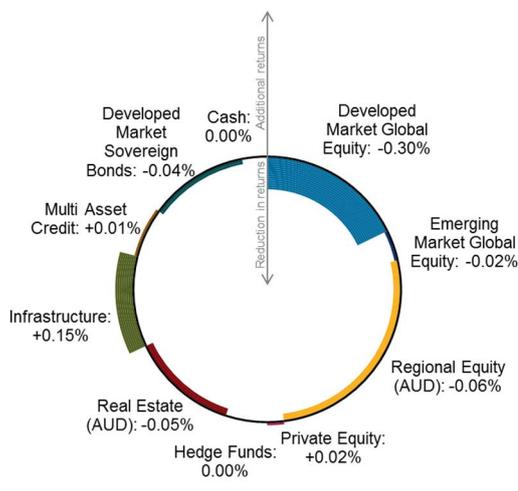


Figure 2:
Cbus Asset Allocations – with emerging markets allocation illustrated
Cbus Growth Option (data over 10 years)

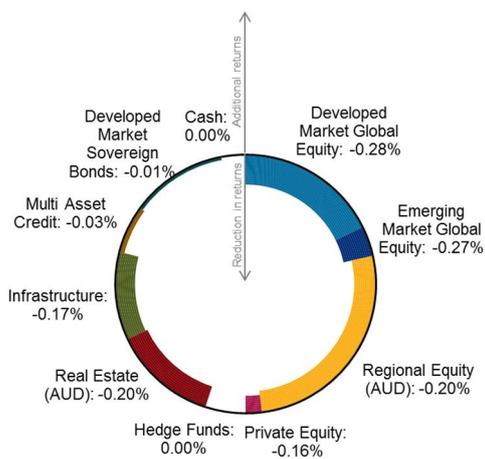
Transformation



Coordination



Fragmentation – Lower Damages



Fragmentation – Higher Damages

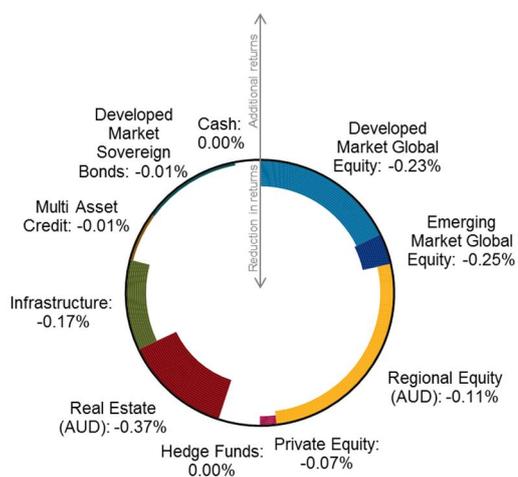
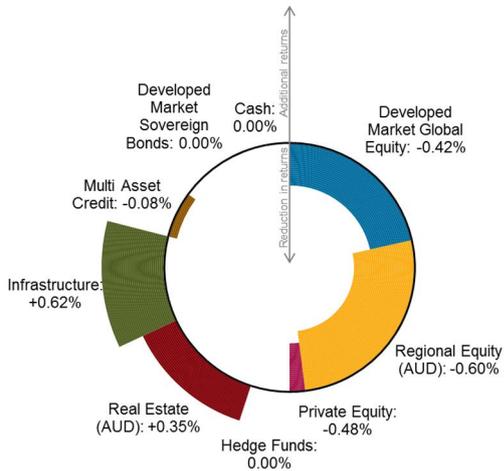
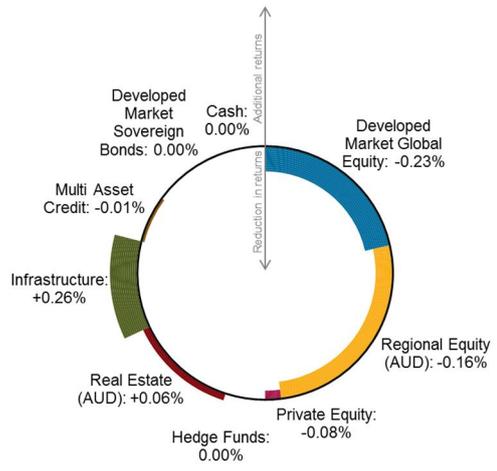


Figure 3:
Cbus Asset Allocations
Cbus Growth Option (data over 35 years)

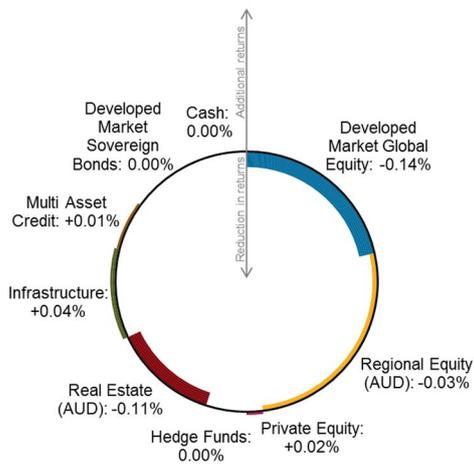
Transformation



Coordination



Fragmentation – Lower Damages



Fragmentation – Higher Damages

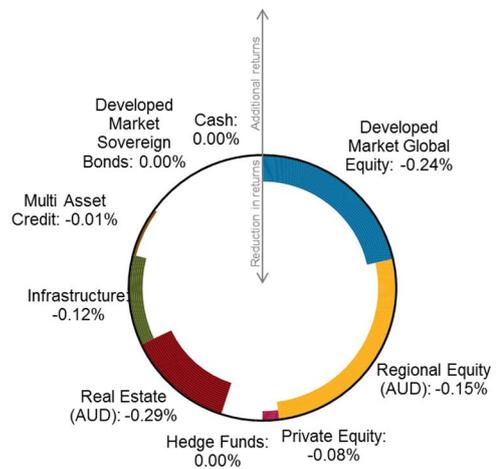
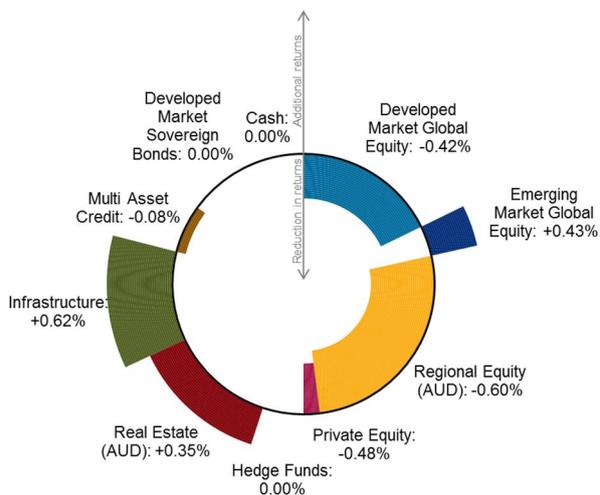
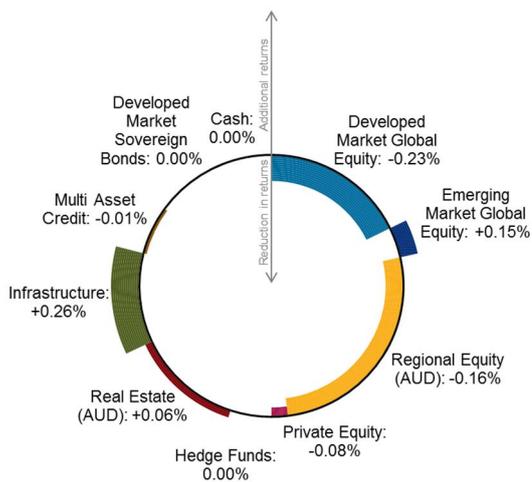


Figure 4:
 Cbus Asset Allocations – with emerging markets allocation illustrated
Cbus Growth Option (data over 35 years)

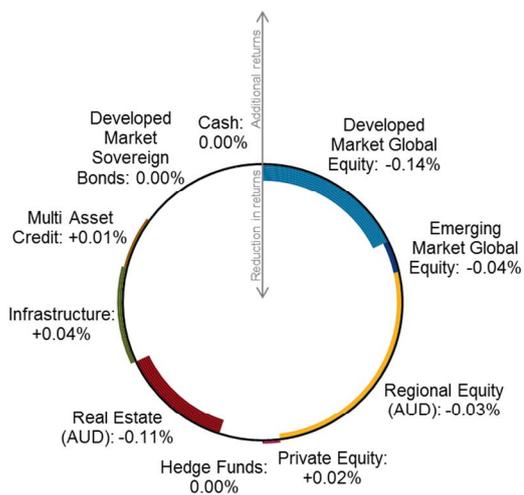
Transformation



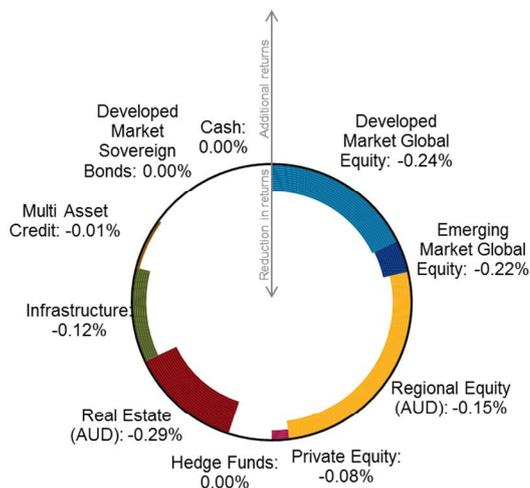
Coordination



Fragmentation – Lower Damages



Fragmentation – Higher Damages



Considering Mitigation vs. Fragmentation Scenarios

- The **Transformation** and **Coordination** scenarios envision stronger levels of mitigation than we see in the Fragmentation scenarios, with the Policy and Technology risk factors representing the most significant influences.
- If Cbus places a reasonable probability on the likelihood of one of these scenarios eventuating, it should take action to manage the Policy risk in its equity portfolios and seek to gain exposure to the Technology risk factor:
 - If Cbus is anticipating a **Transformation** scenario, equal focus should be placed on managing Policy risk in the International and Australian equities. However, under the **Coordination** scenario, Australian equities are less negatively impacted.
 - The Technology factor is a strong signal in both mitigation scenarios, and should lead to positive positioning for companies focused on providing solutions for the low-carbon economy.
- The **Fragmentation** scenarios also see negative impact for equities, but this would be driven more by the Resource Availability and Impact factors. This results in an appropriate focus on environmental risk management versus policy risk management from an equities perspective. The Fragmentation scenarios would also more heavily impact real estate and infrastructure holdings, which warrant increased risk assessment.

INDUSTRY SECTOR IMPLICATIONS

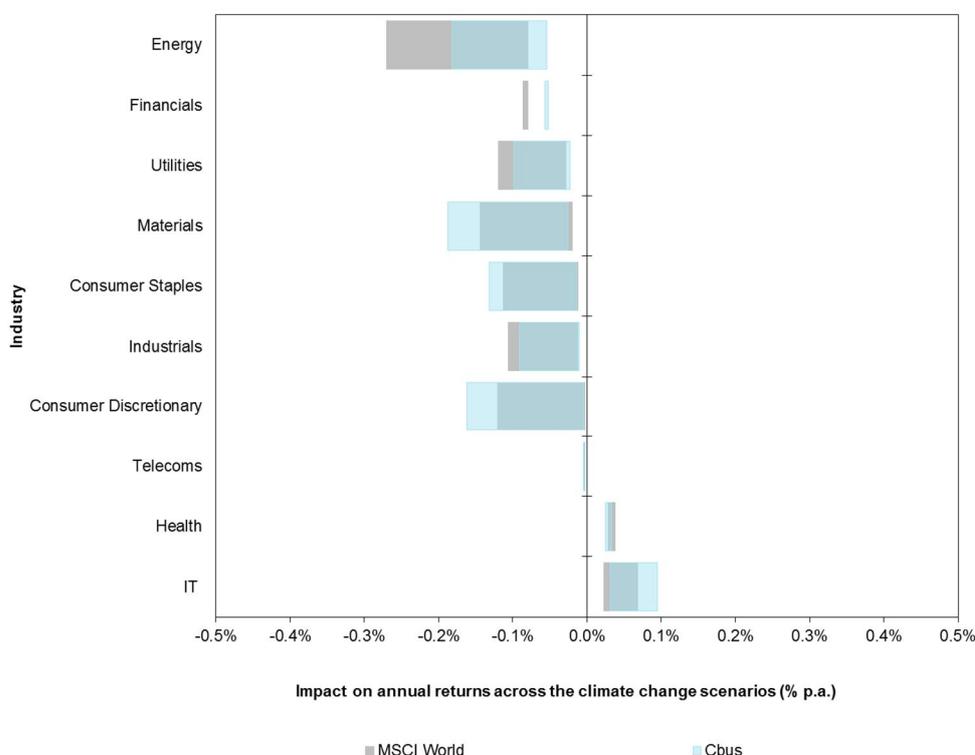
Consistent with the findings in the public report, the impact on different sectors varies widely but can be significant.

Cbus has around 80% exposure to active and 20% exposure to passive equities across the international and regional (Australian) developed market equities exposure. Within the developed market exposure, there is a 17% target allocation to emerging markets.

The charts below are the active exposures for overseas equities, followed by the active Australian equities exposures. The charts show the range, at a point in time, across the four climate change scenarios, of the potential impact on annual median returns against benchmark over both 10 years and the 35 year time-frame of the study. The charts reflect both the climate return impact and the weighting for each industry sector. The dark blue shows the overlap between the portfolio sector exposure in light blue and the benchmark exposure in grey.

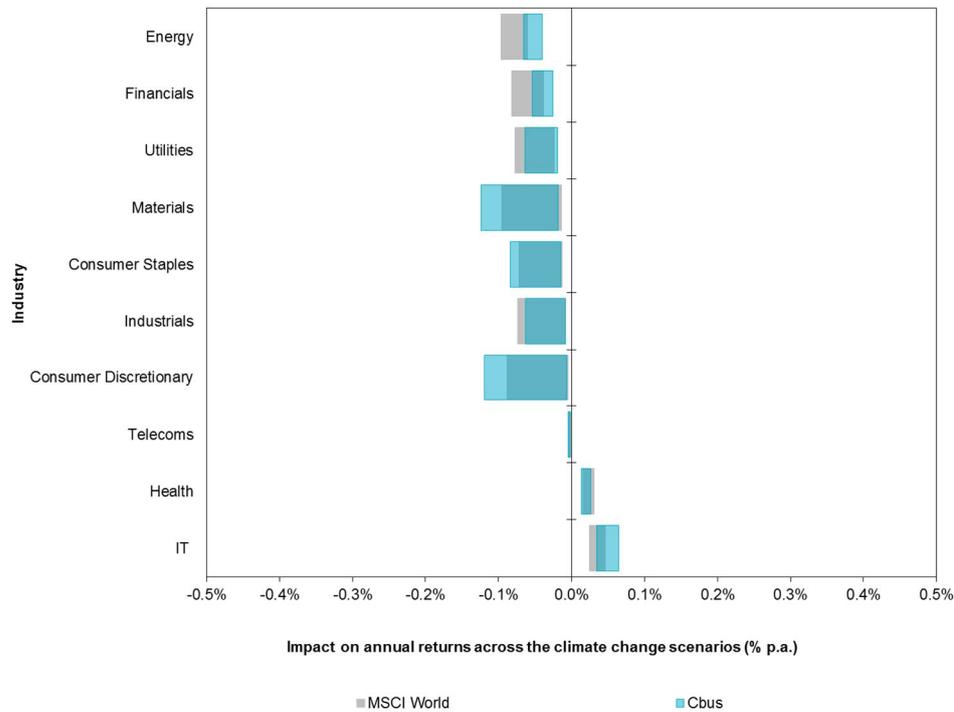
Figure 5:
ACTIVE OVERSEAS EQUITIES: INDUSTRY LEVEL ANALYSIS
 Median annual return impact over 10 years (to 2025)

Active Overseas Equities 10 years



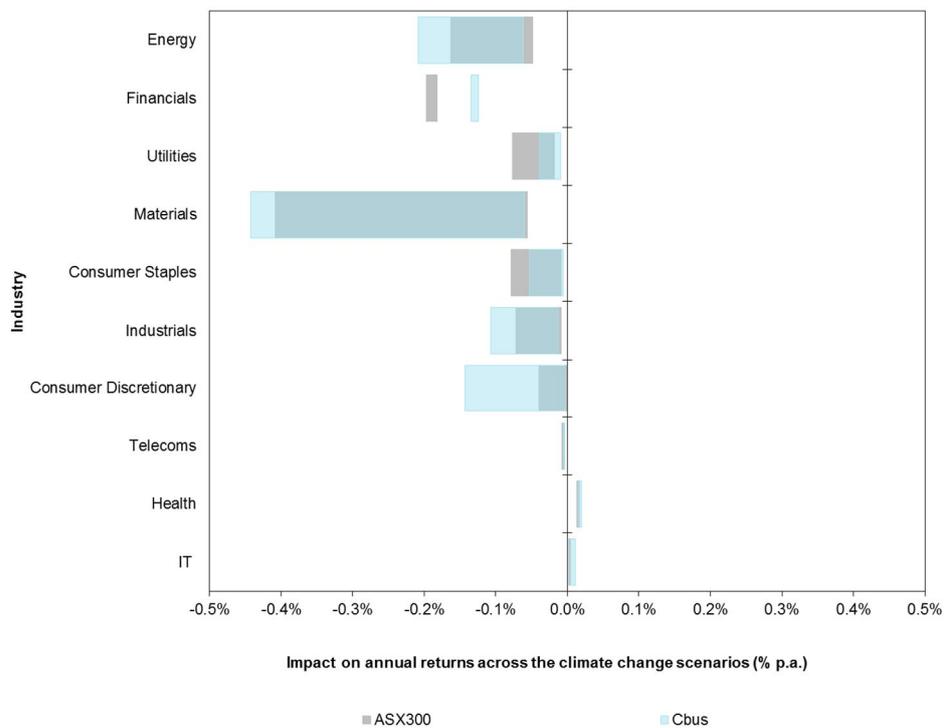
As a group, for the Fund's active overseas equity managers, it is primarily the Materials exposure that is overweight vs the benchmark, together with Consumer Discretionary and Consumer Staples, which are expected to be negatively impacted by the climate risk factors. Underweight positions to Energy and Utilities and overweight to IT are positives from a climate perspective.

Figure 6:
ACTIVE OVERSEAS EQUITIES: INDUSTRY LEVEL ANALYSIS
 Median annual return impact over 35 years (to 2050)



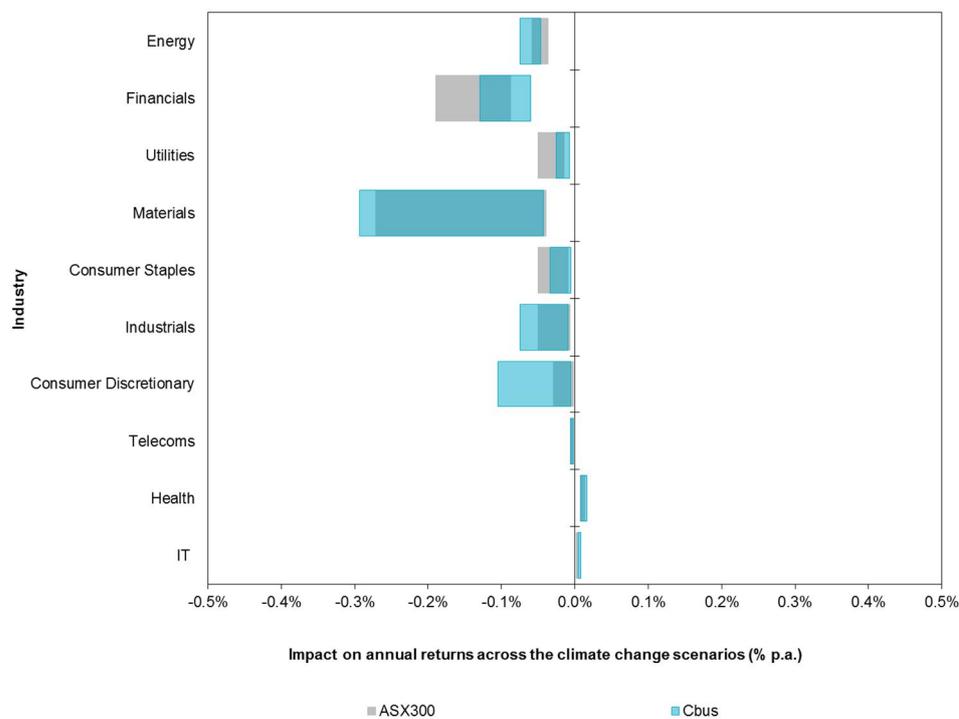
The potential sector impacts narrow over the 35 year time period, with Materials and Consumer Discretionary exposure showing the largest possible return loss versus benchmark. Cbus should ensure that the underlying holdings within this sector are well understood.

Figure 7:
ACTIVE AUSTRALIAN EQUITIES: INDUSTRY LEVEL ANALYSIS
 Median annual return impact over 10 years (to 2025)



As a group, the Fund's active Australian equity managers have overweight positions to Energy Materials, Industrials and Consumer Discretionary which are expected to be negatively impacted by the climate risk factors.

Figure 8:
ACTIVE AUSTRALIAN EQUITIES: INDUSTRY LEVEL ANALYSIS
 Median annual return impact over 35 years (to 2050)



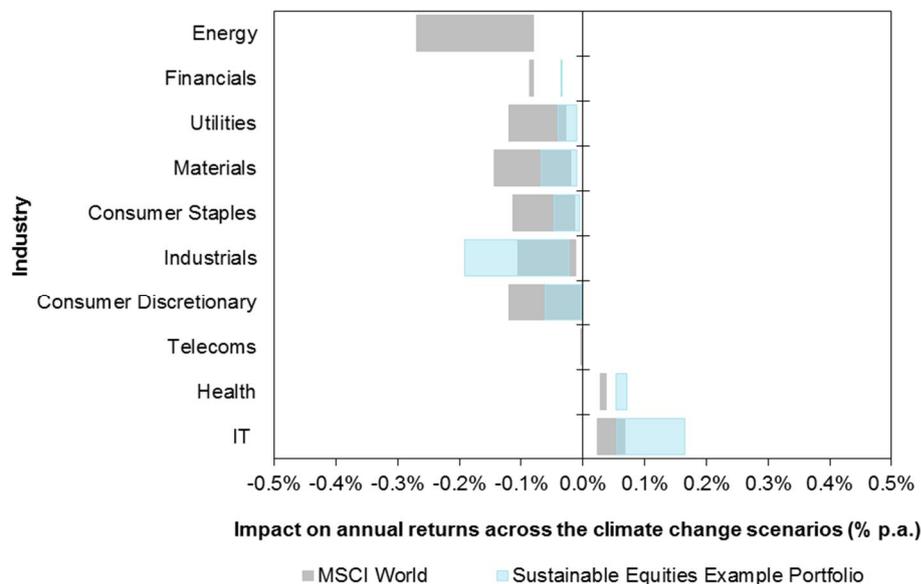
The potential sector impacts narrow over the 35 year time period, with Materials the main stand out as an industry sector priority for Cbus to ensure the underlying holdings are well understood.

Sector exposure of sustainability themed managers

The following chart displays the sector exposure of a group of three global equity sustainability-oriented thematic managers versus the MSCI World. As is apparent, the climate sensitivity of the combined sector weights of these managers is lower than the benchmark. This helps to demonstrate the potentially positive influence that the addition of one or more sustainability-oriented managers could have on the overall sector profile of Cbus’s active overseas equity exposure.

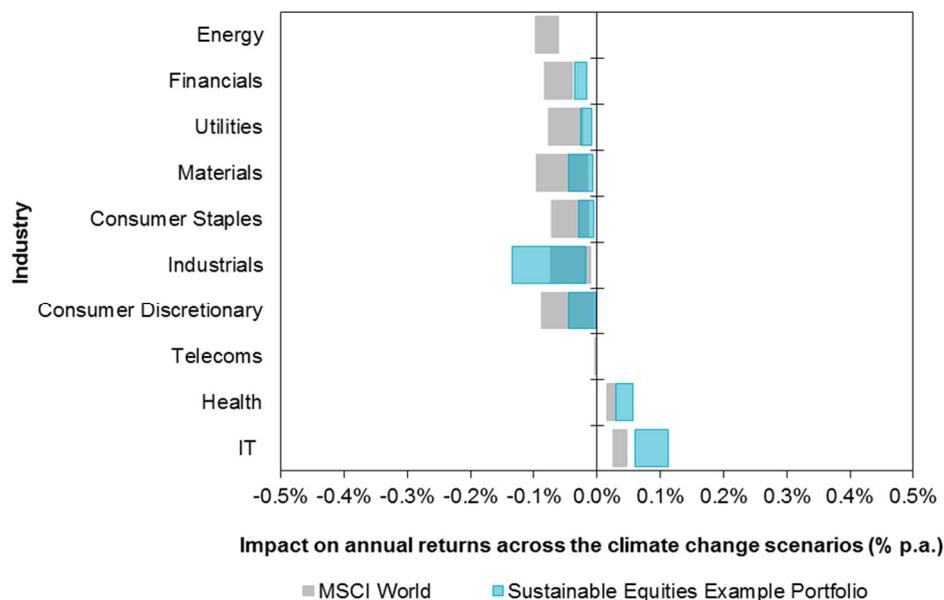
Figures 9 and 10:
Sample Sector Profile of Three Sustainability-Themed Global Equity Managers

10 years



As is apparent, this group of sustainability themed global equity managers have lower exposure to the sectors that would be expected to be the most negatively impacted by climate change: energy and utilities. The managers are positively biased towards IT.

35 years



The sustainability themed managers have more exposure to Industrials, wherein stock selection will focus on companies providing solutions to the low-carbon economy.

Real Assets Investments – Supplementary asset allocation detail

Real asset investments, including Real Estate and Infrastructure, offer investors a variety of attractive attributes, such as a higher return profile than typical fixed income options and a relatively low correlation to broader fixed income and equity markets. However, by virtue of their direct and tangible exposure to the physical manifestations of climate change (short- and long-term weather shifts), the vulnerability of real asset exposures to higher temperature outcomes (e.g. our Fragmentation scenarios) is relatively high versus other asset classes. On the other hand their exposure to climate policy action and resultant investment flows into low-carbon technology is largely positive.

Figure 11: Real Asset Classes – TRIP Factor Sensitivity

ASSET CLASS SENSITIVITY	T	R	I	P
GLOBAL REAL ESTATE	<0.25	0.00	-0.75	<0.25
INFRASTRUCTURE	0.25	>-0.25	-0.50	<0.25

Such push and pull results in large return variability across climate scenarios for real assets as depicted by the positive influence of the climate risk factors on Real Estate and Infrastructure performance under the two mitigation scenarios (Transformation and Coordination), and detraction of returns under the Fragmentation scenarios (as seen in the circle charts). This range of outcomes demonstrates a greater need for monitoring of real asset exposures at the portfolio level to ensure climate change risks – which are in this case largely location dependent – are being monitored and managed.

The manner and method of monitoring these exposures and related protections will differ depending on the manner and method of investment utilised. Cbus focuses its real asset investments on Australian Property and Infrastructure, which is primarily unlisted, with some listed exposure. The unlisted, less liquid, exposure to these asset classes makes climate considerations increasingly important for these long term allocations.

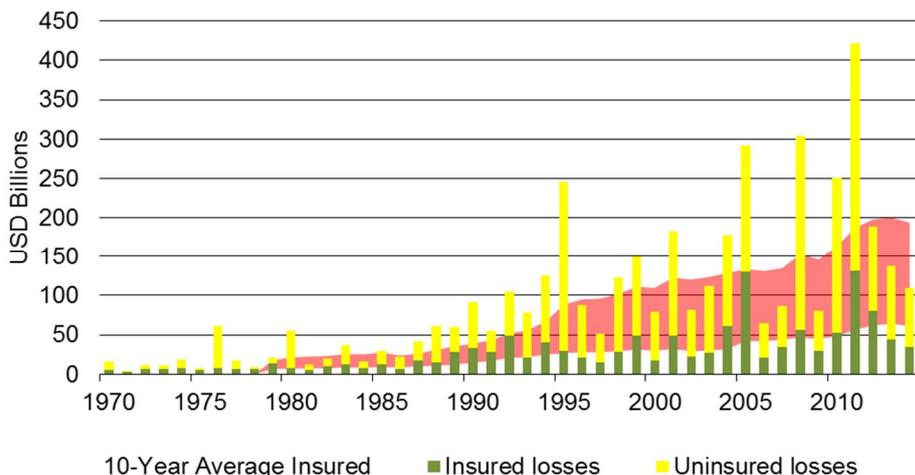
Table 2:
Cbus Real Assets

Asset Class	Cbus Growth
Real Estate (AUD)	13.00%
Infrastructure	11.00%

Unlisted Australian property and infrastructure:

For these assets, exposure to climate change is highly location dependent. To appropriately understand the climate change risk profile of these assets, portfolio location-level information is necessary. There are a variety of ways in which to gain an appreciation of geographic exposure and/or probabilistic climate risk, together with insurance and capital expenditure considerations, which we would be happy to discuss in more detail. This is particularly relevant for new investments, as highlighted below.

Figure 12:
Worldwide Uninsured Catastrophe Losses – A Widening Gap



As shown here, the gap between economic and insured losses is widening. Monitoring portfolios for overall exposure to extreme risks and ensuring adequate catastrophe insurance coverages are in place should be a priority going forward.

Source: Swiss Re Sigma 02/2015

Listed infrastructure and GREITS:

With listed exposure, it will be important to understand how managers are evaluating TRIP factor risks as part of their ESG and investment analysis process. For example, listed infrastructure managers can have significant exposure to pipelines; it would be interesting to understand their perspective on any vulnerability these assets have under a Transformation scenario, and if such risks are appropriately priced.

We understand that IFM does have sustainability themed assets within its exposure, including hydro and wind farms.

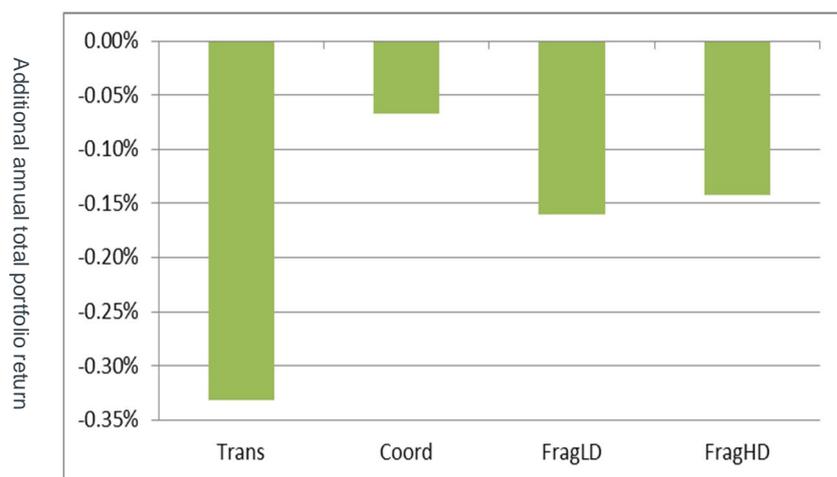
TOTAL PORTFOLIO IMPACTS

For the purposes of quantifying total fund impact, we have assessed the aggregate impact of each scenario on the **Cbus Growth Option**, as shown below.

Figure 13:

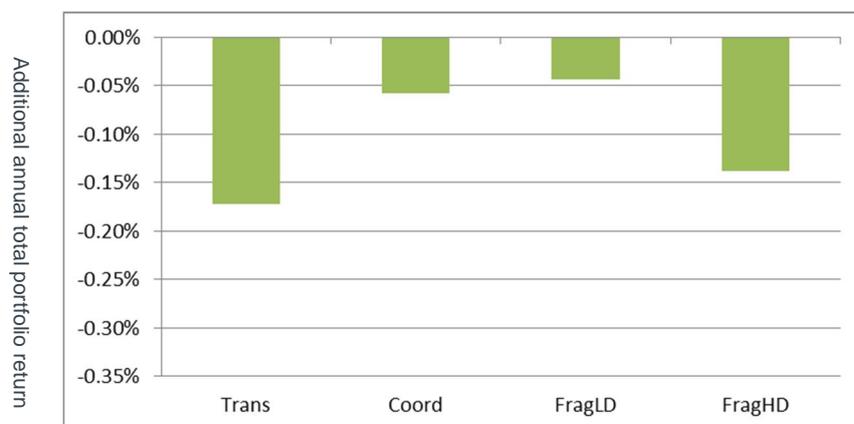
IMPACT ON TOTAL PORTFOLIO RETURNS BY SCENARIO – GROWTH OPTION

Annual median return impact over 10 years (to 2025) and 35 years (to 2050)



A Transformation scenario, particularly over the coming decade, could see a -0.33%pa impact on median returns, assuming no changes are made to current exposures.

The portfolio is less adversely affected under the other scenarios, but even the Coordination scenario, which has the least impact, is still expected to be -0.07%pa.



Over a 35 year period, the Transformation impact is reduced to -0.17% pa but remains the highest impact scenario.

Fragmentation (Higher Damages) is expected to have a -0.14% pa impact on median returns over the 35 year time period, which is expected to become more significant beyond 35 years (as physical impacts increase).

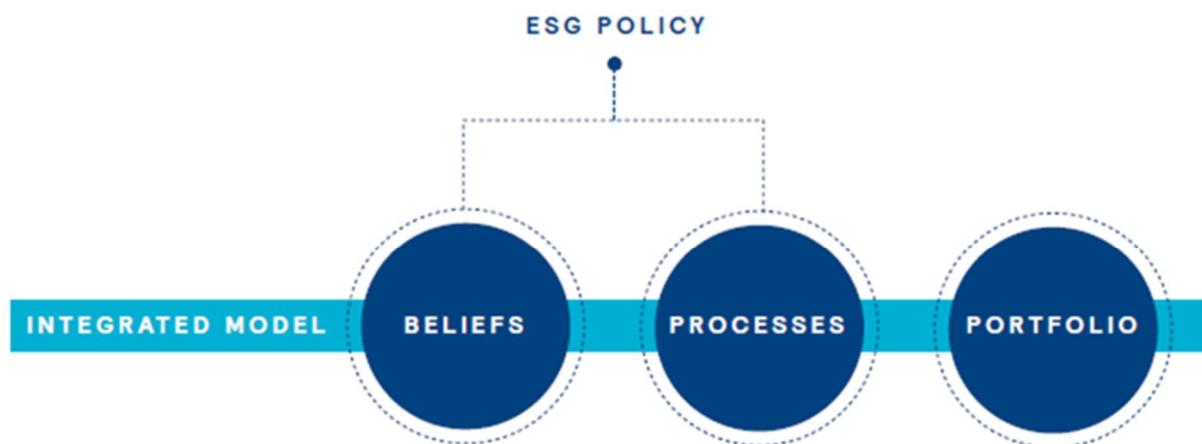
If a Transformation scenario eventuates, the cumulative impact over ten years for every \$1 billion could be a \$56 million reduction. This assumes an annual expected return for the current allocation of 6.19%pa and a starting value of \$1 billion, over ten years (\$1.82 billion with a 6.19%pa expected return versus \$1.77 billion with an expected return of 5.86%pa (i.e. 6.19% minus 0.33%)).

3

Recommendations for Cbus

Consistent with a key finding of the public report, our Cbus specific findings suggest that climate risk is inevitable but outcomes can be improved by being prepared. Addressing climate risk within portfolio decisions is most effective when it is integrated within standard investment decision-making processes. This is consistent with Mercer's recommended approach to incorporating broader environmental, social, and governance (ESG) considerations into investment processes.

Figure 14:
Integrated Model for Addressing ESG Considerations



Source: Mercer, An Investment Framework for Sustainable Growth³

³ Mercer. An Investment Framework for Sustainable Growth, 2014, available at <http://www.mercer.com/services/investments/investment-opportunities/responsible-investment.html>, accessed 11 May 2015.

RECOMMENDATIONS AND NEXT STEPS

The following table provides recommendations for Cbus, which consider this portfolio from a climate change perspective. Other factors would need to be taken into account before implementing allocation changes within the portfolio e.g. objectives, liquidity, fees, current valuation views etc.

The table captures what the Cbus status is for the recommended actions, given the findings in the previous section. The recommendations are based on the actions in the public report, grouped by Beliefs, Policy, Processes and Portfolio. A dashboard indicator provides a visual summary for Cbus' status, representing the comments as follows:

No Action	
Under Review	
In Progress	
Completed	

Of the recommended actions in the following pages, we expect the following should be a near term priority for Cbus to consider as you increasingly incorporate climate considerations as standard within your governance, strategy and portfolio decision making processes.

- **Beliefs, Policy and Processes:** Recognise climate explicitly within: existing Investment Beliefs; voting and engagement; and stakeholder reporting. Also finalise the current review process for adding the Montreal Pledge to the current industry initiatives that Cbus participates in.
- **Portfolio Risk Assessment:** Cbus could commission carbon analysis for equities, to provide additional insights at an industry sector and company level. We also recommend an environmental and climate resilience assessment of real estate and infrastructure holdings (directly, or by requesting the manager undertake this). This is particularly important for any new investments that will have ten year plus time horizons.
- **Portfolio Risks and Opportunities:**
 - Open a dialogue with managers on the potential risks identified as priorities in the Mercer TRIP analysis, e.g. Materials, plus Energy for Australian equities, together with any carbon footprinting for equities, ESG ratings or other sources, to identify where risk reduction may be implemented through appropriate ESG and climate due diligence and voting/engagement processes.
 - Passive Equities: Consider reallocating a portion of the passive equities exposure to a low-carbon alternative. See Appendix A.
 - Active equities: Consider thematic strategies focused on sustainability. Opportunities cover both mitigation and adaptation themes, including low-carbon investments, clean energy, water, agriculture, and broad sustainability themes. See Appendix B.
 - If hedging for a Transformation scenario, review whether current exposures to emerging markets could be increased, at the expense of domestic equities, or take other steps to further diversify equity exposures.
 - Niche exposures: A potential increase in the current allocation/establish an allocation to insurance-linked securities and catastrophe bonds, with timing to take current valuations into account.

Table 3:
Overview of Cbus actions within a four-step process

Activity type		Recommendation	Cbus Status
1. BELIEFS	Investment Beliefs	Consider referencing climate change explicitly within the ESG section of investment beliefs.	For consideration. 
2. POLICIES	Investment Policies	The Cbus Investment Policy references climate change explicitly, after the ESG section.	Complete. 
3. PROCESSES	Portfolio Specific	<p>There is commitment to specialist ESG resourcing within the investment team. A replacement for Louise Davidson is being sourced, with that person's skill set expected to include company analysis and portfolio management experience. This is consistent with the Study's findings that understanding the potential sector level impacts will be important starting point.</p> <p>There is integration of climate within current processes. Additional detail may be required to incorporate climate more thoroughly, in particular risk management and manager selection and monitoring. Additional data may also be required for equities carbon footprinting analysis, particularly if the Montreal Pledge is adopted (see next page).</p> <p>Work towards incorporating climate risk in reporting and communication to stakeholders, to disclose annual climate metrics and actions.</p>	<p>In progress. </p> <p>For consideration. </p>

	<p>Systemic (Market-Wide)</p>	<p>Review and join relevant collaborative industry initiatives to engage with policymakers, access ongoing education and share best practices.</p> <p>Cbus is a signatory to or member of the: Investor Group in Climate Change (IGCC); the Principles for Responsible investment (PRI); Carbon Disclosure Project (CDP); International Corporate Governance Network (ICGN); Responsible Investment Association Australasia (RIAA); Australian Council of Superannuation Investors (ACSI); and leverages the UN Global Compact for monitoring frameworks.</p> <p>The Montreal Pledge on carbon footprint reporting is also an initiative currently being reviewed by Cbus, with a decision yet to be finalised.</p>	<p>In progress.</p> 
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">4. PORTFOLIO</p>	<p>Risk Assessment</p>	<p>Assess climate risks/exposures at the portfolio, asset and industry sector level.</p> <p>Consider undertaking a carbon footprint analysis (directly or by requesting the managers undertake this) to provide additional insights at an industry sector level by company and the potential ‘winners and losers’ in the transition.</p> <p>Undertake environmental and climate resilience assessment of private real estate and infrastructure holdings (directly, or by requesting the manager undertake this).</p>	<p>Complete (this report).</p>  <p>For consideration.</p> 
	<p>Risk Reduction, Transfer, Hedging</p>	<p>Passive Equities: Reallocate a portion of International and Australian equity holdings to a low-carbon alternative. See Appendix A.</p>	<p>For consideration.</p> 

Table 3 (continued):
Overview of Cbus actions within a four-step process

Activity type	Recommendation	Cbus Status	
4. PORTFOLIO (CONT.)	<p>Identify Opportunities</p> <p>Active equities: Introduce thematic strategies focused on sustainability. Opportunities cover both mitigation and adaptation themes, including low-carbon investments, clean energy, water, agriculture, and broad sustainability themes. See Appendix B.</p> <p>Private markets: Consider increasing the small allocation to sustainability-themed (low-carbon solutions), and/or renewable energy infrastructure. [Some IFM exposure currently].</p> <p>Over the longer term, Cbus could consider niche investment areas which provide additional diversification, and are also linked to climate resilience, such as insurance -linked securities (ILS), catastrophe bonds, and firms driving innovative solutions to climate-related risks (e.g. micro-insurance).</p>	<p>For consideration.</p>  <p>In progress.</p>  <p>For consideration.</p> 	
	4. PORTFOLIO (CONT.)	<p>Engagement with investment managers</p> <p>Require investment managers to provide information on their voting/engagement approach to climate-specific risks and opportunities. Once the information is being reported, additional steps can be considered accordingly. Cbus should expect managers to focus on: encouraging corporate disclosure of climate/carbon exposure and the development of GHG-reduction plans (mitigation); address corporate lobbying; and, seek companies with large exposure to weather or resource risks to develop climate-risk management plans (adaptation).</p> <p>Work with managers to develop/enhance their approach to ESG and climate risks (strategic use of ESG ratings) by discussing the potential risks identified as priorities, e.g. Materials, plus Energy for Australian equities, to identify where risk reduction may be implemented.</p> <p>Cbus could also encourage managers to develop a perspective on the insights carbon footprinting can provide, in relation to the Policy risk, or environmental risk assessment of real assets can provide for Impact and Resource Availability risks.</p>	<p>In progress (add detail regarding climate).</p>  <p>For consideration.</p> 

4

Looking ahead: Future Taker or Future Maker?

Through its participation in this study, Cbus has already demonstrated its commitment to be a 'climate aware' investor, and determine how different futures will influence potential investment outcomes.

A key question remains, which is – does Cbus want to adopt a more proactive approach, whereby it seeks to encourage the future climate pathway the world adopts?

Figure 15:
From future taker to future maker



There is growing pressure for financial institutions to articulate their position on climate change, and given that Transformation is expected to better protect long-term returns beyond 2050, we expect to see a growing number of investors align their investment behaviour to align with a 2°C outcome.

Beyond assessing the position of your investments in order to protect and enhance returns to the extent possible in a time of climate change, a strategic question remains: Does Cbus want to develop a proactive strategy – with associated resource – towards seeking to make a contribution towards limiting global warming to 2 degrees?

We look forward to discussing this opportunity with you.

5

Appendix A – Low-carbon Indices

A number of low-carbon variants of broad market indices have become available over the recent past⁴. Benefits of these indices are that they are relatively straightforward and transparent (i.e. asset owners can point to a clear carbon reduction and impact) and inexpensive (albeit more expensive than broad market indices).

Beyond practical issues (such as cost, accessibility and performance), the key questions investors must consider is whether these indices will serve as downside protection in the face of rising carbon prices, and thus offer an effective hedge for passively managed equities. In a world where the cost of carbon is likely to rise then having less exposure to high carbon companies is intuitive, although it may not always be this straightforward. Two key points should be made here:

- A lower carbon footprint (including both current emissions as measured on CO2 emissions/sales and potential emission from fossil fuel reserves as measured on CO2 emissions/market cap), may not necessarily translate to lower operating cost (and thus relatively higher operating profits). Where demand is inelastic, suppliers may be able to push this cost to consumers, as may be the case for some utilities.
- Existing indices are based on Scope 1 and Scope 2 emissions (which cover direct emissions owned by the company and indirect emissions resulting from energy use by the company). In some cases, such as automotive, the critical measurement is actually Scope 3 (indirect emissions not owned by the company but related to the company's activities). Data on Scope 3 emissions is less prevalent, which may result in misrepresenting the actual net carbon benefit (or deficit) of a company. It should be noted that Scope 3 data is broadly available for the automotive sector and an improvement upon current indices could be to incorporate Scope 3 for this sub-sector.

Additional things to recognise about these indices are that:

- To date, they are based on market cap weighted methodology, and therefore bring with them the same concerns that core benchmarks have in this context (i.e. that investors end up with more exposure to overvalued companies as price fluctuates)
- They do not necessarily capture the opportunity side of the equation (i.e. by shifting from high carbon to lower carbon companies, investors may not necessarily gain exposure to companies leading on the development or provision of products/services best positioned to succeed in a lower carbon environment).
- Currently, index providers do not provide in-depth shareholder engagement on climate risk management as a supplement to index provision. This would be a welcome addition to the current offerings, and is likely to evolve based on client demand and feedback.

⁴ Low-carbon versions of numerous indices are available from the large passive index providers.

Given the above considerations, low-carbon indices may not necessarily bring an outperformance premia in the traditional sense – i.e. the premia is low carbon rather than performance. With a low tracking error to the benchmark, that should be ok; however clients should be aware that during periods of extreme stress or market dislocation that the performance of the low carbon indices could deviate significantly from the mainstream benchmark. For example, during 2014 when oil prices declined significantly, low carbon indices performed strongly relative to their parent indices; however, this performance could reverse during periods of strong energy sector performance and rebounding oil prices.

In closing, while low-carbon indices are not a perfect hedge against future uncertain carbon pricing, they do provide an interesting tool for long-term investors. We believe that Cbus should consider re-allocating some of its passive equities towards a low-carbon index variant, if it is aligned with one or more of the following statements:

- a) We believe that action towards climate change mitigation will occur, resulting in some (meaningful) higher price on carbon over the coming 5 year period
- b) We believe that climate change mitigation is beneficial to capital markets and Cbus members over the medium to long run
- c) Our stakeholders would like to see us clearly manage climate risk, both in our investments and through our actions as a financial sector stakeholder.

We would be pleased to discuss low-carbon index options in further detail with Cbus.

7

Appendix C – Study Participants

Partners

- Allianz Climate Solutions GmbH – Germany
- Baillie Gifford & Company – UK
- BBC Pension Trust – UK
- British Telecom Pension Scheme (BTPS) – UK
- California State Teachers' Retirement System (CalSTRS) – US
- Church of England National Investing Bodies – UK
- Connecticut Pension Fund – US
- Construction and Building Industry Super (Cbus) – Australia
- Credit Suisse – US
- Environment Agency Pension Fund (EAPF) – UK
- Första AP-fonden (AP1) – Sweden
- Guardians of New Zealand Superannuation Fund (NZ Super) – New Zealand
- International Finance Corporation (IFC), a member of the World Bank Group – Global
- New York State Common Retirement Fund (CRF) – US
- Queensland Investment Corporation (QIC) Limited – Australia
- State Super Financial Services (SSFS) – Australia
- The Department for International Development (DFID) – UK
- WWF-UK – UK

Advisory Group

- Dr Rob Bauer, University of Maastricht – Netherlands
- Dr Barbara Buchner, Climate Policy Initiative – Italy/Global
- Sagarika Chatterjee, Principles for Responsible Investment (PRI) – UK
- Paul Dickinson, Carbon Disclosure Project – UK
- Nathan Fabian, Investor Group on Climate Change – Australia/Global
- Mark Fulton, Carbon Tracker Initiative/ CERES/ Energy Transition Advisors – US/ Australia
- Dr Noah Kaufman, WRI (formerly NERA) – US
- Sean Kidney, Climate Bonds Initiative – UK / Global
- Bob Litterman, Financial Analyst Journal/ Asset Owners Disclosure Project – US
- Nick Robins, UN Environment Programme – UK
- Mike Wilkins, Standard & Poor's Ratings Services – UK
- Dr Paul Wilson, RMS – UK
- Helene Winch, Low Carbon (formerly PRI) – UK

8

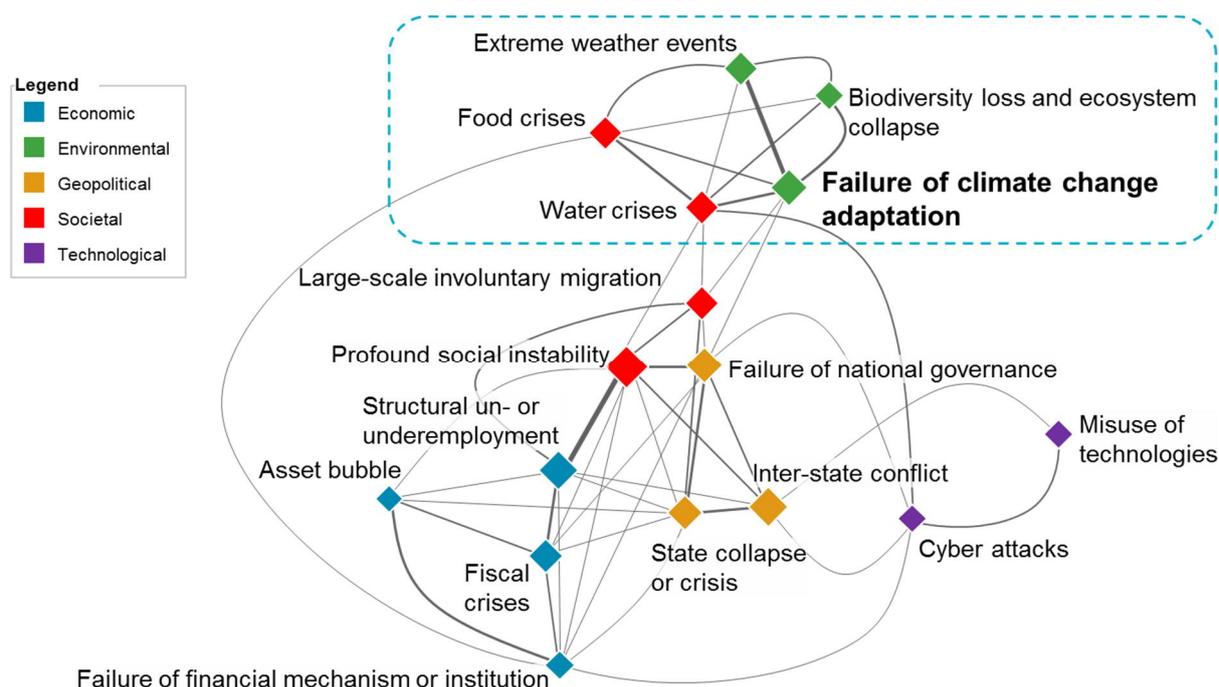
Appendix D – Study Synopsis

AN INTERCONNECTED WORLD: CLIMATE CHANGE IS AN ECONOMIC ISSUE

While climate change, caused by human activities, is an established scientific fact, there remains uncertainty around how climate change will develop and questions prevail, including:

- What level of temperature increase is the world heading for? What are the implications for weather patterns, food and water security and global demographics?
- Will a global climate change agreement be reached later this year? If not, who will the winners and losers be? Can we mitigate the risks in time?
- Will science and technology developments offer solutions? How quickly can we adapt?
- How will geopolitical relations develop? What will a model for sustainable growth look like?

Figure 17:
Global Risks: Interconnections Map 2015



Source: World Economic Forum, Global Risks Report 2015

The complex world between future global economic development and climate change is an extremely difficult minefield to navigate. However, with economic growth being the lifeblood of investments, this is a challenge that long-term investors need to take. To help, we have used scenario analysis and adapted Mercer's investment modelling tool to consider some of the potential future climate change pathways, the impact these may have from an economic perspective and the implications for investors.

TIME-FRAME DISCONNECT: A CHALLENGE FOR INVESTORS

One of the key challenges for investors in considering the risks and opportunities posed by climate change is the disconnect in time-frame between that of investors and that of climate change impacts.

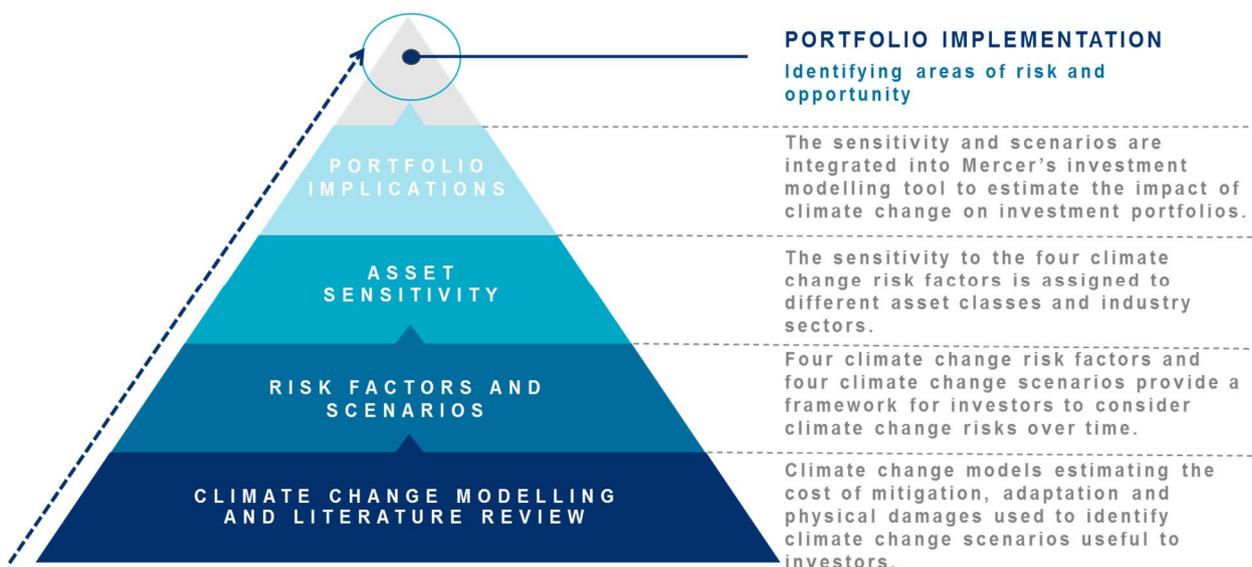
Mercer’s study focuses on a 35 year timeframe from 2015 to 2050. This is very long term from an investment perspective; typically, strategic investment advice is based on a modelling period of 10 years and investment managers take investment decisions on a 3-5 year time-frame, or less. However, climate change impacts become increasingly apparent post 2050 and climate models focus on 2100; extending out to 2300 and beyond. 2050 is short-term from a climate change perspective.

In particular, the physical impacts of climate change; such as extreme weather events and sea level rises are expected to be relatively limited over the period to 2050. As such, the post 2050 implications cannot be ignored. Given the Fund remains open to both new entrants and future accrual, it is expected to have liabilities stretching out well beyond this time. However, the further forward we look, the greater the uncertainty and it is difficult to justify investment modelling beyond our 35 year time-frame.

While there is notable dis-connect between the time-frame of investment decision-making and that of climate change considerations, there are nearer-term actions that investors can take and signposts that investors can monitor to better understand future climate change related developments.

STUDY APPROACH: CLIMATE MODELLING - PORTFOLIO IMPLEMENTATION

There were 5 key stages to the study to consider the risk of climate change on investment portfolios, as set out in the diagram below.



Source: Mercer

CLIMATE CHANGE SCENARIOS

Given the uncertainty and complexity of future developments with respect to climate change, we used a scenario based approach to considering the potential risks and opportunities. Four climate change scenarios have been developed in the study, each reflecting different climate change policy ambitions that result in varying CO₂ emissions pathways and levels of economic damages related to climate change. These have been developed using existing climate change models and through an extensive literature review.

THE BUILDING BLOCKS OF THE CLIMATE CHANGE SCENARIOS AND THE IMPORTANCE OF 2°C

GREEN-HOUSE GAS (GHG) EMISSIONS:

There is now wide spread scientific consensus that man-made GHG emissions are the dominant cause of the climate change observed over the past half century. Carbon dioxide (CO₂) is the most prevalent GHG and therefore CO₂ emissions are used as a proxy for GHG emissions more broadly. The level of atmospheric warming is directly related to the level of GHG emissions and so CO₂ emissions pathways are an indicator of the potential extent of warming.

LEVEL OF TEMPERATURE WARMING:

The most common reference is the rise in temperature above pre-industrial levels. All major countries, including the US and China, have recognised the scientific evidence that limiting global warming to 2°C is required to avoid “dangerous” interference with the climate. If temperature increases exceed this level, the world starts to rapidly increase its risk exposure. It is important to note that even if the world stopped all GHG emissions tomorrow, it would still be ‘locked in’ to a degree of further global warming, which is currently estimated to be 1.5°C (Source: World Bank Group, Turn Down the Heat).

MITIGATION ACTIVITIES:

Human intervention to limit climate change and the resulting impacts by reducing GHG emissions (e.g. through subsidies to increase the deployment of renewable energy) or increasing GHG ‘sinks’ (e.g. through afforestation). Mitigation refers to efforts to limit the cause of warming in the first place.

ADAPTATION ACTIVITIES:

Protecting against the impacts of climate change (e.g. building flood walls). Adaptation refers to managing the warming that occurs by making changes.

MITIGATION VERSUS ADAPTATION: The greater investment made in mitigation activities today, the less investment will be required in adaptation activities in the future. The inverse unfortunately is not also true. While investment in adaptation today will improve resilience tomorrow, without some degree of mitigation the impact of climate change is likely to increase unabated until adaptive capacity is overwhelmed.

Four scenarios, Transformation, Co-ordination, Fragmentation (Lower Damages) and Fragmentation (Higher Damages) were identified as being useful for investors to consider a range of climate change outcomes and these are summarised below.

1. TRANSFORMATION

Ambitious and stringent climate change policy and mitigation action puts the world on a path to limiting global warming to 2°C above pre-industrial temperatures by the end of this century.

Climate perspective	The most ambitious of the four scenarios considered in this study in terms of climate policy but also the most contentious. This scenario is the critical benchmark: from a scientific perspective it avoids dangerous climate change, with international climate policy supporting the transformation to a low carbon economy. However, some believe this scenario is already “off the table” as policy makers have not reacted quickly enough to date, with many pledges to reduce emissions not being met sufficiently. If Transformation is to occur, time is certainly of the essence and the results of the Paris negotiations later this year will be a crucial signpost as to its likelihood.
Investor perspective	Where change is fast, near-term and significant, investors that have not considered the risks posed by climate change are likely to be caught off guard. A Transformation scenario could cause significant shorter-term market volatility (e.g. months and years until 2020). Investors that have considered the risks and opportunities posed by climate change should be well positioned relative to those that have not considered such risks and would be expected to benefit from first-mover advantage relative to peers.

2. CO-ORDINATION

Climate change policy and mitigation actions are aligned and cohesive, keeping warming to 3°C above pre-industrial temperatures by the end of this century.

Climate perspective	While not as ambitious as Transformation, this scenario assumes a coordinated and well-defined policy response to reduce emissions by 2030.
Investor perspective	Where change is more measured and anticipated, investors have more time to react and position their portfolios accordingly. Early movers would be expected to benefit in the shorter term as the policy response becomes increasing apparent to the broader market. However, investors would need to be careful that policy transparency is not mistaken for adequacy in terms of the scale of ambition as this could cause investors to under-estimate the economic damages associated with the long-term physical impacts of climate change.

3. FRAGMENTATION (LOWER DAMAGES)

Limited climate action and lack of co-ordination result in warming rising to 4°C or above from pre-industrial temperatures by the end of this century.

Climate perspective	This scenario assumes a fragmented policy response (both by region and ambition) with limited additional action from policy agreements currently in place.
Investor perspective	If the policy response is disparate in terms of commitment and timing by region, an increased level of uncertainty is created for investors. While shorter-term, this could lull investors into a false sense of security that it is business as usual, from a longer term perspective investors cannot afford to be complacent about structural economic change and emerging market policy. Those investors that have an increased understanding of the potentially divergent responses are likely to be better able to adapt their investment strategy by anticipating regional differences and positioning their portfolios accordingly.

4. FRAGMENTATION (HIGHER DAMAGES)

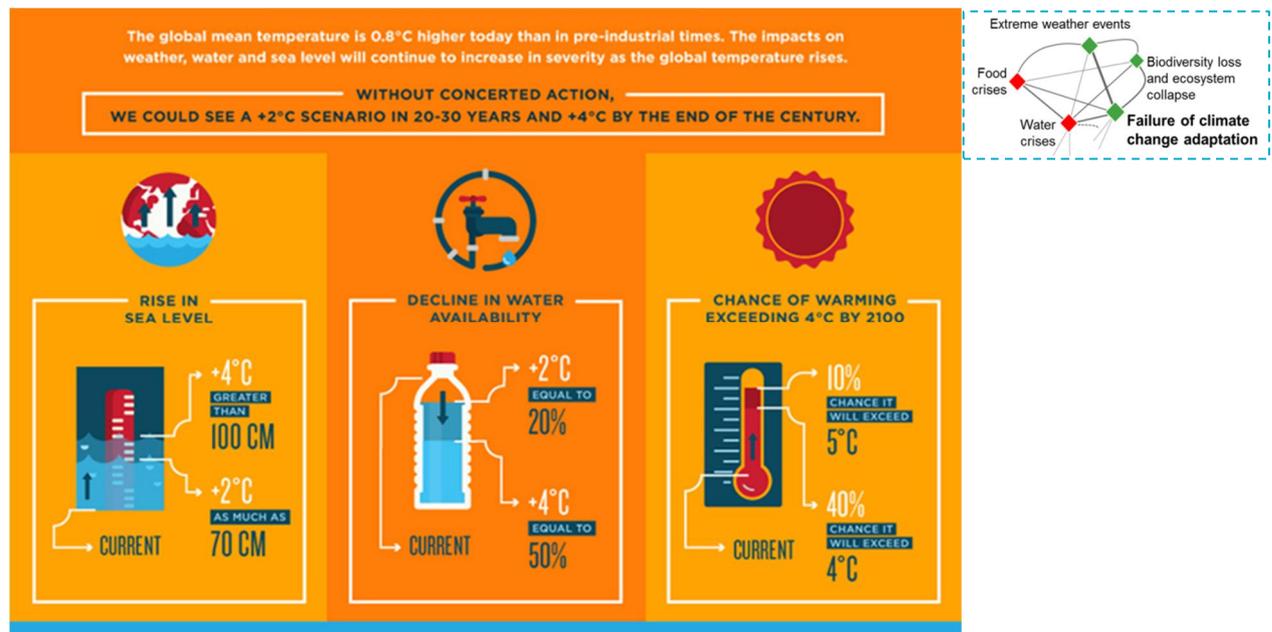
Limited climate action and lack of co-ordination result in warming rising to 4°C or above from pre-industrial temperatures by the end of this century. The physical impacts of this warming are felt more severely.

Climate perspective	This scenario follows the same CO ₂ emissions pathway and policy response as Fragmentation (Lower Damages) but scales up the potential physical impacts of climate change.
Investor perspective	On top of the considerations highlighted for the Fragmentation (Lower Damages) scenario, investors with exposure to investments expected to be most sensitive to the physical impacts of climate change should monitor the risks posed by climate change carefully (particularly where investments are illiquid).

While the Transformation scenario is an ambitious benchmark and could be seen as a “best-case” scenario from a climate change perspective, the Fragmentation (Higher Damages) scenario is by no means a “worst-case” scenario. While it is the least favourable (from a climate change perspective) of the scenarios considered in the study, it broadly equates to a temperature warming of 4°C and is consistent with existing policy commitments. Should countries renege on existing commitments, there is the potential for a more divergent and negative outcome to occur (resulting in a higher level of warming than 4°C).

The following diagram (Figure 17) from the World Bank Group highlights some of the changes that may occur across different levels of temperature warming and links back to the global risks considered by the World Economic Forum.

Figure 18:
Considering different levels of warming: putting the Mercer scenarios into context



Source: World Bank Group, Turn Down the Heat

In order to consider the impact on investment returns and volatility under the different climate change scenarios, Mercer identified four climate change risk factors that can be used to translate each of the climate change scenarios (based on the outputs of the climate change modelling and literature review) into the language of investments. This allows us to build the climate change scenario pathways into the investment modelling tool.

CLIMATE CHANGE INVESTMENT RISK FACTORS

This study built on Mercer’s previous work to consider four climate change related investment risk factors: Technology, Resources, Impact of Physical Damages and Policy, together known as the “TRIP” factors.

TECHNOLOGY (T)



The rate of progress and investment in the development of technology to support the low carbon economy.

The Technology factor captures technological advancement and the opportunity for increased efficiency through technological change.

The speed, scale and success of low carbon technologies, coupled with the extent of transformation and disruption of existing sectors, or development of new sectors, are key considerations for investors.

RESOURCE AVAILABILITY (R)



The impact of chronic weather patterns (e.g. long-term changes in temperature or precipitation).

Resource availability is a new aspect being added to the previous Mercer study to identify how changes to the physical environment might impact investments reliant on the use of resources, such as water and agricultural resources at risk of becoming scarcer or, in some cases, more abundant over the long-term as a result in changes to weather patterns. The impacts on agriculture, energy and water are key.

IMPACT OF PHYSICAL DAMAGES (I)



The physical impact of acute weather incidence (i.e. extreme or catastrophic events).

This factor can be interpreted as the economic impact of climate change on the physical environment caused largely by changes in the incidence and severity of extreme weather events.

Examples include damage to property caused by flooding as a result of sea level rises; damage caused by hurricanes and damage caused by wildfire.

POLICY (P)



Collectively refers to all international, national, and sub-national regulation (including legislation and targets) intended to reduce the risk of further man-made climate change.

This factor can be interpreted as the level of co-ordinated ambition of governments to adopt and adhere to policies and regulations to reduce green-house gas emissions.

Examples of climate-related policy include green-house gas emissions targets, carbon pricing, subsidies and energy efficiency standards.

Policies can be classified into those that focus on the supply side (by encouraging the substitution of high emission products with lower emission alternatives) and those that focus on the demand side (by reducing demand for high emission products).

CLIMATE CHANGE SIGNPOSTS FOR INVESTORS

By considering the climate change scenarios through the lens of our climate change risk factors, we are able to highlight signposts that investors can monitor in order to be prepared for changes that may occur as a result of climate change. We have focused on the following elements; each represented by our TRIP factors, that we believe are important signposts for investors:

- The timeframe of CO₂ emissions peaking, potential changes to the energy mix out to 2050 and modelled mitigation cost estimates
- The rate of investment required into technologies designed to facilitate the transition to a low carbon economy
- Potential shifts in long-term weather patterns and resultant economic impacts as a result of global warming
- Potential shifts in the level of economic damages caused by shifts in the frequency and/or severity of catastrophic weather events, such as floods and hurricanes.

The table below outlines the investor signposts under each of the scenarios by risk factor. Development against these signposts will allow investors to consider the likelihood of different climate change scenarios as additional evidence is presented.

Overall, the highest climate change risk factor impact over the period to 2050 is that of Policy under the Transformation scenario. Under both the Transformation and Co-ordination scenarios, Policy and Technology are dominant relative to Resource Availability and Impact of Physical Damages given the physical impacts of climate change become increasingly apparent post 2050. For the Fragmentation scenarios, particularly Fragmentation (Higher Damages), Resource Availability and Impact (Physical Damages) are more apparent and are not dominated by Policy and Technology developments, which are expected to be limited.

Table 4:
Key signposts for investors by climate change scenario (to 2050)

SIGNPOST FOR INVESTORS	TRANSFORMATION	CO-ORDINATION	FRAGMENTATION LOWER DAMAGES	FRAGMENTATION HIGHER DAMAGES
Potential changes to the energy mix 	Significant change to the energy mix: fossil fuels represent less than half of the energy mix at 2050.	Fossil fuels represent c.75% of the energy mix at 2050.	Fossil fuels continue to be the dominant energy source, representing 85% of the energy mix at 2050.	
Rate of investment in technologies supporting the low carbon economy 	Cumulative investment of US\$65 trillion in energy supply and efficiency (ex-fossil fuels) required over 2015–2050.	Cumulative investment of US\$47 trillion in energy supply and efficiency (ex-fossil fuels) required over 2015–2050.	Total energy investments increase to US\$3.13 trillion in 2050. Limited investment into low carbon energy	
Potential shifts in long-term weather patterns and impact on resource availability 	Limited impact by 2050.	Limited impact by 2050.	Estimated net benefit from resource availability as a percentage of global GDP of 0.5% at 2050. Driven by gains in agriculture, partially offset by losses related to biodiversity.	Estimated net loss from resource availability as a percentage of global GDP of 0.8% at 2050. Driven by losses due to energy, water, and biodiversity.
The level of physical damages caused by catastrophic events, such as floods and hurricanes 	Limited impact by 2050; driven by losses from (extra) tropical storms and coastal flood.	Limited impact by 2050; driven by losses from (extra) tropical storms and coastal flood.	Estimated net loss as a percentage of global GDP of 0.4% at 2050. Driven by losses from (extra) tropical storms and coastal flood.	Estimated net loss as a percentage of global GDP of 0.7% at 2050. Primarily represents losses from wildfire, coastal flood, and extreme temperatures.
Global policy response 	Most effective from a climate change mitigation perspective, Aggressive introduction of carbon pricing likely to result in shock to financial markets.	Existing policy pledges with respect to carbon emissions are implemented with mitigation efforts extended to 2030.	Divergent with limited efforts beyond existing pledges. Although a reduction in emissions of 10% (versus 2010 levels) is achieved by 2050 in developed markets, this is outweighed by increases in emissions in emerging markets.	
Expected cost of carbon (\$US2013/t CO₂) 	Global carbon pricing introduced relatively swiftly, then flattening out to around \$180 by 2050.	Global carbon pricing introduced more slowly, picking up pace after 2030 and reaching \$210 in 2050.	Lack of development of a global carbon price recognised by the market.	
Global greenhouse gas emissions at 2050 	22 Gt CO ₂ e/yr. 56% decrease vs. 2010 levels.	37 Gt CO ₂ e/yr. 27% decrease vs. 2010 levels	67 Gt CO ₂ e/yr. 33% increase vs. 2010 levels	
Timeframe for emissions level peaking 	Emissions peak by 2020.	Emissions peak by 2030.	Emissions peak after 2040.	

STRUCTURAL CHANGE: PAST PERFORMANCE IS NOT A GUIDE TO FUTURE PERFORMANCE

A particularly difficult task for investors is in identifying and managing structural changes. The greater the level of change, the more disparity between the winners and losers, and today's "giants" often become tomorrow's "dinosaurs", as those that fail to adapt are left behind. Such changes can create new industries at the expense of existing industries.

It remains very difficult to capture long-term forward-looking changes within quantitative investment modelling processes, and although we know that in practice long-term, sustainable global economic growth is not going to follow the same path as historical economic growth, we have not sought to reflect these uncertain future structural changes within our investment modelling. Therefore:

- **Industry classification is based on today's definition:** We have not made allowance for new industries and/or any re-classification that would be expected as markets reflect the adaptation to a low carbon economy.
- **We have not attempted to forecast changes in the regional composition of global equity indices:** However, over the period modelled to 2050, we would expect certain nations currently classified as emerging markets to be re-classified to developed markets.
- **There is a "negative bias" to the heat maps (that is, more red than green), as a result of our analysis being based on a starting point of today:** We recognise that there will be opportunities created and that across different industries and regions there will be winners and losers, as some companies will adapt business models accordingly and others will not. Within industries and sectors there will continue to be different supply and demand drivers, including those industries where overall sensitivity may be neutral.

HOW SENSITIVE ARE DIFFERENT INVESTMENTS TO CLIMATE CHANGE?

Now that we have identified how different climate change scenarios may develop to 2050 by looking at how the four climate change risk factors progress in terms of influence over time, the next stage is to consider how sensitive different investments are to the climate change risk factors. By combining the development of the TRIP factors over time with the sensitivity of different investments to the TRIP factors we are able to look at the potential impact of climate change on the Fund's investments.

Mercer has developed climate change sensitivity heat maps that summarise our assessment of the sensitivity of different asset classes and industry sectors to the TRIP factors. We have assigned sensitivity on a relative basis using a scale of -1 where we expect the most negative impact on investment returns, to +1 where we expect the most positive impact on investment returns.

While investors do not typically consider industry level detail when making strategic investment decisions, it is necessary to "drill-down" to this level due to the disparity of sensitivity across different industries. We have focused our attention on those industries we believe to be of most interest for this study; those that are expected to be the most sensitive to climate change. Although we have not looked at security level analysis as part of this study, it is crucial that Cbus understands where risks and opportunities might lie and to ensure that the Fund's investment managers are fully considering these risks when building portfolios, particularly when investing in asset classes, industries and sectors with the highest sensitivity.

Table 5:
Sensitivity to the climate change risk factors: asset class level

ASSET CLASS	T 	R 	I 	P 
Developed Market Global Equity	<0.25	>-0.25	>-0.25	>-0.25
Emerging Market Global Equity	<0.25	-0.25	-0.50	<0.25
Low Volatility Equity	0.00	>-0.25	>-0.25	>-0.25
Small Cap Equity	<0.25	>-0.25	>-0.25	>-0.25
Developed Market Sovereign Bonds	0.00	0.00	0.00	0.00
Investment Grade Credit	<0.25	>-0.25	>-0.25	>-0.25
Multi Asset Credit	0.00	0.00	>-0.25	0.00
Emerging Market Debt	0.00	>-0.25	-0.25	<0.25
High Yield Debt	0.00	>-0.25	-0.25	>-0.25
Private Debt	0.00	0.00	0.00	0.00
Global Real Estate	<0.25	0.00	-0.75	<0.25
Private Equity	<0.25	>-0.25	-0.25	>-0.25
Infrastructure	0.25	>-0.25	-0.50	<0.25
Timber	<0.25	-0.75	-0.50	0.25
Agriculture	0.25	-1.00	-0.50	0.25
Hedge Funds	0.00	0.00	0.00	0.00



- Growth assets, such as equities, are more sensitive to climate change than defensive assets, such as sovereign bonds.
- Global developed market equities are expected to have a negative sensitivity to policy and a positive sensitivity to technology. Emerging market equities are expected to benefit from additional climate change policy and technology developments, which should help to protect long-term sustainable economic growth in emerging markets.
- Within bonds, emerging market debt and high yield debt are most sensitive to the climate change risk factors.
- Real estate, agriculture and timberland have the greatest negative sensitivity to the impact of physical damages and resource availability. Agriculture and timberland are the most sensitive (positive) to policy while infrastructure and agriculture have the greatest positive sensitivity to technology.
- We do not expect private debt or hedge funds, in aggregate, to be sensitive to the climate change risk factors.

Table 6:
Sensitivity to the climate change risk factors: industry and sector level

INDUSTRY SECTOR	T 	R 	I 	P 
ENERGY	-0.25	-0.75	-0.75	-0.75
Oil	-0.50	-0.75	-0.75	-0.75
Gas	<0.25	-0.50	-0.75	<0.25
Coal	-0.50	-0.75	-0.75	-1.00
Renewable	0.50	-0.25	-0.25	1.00
Nuclear	0.50	-0.75	-0.25	0.50
UTILITIES	-0.25	-0.75	-0.50	-0.50
Electric	-0.50	-0.75	-0.50	-1.00
Gas	-0.25	-0.75	-0.25	-0.50
Multi	-0.25	-0.75	-0.50	-0.75
Water	-0.25	-0.50	-0.25	-0.75
MATERIALS	<0.25	-0.75	-0.25	-0.50
Metals and mining	<0.25	-0.75	-0.25	-0.75
INDUSTRIALS	<0.25	>-0.25	-0.50	-0.25
Transport and infrastructure	<0.25	>-0.25	-0.75	<0.25
CONSUMER DISCRETIONARY	0.00	0.00	0.00	>-0.25
CONSUMER STAPLES	0.00	-0.25	0.00	>-0.25
HEALTH	0.00	<0.25	<0.25	0.00
FINANCIALS	0.00	>-0.25	-0.50	0.00
IT	<0.25	0.00	0.00	0.00
TELECOMMUNICATIONS	0.00	0.00	>-0.25	0.00



- Policy is the most significant risk factor in terms of sensitivity. The industries expected to be most sensitive are energy and utilities and the sectors with the highest negative sensitivity to policy are coal, electric while renewables has the highest positive sensitivity.
- Energy and utilities have the greatest negative sensitivity to resource availability and physical impacts, with industrials also sensitive to physical impacts.
- Within each sector there will be “winners and losers” at a security level, including those sectors where overall sensitivity is expected to be neutral. Corporate debt could be subject to downgrade and defaults.

STUDY HIGHLIGHTS: COMBINING THE SCENARIOS AND RISK SENSITIVITY

- Over the long term (35 years), for a well-diversified portfolio, a Transformation scenario does not jeopardise financial returns, a common misconception.
- The Fragmentation (Higher Damages) scenario is increasingly detrimental to returns over time and the Transformation scenario becomes increasingly favourable relative to the other scenarios.
- At a total portfolio level, under the Transformation scenario, while the overall impact is less significant (given positive and negative impacts for different asset classes) there are key areas that investors should focus on: e.g. developed market equities vs. EM equities and real assets.
- The most apparent differential between winners and losers is at an industry sector level and investors can position themselves accordingly to manage the downside risks as well as position for favourable opportunities.

Figure 19:
Climate impact on return by industry sector (35 years)



Figure 20:
Climate impact on return by asset class (35 years)



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For more information about this report and related content, please contact:

Helga Birgden
Helga.Birgden@mercer.com
+61 3 9623 5524

Mercer Investments (Australia) Limited
Collins Square
727 Collins Street
Melbourne VIC 3008
AUSTRALIA