The Climate Institute

Corporate Responses to the 1.5-2°C Paris Agreement Climate Objectives



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Corporate Responses to the 1.5-2°C Paris Agreement climate objectives

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Contents	
Foreword	1
Key points	2
Recommendations	3
Introduction	4
Three key components of corporate responses to the 1.5-2°C objectives	6
1. Evaluate the current context	7
2. Scenario analysis	10
3. Responses: Strategies and targets	15
Challenges faced and lessons learned	18
Recommendations	21
Appendix: SBTI methodology summary & analysis	23
Company reflections on setting Science-Based Targets	26

Creating change takes leadership. We need people to lead: individuals, communities, investors and business leaders. We need people from all walks of like to step forward and join us as leaders of change. This policy brief was written by Chi Mun Woo, Mike Suffield and Steve Tonner from KPMG and Kate Mackenzie from The Climate Institute



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Design The Climate Insitute Platform GLIDER

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Foreword

The past two years have seen significant shifts in corporate activity regarding climate change. For businesses, the entry into force of the Paris Agreement has perhaps been the key catalyst to contemplate a future policy environment consistent with its objective of limiting global warming to well below 2°C. Some companies are committing to and disclosing carbon targets informed by the Paris Agreement. Others have performed and published scenario analyses showing the impacts on the business from various climate policy futures.

Both KPMG and The Climate Institute aim to encourage and facilitate robust actions to understand, respond to and communicate the risks and opportunities flowing from climate change. In undertaking this research, we sought to explore the state of corporate responses to the 2°C objective, and the Agreement's more ambitious 1.5°C objective, as well as companies' motivations for action and challenges faced.

The pace of change in this area is so rapid that proposed guidelines and solutions for addressing the challenges identified by companies were developed and issued while this research was being carried out. Additionally, the focus of investors and regulators on climate risks have been sharpened, 1) by the legal profession's opinion on directors' duties with regard to climate change, and 2) by APRA's plans to monitor the adequacy of companies' assessments and responses to climate risk in accordance with their risk management frameworks. This report provides a status update of corporate responses to the 1.5-2°C objective. It also, identifies gaps and challenges, and their implications, and offers recommendations for driving strong responses and more meaningful disclosures. In sharing the experiences from those in the vanguard of climate risk response, we hope that others contemplating action may benefit from lessons learnt so far in this area of increasing importance.

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Key Points

- 1 Advances in climate change action in the past two years have led businesses to contemplate their prospects in a future in which warming is limited to less than 2°C. The number of businesses actively considering such a future has grown quickly from almost zero two years ago to more than 200 now. Key drivers are: the signing and coming into force of the Paris Agreement; greater legal guidance over the duties of directors and trustees with respect to climate risks; increasing pressure from institutional investors to disclose and address risks related to climate change.
- 2 Significant experimentation is taking place over approaches to analyse companies' risks and opportunities, communicate resilience or exposures, and develop long-term carbon reduction targets consistent with the Paris Agreement
- 3 Scenario analysis is emerging as a key method for understanding risks and opportunities around climate change, and for informing strategic responses. Organisations such as the Financial Stability Board's Task Force on Climate-related Financial Disclosure (FSB-TCFD) and the Investor Group on Climate Change have recently published or updated guidance seeking the reporting of climate change risks and opportunities flowing from a below 2°C scenario.
- 4 However, scenario analysis relating to climate change remains immature and there are significant problems with the reference scenarios against which corporate impacts are evaluated. Most companies rely upon mitigation scenarios that are not consistent with a below-2°C future as set out in the Paris Agreement, and none have considered the agreement's 1.5°C objective. Where climate scenarios have been conducted and disclosed, the disclosures have contained insufficient detail to facilitate comparisons. Physical risks associated with scenarios are also rarely disclosed.

- 5 Some companies have committed to actively supporting a less than 2°C future through their own strategies and activities, often via the Science Based Target Initiative (SBTI), a multi-stakeholder organisation set up in 2016 to encourage the adoption of Science Based Targets (SBTs). As a new organisation, and with guidance and tools in relatively early stages of maturity, the SBTI is rightly approving targets on a case by case basis. The challenge it faces is to facilitate experimentation while concurrently providing scalable, consistent guidance to organisations seeking to claim they have developed SBTs.
- 6 Businesses face the following challenges in setting long term SBTs:
 - a) long term commitments conflict with short-term time horizons that factor into most corporate strategy and into structures, such as management incentives
 - b) a lack of authoritative, detailed guidance on 'best practice'
 - c) a lack of adequately detailed long-term policy guidance to understand how a 1.5-2°C scenario may play out in specific countries and sectors
 - d) building internal consensus on the need to analyse and respond to the 1.5-2°C objectives, often caused by:
 - a lack of understanding of the implications of physical and transitional climate risks;
 - + reluctance to fund investments that a comprehensive response may entail; and
 - apprehension that conducting and disclosing any thorough exploration of a 1.5-2°C future may risk public criticism in the event of future revisions or inconsistencies.

Recommendations

- 1 Companies should participate in efforts to enhance and reconcile the various standards, frameworks and tools that support credible analysis of climate-related transitions and impacts.
- 2 Scenario analysis is an important process for understanding how companies may fare in a 1.5-2°C future. Scenario analysis should be conducted and disclosed, along with sufficient detail about underlying assumptions.
- 3 Industry bodies, companies, policy makers and regulators should develop and encourage the use of a common set of assumptions and inputs for scenario analyses. At least one of the scenarios explored should be compliant with the target of the Paris Agreement. More consistent disclosure frameworks and guidance would increase investor confidence and help in the proper interpretation of results.
- 4 Companies should set ambitious carbon reduction targets consistent with the objectives agreed by the Paris Agreement. The goal should be to acknowledge and confront the significant climate-driven risks, along with the challenges and opportunities of transition, and identify what strategic changes are necessary, not whether changes are needed.

One approach suggested is to envisage what "net zero" emissions in 2050 looks like as part of scenario analysis, identifying the necessary step changes in technology, energy, markets, assets and products to protect competitiveness. Most scenario analyses carried out to-date do not go beyond 2035-40, and therefore do not explore conditions "beyond the cliff face".

5 Boards should support a "Safe to Fail" culture that recognises the ambitious targets cannot be guaranteed to be achieved, and that weak targets present a greater risk.

They should encourage, and challenge the appropriateness of, responses to a 1.5-2°C future, which should include scenario analyses that incorporates a net zero horizon.

6 Because the timeline for climate change is long relative to the tenure of most directors and executives, boards need to ensure that a commitment to responding to long-term climate risk is appropriately incentivised.

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Introduction

The past year has seen many organisations explore the implications of the Paris Agreement, notably a carbon constrained future where efforts are made to hold global warming to well below 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C. However, information on what has been done to analyse climate change risks, as well as resulting updates on business strategies and greenhouse gas (GHG) reduction targets, is limited.

As businesses account for the bulk of global emissions, either directly or indirectly (63 per cent of global emissions were directly caused by the top 90 businesses), attention is turning to challenging corporate strategies, risk assessments and emission reduction commitments. Just as countries are being held to account for the credibility of their reduction targets, investors and NGOs and other stakeholders, are now posing similar questions to businesses:

- + How will the business be affected by the 1.5-2°C objectives?
- + How will the business participate in reaching the objectives?

The Climate Institute worked with KPMG to gauge current business responses to the Paris Agreement, with the aim of stocktaking approaches and highlighting the challenges and lessons learnt.

Many global leaders are now evaluating a severely carbon constrained future. Some are significantly advanced in evaluating their own carbon reduction targets consistent with the achievement of a 1.5-2°C goal.

So what does this mean? How difficult is it? And should all companies now be following suit?

The paper seeks to address these questions in a way that is relevant to:

- businesses that are carrying out scenario analysis or are considering whether to set carbon/climate targets aligned with global goals to keep warming to 1.5-2°C
- businesses that have already committed to setting targets, and are deciding on strategy and how to "operationalise" these targets
- investors assessing the risks within portfolios this will be particularly relevant for investors' engagement programmes
- + policymakers (particularly those in Australia) who are seeking to understand the challenges faced by businesses in forecasting the regulatory future, as well as the complementary action being taken by other players within value chains.

Approach

With limited public information about corporate action in this area to date, and many businesses still in exploration and experimentation phases, the approach to developing this paper was to:

- + consider emerging frameworks and tools for analysing the 1.5-2°C objectives, developing strategic responses, setting related targets, and disclosure: desktop research was conducted using publicly-available material and drawing on findings from KPMG's Corporate Sustainability Report series
- interview selected businesses to understand the challenges and lessons they have learnt: in total, eight businesses were consulted and a further 12 were evaluated through publicly available sources
- + engage with WWF to identify the key focus points for the Science Based Targets Initiative (SBTI) and how companies can learn from the mistakes made by those before them when setting a target.

KEY CONCEPTS AND DEFINITIONS

1 1.5°C and 2°C targets

Since the pre-industrial era, the world has warmed by an annual average of about 0.9°C, primarily due to human activity. In 2009 at the UN Climate Change Conference in Copenhagen, the world's nations agreed to try to limit total warming to less than 2°C. In Paris in December 2015, virtually every country in the world agreed to hold temperature increases to "well below" 2°C, and to "pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels".

There is a big difference in the severity of impacts flowing from a 1.5 versus 20C scenario as detailed in The Climate Institute's report Beyond the Limits: Australia in a 1.5 to 20C world .

Table 1: Estimated impacts of climate change for 1.5-2°C scenarios.⁶

Impact	1.5°C	2°C
Coral reefs	Severe impacts; some potential for limited adaptation remains	Virtually all tropical coral reefs will be severely degraded
Heat extremes	On average, south and central Australia would experience heatwaves of two weeks of the year; heatwave length for the northern regions would be around a month	Extreme heatwaves are much more severe than current experience and occur annually. Heatwave length extends to about 3 weeks in south and central Australia, and around two months in the north
Water availability	Declines (~10 per cent) across most of Australia (more severe in west); up to 30 per cent reductions in some scenarios	Greater declines across southern Australia. Up to 40 per cent reductions in some scenarios
Sea level rise	~40cms to 2100; declining rates of sea-level rise towards the end of the 21st century reduce the long-term sea-level rise commitment; risks to multi-metre increases still exist due to loss of ice from major ice sheets	~50cms to 2100; multi-metre sea-level rise commitment over centuries to come

2 1.5°C and 2°C targets

Human activity means greenhouse gas emissions are being released into the atmosphere much more quickly than natural mechanisms can draw them back out. The result is that they accumulate in the atmosphere, forming a thickening heat-trapping blanket. That process causes global temperatures to rise. In order to limit global warming over the rest of this century and beyond, scientists have proposed the use of a "carbon budget" - the total amount of greenhouse gas that can be released by human activity over a period of time, while still staying within a certain increase in global temperature.

The size of the carbon budget is a function of the temperature ambition and the likelihood of achieving that goal. A budget associated with a 1.5°C goal is smaller than that for 2°C.

This total carbon budget does not change, though the rate at which it is "expended" could vary. The Paris Agreement, by identifying upper limit targets for warming, has therefore implicitly defined the total net amount of greenhouse gas emissions the world can release.

3 Net zero emissions

"Net zero emissions" means any greenhouse gases being emitted by human activity are offset by measures to capture and sequester emissions. The Paris Agreement refers to "achiev(ing) a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty". This means that for developed countries, CO2 emissions must reach net zero by around 2050 (later for some other greenhouse gases) to have a reasonable chance of limiting warming to less than 1.5-2°C.

4 Emission Scopes

The Greenhouse Gas Protocol Reporting Standard outlines three categories of recording greenhouse gas emissions: Scope 1, Scope 2, and Scope 3. These categories are referenced in this paper and can be defined by the following boundaries:

- Scope 1 emissions (direct emissions) are those released from sources owned or controlled by the organisation, for example the combustion of fossil fuels to generate energy, or the unintentional release of greenhouse gases from natural gas distribution or refrigerant systems
- + Scope 2 emissions (indirect energy emissions) are emissions from the consumption of purchased electricity, steam, or other sources of energy generated upstream from the organisation
- + Scope 3 emissions (other indirect emissions) are defined as emissions which are a consequence of the operations of an organisation, but are not directly owned or controlled by the organisation - these can include, for example, employee commuting or business travel, third party logistics, or emissions from the use of purchased products.

Three key components of corporate responses to the 1.5-2°C objectives

An iterative process

Many companies indicated their current responses, disclosures, and position were an early iteration of a longer-term "journey" involving development of policy, position, target, stress testing and scenarios analysis.

For example, Westpac first introduced a climate change policy statement in 2008, then made a commitment in 2015 to conduct scenario analysis in response to various future policy futures, including the 2°C objective. Some information about the 2°C scenario analysis was then disclosed in 2016. The company now expects that analysis to inform a future refresh of their climate change policy statement and future greenhouse gas targets reviews. BHP Billiton published its first "carbon portfolio analysis" in late 2015, prior to the Paris Agreement. It then revised this analysis a year later, incorporating changes implied by the Paris Agreement and by advances in renewables technology.

While the organisations interviewed had developed their responses in different ways, their processes tended to follow the model shown below in figure 1.



FIGURE 1

Processes to develop 1.5-2°C objectives.

- 1 Evaluate context. The organisations had first sought to understand the current context surrounding climate mitigation efforts and climate impacts, and to confirm whether or not they would develop a position and approach.
- 2 Scenario analysis was often (although not always) the next step, in which plausible future economic, political, and environmental scenarios were used to test possible impacts on the business. Ultimately, not all companies publicly disclosed information about their scenario analysis.
- 3 A response to the 1.5-2°C objectives was disclosed by some companies, either through a position statement, strategy, or target.

However, not all steps were taken by all companies:

+ some companies did not undertake scenario analysis before proceeding to commit to a target (generally, this was because they had committed to the SBTI)

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 some companies undertook a scenario analysis, but didn't demonstrably devise a 'response' to the analysis.

1. Evaluate the current context

- Asessment of current context and drivers
- Confirm the case for developing or enhancing the climate change response

Evaluate the current context

A turning point: the Paris Agreement

The 5th Assessment Report of the Intergovernmental Panel on Climate Change (AR5) highlighted the risks of global warming and the need to limit temperature rise to well below 2°Cabove pre-industrial levels. The Intergovernmental Panel on Climate Change (IPCC) projected that, in order to limit temperature increases to well below 2°C, global greenhouse gas emissions will need to be between 78 and 118 per cent below 2010 levels in 2100. In an historic move, 195 countries met in Paris in December 2015 and agreed to limit global warming to "well below" 2°C above pre-industrial levels and to "pursu(e) efforts" to limit warming to 1.5°C. This unprecedented international climate deal sent a clear and unequivocal signal to the private sector of the global political intention to shift to a low carbon, and ultimately zero carbon, future. Achievement of the goal agreed in Paris means there must be a transformation of global energy systems, transport and industrial processes over the next few decades.

The Climate Action Tracker initiative has modelled global emissions and temperature expectations based on current policies, the Nationally Determined Contributions (NDCs) submitted by each country , and the requirement for a 2°C and 1.5°C future.

The output in figure 2 shows that policies already implemented would limit warming to between 3.3 and 3.9°C. Current pledges and NDCs will only achieve a limiting of temperatures to between 2.5 and 2.8°C.

Hence, organisations cannot assume that governments' current policies will not substantially change in coming years.

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FIGURE 2

Climate Action Tracker initiative's modelled global emissions and temperature expectations. (Source : http://climateactiontracker.org/global.html)

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Why are companies considering the 1.5-2°C objectives?

Climate change is an increasingly important topic for corporate risk management and is referred to as a material issue by a majority of large companies worldwide . In addition to the Paris COP21 meeting in 2015, key drivers of this growing attention include:

- + increasing evidence of current and future physical climate change impacts, and acknowledgement that society must move to a carbon-constrained future (including an expectation for strengthened national restrictions on carbon emissions)
- growing concern among investors about the organisation's preparedness for a carbon-constrained future, including material financial risks such as stranded assets (e.g. fossil fuel reserves) : this was identified as a key point of concern for three of the organisations we interviewed
- + greater clarity over the duty of directors and fiduciaries to assess the risks and opportunities associated with climate change: a recent legal opinion has indicated that it is the duty of Directors and Boards to actively engage in assessing climate-related risks for their organisations

Legal and regulatory risks grow clearer

- + an appreciation that the climate transition window encompasses the lifespan of capital investment and strategic decisions that are being made now, and thus, that climate change impacts (policy and physical) are relevant to investment
- public interest and shareholder activism for disclosures on risks and responses are strong, organised and increasing
- carbon and energy policies, albeit patchy around the world, encourage management to be conscious of the financial costs of greenhouse gas emissions, and often to estimate likely future costs of carbon
- advances in technology are reducing costs of renewables and energy efficiency: battery and solar technologies will significantly disrupt value chains
- an emerging focus on the duties of directors and boards in relation to managing climate-related-risk .

Several recent developments in Australia and overseas have underlined the possible legal and regulatory risks for companies that fail to adequately consider and respond to risks relating to climate change – particularly where financial losses may result.

A memorandum of legal opinion commissioned by the Centre for Policy Development and the Future Business Council in October 2016^[1] found that many climate change risks ": would be regarded by a Court as being foreseeable at the present time"; and directors "who fail to consider climate change risks now could be found liable for breaching their duty of care and diligence in the future" under s180 (1) of the Corporations Act. It also noted the steep decline in emissions that will be required in order to meet the Australian government's Paris Agreement commitments, adding that "A change in the regulatory environment is certainly foreseeable, and probably inevitable."

The Australian Prudential Regulation Authority (APRA), which supervises Australia's financial institutions, stated in February 2017 that climate risks are often financial in nature, that "(m)any of these risks are foreseeable, material and actionable now", and that "robust, scenario-based thinking about risks should be the new standard for risk management."^[2].

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[2] Summerhayes, Geoff, 2017, "Australia's new horizon: climate change challenges and prudential risk", speech to Insurance Council of Australia, February 17, 2017. http://www.apra.gov.au/Speeches/Pages/Australias-new-horizon.aspx

Expectations of companies are growing and converging

There is a growing awareness of climate risk among both investors and regulators. However, there is currently inconsistency in both assessment and disclosure of how companies will be impacted by climate change. Non-government organisations such as the Asset Owners Disclosure Project (AODP), the Investor Group on Climate Change (IGCC) and the Carbon Disclosure Project (CDP) have been promoting greater transparency on carbon disclosure since 2003. However, financial reporting rules and guidance for Australian listed companies do not refer specifically to climate-related risks, although recent guidance from both ASIC (RG 247) and the ASX Corporate Governance Council, broadly refers to environmental and sustainability risks. This guidance has not led to consistent, transparent reporting of climate-related risks.

This gap between investors' expectations and regulatory requirements around climate risk analysis and disclosure may be narrowing. The FSB-TFCD demonstrates growing recognition that greater transparency and disclosure are required on climate risk. The FSB-TFCD was established to research and develop voluntary, consistent climaterelated financial risk disclosure standards for companies, asset owners, and asset managers.

The FSB has produced the following draft recommendations to assist both companies and investors alike (Table 1). The recommendations will likely form a "de-facto" set of standards for disclosure and be open to each country to adopt as required.

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TABLE 1FSB Recommendations

CATEGORY	RECOMMENDED DISCLOSURE
GOVERNANCE: Disclose the organisation's governance around climate-related risks and opportunities	a. The board's oversight of climate-related risks and opportunities.b. Management's role in assessing and managing climate-related risks and opportunities.
STRATEGY: Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning	 a. The climate-related risks and opportunities the organisation has identified over the short, medium, and long-term. b. The impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning. c. The potential impact of different scenarios, including a 2°C scenario, on the organisation's business, strategy, and financial planning.
RISK MANAGEMENT: Disclose how the organisation identifies, assesses, and manages climate related risks	 a. The organisation's processes for identifying and assessing climate-related risks. b. The organisation's processes for managing climate-related risks. c. How those processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management.
METRICS AND TARGETS: Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities	 a. The metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process. b. Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas emissions, and the related risks. c. The targets used by the organisation to manage climate-related risks, opportunities and performance against targets.

The FSB-TCFD also made sector-specific disclosure recommendations. These cover banking, insurance, asset owners, asset managers, energy, transport, materials and buildings, agriculture, food, and forest products .

Emerging portfolio-level 2°C tools for external analysis

Investors are becoming increasingly equipped to form their own assessments, with rapidly emerging group of tools for conducting "external analytics", to assess the prospects of multiple companies in a 2°C future. Such tools allow third parties to analyse a company's carbon risk, and to take a position on it, regardless of the analysis or disclosure that those companies are conducting themselves.

Initially these tools were mostly commercial services relying on proprietary methodologies. But some newer tools are using open source analytics, which can therefore be used widely by investors and investment managers.

These tools should be understood and considered by companies undertaking 1.5-2°C targets and strategies. They may provide guidance on the kind of information that the market is seeking so it can assess climate risk in companies.

Below are some examples of these tools:

- + The Two Degrees Investing Initiative (2°ii), and other organisations, have developed the Sustainable Energy Investment Metrics (SEI Metrics) tool. The 2°ii has funded research and engagement activities which seek to align the financial and capital investment process with 2°C climate scenarios, and to develop the metrics and tools to measure climate performance of financial institutions.
- + The Transition Pathway Initiative is supported by asset managers and owners with over £2 trillion assets under management. The initiative is also supported by the Church of England and assesses how companies are preparing for the transition to a low-carbon economy.
- + The Bloomberg Carbon Risk Valuation tool provides data and analytics to help companies manage risks

such as stranded assets and unexpected swings in markets.

Internal context: Building off a low base

There is a "disconnect" between the scale of the risks and opportunities to companies, and the rigour with which companies engage on the issues.

In the lead up to the Paris COP21, KPMG analysed carbon information published by the world's 250 largest companies (G250) in their corporate responsibility reports and their annual financial reports .

The analysis found a lack of consistency in the carbon information published by the world's largest companies, which makes it almost impossible in many cases to accurately compare one company's carbon performance with another.

Other key findings included:

- + 1 in 5 large companies in high carbon sectors (e.g. mining) did not report on carbon
- + less than 1 in 10 companies that report on carbon, report on emissions from the use or disposal of their products
- around half (47 per cent) of the world's largest companies do not publish targets for carbon reduction: European companies are the most likely to do so, and companies in Asia Pacific are the least likely
- + the average timeframe for corporate carbon reduction target is around 11 years, but few companies are aligning their timelines with the 15+ year targets being set by many national governments.

Only one third (35 per cent) of the companies that publish targets to reduce carbon explain in their reports why they have chosen those targets.

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2. Scenario Analysis

Scenario Analysis

- Quantitative or qualitative scenario analysis
- Result provides conceptual 'buy-in' to respond

A turning point: the Paris Agreement

Scenario analysis dates back to post-war military strategy in the US, and French public policy planning . It has been used by the private sector for more than 40 years . It is quickly emerging as a key tool for understanding how corporations should respond to the Paris Agreement objectives, and how they should prepare for broader future climate-related developments.

Despite this, scenario analysis relating to climate change for corporates is still nascent.

What is it? A scenario describes a path of development leading to a particular outcome. Scenarios are not intended to represent a full description of the future, but rather to highlight central elements of a possible future and to draw attention to the key factors that will drive future developments. It is important to remember that scenarios are hypothetical constructs; they are not forecasts or predictions, nor are they sensitivity analyses. A key feature of scenarios is that they should challenge conventional wisdom about the future. In a world of uncertainty, scenarios are intended to explore alternatives that may significantly alter the basis for "business-as-usual" assumptions. - Financial Stability Board's Task force on Climate-related Financial Disclosure, Technical Supplement: The use of scenario analysis in disclosure of climate-related risks and opportunities.

Why use it?

Scenario analysis is a useful process to enable companies to contemplate a 1.5-2°C future. It aligns with many characteristics of climate change: it is forward-looking; can span long time frames, and; through a combination of scenarios, the varying levels of certainty around climate change and climate risk can be incorporated.

Scenario analysis can also be useful in gaining broader organisation-level support for committing to a 1.5-2°C target. Risks and opportunities that are described under the 1.5-2°C scenario may be a powerful motivator for management to identify possible strategic shifts. They can also support credible engagement with investors.

The FSB-TCFD recommendations

The FSB-TFCD has highlighted the importance of scenario analysis in understanding an organisation's climate-related risks, and for communicating to stakeholders how these risks are to be addressed. Its draft recommendations included supplementary guidance on the use of scenario analysis, including on fundamental considerations, types of scenarios and the challenges of each . These are outlined in box 1.

The FSB-TCFD have outlined the following characteristics which should be present in scenario analysis:

- 1 Plausible. The events in the scenario should be possible and the narrative credible (i.e., the descriptions of what happened, and why and how it happened should be believable).
- 2 Distinctive. Each scenario should focus on a different combination of the key factors. Scenarios should be clearly differentiated in structure and in message, not variations on a single theme. Multiple scenarios should be used to explore how different permutations and/or temporal developments of the same key factors can yield very different outcomes.
- 3 Consistent. Each scenario should have strong internal logic. The goal of scenario analysis is to explore the way that factors interact, and each action should have a reaction. Neither actors nor external factors should completely overturn the evidence of current trends and positions unless logical explanations for those changes are a central part of the scenario.
- 4 Relevant. Each scenario, and the set of scenarios taken as a whole, should contribute specific insights into the future that relate to strategic and/or financial implications of climate-related risks and opportunities.
- 5 Challenging. Scenarios should challenge conventional wisdom and simplistic assumptions about the future. When thinking about the major sources of uncertainty, scenarios should try to explore alternatives that will significantly alter the basis for business-as-usual assumptions.

BOX 1

Financial Stability Board's Task force on Climate-related Financial Disclosure, Technical

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PLEMENT: THE USE OF SCENARIO ANALYSIS IN DISCLOSURE OF CLIMATE-RELATED RISKS AND OPPORTUNITIES.

Scenarios mitigation pathways

Limiting warming to well below 2°C relative to preindustrial levels would require substantial emissions reductions over the next few decades. Figure 3 demonstrates the scale of this reduction in Australia. Implementing such reductions poses substantial technological, financial and economic, social and institutional challenges; all of which increase with delays in additional mitigation.



FIGURE 3

Beyond the Limits: Australia in a 1.5-2°C world, The Climate Institute, August 2016.

The IEA 450 Scenario

The most common 2°C approach identified was for organisations to reference the IEA's World Energy Outlook 450 scenario . This scenario sets out an energy pathway consistent with a 50 per cent chance of limiting global temperature increase to below 2°C. There are limitations to the IEA450 scenario which should be noted by organisations conducting scenario analysis:

- + it only models an even chance of remaining below 2°C: this is inconsistent with the intent of the Paris Agreement
- + it does not extend beyond 2040, at which point a significant increase in speed of emission reduction will be required to meet Paris Agreement targets
- + it only models emission pathways for the energy sector

Challenges in conducting scenario analysis

The interviews identified a number of challenges in relation to scenario analysis. One was that climate risks and scenarios are not typically considered as part of existing risk management and strategy development mechanisms. Climate change specialists within organisations also had limited experience with the use of scenario analyses, and no significant previous participation in risk and strategy processes.

Another key challenge, which was identified in interviews with organisations currently using scenario analysis, is a potential lack of consistency between the scenarios used by each company. As more companies move towards a scenario analysis approach, there is a risk of large differences between the possible scenarios used by different organisations in the same market (or industry).

BHP Billiton's Scenario Analysis

As part of their corporate planning process in 2015, BHP Billiton (BHP) released their first scenario-based portfolio evaluation, Climate Change: Portfolio Analysis .

This evaluation encompasses a large range of potential outcomes for key global uncertainties and how shifts in the global economy, political landscape, and physical environment may impact BHP's business into the future.

BHP states that one of the most important aspects of conducting a credible scenario analysis is ensuring that the tested scenarios are divergent, plausible, and internally consistent.

In its initial scenario analysis BHP tested their central case against four scenarios:

- 1 "A New Gear" sustained economic growth due to productivity gains in advanced economies, global focus initially on reactive adaptation followed by a longer-term shift towards mitigation.
- 2 "Closed Doors" protectionism drives economic decline and limited global cooperation. Research and development dwindles, and food and water shortages provoke instability in some economies. Climate change commitments are abandoned in favour of adaptation.
- 3 "Global Accord" strong economic growth sustains a global push to develop and implement cleaner, more energy efficient solutions that support growth. Technology plays a pivotal role with breakthroughs in new and next generation clean energy technologies. High-cost solutions often deployed to meet lower emissions targets.
- 4 "Two Giants" strong growth led by China and US enable greater liberalised trade. Coordinated policy response and agricultural productivity gains ease water and food constraints.

Based in part on the global action seen during and after COP 21, BHP believes that the Global Accord scenario is now the most likely of the four, but the company intends to regularly review the analysis and be prepared to shift to an alternative scenario if global circumstances warranted (e.g. the rise of protectionism).

An example of BHP's disclosure in relation to its scenario analysis is included at the end of this section.

Different approaches to scenario analysis

The most common 2°C approach identified was for The choice of inputs, parameters, and the level of detail behind each scenario analysis varies from one company to another. These choices appear to be a function of: the risk appetite and culture of an organisation; the sector in which it operates and the perceived degree of climate-related risks within that sector; and the availability of data and resources to carry out the analysis. Some organisations had developed scenarios based on economic modelling. This helped to achieve internal 'buyin' for a chosen pathway. Other organisations took a more qualitative approach.

Table 2 compares the approaches taken by the various companies surveyed to evaluate business risks against possible climate scenarios. Information was sourced from publicly available documents.

HAS A 2 ORGANISATION SCENAI	LEVEL OF °C TRANSPARENCY / RIO DISCLOSURE	KEY SCENARIO POINTS	HORIZON OF ANALYSIS
AGL ¹ Maybe	 Discloses carbon budget Discloses trajectory Discloses own sectoral budget allocation Discloses a 2050 point 	Budgeted response, using the Climate Change Authority's 10.1Gt budget to 2050. Derives a National Electricity Market budget of 3,026Mt. PLEXOS modelling for 3 NEM reduction pathways (1. no carbon reduction; 2. 26-28% reduction from 2005 levels by 2030; and 3. 2°C budget based on CCA analysis). Discusses marginal abatement cost of carbon at AUD\$40/t for a new coal power plant, and >AUD\$100/t for an existing coal plant. Annual sectoral emissions reductions of c.7% p/a from 2020-2050	2030, 2050
ROYAL DUTCH SHELL2IEA 450 Scenario	IEA 450 Scenario*	Two independent scenarios and IEA's 450ppm Scenario, all scenarios out to 2100; expectation of net zero emissions in 2100.	2100
BHP BILLITON ³ Maybe	 Discloses 2030 reductions by region Does not disclose global budget or trajectory; states "in line with levels indicated by the IPCC" to 2030 Discloses carbon prices Does not disclose 2050 point 	Four scenarios (see box on previous page) including 'signals' which show that the world is moving towards or away from each scenario. 'Global accord' 2°C carbon price of US\$50 in 2030. Supplementary "shock" stress test includes price of \$US80 in 2030.	2030
WESTPAC ⁴ Maybe	 Discloses net zero endpoint by 2050 for Australia; a necessary achievement for <2°C Doesn't disclose budget or midpoint/trajectory Implies carbon price in one scenario but doesn't specify level 	 Three 2°C scenarios which all achieve net zero emissions by 2050: Strong national action: countries act on their own and there is rapid domestic action on climate change; Combined global action: international carbon markets facilitate a smooth transition; and Delayed action: initial delays in action lead to a rapid mitigation post-2030. 	2050
BP ⁵ No	N/A	BP mentions the existence of IEA's 450ppm scenario as a requirement of a 2°C world; a 2°C scenario was not applied. "Base case" of fossil fuels accounting for 80% of total energy supplies in 2035. 'Faster transition' case requires \$100/t price on carbon by 2035 and strict emission policy. However, this is still far off the requirements of achieving the IEA 450 scenario.	2035
GLENCORE IEA 450 XSTRATA ⁶ Scenario	IEA 450 Scenario* *	Three scenarios: "delayed action" based on no change to current policies; "committed action" based on the IEA NDC scenario; and ambitious action based on IEA 450 scenario. There is no explicit mention of a carbon price in Glencore's scenarios.	2030
AURIZON ⁷ IEA 450 Scenario	IEA 450 Scenario*	Three scenarios: IEA Current Policies; IEA New Policies; and IEA 450. Scenario analyses relate to 'exports of thermal coal'	2030

¹ AGL, Carbon constrained future: AGL's approach to climate change mitigation: a scenario analysis, 2016, http://agl2016.sustainability-report.com.au/files/carbon_constrained_future.pdf

² Shell, Shell Scenarios, http://www.shell.com/energy-and-innovation/the-energy-future/scenarios.html [accessed 3/02/2016]

³ BHP Billiton, Climate Change: Portfolio Analysis, 2015 http://www.bhpbilliton.com/-/media/bhp/documents/investors/reports/2015/bhpbillitonclimatechangeporfolioanalysis2015.pdf?

⁴ Westpac, 2016 Westpac Group Sustainability Performance Report, https://2016annualreport.westpacgroup.com.au/assets/Westpac_Sustainability_Report_2016.pdf

⁶ British Petroleum, BP Energy Outlook 2017 Edition, http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf

⁶ Glencore, Business Strategy Climate change sustainability, http://www.glencore.com/sustainability/climate-change/planning-for-climate-change/ [Accessed on 3/02/2017]

⁷ Aurizon, Delivering for the Long Haul. FY2015 Sustainability Report, 2015 https://www.aurizon.com.au/~/media/aurizon/files/sustainability

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Key inconsistencies identified in scenario analysis

Our research identified differences between the scenarios being developed by each company. These include the following:

- Lack of consistent approach towards the referencing of a carbon price (only three of the researched scenario analyses explicitly reference a carbon price) and how the price impacts on the consideration of future risks and opportunities.
- + The time horizon of analysis differs between organisations from 2030 to 2100, with the majority in the 2035-2040 range.
- Some companies acknowledge the 2°C pathways, but do not apply them (eg BP, Westpac); while others apply a form of 2°C scenario without identifying it as such (eg, Aurizon).
- + Disclosures accompanying scenario analysis are generally high level, rather than detailed. The lack of supporting information for 2°C scenarios creates challenges for external readers to understand, trust and interpret. The value of the scenario analysis to investors is diminished if there is no consistency in the 2°C scenarios applied by various organisations.

Other issues with scenarios

+ Physical risks are rarely included. All scenario analyses examined for this paper identify policy risks, but few identified physical risks associated with warming and how that might impact the future of their organisation. Some companies have carried out separate physical risk assessments, but have not connected these evaluations to the scenario analysis exercise. Physical risks are a key component of the scenario analysis recommendations from the FSB-TFCD scenario analysis technical supplement . The difference between a 1.5°C world and a 2°C world marks the movement from what are current-day extreme events to a new climate regime .

- + The 2°C scenarios used are of low confidence: The Paris Agreement's central aim is to keep a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C. However, the IEA's existing scenarios, which are heavily relied upon by companies undertaking climate scenario work , are not consistent with this aim. The IEA is developing new scenarios that take the Paris Agreement into account.
- No company has disclosed a scenario consistent with a 1.5°C future: This may be because:
 - global greenhouse gas emission pathways, consistent with a 1.5°C target, have not yet been published by the IEA or IPCC
 - 2°C is already perceived to be a significant challenge: A 1.5°C pathway can be seen as an ambitious undertaking, requiring the achievement of net zero emissions between 2040 and 2060, and a reduction of emissions between 110 per cent and 120 per cent by 2100.
- + Limiting climate scenarios to before 2050: The implications of this are potentially dramatic. Organisations may fail to consider long-term transitional risks just at a point when transformative changes are required. As the IEA puts it the decade between 2040 and 2050 is likely to be "increasingly challenging" as remaining emissions would be in areas that are more difficult to decarbonise .

Disclosures arising from scenario analysis: BHP Billiton's example

An example of disclosure in relation to scenario analysis by BHP Billiton can be seen in figure 4.

The portfolio is tested across a range of scenarios and shock events

While the central case is our forecast of what we expect will happen, we recognise that this forecast is subject to uncertainty and that the world could move in any number of ways in the future.

To understand the impact of this uncertainty on the BHP Billiton portfolio, the corporate planning process uses scenario analysis to encompass a wide spectrum of potential outcomes. Designed to interpret external factors, including technical, economic, political and governance trends facing the global resources industry, the scenarios offer a means by which to explore potential portfolio discontinuities and opportunities, as well as to test the robustness of decisions.

The scenarios do not constitute preferred outcomes for BHP Billiton. They represent a range of possible long-term future states. While these are possible futures, there are inherent limitations with scenario planning and it is difficult to predict which, if any, of the scenarios might eventuate. They are designed to be divergent, but also plausible, spanning unique potential future business environments. The scenarios use a consistent set of assumptions which are applied across the range of commodities. Every scenario includes an assumption that climate change occurs – what varies between them is the extent of the global response.

Tracking the signposts (trends) and triggers (events) across scenarios is integral to the planning process. These signposts and triggers provide an indication of which scenarios are becoming more or less dominant through time, offering us a powerful decision-making tool that would enable us to act early. For example, a potential trigger event would be a breakthrough in low-cost CCS for power generation.

Along with scenario analysis, we test the portfolio against shock events. These are unlikely and extreme events, which are typically short-term but may have associated longer-term impacts.

While we optimise the 20-year plan based on the central case, we use long-term scenarios and shock events to test the resilience of the portfolio across a range of possible futures. The difference between how we expect the portfolio to perform in the central case, and how we forecast it could perform in a scenario, helps us to understand the risks and opportunities and what we might do differently if the world were to move towards a particular scenario.

3. Responses: Strategies and Targets

- Development of strategy and/or targets
- Demonstrate credibility and achieveability

Response: Strategy / Targets

Strategy

In any strategy development, companies look to:

- + aet their overall objective;
- + the strategy to get them there;
- + develop appropriate targets;
- + outline what this means for implementation; and
- develop a set of measures and meaningful outcomes to evaluate how they are performing against the strategy.

Having undertaken a 1.5-2°C analysis, companies focused attention on how they will respond through development of strategies and targets. The approaches that were observed were inconsistent. Some companies confirmed their climate change policy without specific targets. Others focused on targets without revising strategy. Strategy and targets are linked and both are needed to assist companies to respond to climate change.

There is little established consensus on what should be considered in setting a climate change strategy, although CDP methodologies, FSB-TCFD recommendations will likely advance this.

In KPMG's experience, a robust and credible strategy should consider:

- + an overall vision / objective for the organisation to be aligned with a 1.5-2°C future
- + national and global commitments
- + the current and likely future regulatory environment
- + changes in the market environment and technologies+ financial risks and opportunities
- + related risks and opportunities that result from climate change (water, social, etc.)
- the magnitude of emissions associated with the sector (both direct and indirect), and
- both known and as yet unproven solutions [e.g., carbon capture and storage] to emissions reductions in the sector.

As identified by four of the organisations interviewed, companies that are directly exposed to transition-related risk (e.g. large emitters and/or energy users) are likely to develop a strategy focused around their operational greenhouse gas footprint. Other companies in the nonfinancial sector (e.g. manufacturing, ICT and services) may develop strategies based on changing product technologies, and demand and consumer behaviour in their sectors.

Companies in the financial services sector will need to look beyond their operational footprint, and identify the meaningful outcomes that they seek to achieve, before then determining the way that these should be measured.

Responses: Emissions reductions options by sector

From the interviews, it was apparent that the impact of climate-related risks, and hence the approach taken by companies, will play out in different ways across different industry sectors. Businesses were categorised into the following categories:

- + Large direct emitters are companies at most risk of regulatory impact (e.g. carbon pricing), changes in technology and demand, and of potentially stranded assets. This risk is concentrated with a numerically small number of companies in mining, oil and gas, electricity generation, and heavy industrial manufacturing. The California Public Employees Retirement System (CalPERS) estimates that out of 10,000 firms in their equity portfolio, 80 are responsible for 50 per cent of the emissions covered by their portfolio. These companies tend to be able to fairly accurately estimate their emissions profile on the basis of the emissions intensity of their portfolio of generators. One interviewed organisation identified that this was a consideration in the development of their portfolio scenario analysis.
- + Indirect emitters are large users of electricity who may have similar risks to direct emitters, but will be dependent, to some extent, on the decarbonisation of the electricity sector. In terms of emissions, their control is limited to energy intensity, and their strategic responses tend to focus on energy efficiency measures. They include property services, companies, and manufacturing and service companies. Such companies may have the opportunity to further reduce emissions by substituting their products or services with alternatives, and by changing their own energy sourcing to increase the proportion of renewables.
- + The financial services sector facilitates the behaviours of the other sectors through provision of financing. Within this sector, an absolute target becomes more challenging. Without a mandated framework for disclosure, companies are investing significant time and resources to developing their own approaches for managing risks and then determining the right level of disclosure.

Responses: Targets and the Science Based Target Initiative

There are a number of organisations working to assist businesses developing climate strategies that are aligned with a 1.5-2°C future. The SBTI, a partnership between the CDP, UN Global Compact, WRI, and WWF; helps companies determine emission reduction targets aligned with the target of limiting global warming to well below 2°C above pre-industrial levels.

The SBTI was established to support companies in seting emission reduction targets in line with the scientifically defined conditions which will limit global warming to well below 2°C. The SBTI produced a draft target setting manual in 2015 which identifies seven different methods for setting emission reduction targets. These methods encompass both intensity and absolute targets, and range from sector-based to economic value-add approaches.

As of 10 April 2017, according the SBTI website, 189 companies have committed to setting a SBT, with 41 companies having their SBT approved by the SBTI. Seven Australian companies committed to setting a SBT on this portal:

- + Australian Ethical Investment
- + Origin Energy
- + Investa
- + Westpac Banking Corporation
- + Infigen Energy
- + Bank Australia
- + Teachers Mutual

The SBTI are also working with companies to informally review targets and support further methodology development. For example, they have been working with National Australia Bank to review its SBTI covering scopes 1 and 2, noting that there is currently no agreed methodology for SBTs for finance-related activities (scope 3).

The SBTI outlines certain criteria for setting SBTs:

- + **Boundary** The target must cover company-wide Scope 1 and Scope 2 emissions and all relevant greenhouse gases as required by the Greenhouse Gas Protocol Corporate Standard.
- + **Timeframe** The target must cover a minimum of 5 years and a maximum of 15 years from the date of announcement of the target.
- + Level of ambition At a minimum, the target must be consistent with the level of decarbonisation required to keep global temperature increase to 2°C compared to pre-industrial temperatures (although greater efforts towards a 1.5°C trajectory are encouraged).

- + **Treatment of Scope 3 emissions** An ambitious and measureable Scope 3 target with a clear timeframe is required when Scope 3 emissions cover greater than 40 per cent of total Scope 1, 2 and 3 emissions of a company's overall emissions. The target boundary must include the majority of value chain emissions as defined by the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (e.g. top 3 categories, or 2/3 of total Scope 3 emissions).
- + **Reporting** A company must disclose its greenhouse gas emissions inventory on an annual basis.

The SBTI methodologies are analysed and discussed in more detail in the Appendix.

Targets

The SBTI has drawn attention to the importance of setting targets that are relevant to the organisation, connected to the strategy and which commit the organisation to a climate goal aligned with the ambitions of the Paris Agreement.

From KPMG's experience of sustainability reporting and improvement (process and environmental outcomes), two important considerations of target setting are:

- + **Credibility:** Metrics, baselines, milestones and goals that are consistent with the ambition. While greenhouse gas target setting is not uncommon within businesses, there are various factors that make the development of science-based strategies and targets complex.
- + Achievability: The setting of long-term targets beyond five (or even two) years generally is not standard business practice. There are multiple uncertainties and assumptions that make achievability harder and more complex. Without a convincing case that considers costs, risks and benefits, few business leaders are willing to approve ambitious long-term targets.

There are parallels between the setting of national commitments and of corporate targets:

- How should a carbon budget be apportioned between countries, sectors, and organisations? This might relate to apportionment between different assets, functions or businesses. It may involve different stakeholders (including NGOs, government, consultants) and may benefit from an authoritative source of guidance.
- + What current and proposed strategies, policies and investments will enable the target to be achieved?
 How do these responses align or conflict with broader economic, commercial, societal and environmental goals for a government, sector or organisation?

• 16

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Examples of responses

The following examples show how corporate responses to climate change can vary significantly in approach, scope and ambition.

Ford Motor Corporation

Ford Motor Corporation (Ford) set a global vehicle intensity target based on the level of atmospheric CO2 that climate scientists recommended would limit the impact of climate change.

Ford began developing a climate-stabilising business strategy in 2004. This strategy was motivated by rising petrol prices, as well as awareness of the impacts of climate change. Ford decided both issues could be tackled by altering their business model to anticipate more strict fleet emissions rules.

In the development of their climate strategy, Ford Motor Corporation recognised that the company needed to be able to meet new regulatory mandates, and be able to plan for new products with limited visibility of future fuel economy regulations. Ford also recognised the important role they played, as a manufacturer of consumer goods, in contributing to global action on climate change.

Using what it describes as a "Science-Based CO2 Model", Ford has calculated the amount of light-duty vehicle CO2 emissions which are consistent with the IEA's scenario that sees stabilising atmospheric CO2 below 450ppm (broadly consistent with limiting warming to below 2°C). Ford then calculated the reduction in light-duty vehicle CO2 emission rate (g CO2-e/km) from new vehicles needed over the coming decades to achieve 450ppm stabilisation. From these calculations, Ford established 'glide paths' for vehicle emission intensity for North America, Europe, China, and Latin America. These glide paths are the trajectory that improvements in vehicle emissions intensity need to follow over time to support Ford's climate target They are fundamental to Ford's commitment to emissions reduction. The glide paths are updated every five years.

BHP Billiton

BHP has identified the business risk to its portfolio of operating in a carbon constrained world and conducted portfolio analyses to stress test the resilience of projects against a carbon price of up to \$US80 per tonne.

The company incorporated the agreement reached at the Paris COP21 to hold global temperature increase to well below 2°C. It has developed its carbon scenarios around economic growth in both emerging and developed economies.

BHP elected to use an absolute target to reduce absolute emissions to below 2006 levels, by 2017. The choice of an absolute target (as opposed to an intensity target) was seen as having more credibility with stakeholders. BHP stress tested the company's portfolio against four scenarios, including one in which shock events lead to a much more rapid transition to a 2°C world by 2030. Part of this testing includes assessing the BHP portfolio against a possible carbon price of between \$50 and \$80 per tonne of CO2 equivalent.

Sony

Sony has recognised the importance of carbon neutrality by the second half of the 21st Century in its "Road to Zero" strategy, which has been accepted as an approved SBT.

In 2015, Sony updated its emissions reduction target in line with the global consensus to limit global warming to well below 2°C and set a SBT. The new target requires Sony to reduce emissions by 2.1 per cent per year between 2000 and 2020, with a long-term vision to reduce emissions by 90 per cent by 2050.

Sony has acknowledged that it has the ability to reduce its emissions across various stages of its product's lifecycle, from procurement of raw materials to the recycling of end-life products. This includes: designing products which are able to be recycled; reducing packaging materials to improve loading efficiency and, in turn, reduce transport emissions; and setting globally unified targets, in absolute terms, to eliminate the environmental footprint of all plants and offices.

Challenges faced and lessons learned

This section consolidates some of the common issues that companies encountered as they set out to develop their responses to climate change.

Scenarios and analysis: Inconsistencies in approaches and disclosure

As noted in the Scenarios section, corporate climate scenarios have to date been inconsistent with each other, and companies have not tended to disclose a useful level of detail about how their scenarios were formulated. .

Furthermore, their underlying inputs sometimes fell short of the Paris Agreement objective of keeping temperatures "well below 2°C", even when a 2°C objective was explicitly addressed. None had addressed the 1.5°C objective. This in part due to reliance on IEA reference scenarios, which have a poor probability of remaining below 2°C and do not yet address 1.5°C.

These shortcomings are unsurprising, given that climate scenario analysis for business purposes is still novel and emerging . Some organisations indicated a need for clearer guidance on how to proceed. .

The scenario analyses considered in this report were carried out prior to the issue of the TCFD's Technical Supplement. The TCFD's detailed categorisation of Parameters/Assumptions, Analytical Choices, and Business Impacts/Effects could form the basis of much more rigorous, useful and comparable scenario analyses by companies.

Policy uncertainty

The gap between Australia's existing climate policy and its international commitments creates challenges for companies wanting to understand their climate-related risks and opportunities. Since 2015 a broad coalition of Australian industry, social and environmental groups have warned of the costs of 'delayed, unpredictable and piecemeal action' and called for more detailed and credible policy.

Five of the interviewed organisations identified that policy uncertainty both complicated and impeded the development of their response to climate change.

When aligned with a carbon budget estimated by The Climate Institute, the existing national 2030 emissions reduction target would require Australia to reduce emissions to zero within around five years after 2030, in order to meet its Paris Agreement commitments.

This gap in policy is particularly acute for the electricity sector. This sector's decarbonisation trajectory will in turn affect companies in other sectors.

As seen in table 3, other countries have already set longterm climate targets in response to the Paris 1.5-2°C objectives, often mapping out enough detail of sectoral and regional pathways for companies (along with policy makers and regulators) to develop their scenarios and climate responses with some degree of confidence:

COUNTRY	OBJECTIVE OF 2050 PLANS	INTERVENTIONS TO ACHIEVE 2050 TARGETS
Canada	"The development of a Mid-Century Strategy is an essential step to set the course towards a low-carbon economy as it will inform longer-term planning and investment. Long-term planning is fundamental for creating and managing robust energy systems, and careful and farsighted policy making is essential to combat climate change in an economically efficient, socially acceptable, and effective manner. " government policies should be designed with both a shorter-term as well as longer-term focus, ensuring that greenhouse gas emissions will continue to decline towards a low-GHG future "By aligning its goals to the UNFCCC temperature goals, Canada now has an opportunity to integrate climate change objectives into its long-term planning processes."	Energy sector: Electrification of energy use with clean energy essential (e.g. electric vehicles), expand zero-carbon energy sources, optimize electricity transmission across jurisdictions (across Canada and North America), move to low emissions liquid fuels, and maximise energy efficiency and Demand Side Management. Abate gases with high impact on the climate system like methane and hydrofluorocarbons. Proactively manage forests and land to sequester carbon in the landscape. Collaboration with provinces and territories, Indigenous peoples, municipalities, business and other stakeholders.
Germany	 Key elements are: Long-term target of extensive greenhouse gas neutrality by 2050 Milestones and targets as a framework for all sectors up to 2030 Strategic measures for every area of action Establishment of a learning process which enables the progressive raising of ambition "The Climate Action Plan 2050 is a strategy for modernising our economy and provides guidance for all areas of action up to 2050 and for upcoming investments, especially for the period up to 2030. By specifying clear framework conditions, the strategy will help avoid stranded investments and structural breaks. The Climate Action Plan introduces a paradigm shift. In the future, renewable energies and energy efficiency will be the standard for investments. In this way, the Climate Action Plan 2050 creates the necessary conditions to keep Germany's economy competitive in a decarbonising world." 	Sectoral 2030 emissions targets: • Power sector: - 61% to 62% • Buildings: - 66% to 67% • Industry:- 49% to 51% • Transport: - 40 to 42% • Agriculture: - 31% to 34% Collectively mean a 55 to56% reduction in national emissions by 2030.
Mexico	"[Strategy is] a guiding instrument of the national climate change policy, both in the medium and long-term. As the guiding instrument, it describes the strategic lines of action guiding policy at national and subnational levels. It also aims to encourage social participation and co-responsibility."	 Focus on five key areas: A clean energy transition Energy efficiency Sustainable cities Reduction of short-lived climate pollutants Sustainable agriculture and protection of natural carbon sinks Cross cutting (e.g. carbon pricing) and sector measures have been identified (e.g. 35% clean energy within 10 years).
USA	"Mid-century strategies will help to put near-term emissions reduction goals in a longer-term context. For example, the NDCs [current targets] set for 2025 and 2030 include important and significant pledges to reduce emissions, yet in total, the current NDCs are insufficient to achieve the long-term Paris Agreement temperature Objectives Mid-century strategies can help to ensure that future NDCs lay the groundwork for more ambitious long-term action consistent with the Paris Agreement. "Mid-century strategies are also important in sending clear signals to the private sector that economies are headed to a low- emissions future. Such signals can provide confidence to investors and entrepreneurs that markets for low carbon technologies will continue to rapidly expand, thus fostering innovation in low carbon solutions."	 Three key pillars: Transitioning to a low-carbon energy system, by cutting energy waste, decarbonizing the electricity system, deploying clean electricity and low carbon fuels in the transportation, buildings, and industrial sectors Sequestering carbon through forests, soils, and CO2 removal technologies Reducing non- CO2 emissions, such as methane, nitrous oxide, and fluorinated gases

SUMMARY OF KEY STRATEGIC

Table 3 Overview of mid-century emissions strategies of Canada, Germany, Mexico and the USA. The Climate Institute, 2017, Reducing the Horizons of Uncertainty: Setting Australia's post-2030 emissions goal.

Organisational barriers to a credible 1.5-2°C response

Obtaining management buy-in to ambitious long-term analysis and targets was a challenge identified by five of the eight interviewed companies. The most commonlyidentified hurdles to obtaining management support include:

- 1 Uncertainty around future policy and regulatory direction: Delayed regulatory action and the continued political contentiousness of climate change in some jurisdictions increase the uncertainty around climate transition risks.
- 2 Lack of long range economic, commercial and technological forecasts: Lack of access to long range forecast data on production, market and competitor behaviour, and technology change make assessments of target achievability more difficult.
- 3 Limited initial awareness of climate-related risks and opportunities: Some companies interviewed indicated that senior management or parts of the business had a narrow or dated understanding of the implications of the 1.5-2°C objectives and country specific obligations. An appreciation of the extensive transition implied for many sectors, and the potential to disrupt market environments, was essential.
- 4 Genuine challenges in making the business case: There is a perception that formulating a 1.5-2°C

response would require upfront investments that may struggle to meet company-wide return rates hurdles, or would yield returns that were less tangible than their costs. These returns might include reputational benefits and operational resilience which are more difficult to recognise. Benefits that may accrue to broader communities, beyond customers and clients may, as positive externalities, also be omitted from the business case.

5 A time horizon mismatch: A thorough response to 1.5-2°C objectives means considering time horizons that extend beyond the current tenure of executives and boards. This further underlines the importance of policy certainty that enables credible pathways to be fleshed out with enough confidence to be incorporated into shorter-term time horizons.

Conclusion: The risks of inadequate responses

At this stage, the inconsistency and lack of rigour in many corporate responses to the 1.5-2°C objectives in part reflect genuine limitations of external guidance, and the relatively recent nature of key events; for example, the Paris Agreement was signed only months before many of the corporate responses in this paper were finalised. The shortcomings can also be traced in part to uncertainty about likely long-term policy pathways.

However, the lack of internal buy-in to the need to act and concerns over committing too soon or too much were also a factor identified by some companies. Often, these could be attributed to lack of understanding about the likelihood and severity of transitional and physical risks.

These challenges, coupled with increasing pressure from investors to produce a climate response, may lead to choosing a less ambitious and ostensibly 'safe' target; or to overestimate the resilience of the current business model and select scenarios and model inputs that support this conclusion.

For example, it may be considered adequate to select a target and methodology that is in line with the business strategy, as well as current national or business sector commitments to emissions reduction. If this approach is supported by current data and resources (e.g. forecasting capability), then the outcome may be a target and trajectory that is aligned with "Business as Usual" (BAU).

While this outcome may provide comfort to board members and executives that the business is strong enough to survive climate change (or is at least at no more risk than other companies in its sector), it has already been demonstrated that current policies do not meet the global target of keeping temperature rise to between 1.5 and 2°C.

In addition, a BAU emissions-based target does not address the major structural changes that are required by a net zero emissions future (e.g. decarbonisation of the electricity grid). Nor does it address the physical risks of climate change, such as flooding, temperature rise and an increased frequency of extreme weather events, even though the emergence of these physical risks to a company's assets is less contentious than the causes and responses to global warming.

Importantly, a BAU approach may overlook the opportunities for businesses, such as opportunities in new technology and markets, and in being a 'first mover'.

All of this adds up to a situation where a company may expend a great deal of effort in developing a strategic response to climate change that is out-of-step with other companies in their sector and not aligned with the timeline and scope of climate risk. As a result, the response has little use for investors, regulators, NGOs, employees and other important stakeholders.

Recommendations

Obtaining management buy-in to ambitious long-term Companies should participate in efforts to further enhance and reconcile the various approaches, frameworks and tools that support them in analysing and disclosing their possible 1.5-2°C scenarios, and in committing to targets around playing their fair share in such a future. These efforts include applying the FSB-TCFD recommendations, sector-specific initiatives around carbon budget allocations and emissions accounting, and calling for clarity and certainty in national long-term climate policy goals. The success of such efforts will benefit businesses, their investors, and the broader public, through encouraging transparent and evidencebased decisions for the long-term.

Scenario analysis is an important process for understanding how companies may fare in a $1.5 - 2^{\circ}$ C future. Scenario analysis should be conducted and disclosed, along with the assumptions and inputs on which they are based, in as much detail as possible. The FSB-TCFD recommendations and Technical Supplement on scenario analysis are important reference sources (see extract in Box 2), but are by no means comprehensive.

Organizations should carefully consider the key parameters, assumptions, and other analytical choices made during scenario analysis as well as the potential impacts or effects that are identified and how those results are considered by management. Organizations should consider disclosing this information where appropriate. In particular, organizations are encouraged to disclose the approach used for selecting scenarios used as well as the underlying assumptions for each scenario regarding how a particular pathway might develop (e.g., emergence and deployment of key technologies, policy developments and timing, geopolitical environment around climate policies). this information will be important for an organization to disclose and discuss, including the sensitivity of various assumptions to changes in key parameters such as carbon prices, input prices, customer preferences, etc., so that investors and other stakeholders have a clear understanding of the scenario process – not only the outcomes each scenario describes, but the pathway envisioned by an organization that leads to that outcome (i.e., the how and why of those outcomes).

BOX 2

The TCFD's Technical Supplement provides more guidance on assumptions, key parameters and disclosure.

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Industry bodies, companies, policy makers and regulators should develop and encourage the use of a common set of **assumptions and inputs** for scenario analyses sector by sector. This would improve understanding of companies' risks, opportunities and responses.

More consistent **disclosure frameworks and**

guidance would increase investor confidence and help in the proper interpretation of results. Guidance from the FSB-TCFD should be the primary support document for organisations seeking to use scenario analysis to inform climate risks and opportunities and the setting of climate change strategies and targets.

Companies should set ambitious **carbon reduction targets** consistent with the objectives of the Paris Agreement. The objective should be to acknowledge and confront the significant climate-driven risks, and to identify the strategic changes that are necessary, not whether changes are needed.

Consider zero net emissions by mid-century:

A suggested approach for determining responses to the a 1.5-2°C objectives is to envisage what "net zero" emissions in 2050 looks like as part of scenario analysis, and work backwards from these to today, identifying the step changes in technology, energy, markets, assets and products that are needed.

Boards should **support a "Safe to Fail" culture** that recognises ambitious targets cannot be guaranteed to be achieved, and that weak targets present a greater risk. Boards need to demonstrate their commitment to climate change through strong sponsorship. Responses to a 1.5-2°C future, including scenario analysis, should be integrated into corporate risk management frameworks, and not relegated solely to a "sustainability" or environmental silo. Because the timeline for climate change is long relative to the tenure of most directors and executives, Boards need to ensure that a commitment to responding to long-term climate risk is appropriately incentivised.

Appendix: SBTI methodology summary & analysis

Methodology challenges

The SBTI has identified seven methods for setting a greenhouse gas reduction target in the draft Sciencebased Target Setting Manual .

These methods can be separated into two major groups: value add derived methods, and activity-based intensity methods.

Value add derived methods (CEVA, CSI, CSO and C-FACT)

Several SBT methodologies use a value add approach to developing targets. The most simple of these methods is the Greenhouse-gas Emissions by Value Add (GEVA) approach. The other value add methods are based on GEVA but allow for allocation of "fair share" of emission reduction based on a corporation's contribution to global production (in dollar terms).

These methods require companies to set a target in tonnes of carbon emissions per unit of added value, as a result of converting inputs into end products or services. Depending on the accounting treatment in a particular company, value add can be defined as either:

EBITDA -employee costs

Or

Turnover-cost of bought in goods and services

The resulting intensity metric (t CO2-e emissions / Value Added) can be referred to as a company's "Carbon Intensity Ratio" (CIR).

The "EBITDA – employee costs" approach may be suited to service industries where non-labour input costs are not significant (or carbon-intensive). The "Turnover – cost of bought in goods and services" may be better suited to a business that converts material inputs.

Reflections on Value Add methods

There are challenges in setting an intensity target in which the denominator is based on economic returns. For example, a significant increase in value added over time will result in an apparent reduction in emissions intensity, but not necessarily in absolute emissions (this is true for the GEVA and CSI methods outlined below).

Applying value add approaches can be complicated in some companies where the added value is difficult to ascertain (e.g. service industries such as health, government and hospitality). This may result in an apparent lack of transparency and understanding when discussing how an organisation has derived their emission reduction pathway and target.

A value added metric may not be appropriate for organisations which operate in a regulated market.

By changing the price generated by producing and selling goods and services (and therefore value add) there is a discrepancy between the true value of products provided in a regulated market and the emissions these organisations account for in the global carbon budget.

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Non Value Add Derived Methods

Sectorial Decarbonisation Approach (SDA)

The Sectorial Decarbonisation Approach (SDA) has been developed by the Carbon Disclosure Project (CDP), World Resources Institute (WRI), and the World Wildlife Fund (WWF) in an effort to allocate sector and sub-sector emissions reduction targets. The SDA takes into account the different characteristics of each sector and applies the appropriate portion of the global carbon budget to each sector, sub-sector, and then finally to each company, based on their contribution to that sector's economic and environmental impact. The carbon budget is apportioned out to each sector, and each company is allocated part of the sector's contribution to the budget.

The SDA has been designed to account for homogenous and heterogeneous sectors, and is best applied to high emitting sectors such as the electricity generation, iron and steel production, and transport sectors. The benefit of the SDA approach is that it applies an activity intensity to each sector so that companies can be compared and total sector emissions allocated appropriately.

A possible shortcoming of the SDA approach is that currently there are no appropriate allocations for smaller sectors such as service industries, water utilities and IT services. The SDA development team is currently working to improve the tool to allow for the inclusion of more sectors and of the activities which are most appropriate for the development of targets in these sectors.

The SDA will be supported by a tool (under development).

Absolute Emissions Contraction

The Absolute Emissions Contraction method is derived from the IPCC's AR5 scenario which requires a 41-72 per cent reduction of emissions from 2010 to 2050; and assumes that if all businesses decreased their emissions by between 41 and 72 per cent, the carbon budget would be maintained (however, this does not account for the establishment of new businesses).

This method allows companies to set their own targets and emissions pathways. It must be noted that if companies were to set their targets at the lower end of the range (41 per cent) there would be increased pressure on carbon sequestration opportunities in the future, therefore the SBTI recommends a minimum target of 56 per cent reduction by 2050.

This method is based on the work conducted by the Mars Corporation. The key concept in its development was to account for Mars' fair share through linear downscaling of global emissions to fit within the carbon budget. i.e. global emissions must fall 80 per cent from ~35Gt/year, so Mars must reduce its emissions to 80 per cent of their 2010 annual emissions of ~14Mt/ year. A shortcoming of this approach is that it only contributes to global emissions reduction targets if all of industry participates, otherwise the share of participating industries increases.

3 per cent Solution

The 3 per cent solution was designed by the WWF to provide US companies with greenhouse gas reduction targets which would lead to both alignment with the IPCC's 2°C future and NPV savings associated with emissions reduction. The premise behind the method was for US Companies to cut emissions by 3 per cent annually, and to improve energy efficiency between 2010 and 2020.

This method is seen as a responsible approach for corporate target setting as it incorporates a financial benefit, by way of achieving cost savings in energy, to what might otherwise be an environmental burden. Unfortunately the tool has only been developed for use by American companies and only provides a target up to 2020.

General challenges of methodologies

A shortcoming of all methodologies (not just value-add approaches) is the allocation of "fair share". It can be difficult for large emitters to gain support for emissions reduction if there is a belief that there is not common support and a common approach on the part of other emitters in their sector. It could be argued that "fair share" is only appropriate if all companies within a sector follow the same approach, including to developing SBTs.

Further challenges include:

Additionality

In the last decade, a growing number of organisations have set short-term emissions reduction targets. The process of setting a target and gaining internal approval can be complicated and often presents significant barriers. One response is for a company to identify an emissions pathway based on current targets and planned abatement, and to attempt to align expected reductions with the reduction required by science to achieve a 1.5-2°C future.

National electricity grids will decarbonise in the future, with the Paris Agreement indicating that that grids in developed countries will be net zero in the second half of this century . For many companies, Scope 2 emissions account for a large proportion of the total organisation emissions. As the grid decarbonises, such organisations may "free ride" their way to meeting emission reduction targets due to reductions in Scope 2 emissions – even though such reductions may be presented as truly "additional". It is recommended that companies acknowledge the impact that grid decarbonisation will have on their emissions reduction to be factored into abatement targets to compliment any "BAU" reductions.

Boundary considerations (including Scope 3 emissions)

The interviews identified challenges in relation to boundary setting (i.e. which emissions are to be included in setting a target). The SBTI requires that organisations with a Scope 3 emissions profile that accounts for more than 40 per cent of total emissions set an ambitious Scope 3 reduction target.

Some companies' proposed SBTs have been rejected by the SBTI because they were viewed as not covering the required extent of Scope 3 emissions. SBTI have indicated that they do not expect to approve any SBTs from a financial institution that does not attempt to capture Scope 3 emissions.

Most companies have only limited data on Scope 3 emissions. Even for those who have voluntary carbon neutral commitments that require the consideration of Scope 3 emissions, the consideration of a broad range of Scope 3 emissions beyond outsourced and travel related activities can be onerous. Organisations that have researched life cycle analyses of products and services appreciate the resources and time required to carry out these studies.

Some industries influence emissions performance downstream in their supply chain or customer base. Inclusion of emissions performance from significant downstream impacts or opportunities within the boundary of a target would appear valuable.

In the financial and services sectors, this challenge is apparent where a strategy and target might include activities outside of the organisation's direct control, such as its collateral on its existing loan book. Such areas of "influence" are complex, as it holds an organisation accountable for emissions beyond its control. One of the property management companies interviewed had expanded its boundary to include tenancies – committing the company to also helping their tenants to achieve science based targets.

Some of the challenges noted in boundary setting and allocation of emissions are shown in the following table:

SECTOR	MOST IMPACTFUL AREAS	PROBLEM
Financial institutions, professional services	 Financed emissions associated with fossil fuels Clean energy finance Adaptation financing Finance for economic transition 	 Limited industry consensus for how financed emissions should be accounted for Complexity of financing and multiple players that influence the outcome of emissions performance
Commodities	 Emissions associated with product use Collaboration on technology solutions to reduce emissions Recycling initiatives 	 Limited influence to drive technology change and therefore lack of control over target Claiming all the reductions when the influence may have been small
ICT	• The emissions impact of technology solutions in ICT organisations' customer base dwarfs the ICT sector's Scope 1 and 2 emissions . For example using improved business-to-business communication to reduce business travel; or reducing the consumption of paper as business go "paperless"	• Broad societal and environmental benefits that are considered within business and brand strategies would be inconsistent with the target if the latter ignored downstream impacts
Logistics and property	 A transport and logistics organisation that applies circular economy strategies to reduce environmental impacts in the customer base A property management company that supports tenants reduce emissions through joint initiatives and provision of efficiency data 	 Reliance on the use of emission reduction factors generated through LCAs Separation of owner/tenancy obligations, targets and commitments Motivating downstream parties (e.g. tenants and consumers) to contribute to target emissions reduction

Boundary considerations and attribution of emissions also come into play in the manufacturing sector. One manufacturer, in developing a response to a 1.5-2°C future for their Australian operation, focused on how their products will allow their customers to reduce emissions. This approach differed from other organisations who considered emissions reduction from the cost perspective. i.e. what it would cost rather than the opportunity created by an economy in transition, and how the company positioned itself to realise the benefits.

Company reflections on setting Science-Based Targets

The following pages explore the experiences of some "early movers" with setting of SBTs. The observations are grouped under the headings of Credibility and Achievability.

Credibility

Evolving guidance and governance

Interviewees who were developing SBTs made the following observations:

- A Sectoral Decarbonisation Approach (SDA) attempts to allocate emissions based on an organisation's emission per unit of production within its sector. However, if an organisation is involved in more than one sector, judgements have to be made on how best to consolidate the commitment
- The criteria against which a target will be evaluated against is not necessarily transparent making it difficult to know upfront whether a proposed target will be accepted
- Methodologies require estimates of business growth in the long-term and results are sensitive to these estimates. Many organisations struggle to develop long-term (out to 2030) growth data.
- Indirect emitters have a heavy reliance on grid decarbonisation to meet targets, however, uncertainty over the timeframe for decarbonisation has made it difficult to estimate Scope 2 emissions.
- Guidance on treatment of Scope 3 emissions is unclear. For example, the SBTI requires that organisations with a Scope 3 emission profile greater than 40 per cent of their total Scope 1, 2, and 3 emissions to set "an ambitious and measurable Scope 3 target with a clear time-frame" however, it is unclear what these terms mean
- The manuals and tools do not foresee every situation (it is unlikely they could achieve this)
- Establishment of governance (i.e. who sets standards; evaluates and certifies targets) is still in development.

Achievability

Demonstrating the achievability of a target was complicated by:

Lack of adequate forecasting information

GHG forecasting requires knowledge of the drivers of emissions, such as:

- Production, markets and competitor behaviour
- Year-on-year efficiency improvements and pathways for technology or process step changes
- Climate variability which may impact productivity and demand, as well as operational parameters such as cooling, heating or pumping
- Regulatory impacts on competitor and supply chain activity
- Economic and demographic forecasts that might impact demand

While such information may be available in the short-term, long-term forecasts out to 2030 and 2050 are often not available.

Organisational buy-in

Setting long-term targets over 5+ years is generally not common practice in businesses. The timeframes of financial targets in most organisations tend to align more with the tenure of executives. The nature of climate change makes it important for Boards to set targets, budgets and goals that are sufficiently far-reaching.

Gaining internal 'buy-in' was widely acknowledged by interviewees as a significant enabler of organisational support for climate action. Although the approach to gaining this buy-in was different for each organisation, it was identified that members at all levels of an organisation should support and understand the reason why climate action is required and how their organisation intends to act.

The ability to support the approach with detailed modelling was highlighted as one way of securing internal support.

Long-term forecasting requires a review mechanism. This allows the organisation to accept for example that it may not have the answer now, but this is its best estimate and will be reassessed at regular intervals. Setting of strategies and targets is an evolving and iterative process, and regular review is important for maintaining commitment and relevance in a changing environment.

This concept is included in guidance from the Australian Climate Change Authority on goals and timeframes for setting greenhouse gas emission reduction targets.

Dependence on other organisations

A common challenge faced by companies across all sectors is the reliance on other companies, organisations, and infrastructure providers to reduce emissions in their supply chain (e.g., decarbonisation of the grid or Carbon Capture and Storage) or in the downstream use of product (e.g. recovery and re-use). This is a particular issue for organisations with large Scope 2 and Scope 3 emissions.

A good example of this is in the water utilities industry, where the vast majority of emissions are from pumping water, and are therefore Scope 2. This means water utility organisations rely upon decarbonisation of the electricity grid in order to reduce their own carbon footprint- a change that is difficult for them to effect

Accounting and measurement

Target setting and monitoring must be supported by robust measurement and defensible methodologies that have been agreed across the organisation. If this level of agreement can be reached, organisational energy can be focused on how to meet targets rather than arguing about the methodology, the approach and the numbers. This is especially the case with treatment of Scope 3 emissions where there are no clear definitions, and issues such as boundary setting can be subjective. The perceptions may be different in different parts of an organisation. For example, including embedded emissions in raw materials as Scope 3 emissions may be at odds with a strict legal view of operational control.

Measurement and accounting may need to be supported by robust modelling and development of assumptions, with sign off by the relevant stakeholders, to ensure credibility and achievability.

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