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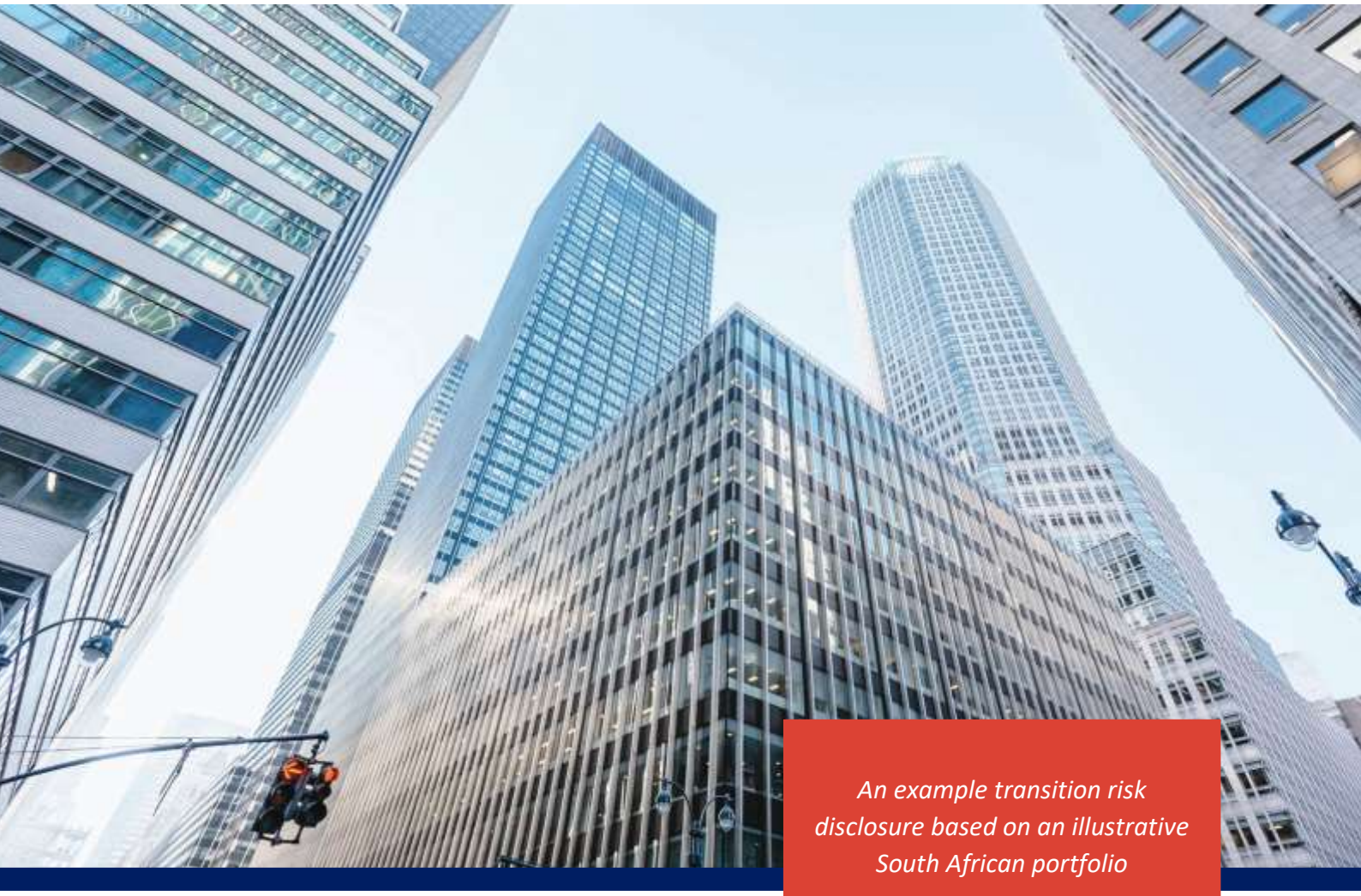

An example transition risk disclosure based on an illustrative South African portfolio

Transition Risk in TCFD Reporting

Vivid Economics

22/11/2021

Executive Summary

Per the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), organisations should carefully assess and openly disclose their climate-related risk exposure. For many organisations, the most severe impacts of climate change will only be realised in the coming decades. The timespan of these impacts introduces significant uncertainty, as the exact nature of the future physical and policy environments cannot be known today.

To tackle this challenge, the TCFD recommends using scenario analysis as a framework to consider a range of potential pathways by which climate-related risks and opportunities may evolve. The central idea of scenario analysis is that considering multiple pathways provides organisations with valuable information about where the most significant risks are likely to come from and under what circumstances they may arise. With a deeper understanding of the exposure of different components of their business to the impacts of climate change, they can plan their climate-related risk strategies with clarity of vision and better adapt them as the state of the world shifts towards or away from the pathways considered in the analysis.

This document provides an example best-practice scenario analysis for an illustrative South African equity portfolio. It first provides a lens through which climate-related risks can be considered and identified, and then explains the methodology for conducting the analysis on the sample portfolio. A step-by-step guide is provided for the components of scenario analysis which are most likely to be unfamiliar, and finally results of the analysis are presented along with interpretations.

Although scenario analysis is only one component of a full risk disclosure report, the conclusions of such an analysis are powerful. The analysis in this report is conducted on an illustrative portfolio of equities which spans several key sectors in the South African economy. The scenarios considered cover different temperature outcomes but also consider differing paces of change. No single scenario is meant to estimate the actual future equity impact of climate change but taken together they can help to develop an informed climate risk management strategy.

Carbon-heavy and capital-intensive industries face more expensive, difficult, and risky climate transitions in any given state of the world. However, less obvious insights are equally dramatic. For example, simply delaying the timing of global policy action on climate change from today to 2030 can increase the long-run expected value loss to certain industries by more than 50%. Such conclusions are equally important in understanding the current and future climate risk exposure of organisations.

Core Elements for Scenario Analysis Reporting

The scenario analysis section of TCFD reporting should include, at a minimum, three key elements:

1. **Exposure summary.** This is a table showing absolute and relative shares of exposure by reporting sector. Any standardised reporting system (such as SIC, NAICS or RBICS) is acceptable, provided this is clearly disclosed.

2. **Scenario characteristics**. This is a summary of the salient characteristics of the chosen scenarios, including temperature pathways, levels of policy ambition and output trajectories for key sectors.

3. **Impact summary.** This is a risk assessment (in this case, only for transition risk), for different climate scenarios and time horizons.

Templates for the three elements above are provided in section 5.4 of the Appendix. This should not be taken exhaustive set of requirements for scenario analysis reporting – these are detailed in the sections below and vary between financial institutions.

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This document, and other outputs of the South Africa-UK PACT supported project: *Aligning South Africa's climate-related financial disclosure with global best practice* are available at: http://www.dnaeconomics.com/pages/sa_climate_disclosure/

1. Introduction

As recognition of the risks posed to organisations by anthropogenic climate change grows, so too is demand for actionable climate-related information in global financial markets. In response to this demand, the Taskforce on Climate-Related Financial Disclosures (TCFD) has published a set of recommended best practices on how organisations can assess and disclose their climate-related risks and opportunities. This document serves as an example of TCFD-aligned scenario analysis, which forms part of broader TCFD reporting recommendations. A typical TCFD disclosure is divided into four sections:

1. Governance, or the roles played by executive management and the board in assessing, managing, and overseeing climate-related risks and opportunities
2. Strategy (of which scenario analysis is one component), or the actual and potential impacts of climate-related risks and opportunities
3. Risk management, or the processes by which the organization identifies, assesses, and manages climate-related risks and opportunities
4. Metrics and targets, or the specific measures and indicators used to assess climate-related risks and opportunities

Scenario analysis is a methodology for identifying and assessing climate-related risks and opportunities. The future state of the climate is highly uncertain, as it will be shaped by the collective impact of human activities over the coming decades. Rather than attempting to predict a single future state of the world, TCFD guidelines recommend modelling an array of potential climate pathways. Each pathway consists of projections of emissions, key commodity prices, demand, and other economic variables which define one possible transition to a particular climate outcome. Multiple pathways can lead to the same outcome, e.g., climate change could be limited to 2°C with concerted global action beginning today or in a decade, though the evolution of the key variables within each pathway will look very different. Specifically, delaying action requires more rapid implementation of climate policies which, in turn, increases the overall economic disruption associated with the low-carbon transition.

Scenario analysis can provide insight into numerous facets of climate risk including the sources of risk, their magnitudes, and variation in risk exposure across companies, industries, and geographies. The aim is not to predict a single future state of the world, but to better understand how risks may evolve over the coming decades and the implications for those risks on organizations and their investors. The conclusions reached through scenario analysis allow organizations to develop more informed risk management processes which are robust to a broader range of uncertain future conditions.

1.1. Portfolio Summary

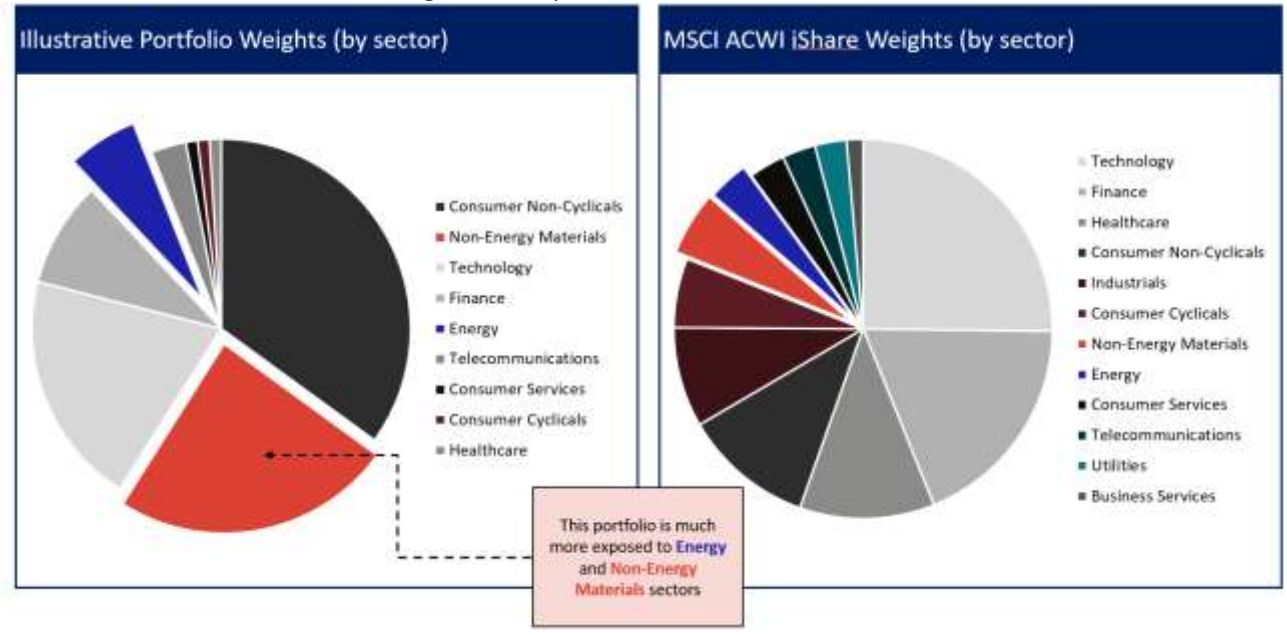
The illustrative portfolio used in this document contains 55 of the largest equities on the Johannesburg Stock Exchange. These companies cover approximately 80% of the JSE's market cap and were selected by virtue of their size with a small number of substitutions to ensure the portfolio includes the main GHG emitting sectors within the South African economy. A full list of these companies is available in section 5.3 of the Appendix. Compared to a typical portfolio of global listed equities, our holdings are more heavily concentrated in the energy, non-energy materials (chemicals, mining, and manufactured products), and consumer non-cyclical (production and retail of food and staples) sectors. This is outlined in Figure 1. All three of these sectors, and thus our portfolio overall, are highly exposed to climate-related risks. Accordingly, it is particularly important to develop a more nuanced understanding of how climate-related risks may impact this type of portfolio over the coming years.

Table 1: Portfolio exposure by sector

Sector (RBICS Level 1)[1]	Exposure (Share of Portfolio)
Consumer Cyclicals	1%
Consumer Non-Cyclicals	35%
Consumer Services	1%
Energy	6%
Finance	9%
Healthcare	1%
Non-Energy Materials	24%
Technology	20%
Telecommunications	3%

Note: Because this portfolio is purely illustrative, exposure shares are assumed to follow market capitalisation. In practice, both absolute exposures and relative exposure shares should be reported.

Figure 1: Comparison with MSCI ACWI index



Note: The MSCI ACWI is a leading global equity index representing a typical investment basket of global listed equities.
Source: MSCI

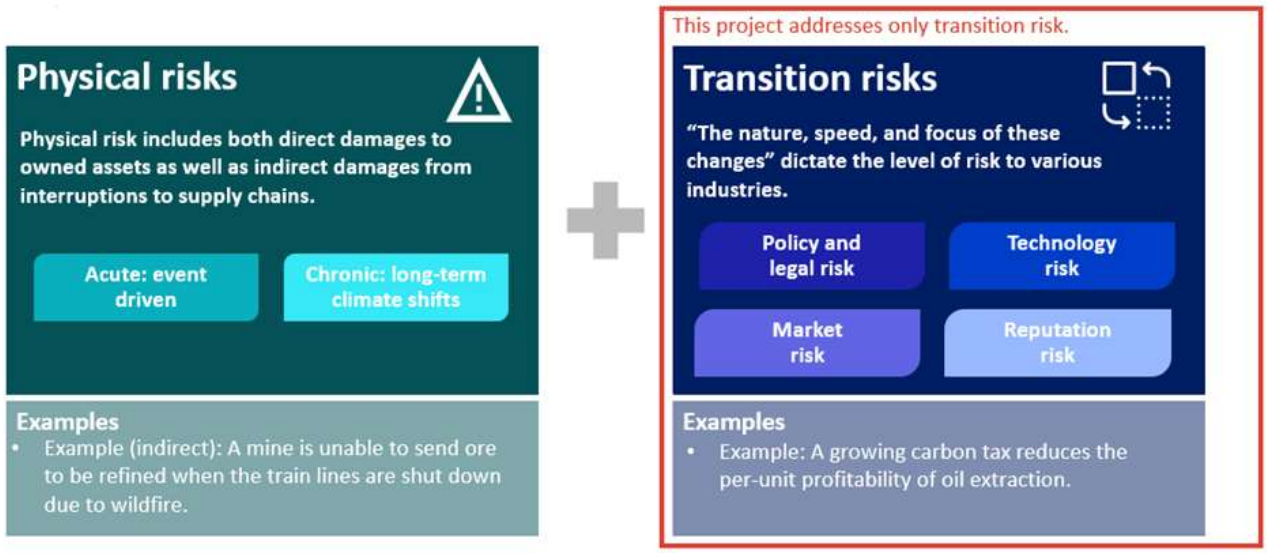
1.2. Overview of Risks and Scope

Climate-related risks fall into two broad categories: physical risks and transition risks. These are summarised in Figure 2.

Physical risks are those associated with the increased frequency and magnitude of climate-related events. They may be event-driven risks, such as floods or wildfires, or they may be chronic risks, such as sea level rise or hotter summers. Physical risks include both direct damages to owned assets as well as indirect damage including supply chain interruptions due to infrastructure damage.

Transition risks are those associated with the shift to a low-carbon economy, and include legal, technological, market, and reputational factors. Legal risks include carbon pricing mechanisms, minimum efficiency standards, and land use restrictions. Technological risks are driven by innovations associated with broad decarbonisation. As new technologies emerge, some companies and industries will face displacement and increased competition. Market risks are those driven by shifts in supply and demand associated with the transition to a low-carbon economy. Reputational risks are centred on customer perceptions, particularly whether companies or industries are associated with slowing the low-carbon transition.

Figure 2: Physical and transition risk



[1] The Vivid Economics/Planetrics toolkit uses RBICS codes as standard, which are sourced from the FactSet financial database. Any standardised industry code framework, such as SIC or NAICS, is perfectly fine as an alternative.

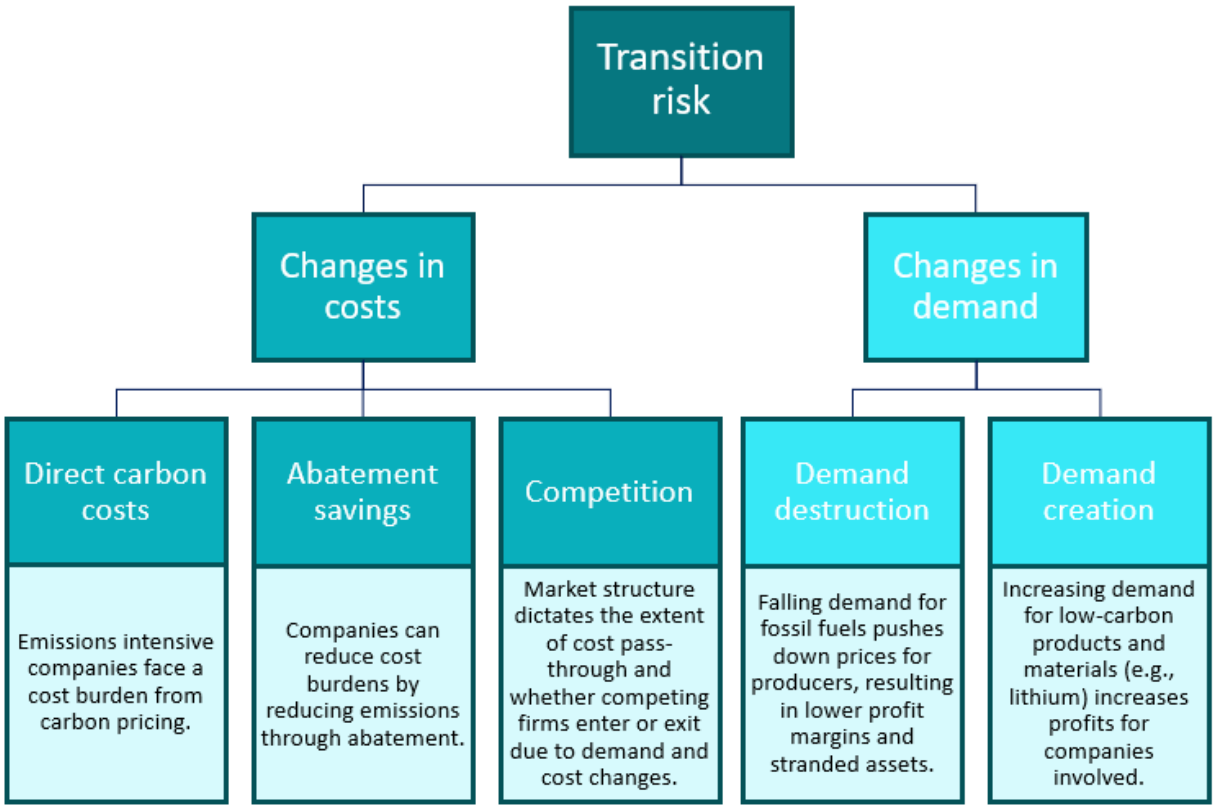
Carbon-intensive industries may face pressures from all these channels, but each risk channel may also present opportunities. Just as carbon-intensive industries may face financial losses associated with new legal restrictions or damaged customer perceptions, companies and industries which are perceived as contributing to the low-carbon transition may stand to benefit from beneficial legal frameworks and growing demand for their products.

The focus of this disclosure is limited to transition risk. As detailed in section 4, future disclosures will need to assess the impact of physical risk as well. A brief overview of physical risk and its impact channels are included in section 5.1 of the Appendix.

2. Modelling Transition Risk

Transition risk is typically modelled through five channels, as illustrated in Figure 3.

Figure 3: Transition risk channels



Note: This disclosure uses modelled carbon price trajectories for South Africa as the direct carbon cost input. These results were further stress tested against global carbon prices.

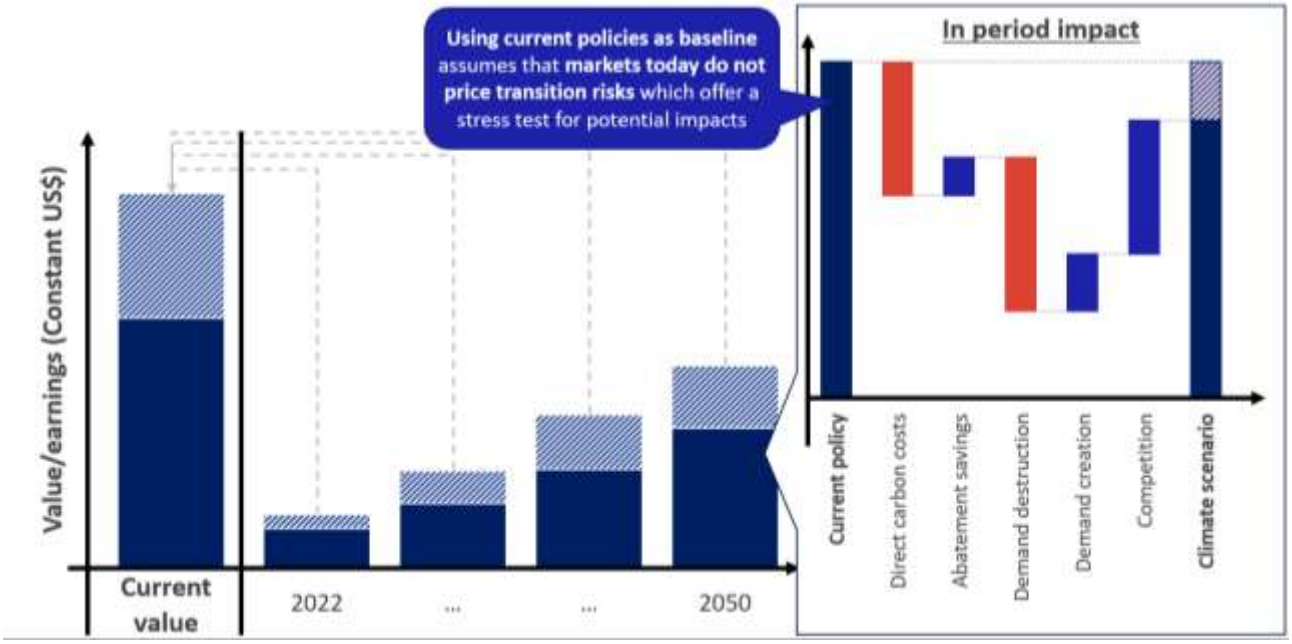
The scope of scenario analysis must also be defined across two dimensions to fully capture the impact of the different transition risks:

1. **Geography:** This relates to the national and supranational regulatory regimes that impact the portfolio's overall transition risk. Because our portfolio consists solely of companies listed on the JSE, we have tailored specific scenario modelling inputs (such as the carbon price) to the South African context. This adds greater precision to our transition risk analysis, but it should be noted that several large South African companies have global operations and are thus subject to several regulatory regimes.

2. **Time:** Time horizons are particularly important to scenario analysis, as estimates of value impairment will vary drastically between decades and this internal variance will also differ between scenarios. Based on our chosen scenarios, outlined in section 3, we present total

equity (NPV) impacts for the period 2021-2050. We aim to disaggregate future disclosures into more granular time horizons, as per the TCFD recommendations.

Figure 4: Translation of risk channels to financial impact



With the geographic and temporal scopes defined, the task of scenario analysis becomes to translate various temperature benchmarks into financial outcomes. The general modelling process is illustrated in Figure 4. A given climate scenario is fixed, which is then translated into associated physical hazards and transition shocks.[2] These risks have impact throughout the value stream, each increasing or reducing earnings relative to a fixed baseline. The discounted sum of these impacts is the final impact associated with a particular scenario.

Data for conducting this analysis was drawn from three primary sources:

1. **Company financials**, which determine the current state of each organisation's activities as well as their overall exposure to climate-related risks and opportunities. In this illustrative portfolio, company market caps are used as a proxy for more detailed activity-related information.

[2] Although this phase of the South Africa-UK PACT programme focuses primarily on transition risk, it also includes an introductory manual into physical risk and its measurement for financial institutions. This document, along with our other publications, can be found at http://www.dnaeconomics.com/pages/sa_climate_disclosure/, last accessed 2021-11-22

2. **Scenario data**, which determines the overall level of climate-related risks and opportunities independent of any specific organisation. These are generally publicly available, and are explained extensively in Section 3.

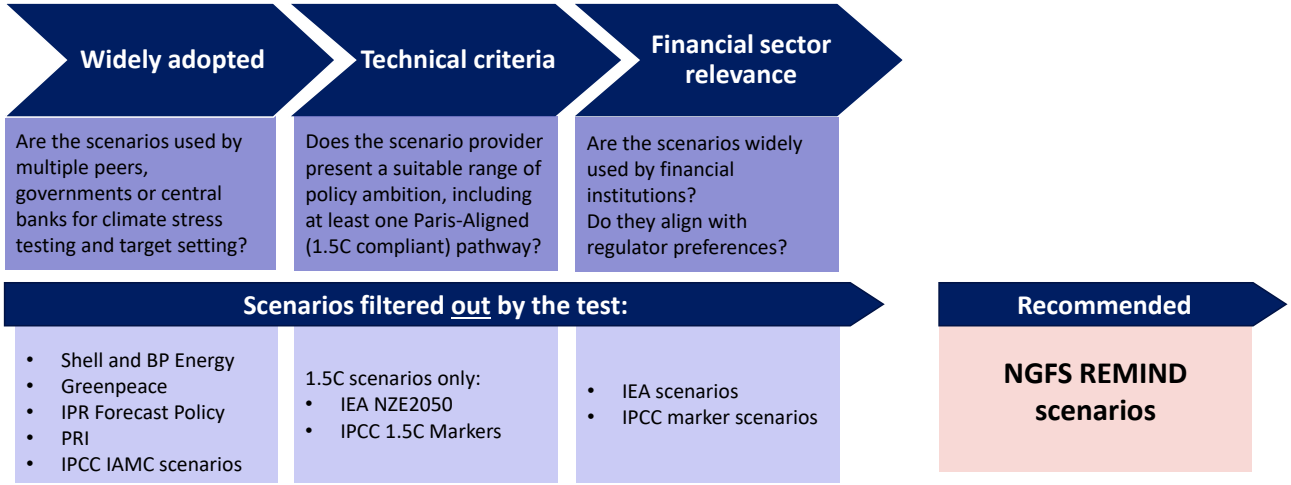
3. **Planetrics' modelling suite**,[3] which maps the external scenario impacts to each company in the illustrative portfolio according to their financial data as well as internalizing interactions both between companies, e.g., market competition, and between scenario impacts, e.g., growing carbon taxes increasing both direct carbon costs and abatement savings.

3. Scenario Selection

The process of scenario selection involves three primary decisions:

1. **Choosing a scenario provider.** We assessed a range of off-the-shelf scenario sets using three criteria: widespread adoption in the financial sector, technical criteria, and financial sector relevance. Based on this assessment, we selected scenarios defined by the Network for Greening the Financial System (NGFS)[4]. The NGFS is a coalition of central banks and supervisors focused on enhancing the financial sector's role in managing climate issues. Additional candidate scenario providers which were not selected are shown in Figure 5.

Figure 5: Criteria for scenario selection



2. **Choosing a scenario model.** The NGFS has selected multiple well-established integrated assessment models (IAMs) for use with its scenarios. These models link together the physical factors associated with climate change, e.g., temperature change and sea level rise, with the

[3] See Planetrics (2021), Planetview, https://planetrics.com/planetview/, last accessed 2021-11-22

[4] NGFS, 'Scenarios Portal', https://www.ngfs.net/ngfs-scenarios-portal/. Last accessed 2021-10-29.

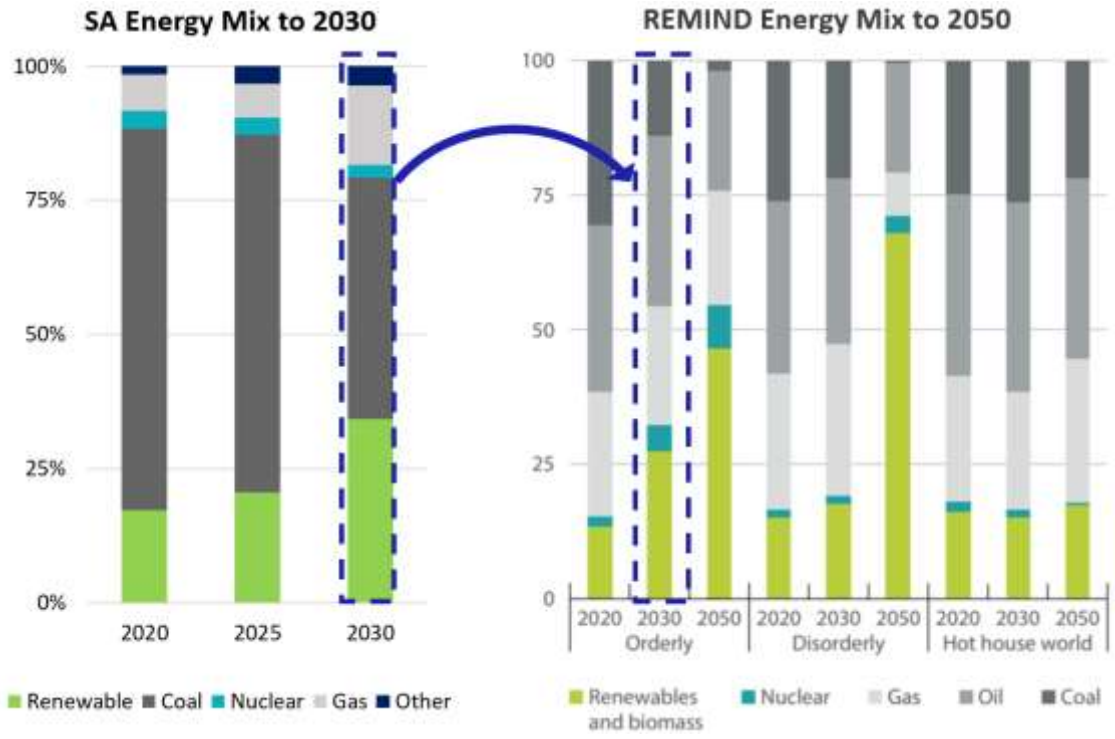
economic factors associated with their outcomes, e.g., fossil fuel demand and energy prices. In practice, IAMs are generally used "off-the-shelf" and translate scenario inputs into real-world projected outputs without additional manipulation.

We chose to use the REMIND-MAgPIE[5] integrated model to forecast the decarbonisation pathways associated with each scenario. The REMIND model in particular uses energy mix forecasts which we believe best reflect recent developments over the last decade. The REMIND energy mix is also comparable to the proposed energy mix in South Africa for 2030, and in line with estimates for 2050 from the latest Integrated Resource Plan (IRP), as illustrated in Figure 6. MESSAGE-GLOBIOM forecasts heavy reliance on CCS technologies and GCAM on nuclear, both of which we believe reflect less plausible policy developments in South Africa. Additional detail is provided in Figure 7.

[5] Versions 2.1 and 4.2, respectively. The Regional Model of Investment and Development (REMIND) focuses on detailed energy systems modelling, pairing it with an economic growth model and a simple climate model. The Model of Agricultural Production and its Impact on the Environment (MAgPIE) is a land use model which estimates future land use patterns and agricultural yields.

Potsdam Institute for Climate Impact Research, 'REMIND', https://www.pik-potsdam.de/en/institute/departments/transformation-pathways/models/remind. Last accessed 2021-10-29.
Potsdam Institute for Climate Impact Research, 'MAgPIE – Model of Agricultural Production and its Impact on the Environment', https://www.pik-potsdam.de/en/institute/departments/activities/land-use-modelling/magpie/magpie-2013-model-of-agricultural-production-and-its-impact-on-the-environment. Last accessed 2021-10-29.

Figure 6: Energy mix comparison



Source: Department of Minerals, Energy and Resources IRP 2019

Figure 7: Comparison of NGFS IAMs

REMIND	MESSAGE-GLOBIOM	GCAM
Decarbonisation pathway: renewable electrons from variable renewables **Energy mix** in 2°C scenario: • Coal use virtually eliminated • Oil use is lower by 2050 but still high due to feedstock use and hard to decarbonise sectors • Gas use halves in delayed scenario **Power supply** is tilted towards **solar**, but there is a material increase in wind **EV uptake** reaches more than 2/3 of new passenger vehicle sales by 2050 **Carbon sequestration** for fossil fuels is limited, but there is significant BECCS **Carbon prices** are relatively modest ($200/tCO$_2$ in the Immediate scenario)	**Decarbonisation pathway:** decarbonised molecules using CCS **Energy mix** in 2°C scenario: • Coal use virtually eliminated • Oil use is materially lower • Gas use (coupled with relatively inexpensive CCS) is higher **Power supply** is relatively balanced across low carbon sources, including wind and solar and nuclear, but relies on a large increase in **natural gas with CCS** **EV uptake** is in line with that in REMIND **Carbon sequestration** is very high for stricter policy scenarios, but fossil-based **Carbon prices** are relatively low ($150/tCO$_2$ in the Immediate scenario)	**Decarbonisation pathway:** low carbon electrons in industry and buildings, continued use of hydrocarbon molecules in transport offset with BECCS **Energy mix** in 2°C scenario: • Coal use virtually eliminated • Gas and oil use is relatively flat **Power supply** is reliant on a large increase in **nuclear** and a balanced increase in wind and solar **EV uptake** is low as GCAM relies on high uptake of ICE hybrids in transport **Carbon sequestration** is very high with significant BECCS **Carbon prices** are relatively high (>$300/tCO$_2$ in the Immediate scenario)

Source: NGFS (2020), The Green House/DNA Economics, Vivid Economics

3. **Choosing individual scenarios.** There are several possible NGFS REMIND-MAgPIE scenarios to choose from, of which we considered the four shown in Figure 8. They provide a broad range of plausible legislative and market trajectories while remaining sufficiently distinct to provide unique insights. Each scenario is characterised by three key elements: a long-run global temperature change, an implementation schedule, and an assumption about the broad implementation of carbon dioxide removal (CDR)[6].

   We chose to consider both 1.5°C and 2°C scenarios to ensure that a reasonable range of policy forecasts is considered. Although the Paris Agreement refers to a 2°C goal, recent IPCC reports are driving the consensus that 1.5°C goals are considered best practice. However, carbon prices in 1.5°C scenarios are much higher in the short to medium term than under 2°C scenarios. Considering scenarios with only one long-run climate outcome significantly restricts the range of potential outcomes and likely responses and runs counter to the general principles of scenario analysis.

   A blank template version of Figure 8 is included section 5.4 of the Appendix, which can be adapted for reporting purposes.

[6] Carbon dioxide removal is a process by which CO_2 is removed from the atmosphere and stored. It includes both natural methods like afforestation and peatland restoration as well as chemical techniques to capture CO_2 directly.

Figure 8: Individual scenario selection

Name	Baseline: Hot House World	2°C Transition	1.5°C Transition	Delayed 2°C Transition
Scenario description	Current policies are maintained. NDCs are not met, and emissions grow until 2080 leading to more than 3°C of warming. This causes severe physical risk.	Climate policies are introduced early and become more stringent gradually. Net zero emissions by 2070 offers a 67% chance of limiting warming to below 2°C.	Climate policies are introduced early and become more stringent gradually. Net zero emissions by 2070 offers a 67% chance of limiting warming to below 1.5C. Emissions reductions occur sooner than in the Immediate 2°C Transition scenario. This increases transition risk.	Climate policies are not introduced until after 2030. Larger emissions reductions are required over a shorter time period to limit warming to 2°C compared to the immediate transition scenario. This increases transition risk.
Stringency	More than 3°C of warming.	Limit warming to well below 2°C	Limit warming to 1.5°C	Limit warming to well below 2°C
Timing:	Immediate implementation (2021)	Immediate implementation (2021)	Immediate implementation (2021)	Delayed implementation (2030)
CDR availability	Not applicable	Full availability (proxy for optimistic mitigation technology roll-out)	Full availability (proxy for optimistic mitigation technology roll-out)	Limited availability (proxy for conservative mitigation technology roll-out)
2050 carbon price	$4.50	$203	$358	$836

3.1. Limitations

Though scenario analysis is a powerful tool for climate risk management, several caveats and limitations must be acknowledged. Modelling climate, energy, land use, and economic systems is inherently complex when each system is in isolation; to integrate these models is more complex yet. Each climate scenario will have its own set of temperature, emissions, and socioeconomic assumptions. Results will be sensitive to these assumptions.

To produce quantitative estimates of transition risk impacts aligned with accepted best practice, we relied on the analytical toolkit provided by the climate analytics firm Planetrics.[7] Though

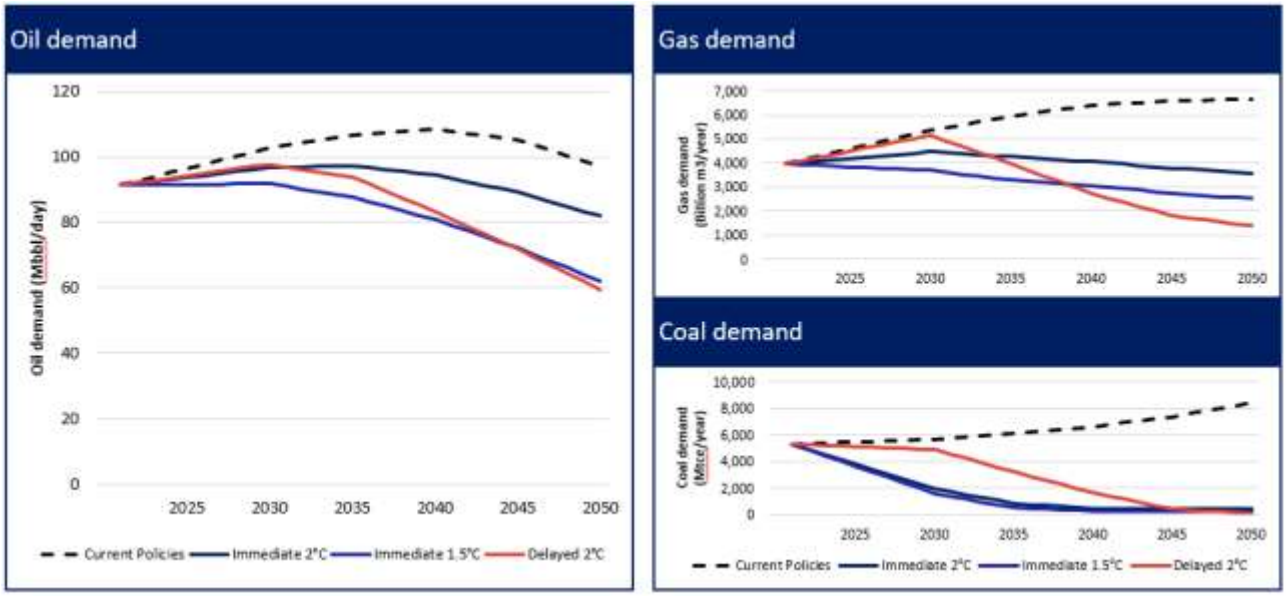
[7] Planetrics, 'Who we are', https://planetrics.com/about/. Last accessed 2021-10-29.

Planetrics employs world-leading data and analytics to model and price climate risk and is used extensively by asset managers, banks, and insurers around the world, the model can only include observed financial and ESG data and does not account for ambitious targets which have not yet been acted upon. Similarly, the model cannot accurately capture the impact of technologies, green or otherwise, which have not yet been invented or deployed at scale.

4. Results

1. **Transition risks vary significantly across scenarios.** The trajectories of key variables, including fossil fuel demand as illustrated in Figure 9, are highly sensitive to the choice of scenario. Immediate action scenarios tend to follow much smoother paths than those under delayed action. The use of coal is effectively phased out by 2035 under any immediate action plan, while this transition takes another decade under delayed action.

Figure 9: Fossil fuel demand projections



2. **Direct carbon costs are the primary driver of transition risk.** This is not the case in every sector but holds within the portfolio overall. Figure 10, Figure 11, and Figure 12 demonstrate that this holds true across all scenarios. Part of the reason for this is due to the countervailing impacts of demand destruction and creation in a diversified portfolio. As one sector sees a drop in demand, a competing sector is likely to capture that demand. However, all sectors are exposed to direct carbon costs. Though carbon intensity and availability of low-carbon substitutes will determine the magnitude of exposure to carbon costs, there are currently no net-negative industries which could stand to "benefit" from a carbon price.

Figure 10: Portfolio NPV impacts by channel – Immediate 1.5°C with CDR

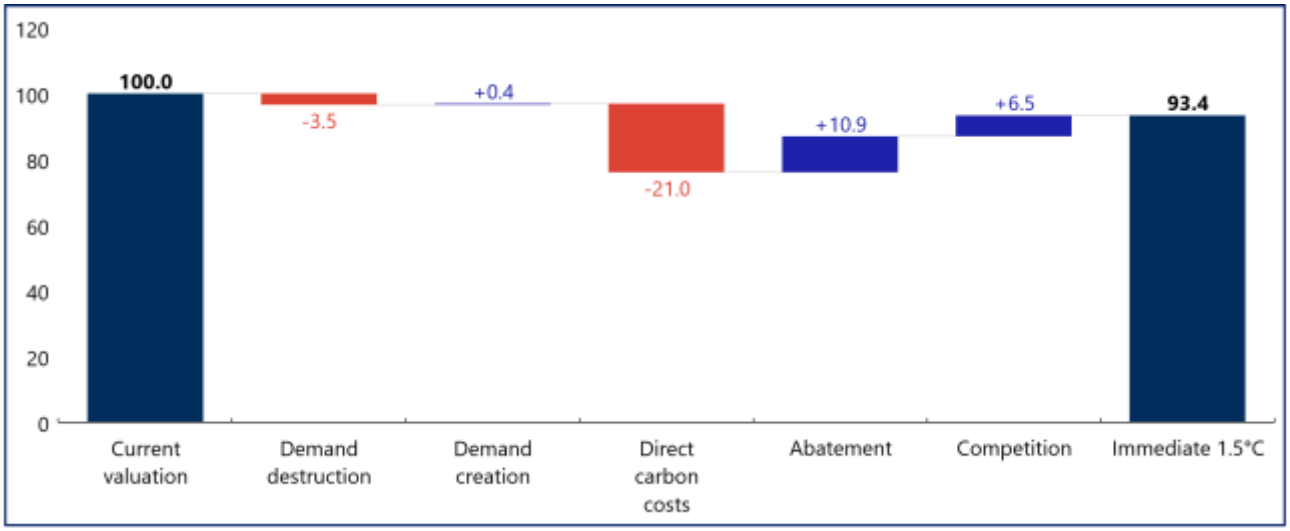


Figure 11: Portfolio NPV impacts by channel – Immediate 2°C with CDR

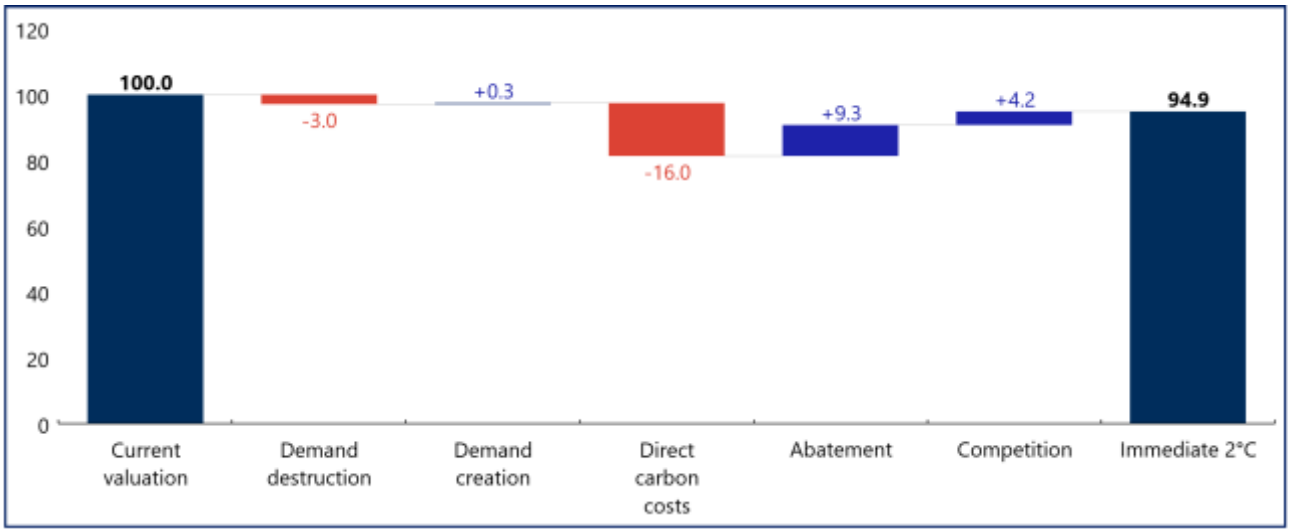
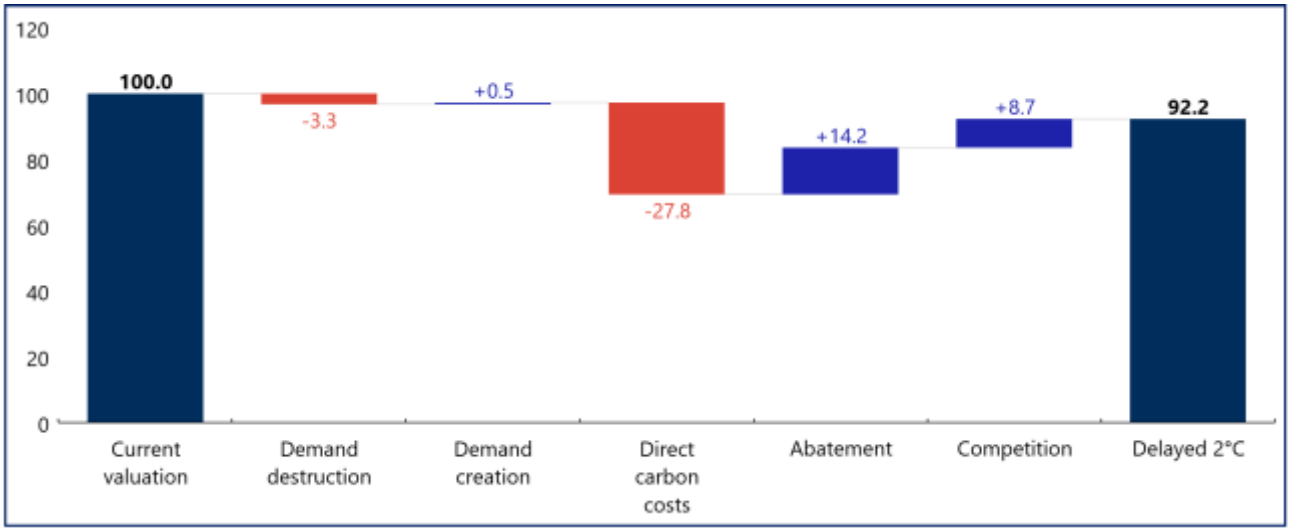


Figure 12: Portfolio NPV impacts by channel – Delayed 2°C with limited CDR



3. **Carbon-intensive sectors are acutely exposed under all scenarios.** To understand which specific elements in the portfolio were most at risk, we estimated NPV impairments within RBICS level 2 sectors. This is more granular than the sectors used to report exposures. In all three scenarios, NPV impacts are concentrated in four sectors: upstream energy; chemical, plastic, and rubber materials; mining and mineral products; and manufactured products. The estimated value loss to each sector is illustrated in Figure 13, Figure 14 and Figure 15.

4. **Upstream energy has the largest estimated value impact by far.** Extensive demand reductions and expensive (or non-existent) decarbonisation pathways are the primary drivers of this impact, as shown by Figure 16. Delaying action reduces the upstream energy impact somewhat but increases NPV losses across the rest of the portfolio. This can be seen, along with the Immediate 2°C scenario, in section 5.2 of the Appendix. This demonstrates the importance of accurately weighting sector-level transition risks when calculating portfolio-level risks.

   Mining and mineral products has a far smaller estimated demand loss but is drastically impacted by direct carbon costs, as shown by Figure 17. Though abatement savings recoup roughly half these losses, overall NPV losses remain significant. Delaying action drives up the impact of direct carbon costs, while abatement increases only marginally. Additional NPV impact illustrations are in section 5.2 of the Appendix.

Figure 13: Sector NPV impacts – Immediate 1.5°C with CDR

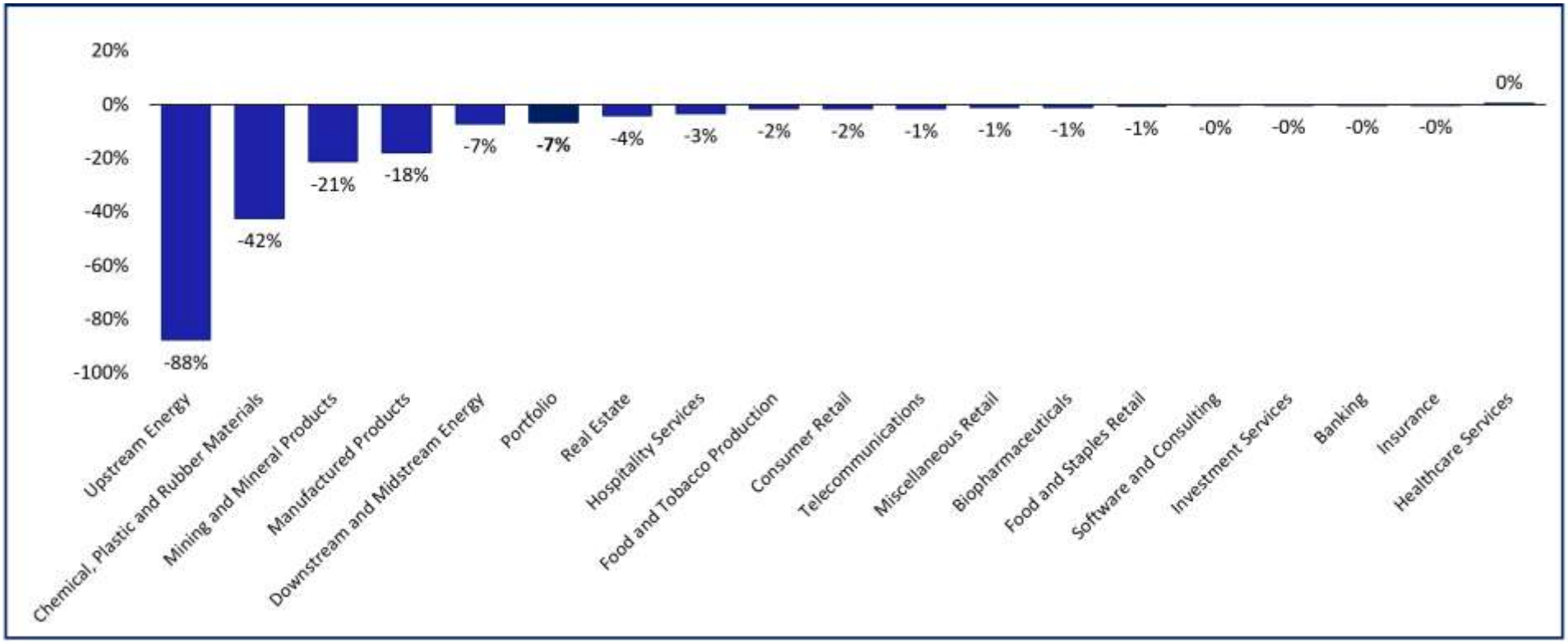


Figure 14: Sector NPV impacts – Immediate 2°C with CDR

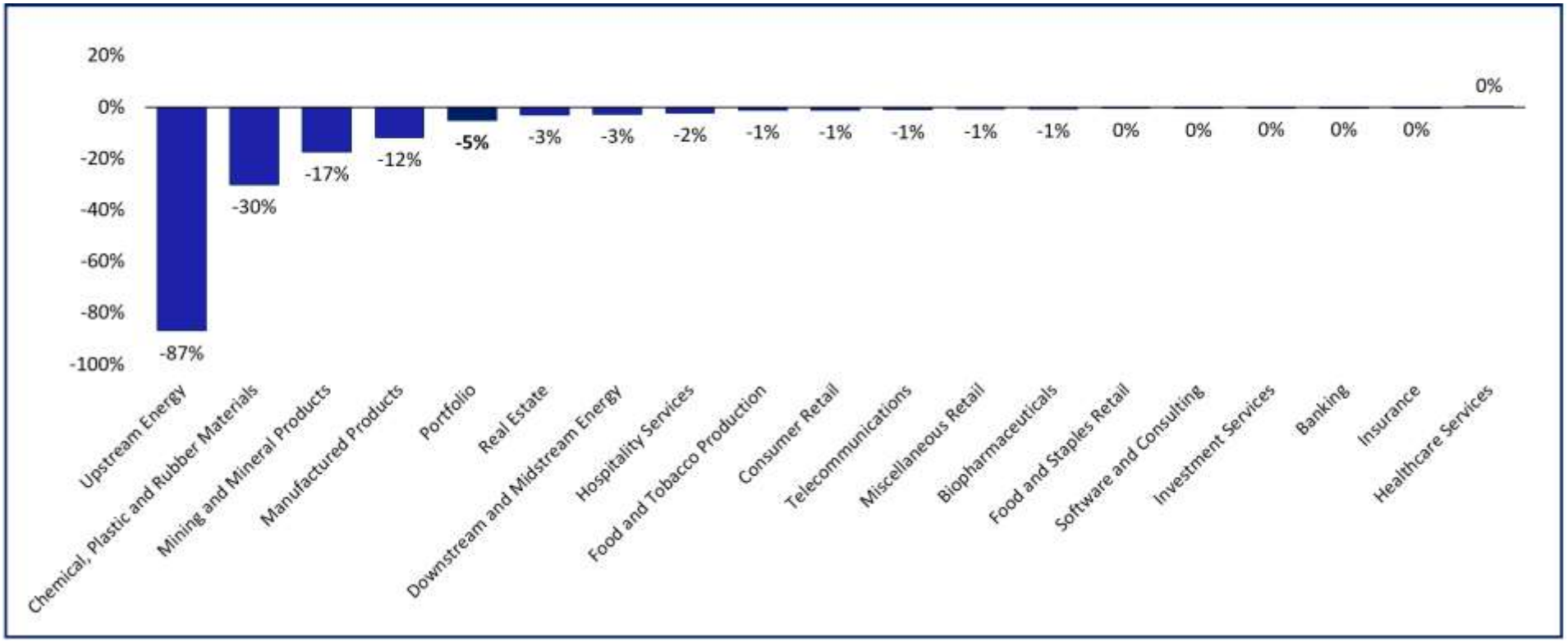


Figure 15: Sector NPV impacts – Delayed 2°C with limited CDR

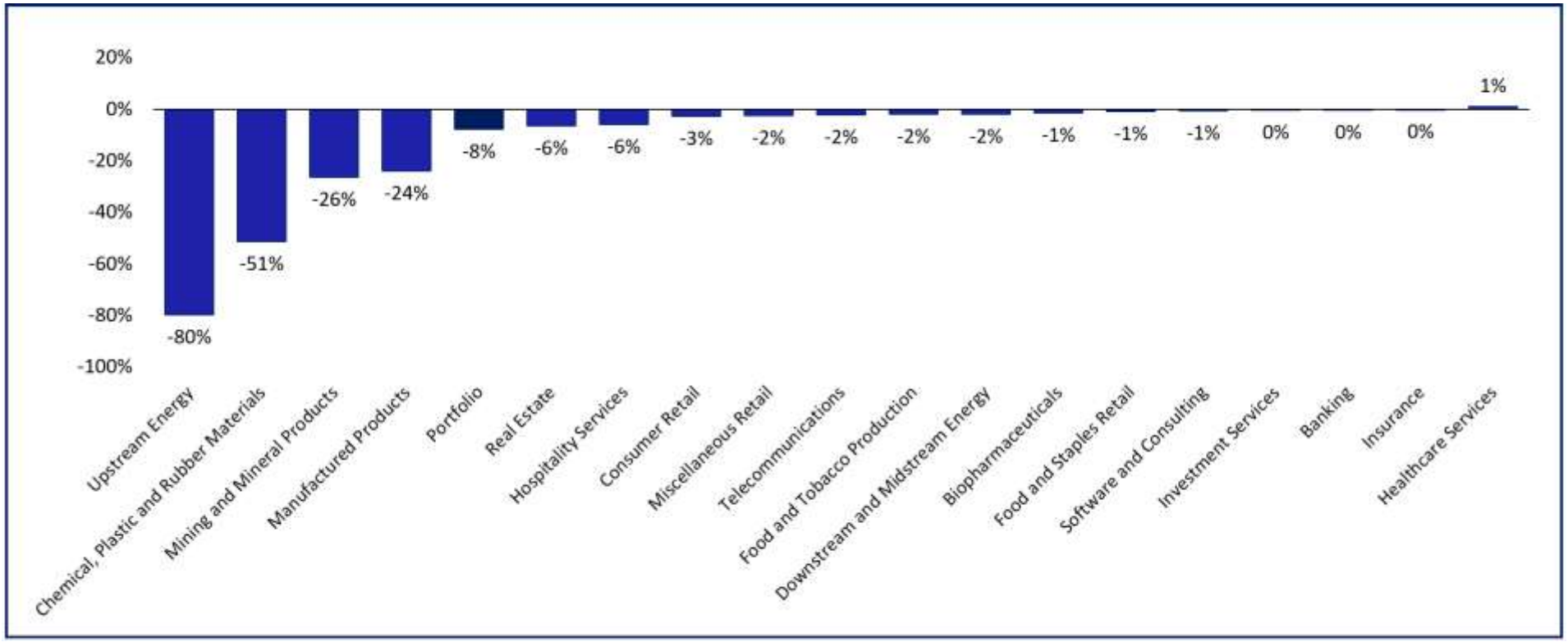


Figure 16: Upstream energy NPV impacts by channel – Immediate 1.5°C with CDR

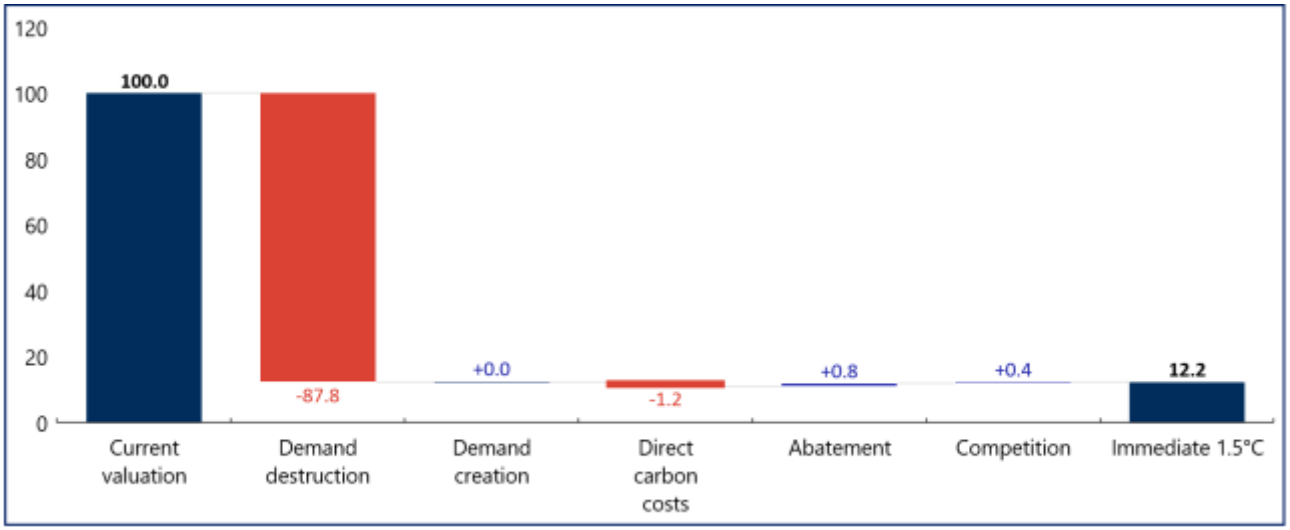
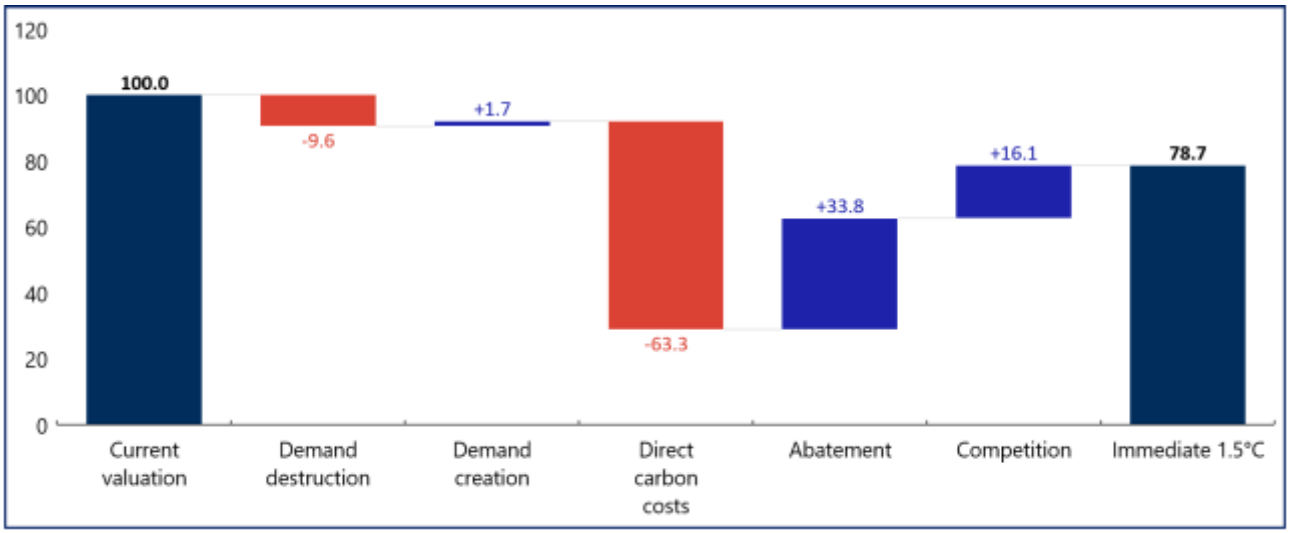


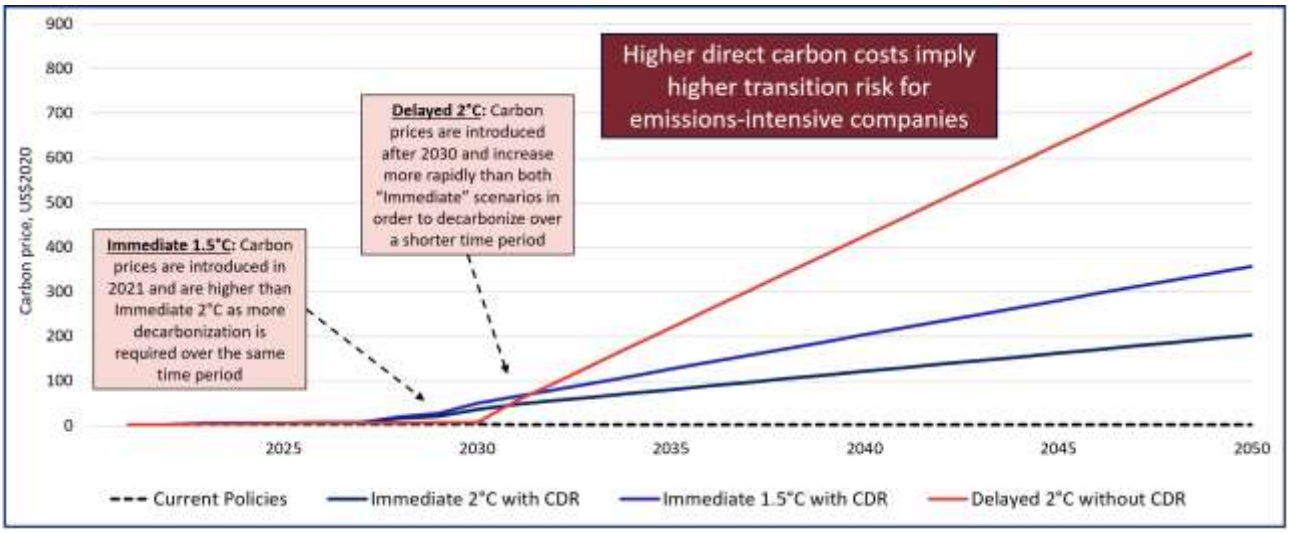
Figure 17: Mining and mineral products NPV impacts by channel – Immediate 1.5°C with CDR



5. **Delaying action is more disruptive than increasing ambition today.** Figure 18 illustrates that carbon price trajectories vary significantly between scenarios, particularly when comparing immediate to delayed action. Projected carbon prices are approximately $36 (2020 USD) by 2030 under the immediate 2°C scenario but only $7 in the delayed 2°C scenario. To make up for the lost decade, carbon prices increase much more steeply from 2030 on, already reaching $55 in 2021 compare to $48 under immediate action. This gap only widens over time, with 2050 carbon prices over four times greater under delayed action ($836 vs. $203).

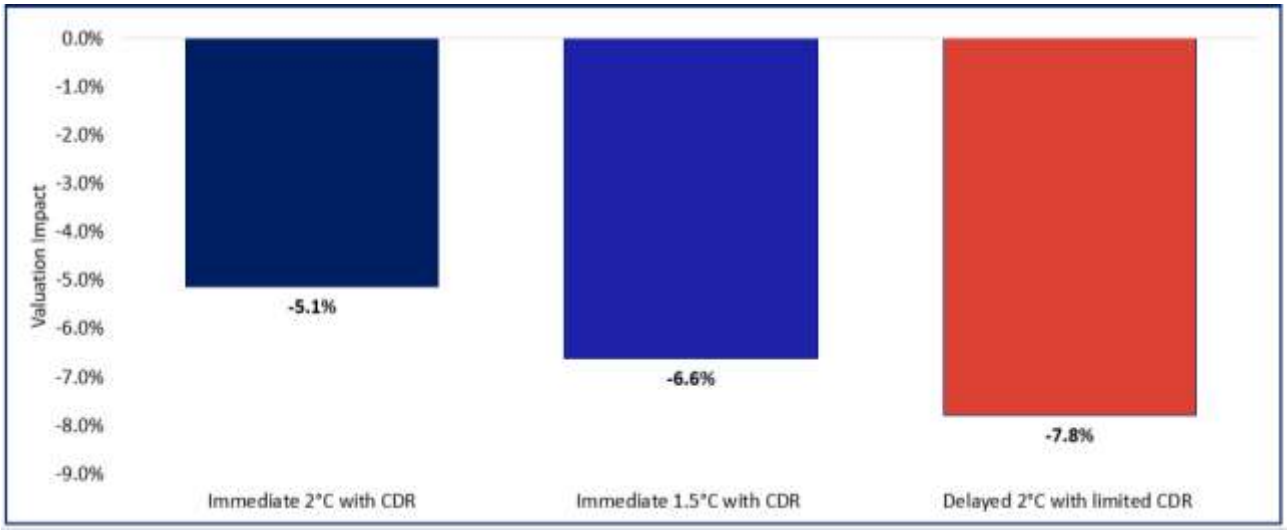
   As demonstrated in Figure 19, the NPV impact of direct carbon costs under Delayed 2°C are nearly double those of Immediate 2°C. This reflects the significantly steeper carbon cost curve of the Delayed 2°C scenario. As carbon costs grow, countervailing abatement savings and competition gains also grow. However, the total offset provided by these factors is always smaller. Accordingly, the delayed 2°C scenario leads to the largest portfolio NPV impact by 2050, with 7.8% value impairment compared to 6.6% under Immediate 1.5°C and 5.1% under Immediate 2°C.

Figure 18: Carbon price trajectories (power)



Note: Power has the highest carbon prices to 2030, after which the carbon prices for all sectors (Power, Building, Transport, Industry) are the same. Carbon prices are projected for South Africa specifically. Short-run projections are based on national policy. Prices are assumed to converge to the global pathway in the long run.

Figure 19: Portfolio NPV impacts by scenario



4.1. Recommendations and Next Steps

As a broad caveat, we cannot make recommendations for investment actions because these are specific to the portfolio under analysis. However, for a portfolio which resembles our illustrative one, we can establish three general conclusions:

1. **Climate-related risk should be both understood and incorporated into future decision-making**. The results of this scenario analysis allow us to tailor our risk management policies to the most salient sources of risk. For our portfolio in particular, carbon prices will have a significant bottom-line impact on equity valuation. For this reason, we should closely monitor developments on carbon pricing policies in the coming years.

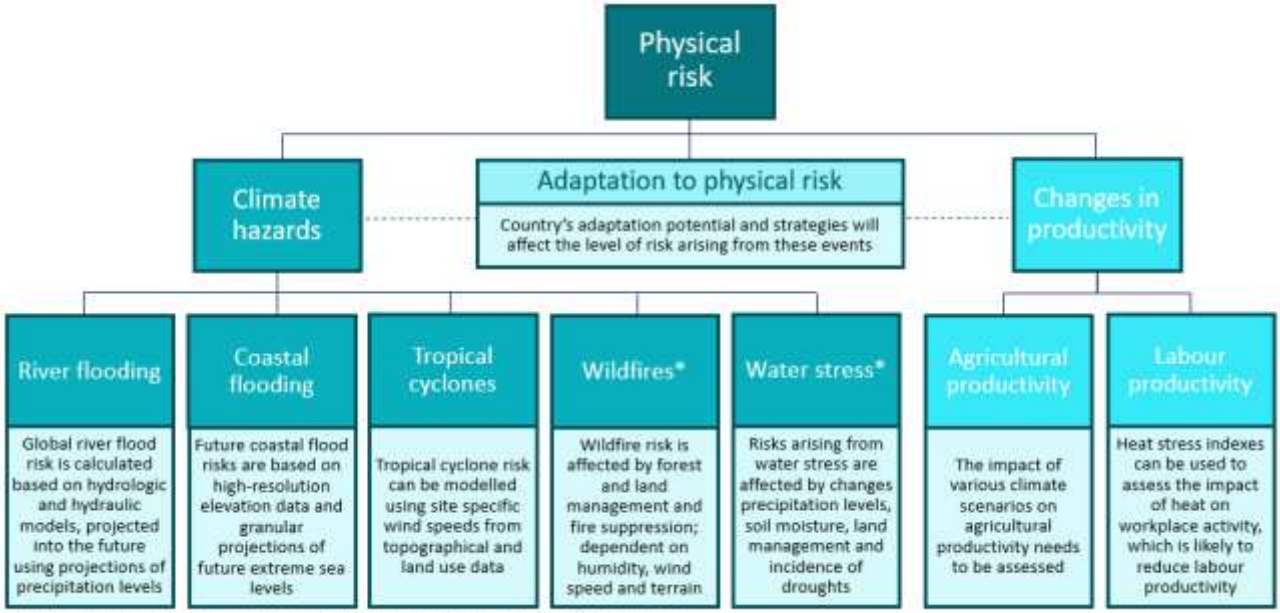
2. **Delayed action is more damaging in the long-term**. This analysis confirms that delayed policy action is far more costly if we are to meet net zero or 2°C goals. It is therefore optimal for financial institutions to prepare early for – and indeed, encourage – the transition to a low carbon economy.

3. **Future analyses should be expanded to include physical risk**. Certain sectors within our portfolio are highly exposed to physical risk, some much more than transition risk. For example, analysing only transition risk for agricultural holdings will vastly understate the true level of risk in both absolute terms as well as relative to other sectors. Including physical risk alongside transition risk will provide a more accurate and holistic understanding of the climate-related risks associated with our investments.

5. Appendix

5.1. Physical Risk Overview

Figure 20: Channels of physical risk impact



5.2. Additional Figures

Figure 21: Upstream energy NPV impacts by channel – Immediate 2°C with CDR

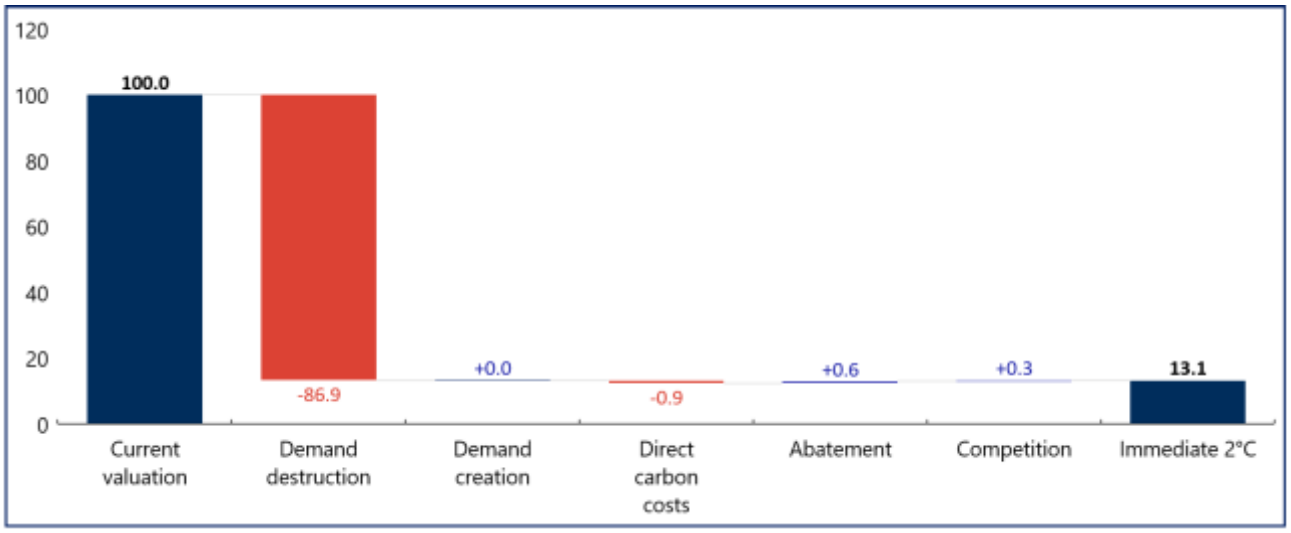


Figure 22: Upstream energy NPV impacts by channel – Delayed 2°C with limited CDR

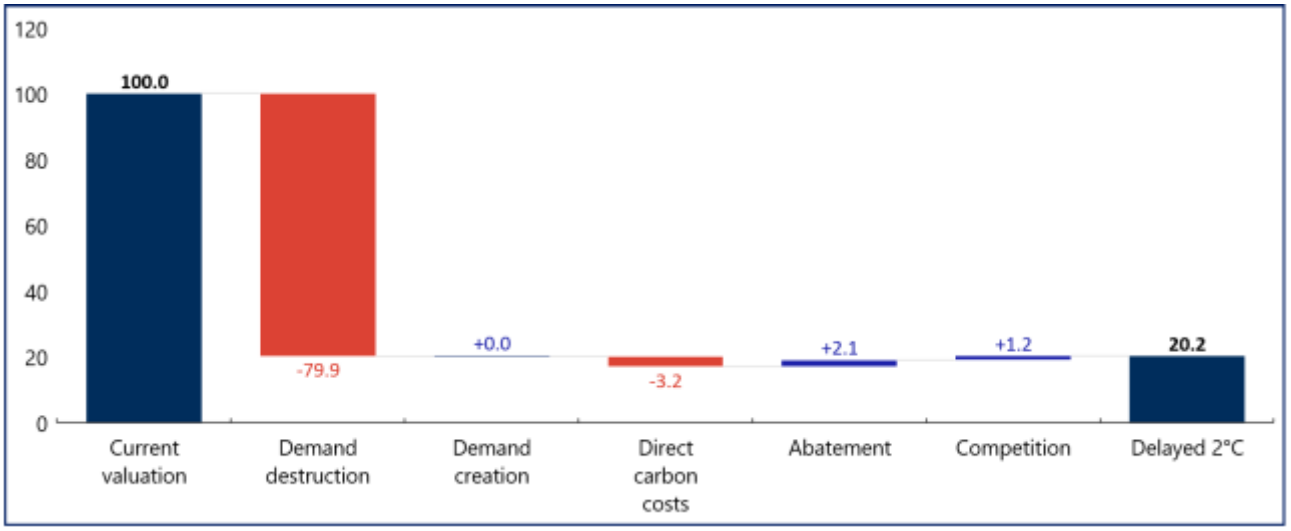


Figure 23: Mining and mineral products NPV impacts by channel – Immediate 2°C with CDR

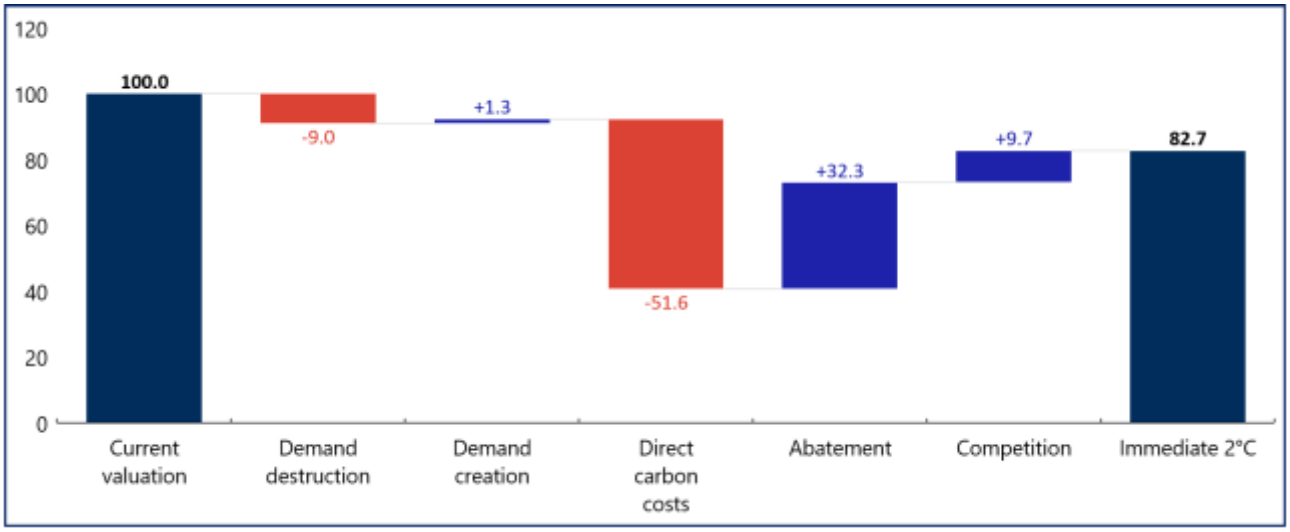
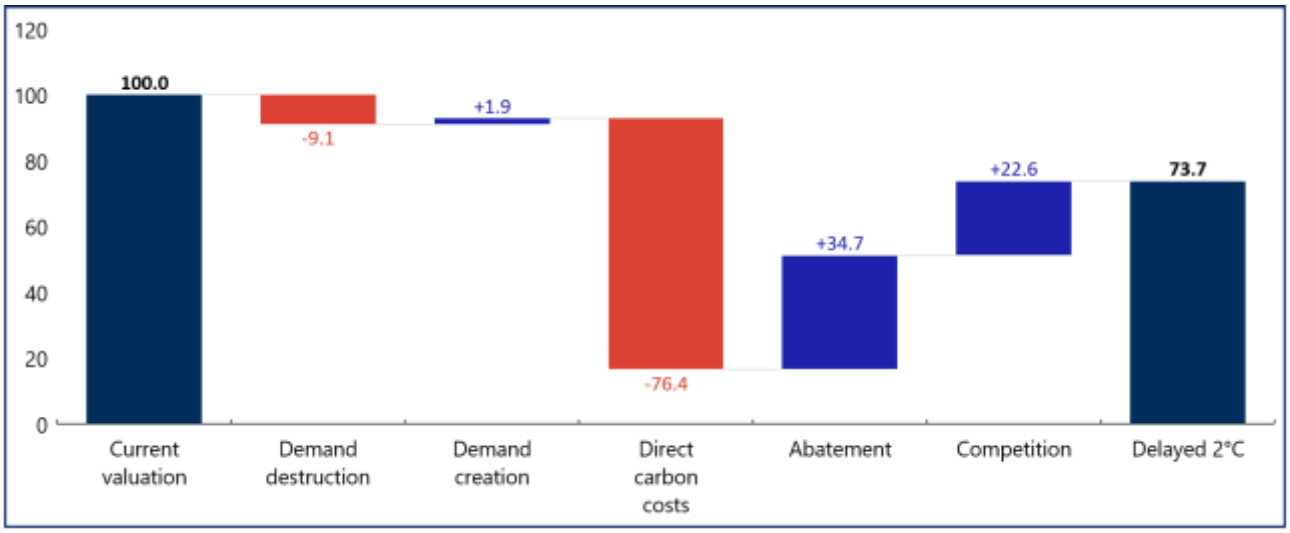


Figure 24: Mining and mineral products NPV impacts by channel – Delayed 2°C with limited CDR



5.3. Companies in Illustrative Portfolio

#	Company Name	Market Cap	Sector	#	Company Name	Market Cap	Sector
1	Prosus N.V.	R2,850,289,591,608	9530 – Software & Computer Services	29	Aspen Pharmacare Hldgs L	R65,309,086,486	4570 – Pharmaceuticals & Biotechnology
2	Anheuser-Busch Inbev Sa	R1,630,659,925,914	3530 – Beverages	30	Clicks Group Ltd	R61,792,667,779	5330 – Food & Drug Retailers
3	Naspers Ltd -N-	R1,514,707,459,724	9530 – Software & Computer Services	31	African Rainbow Min Ltd	R61,551,307,277	1770 – Mining
4	British American Tob Plc	R1,353,813,143,919	3780 – Tobacco	32	Nedbank Group Ltd	R61,446,449,765	8350 – Banks
5	Bhp Group Plc	R880,733,938,932	1770 – Mining	33	Old Mutual Limited	R61,117,026,364	8570 – Life Insurance
6	Glencore Plc	R752,939,647,406	1770 – Mining	34	Multichoice Group Ltd	R57,075,285,208	5550 – Media
7	Compagnie Fin Richemont	R730,069,200,000	3760 – Personal Goods	35	Exxaro Resources Ltd	R54,164,719,854	1770 – Mining
8	Anglo American Plc	R682,240,599,040	1770 – Mining	36	Pepkor Holdings Ltd	R53,953,571,985	5370 – General Retailers
9	Anglo American Plat Ltd	R402,652,551,500	1770 – Mining	37	Bidvest Ltd	R53,375,433,913	2720 – General Industrials
10	Firstrand Ltd	R268,021,336,687	8350 – Banks	38	Remgro Ltd	R53,186,309,203	8770 – General Financial
11	Vodacom Group Ltd	R227,225,006,222	6570 – Mobile Telecommunications	39	Woolworths Holdings Ltd	R47,165,264,175	5370 – General Retailers
12	Standard Bank Group Ltd	R203,950,595,065	8350 – Banks	40	Rand Merchant Inv Hldgs	R46,229,958,498	8770 – General Financial
13	Kumba Iron Ore Ltd	R195,899,131,106	1750 – Industrial Metals and Mining	41	Mr Price Group Ltd	R44,209,636,541	5370 – General Retailers
14	Mondi Plc	R173,629,176,190	2720 – General Industrials	42	Mediclinic Int Plc	R43,548,991,856	4530 – Health Care Equipment & Services
15	Sibanye Stillwater Ltd	R172,344,481,387	1770 – Mining	43	Harmony Gm Co Ltd	R42,981,961,784	1770 – Mining
16	Impala Platinum Hlgs Ltd	R163,007,197,365	1770 – Mining	44	Growthpoint Prop Ltd	R41,581,139,239	8670 – Real Estate Investment Trusts
17	Capitec Bank Hldgs Ltd	R160,381,574,136	8350 – Banks	45	Tiger Brands Ltd	R37,823,319,194	3570 – Food Producers
18	Anglogold Ashanti Ltd	R150,768,299,963	1770 – Mining	46	The Spar Group Ltd	R37,376,413,011	5330 – Food & Drug Retailers
19	South32 Limited	R139,837,222,716	1770 – Mining	47	The Foschini Group Limit	R34,029,606,440	5370 – General Retailers
20	Gold Fields Ltd	R131,520,598,994	1770 – Mining	48	Santam Limited	R30,624,956,922	8530 – Nonlife Insurance
21	Sanlam Limited	R128,407,344,365	8570 - Life Insurance	49	Investec Plc	R27,641,440,760	8350 - Banks
22	Mtn Group Ltd	R117,955,286,850	6570 - Mobile Telecommunications	50	Distell Group Hldgs Ltd	R20,663,807,083	3530 - Beverages
23	Sasol Limited	R103,556,867,745	1350 - Chemicals	51	Liberty Holdings Ltd	R17,601,445,939	8570 - Life Insurance
24	Absa Group Limited	R96,855,515,075	8350 - Banks	52	Coronation Fund Mngrs Ld	R17,105,176,087	8770 - General Financial
25	Northam Platinum Ltd	R96,832,941,219	1770 - Mining	53	Psg Group Ltd	R14,566,265,492	8770 - General Financial
26	Discovery Ltd	R85,631,157,460	8570 - Life Insurance	54	Rmb Holdings Ltd	R2,032,852,633	8630 - Real Estate Investment & Services
27	Bid Corporation Ltd	R84,709,687,782	5330 - Food & Drug Retailers	55	Arcelormittal Sa Limited	R1,832,276,318	1750 - Industrial Metals and Mining
28	Shoprite Holdings Ltd	R82,858,350,900	5330 - Food & Drug Retailers				

5.4. Reporting Templates

Table 2: Exposure summary template

Sector (RBICS Level 1)[8]	Exposure (Share of Portfolio)	Exposure (ZAR)
Consumer Cyclicals	[]%	[]
Consumer Non-Cyclicals	[]%	[]
Consumer Services	[]%	[]
Energy	[]%	[]
Finance	[]%	[]
Healthcare	[]%	[]
Non-Energy Materials	[]%	[]
Technology	[]%	[]
Telecommunications	[]%	[]
Exposure total	**100%**	**[]**

Note: This table should clearly define what is defined as "exposure" for reporting purposes. For example: "loans to banks and customers; only drawn balances".

[8] The Vivid Economics/Planetrics toolkit uses RBICS codes as standard, which are sourced from the FactSet financial database. Any standardised industry code framework, such as SIC or NAICS, is perfectly fine as an alternative.

Table 3: Scenario characteristics template

Attribute	Baseline	Scenario 1	Scenario 2	Scenario 3
Scenario name	…	**Example:** NGFS REMIND Model; 2°C transition	…	…
Scenario description	…	**Example**: Current policies maintained; NDCs not met; emissions grow until 2080 leading to more than 3°C warming. This causes severe physical risk.	…	…
Temperature pathway	…	**Example**: Limit warming to 1.5°C by 2050, with 67% certainty	…	…
Policy timing	…	**Example**: Immediate implementation (2021)	…	…
CDR availability	…	**Example**: Full availability (proxy for optimistic technology rollout)	…	…
2050 carbon price	…	**Example**: $358	…	…
Additional relevant assumptions	…	**Example**: Full phase-out of coal by 2030	…	…

Note: Characteristics are not exhaustive and may be changed based on scenario provider and portfolio exposures.

Table 4: Impact analysis template

Sector (RBICS Level 1)	Baseline			Scenario 1			Scenario 2			Scenario 3		
	2030	2040	2050	2030	2040	2050	2030	2040	2050	2030	2040	2050
Consumer Cyclicals	…	…	…	…	…	…	…	…	…	…	…	…
Consumer Non-Cyclicals	…	…	…	…	…	…	…	…	…	…	…	…
Consumer Services	…	…	…	…	…	…	…	…	…	…	…	…
Energy	…	…	…	…	…	…	…	…	…	…	…	…
Finance	…	…	…	…	…	…	…	…	…	…	…	…
Healthcare	…	…	…	…	…	…	…	…	…	…	…	…
Non-Energy Materials	…	…	…	…	…	…	…	…	…	…	…	…
Technology	…	…	…	…	…	…	…	…	…	…	…	…
Telecommunications	…	…	…	…	…	…	…	…	…	…	…	…

Note: Overall NPV impacts to 2050 can be reported instead of outputs at different time horizons. Impacts can be reported as qualitative scores ("High", "Medium", "Low") or NPV impacts in % terms. As above, any standardised sectoral classification, provided the choice is disclosed, is acceptable for reporting purposes.

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For any enquiries, please get in touch via email at communications@ukpact.co.uk