Impacts of the Inevitable Policy Response on Equity Markets

INEVITABLE POLICY RESPONSE

Contents

INEVITABLE POLICY RESPONSE

Consortium

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Key findings and recommendations

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Interpreting the asset level modelling of the Inevitable Policy Response

This work takes the **macro and sector level outcomes of the Inevitable Policy Response Forecast Policy Scenario** and models the **impact of these on the iShares MSCI ACWI ETF constituents if repricing occurred today**, using a company "bottom up" approach. These impacts are measured in terms of the **difference between a scenario reflecting stated policies (akin to the IEA STEPS or NPS) and the FPS**.

It aims to **improve investor understanding** of how equity valuations might change if there were a shift from market pricing based on currently stated policies to market pricing based on the IPR-FPS which starts to materially impact cash flows in 2025. As the base case, we consider valuation impacts if equities were repriced today, capturing the BAU cash flows until 2025. **This is supplemented by sensitivity analysis around a 2025 repricing.**

It provides a first order assessment of climate policy impacts built up from company level. **It does not purport to be a full balance sheet and P&L analysis** as an equity analyst would carry out, and which is necessary in order to identify specific companies in an appropriate way.

As such, we have **aggregated the results and expressed them at a sector and sub-sector level**, which informs investors about where risks and opportunities are concentrated across a diversified portfolio. **The analysis shows the dispersion or spread of company results in key sectors** – this highlights that there are many winners and losers so that equity analysts should be encouraged to explore regulatory risk such as presented in IPR. In addition, it is also important to note that conglomerates with activities across many sectors can sometimes carry significant climate risk even if their primary sector (i.e. for industry classification) is not a high-risk sector* – here too, equity analysts should be encouraged to look more closely at a company's different business units

We intend to release other asset class findings in the first quarter of 2020.

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Note: See annex slides for more details

Key Findings: Disruption at the Sector and Company level

Overall, **risk to financial markets is significant, but appears manageable with the** iShares MSCI ACWI ETF fall by a noncyclical **3.1% or $1.6trn**

This includes downside demand and cost exposure of $2.1trn (or a 4% fall in share values) offset by about $0.5trn from green demand creation.

If repricing occurs in 2025, when the policy forecasts start to affect cash flows of companies, **the impact further rises to -4.5%.**

Increased volatility is also likely with a more event-driven price adjustment so the impact could be more significant

The most disruption is seen at sector and company level, with some big winners and losers

Some primary sectors will be pure losers or winners –mean company valuations in the energy sector fall by 33%

Within other sectors there is large variation across companies, for example, 80% of impacts in the Utilities sector lie between -62% to 41% of current valuation

Non-OECD domiciled companies are more negatively affected on average – although in some regions (like China) this may reflect the lack of listed vehicles.

Nevertheless, at a country domicile level there is **significant dispersion of results** – for example, in the United States

Many companies likely to succeed in the green upside are not listed in the common indices

Passive investors are therefore unlikely to be as exposed to the upside as the downside of the Inevitable Policy Response.

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Limitations of the asset level modelling of the Inevitable Policy Response

There are several *additional* downside risks not reflected in the analysis that investors need to take into account:

- Physical damages are not modelled or priced
- Upstream scope 3 emissions are not modelled, but represent input price changes from carbon pricing along company supply chains*
- Finance sector exposure through scope 3 financed emissions are not included
- Possible market contagion and high-volatility – as previously experienced in other re-pricing events – is discussed but not modeled
- Full impact of agriculture sector not present in listed equities
- This analysis only covers listed equities and the sectors and regions these represent. This means:
  - Sector composition of the index does not represent the whole economy because conglomerates are assigned their primary sector but act across multiple sectors (see Annex)
  - Not all risk are captured as many fossil fuel producers are not listed, for example, middle eastern NOCs
  - Not all regions are well represented as some economies such as Europe and the US have more listed companies, whereas not as many Chinese equities are listed
- The baseline for valuation – which is comparable with IEA STEPS scenario - could be exaggerated if expectations for NDC implementation are low

Moreover, there are a number of key uncertainties that affect the robustness of the results*:

- There are uncertainties around data, models and exact policy pathways
- These could be improved by higher policy clarity from governments and improved carbon data disclosure from companies (such as green revenues, carbon footprints and supply chains)

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Note: * Changes to electricity input costs (Scope 2) are modelled.

Actions for investors

- The analysis highlights the **importance of forward-looking climate risk assessment** and the **limitations of portfolio carbon foot printing** in capturing the nuance of impacts across and particularly within sectors.
- **Draw on IPR in investor implementation of the TCFD recommendations on forward-looking risk assessment and climate scenario analysis alongside Paris aligned scenarios**
- **Asset owner actions:**
  - Prepare for FPS as a likely central business case
  - At the same time, continue to advocate and engage for earlier and more ambitious climate action to minimize the disruption from a disorderly transition and from physical impacts resulting from global mean temperatures exceeding 1.5°C
  - Review equity asset allocation and define mitigation strategies for both passive and active investments.
  - Incorporate IPR into manager selection, appointment and monitoring
  - Engage service providers on IPR, including in appropriate indices and proxy voting recommendations
  - Consider climate as a factor potentially creating alpha.
- **Passive investors:** draw on IPR in stewardship and consider benchmarks informed by IPR
- **All investors:** draw on IPR to engage exposed sectors to transition
- Further implications for investor action are set out in the section below

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Bottom up methodology (Vivid Economics)

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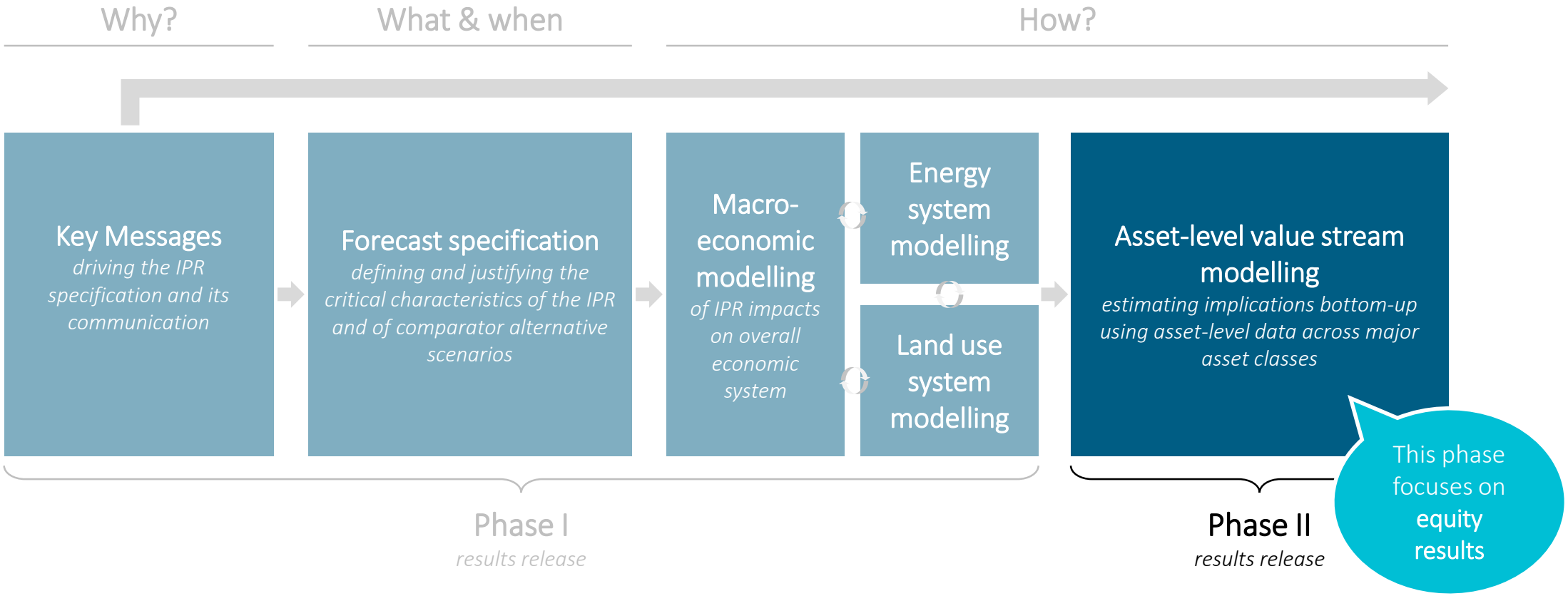
The asset model draws on results from IPR Phase I to generate financial impacts of the IPR Forecast Policy Scenario across various asset classes, starting with equities



Source: Vivid Economics

How do we think about the 'impacts' of the Inevitable Policy Response?

1 Current valuations

Current equity valuations are based on expectations of future company performance. We assume these expectations are consistent with a scenario where current NDCs* as reflected in the IEA NPS (now STEPs) are achieved.

2 The IPR Forecast Policy Scenario (FPS)

The IPR FPS was developed to show the macro and sector level impacts of a specific set of policy forecasts taking affect around the time of the 2025 Paris Agreement 'ratchet'. These generate impacts to company profits going forward due to changes in demand, prices and costs for companies.

3 Impact calculation

We then define 'impacts' as the implied changes in valuation in terms of market capitalisation if investors repriced immediately on the basis of these expected cash flow changes **

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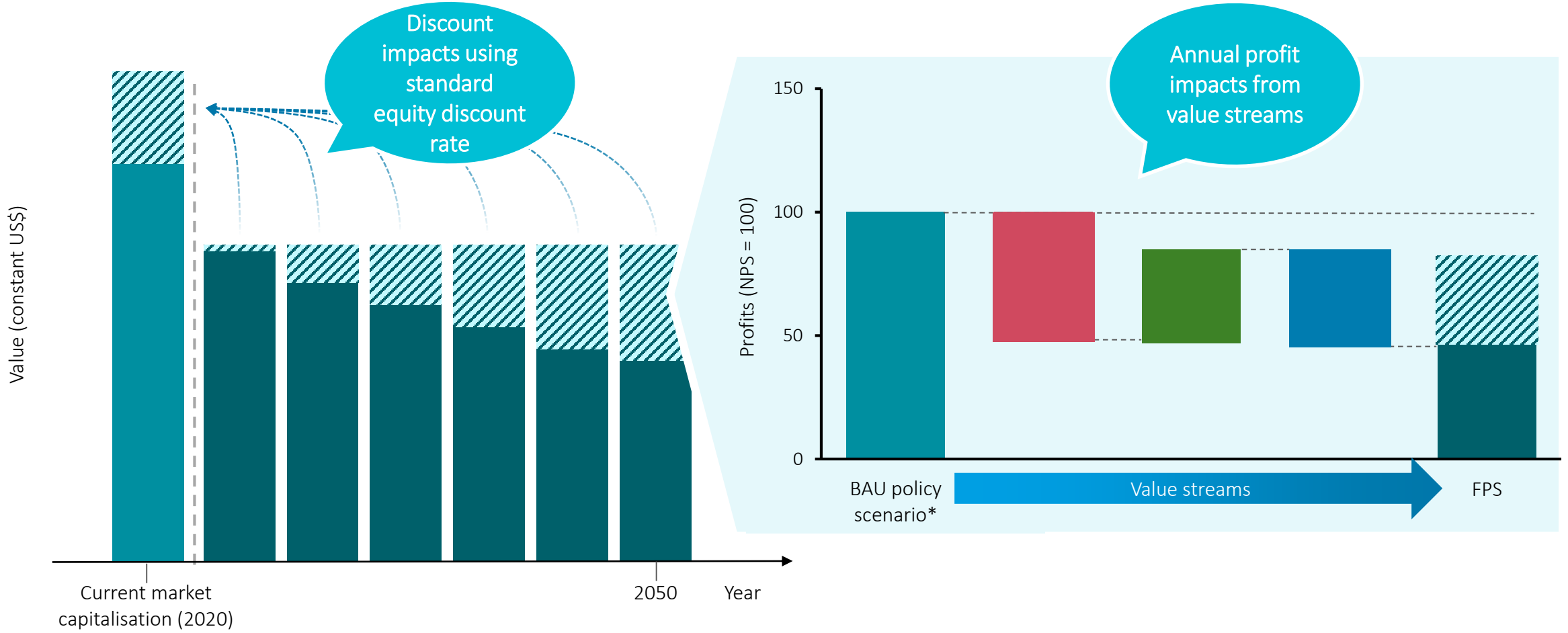
Notes: *NDCs refer to countries' nationally determined contributions to the Paris Agreement.**Immediately is our default assumption in this report but we set sensitivities around delayed repricing in 2025 as well.

Source: Vivid Economics

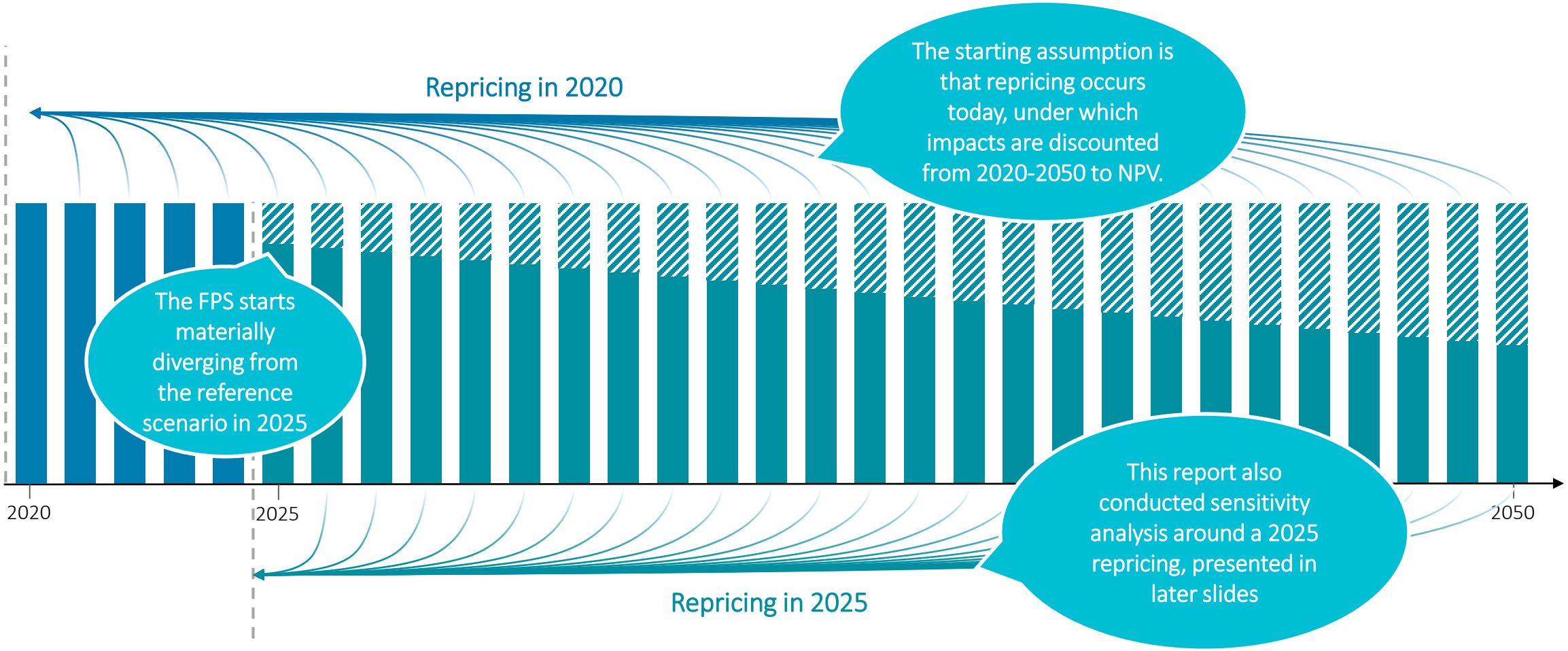
To arrive at a quantitative estimate, the approach estimates annual impacts on profits from 2020 to 2050 and discounts these back to the present



Notes: Current valuation is assumed to be the NPV of projected profits to 2050 based on a 'business as usual' policy scenario where countries implement their stated policies (or NDCs), akin to what is represented in the IEA STEPS (formerly NPS). While in reality, different equities may be valued based on different expectations of a future climate pathway, this assumption is necessary to provide 'value at risk' figures relative to a baseline.

Source: Vivid Economics

The Forecast Policy Scenario starts impacting equity valuations in 2025, but repricing could occur any time from now to 2025



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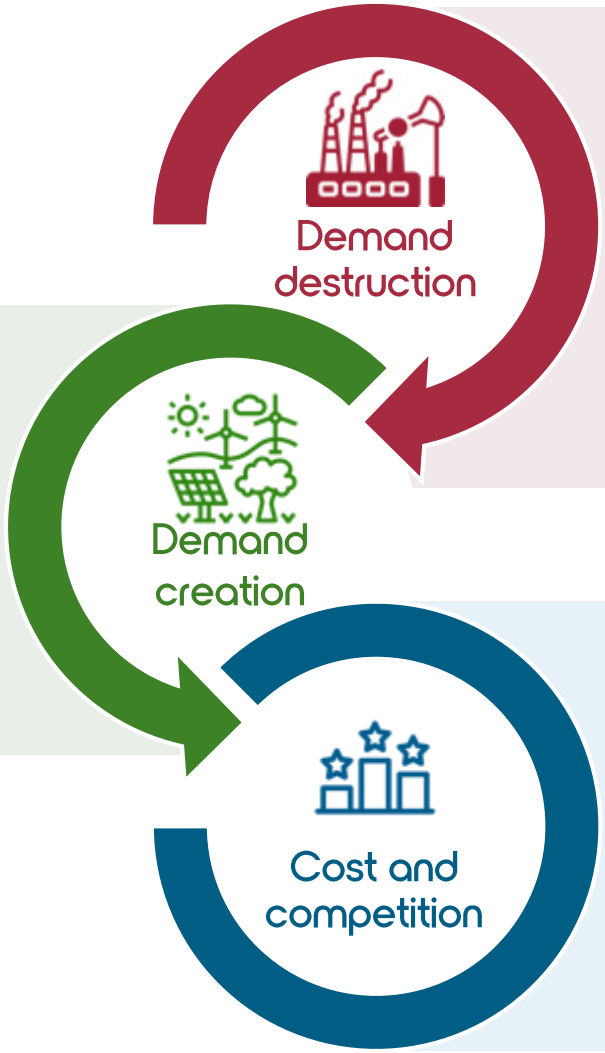
The value streams capture the dynamics of the transition, which affects production costs directly through carbon pricing and indirectly through demand changes

The demand creation value stream captures the effects of **increasing demand for low emissions products or inputs** (such as EVs, copper and renewable energy equipment).

These impacts will depend on **a company's current and future share of green markets,** and the extent of **overall market growth.**



The demand destruction value stream captures the impact of the **contraction in demand for high emissions products** due to climate policy (such as ICEs and fossil fuels).

These impacts will depend on a company's sensitivity to falling **commodity prices and margins**, which will be tied to **production horizons and cost structures**

Cost and competition captures the **carbon costs companies face directly from Scope 1 emissions,** and **indirectly through power prices**.

Impacts will depend on a company's **emissions intensity, abatement opportunities and capacity to pass through costs to consumers,** relative to competitors.*

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Notes: * The cost pass through and competition elements also apply to costs from demand destruction and demand creation models.
Source: Vivid Economics

Overview of bottom up equity results (Vivid Economics)

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Results are laid out from aggregate to detailed, starting with the MSCI ACWI*, then providing detail for individual regions and sectors

Index level results

- Relative and absolute impacts
- Variation within the index
- Deep-dive into the drivers of differences between the top and bottom 10% of companies

Sectoral level impact results

- Impacts across and within sectors (full detail on sectoral disaggregation used in this deck can be found in the Annex)
- Deep-dive into within-sector differences for four worst impacted sectors

Regional results

- Impacts across and within regions
- Deep-dive into the drivers of differences between OECD and non-OECD listed securities

Timing sensitivity results

- Repricing in 2025 rather than 2020 (standard assumption)

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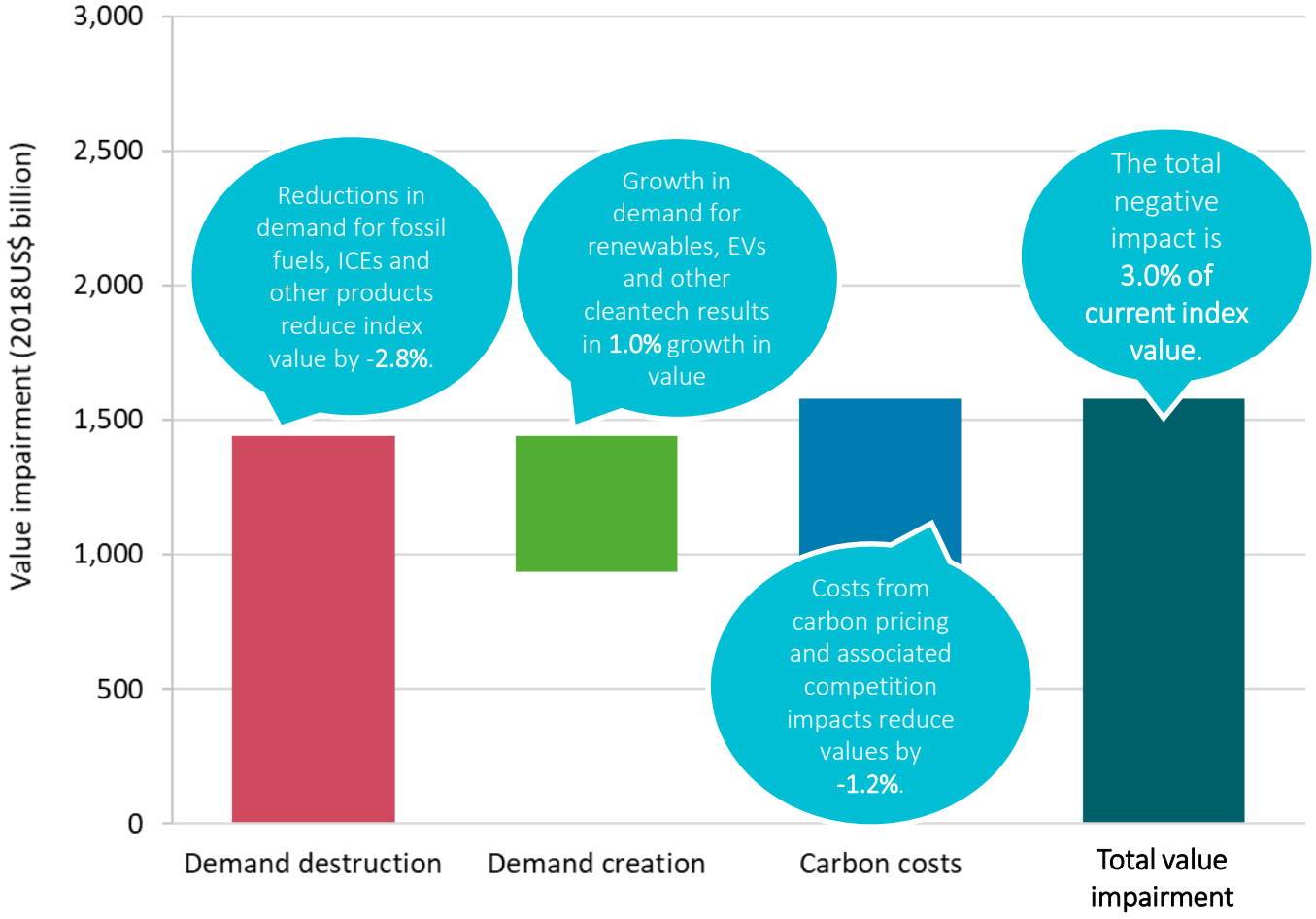
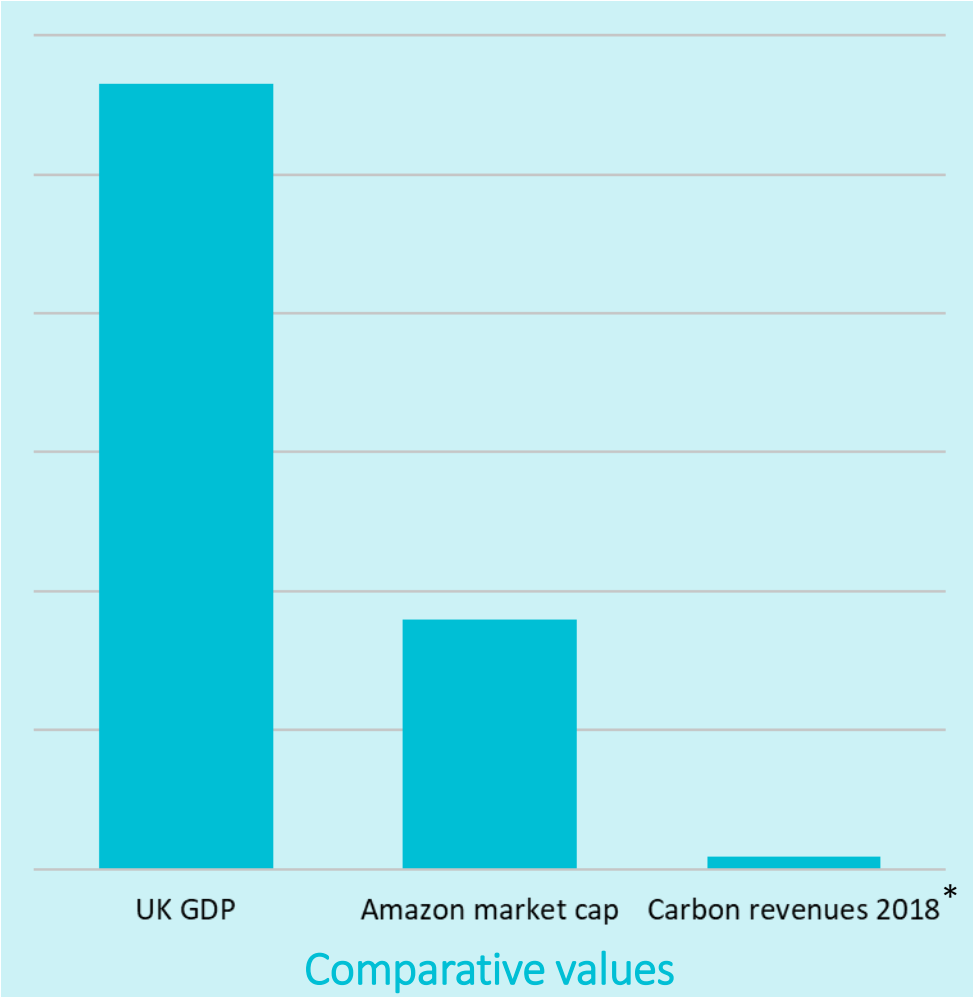
Notes: *In this presentation, we use the iShares MSCI ACWI ETF as representative of the MSCI ACWI

Index: the impact on the current value of the world index is modest in percentage terms, although it implies that US$1.6 trillion (over half of UK GDP) would be wiped off the index





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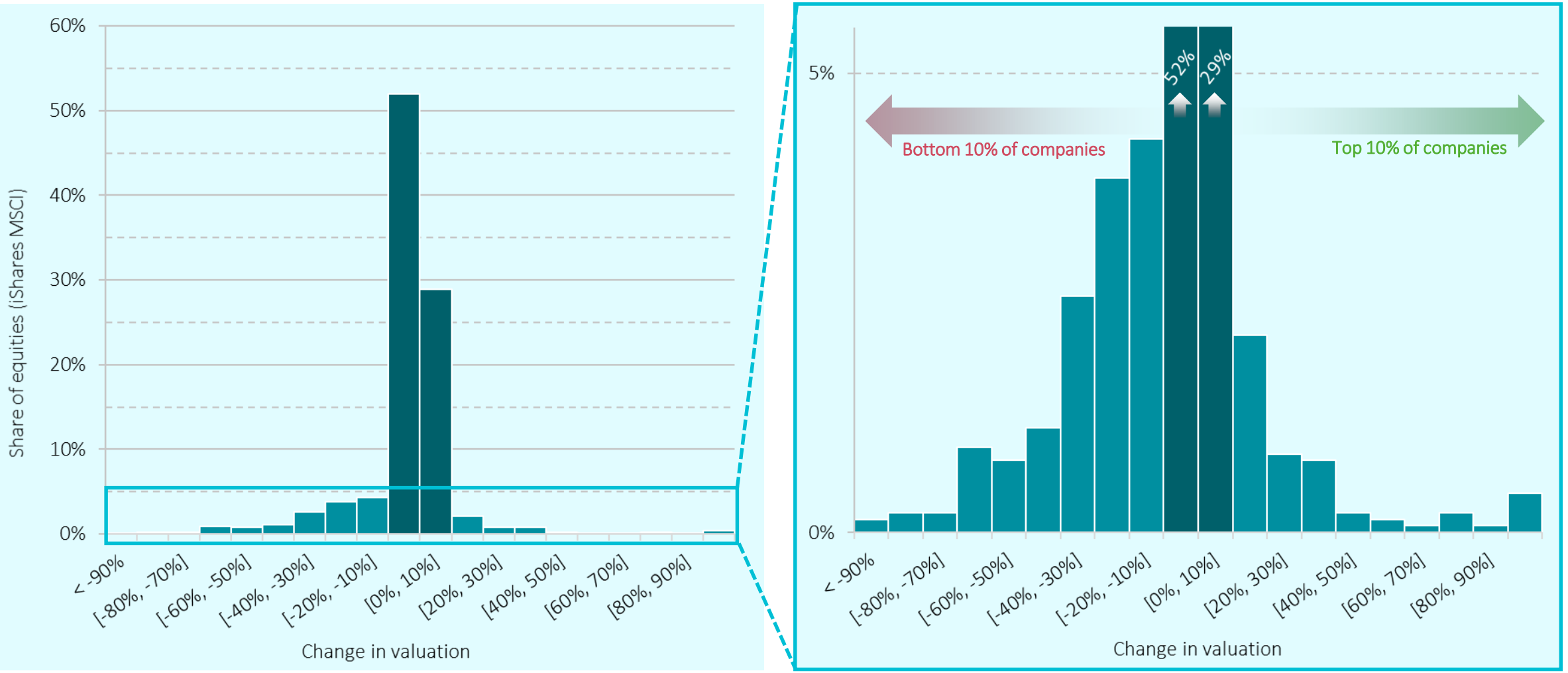
Note: Carbon revenues are government revenues from carbon pricing (see State and Trends of Carbon Pricing 2019, World Bank). Detail on timing of repricing can be found in the Technical Annex.
Source: Vivid Economics Net Zero Toolkit

Index: While most companies have smaller impacts, around one fifth are impacted by at least 10% in either direction



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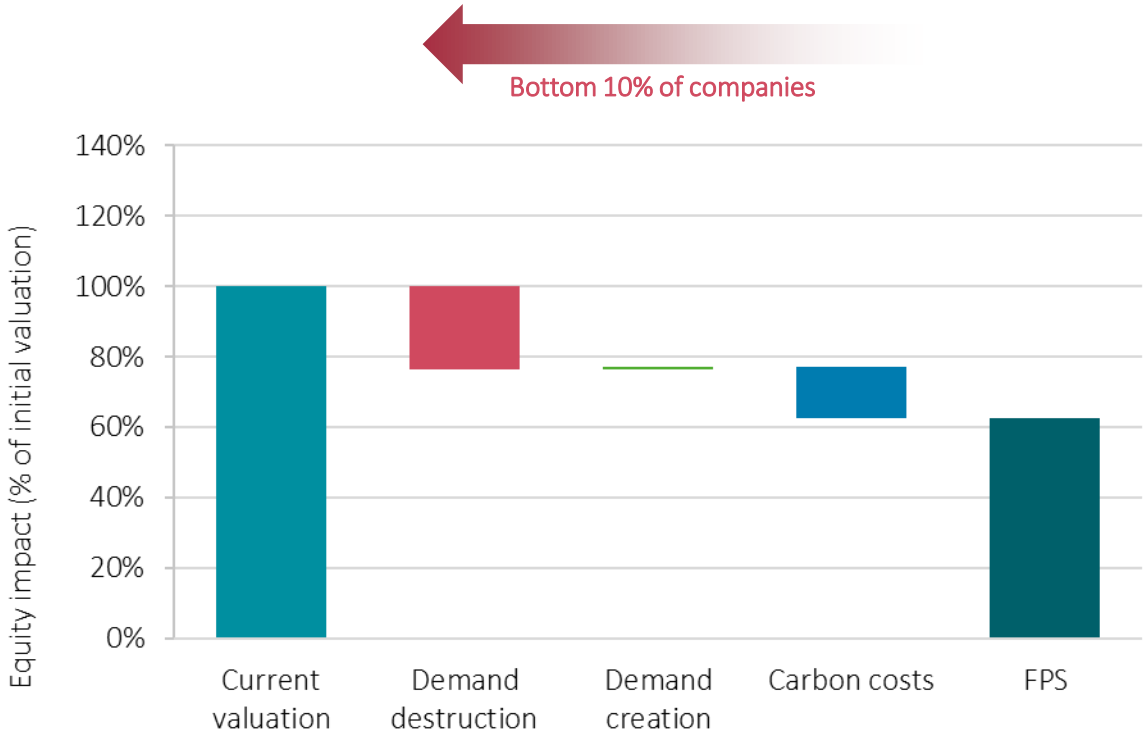
Source: Vivid Economics Net Zero Toolkit

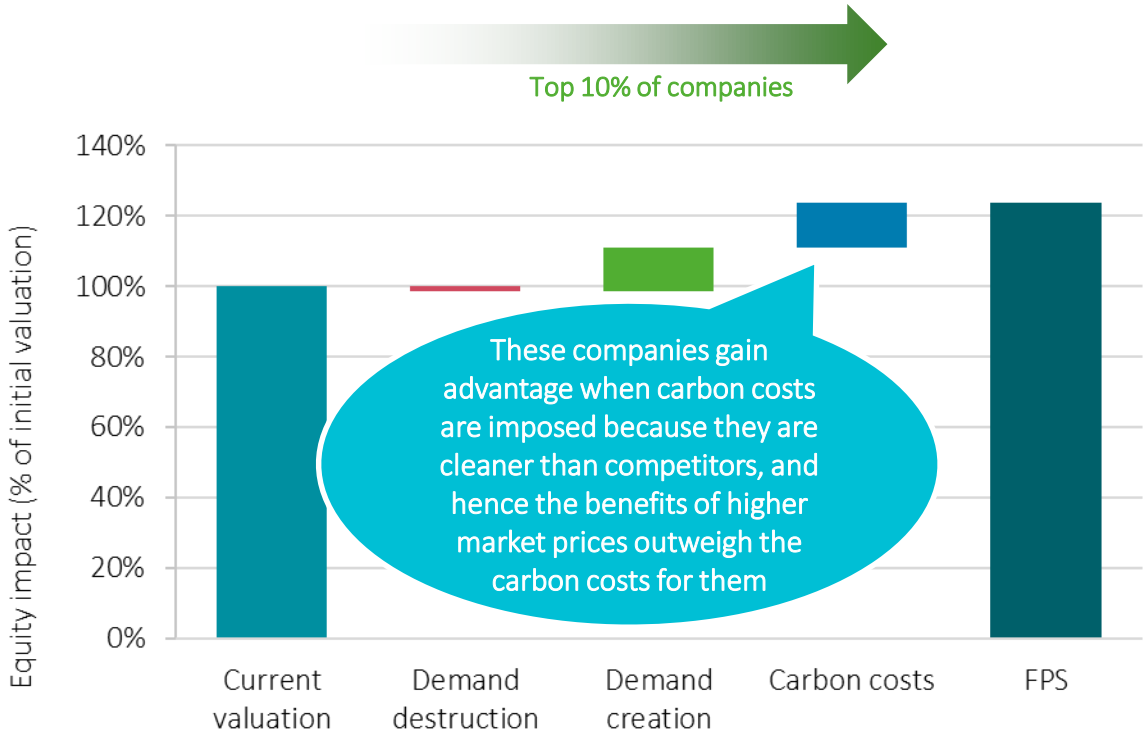
Index: Impacts for the top and bottom performers within the index are driven by different value streams

- The **bottom 10%** of companies experience **significant demand destruction and carbon costs, and virtually no demand creation**
  - ◊ These companies are either highly involved in fossil fuel production (more detail on this in sector insights section), which experiences the bulk of **demand destruction**, or in downstream products tied to fossil fuels (e.g. dirty utilities or ICE manufacturers)
  - ◊ Experience significant **carbon costs from climate policy**, potentially more so than competitors (by having a higher starting point, less emissions abatement potential, or lower capacity to pass through costs to consumers)
- The **top 10%** of companies experience **significant demand creation and carbon cost advantage, with insignificant demand destruction**
  - ◊ The **demand creation** channel primarily affects companies producing clean technology products, such as equipment for renewable energy generation or EVs
    - ○ **Market growth** positively impacts profits for companies in these sectors, however, companies with more intellectual property in these technologies may benefit relatively more through additional growth in market share
  - ◊ **A carbon cost advantage** can occur when a company experiences **less severe impacts from carbon pricing than competitors due to lower emissions intensity** and is able to **gain the market share of those competitors that must reduce or stop production** due to high carbon costs resulting in negative profits.
    - ○ Factors affecting this 'competitive advantage' include **low current emissions intensity, high future abatement potential and high ability to pass costs through to consumers** (this is often the case when there are no substitute products available)

Index: Impacts for the top and bottom performers within the index are driven by different value streams

- The **bottom 10%** of companies face significant **demand destruction and suffer from carbon costs**
- The **top 10%** of companies experience significant **demand creation and benefit from a carbon cost advantage**





Note: For further within sector analysis, see Annex
Source: Vivid Economics Net Zero Toolkit

Sectoral: Overall index-level impacts are small in percentage terms since the majority of companies in the index are in sectors with low exposure to climate policy

Further detail on losing sectors provided in slide 24

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* Finance sector impacts do not include impacts on financial holdings. ** Consumer Non-Cyclicals include Agriculture. This sector is explored further in the sector insights section. *** Consumer Cyclicals include Automobiles (see sector results for further detail).
Source: Vivid Economics Net Zero Toolkit

Sectoral: Within-sector variation can be significant, particularly for the four most impacted sectors in the index: Energy, Consumer Cyclicals, Non-Energy Materials and Utilities

Focusing on sector average impacts hides the significant variation in impacts, particularly in the four worst impacted sectors:

- The **Energy** sector experiences the highest negative impact in weighted average terms of -33%
  - Impacts also have significant range, from below -60% for the bottom 10% of companies to above -16% for the top 10%
  - This is the only sector where there is not a significant number of winners as well as losers
- **Consumer Cyclicals**, which prominently includes automobiles, experiences a weighted average impact of -5%
  - The range here is the lowest among the four worst impacted sectors, from -30% to 1%, but still significant (10^{th}/90^{th} percentile)
  - Automobiles are the key story in this sector and are examined in further detail in the sector insights section
- Among **Non-Energy Materials**, which includes the mining sectors, the weighted average impact is -4%
  - There are a significant number of companies in this sector experience positive impacts, with the top 10% of companies experiencing impacts above 26%, because the sector covers a wide range of subsectors, including chemicals, minerals mining, and manufacturing, that stand to gain significantly (such as green minerals) or lose (such as cement).
- Finally, the **Utilities** sector has a weighted average impact of -4% as well, however:
  - It is the sector with the most significant variation, as is further explored in the sector insights section
  - Companies with relatively smaller market capitalisation fare worse in this sector, likely because they are less diversified across power sources
- In most other sectors, **companies with smaller market capitalisation experience slightly smaller impacts than larger-cap companies**

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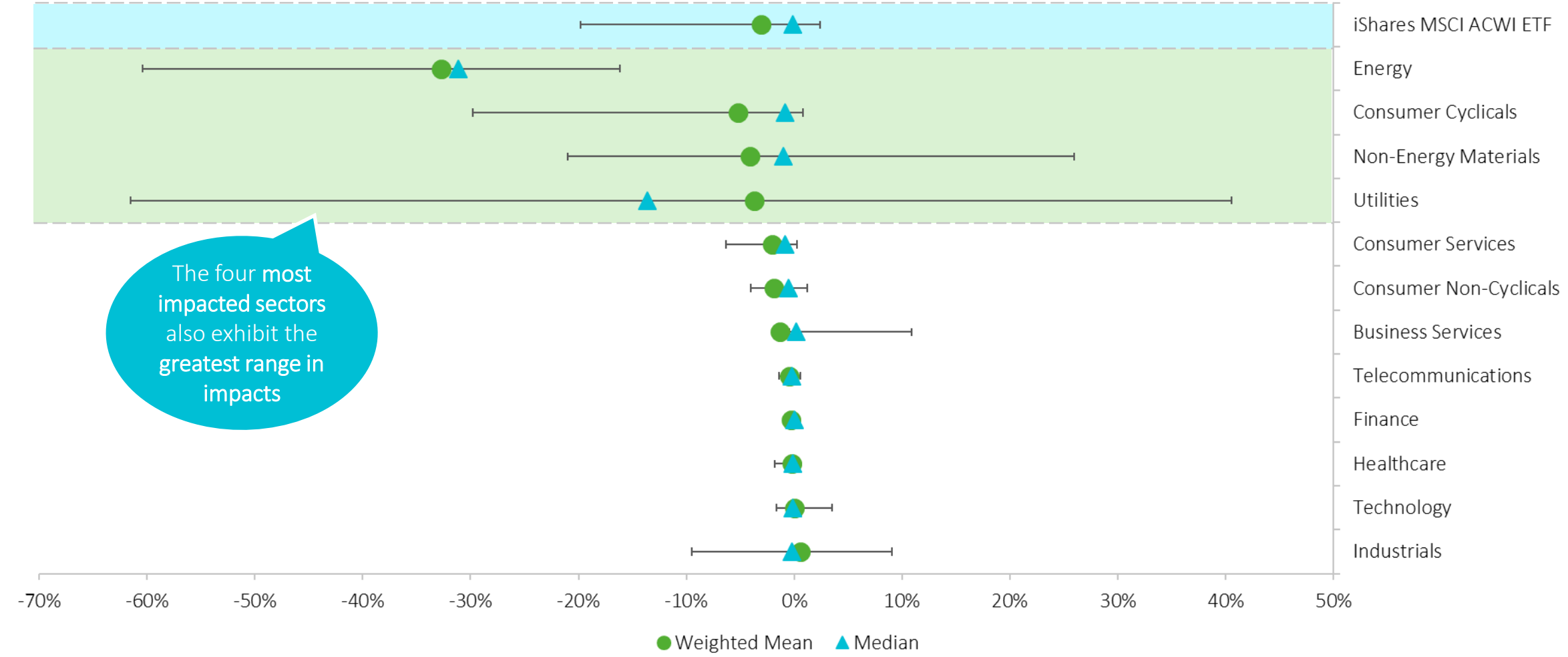
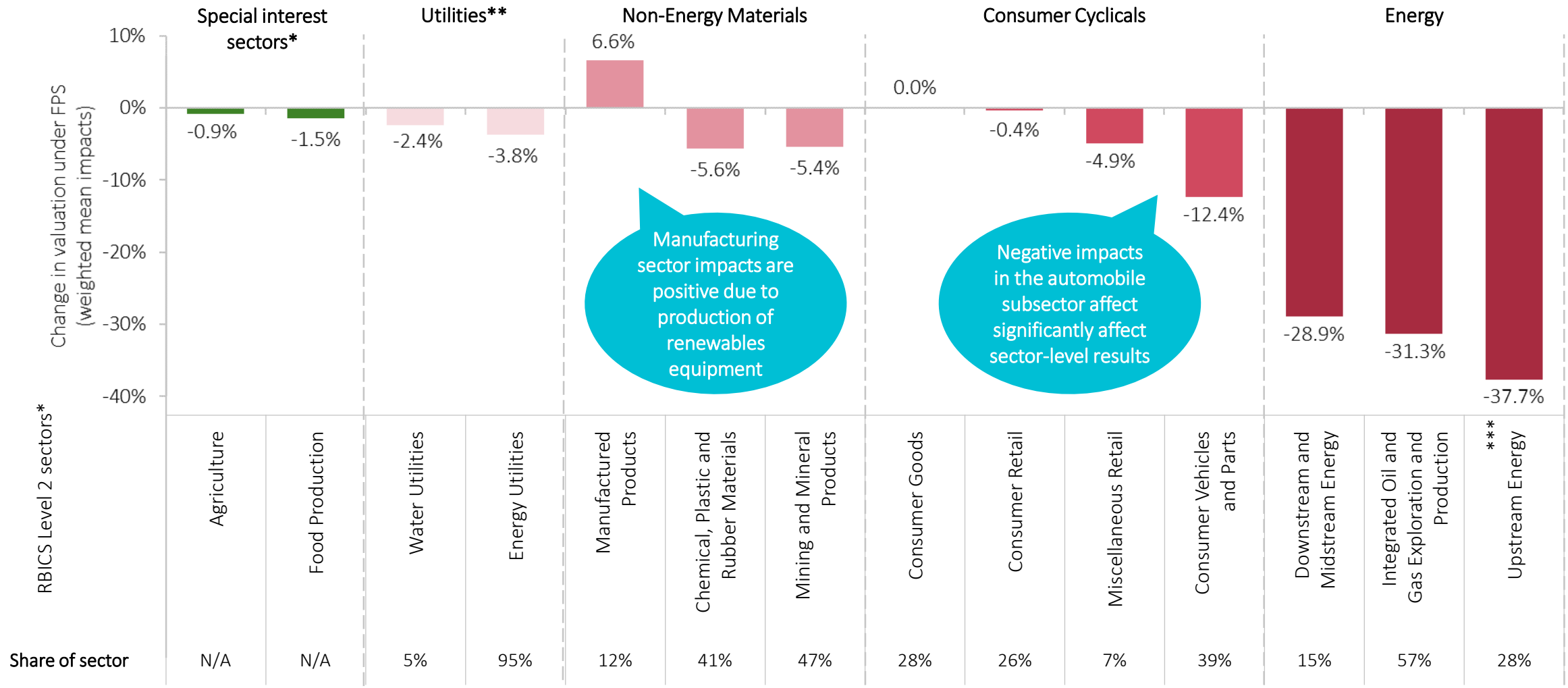
Notes: The sector insights section provides more granular analysis on each of these sectors

Sectoral: Within-sector variation can be significant, particularly for the four most impacted sectors in the index: Energy, Consumer Cyclicals, Non-Energy Materials and Utilities



Notes: Error bars indicate the 10th and 90th percentiles of impact within each sector. Sectors: RBICS level 1.
Source: Vivid Economics Net Zero Toolkit

Sectoral: Zooming in on the sectors with the most negative impacts on average and special interest sectors, it is clear that subsectors can experience considerably different impacts



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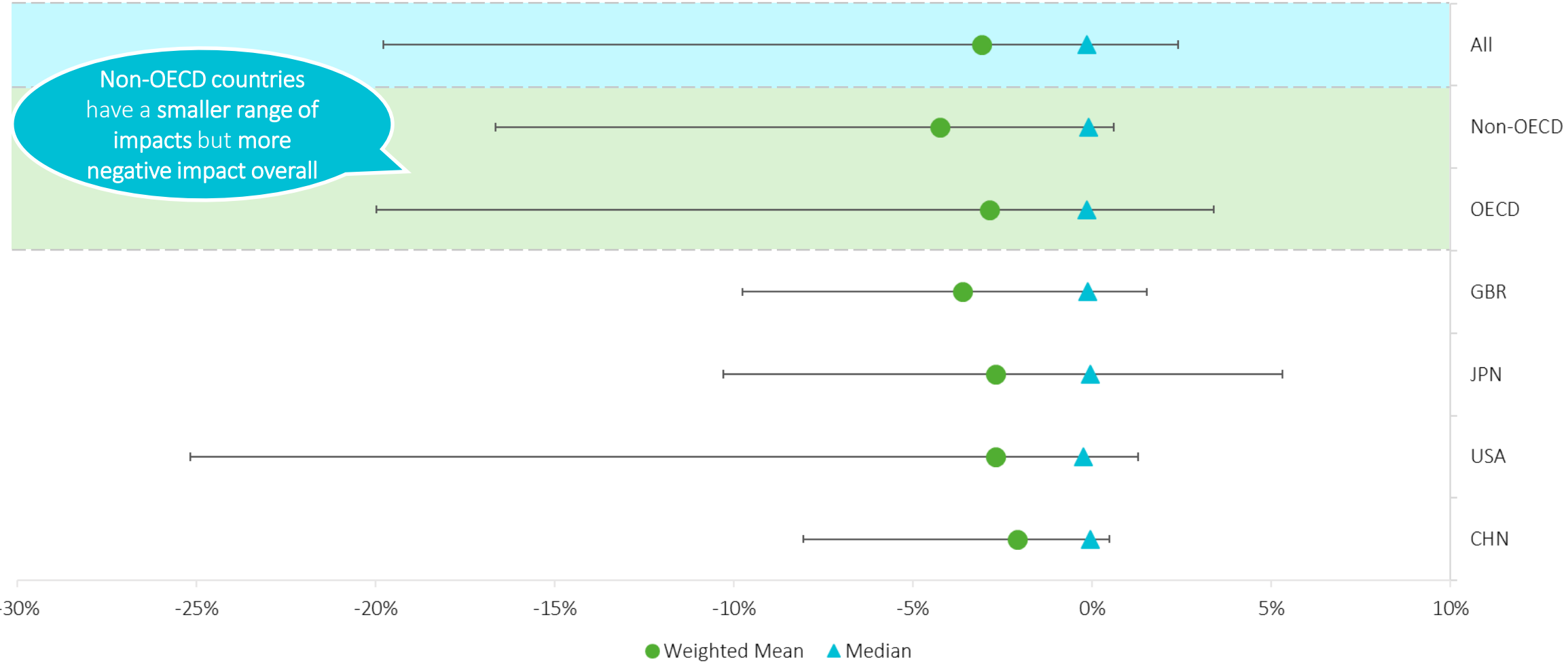
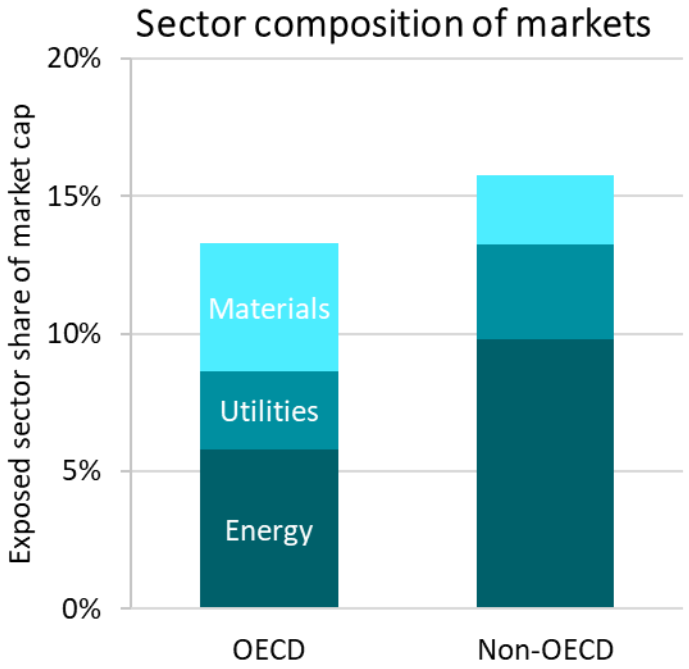
* The special interest sectors are contained Consumer Non-Cyclicals. Agriculture is a Level 3 subsector, Food production a Level 4 subsector. Sector shares are not available as results for the 'Agriculture' sector are based on oversampling of companies – there are very few agriculture companies in the index.
** Utilities sector broken down to RBICS level 3 to provide further detail. *** Upstream energy includes coal mining and oil and gas exploration and production.

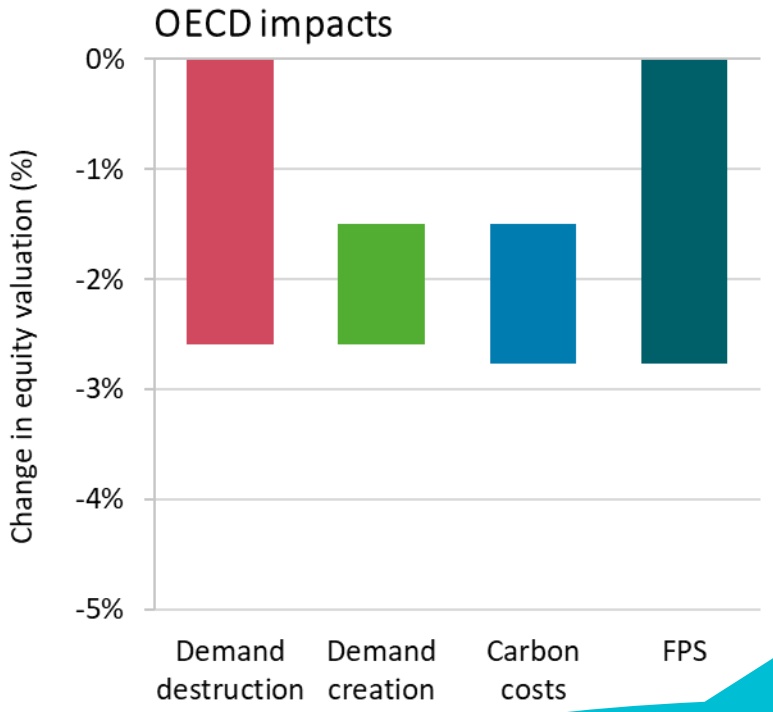
Regional: Grouping impacts by company domicile highlights the significant range of impacts further, particularly in highly diversified equity markets like the US

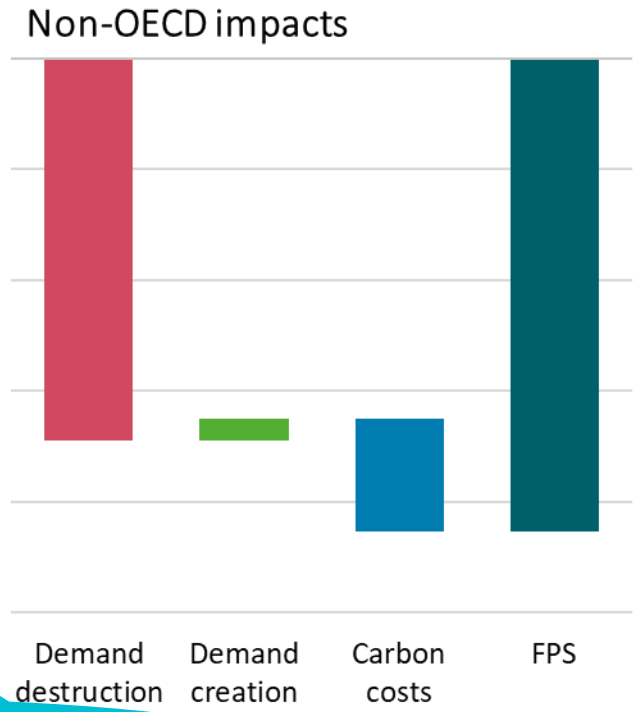


Notes: Error bars indicate the 10th and 90th percentiles of impact within each region. GBR = Great Britain, JPN = Japan, CHN = China
Source: Vivid Economics Net Zero Toolkit

Regional: Sector composition drives differences between OECD and non-OECD domiciled companies in the index







Total market cap: $52 trillion
OECD: $44 trillion
Non-OECD:$8 trillion

Non-OECD domiciled companies experience **higher demand destruction** and **lower demand creation,** although this may reflect the fact that 'green' companies in countries like China are not yet listed on world indices

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Notes: Asset level data on geography is only available through domicile. This means data does not capture where operations or supply chains are located. The full list of OECD countries is available at https://www.oecd.org/about/members-and-partners/

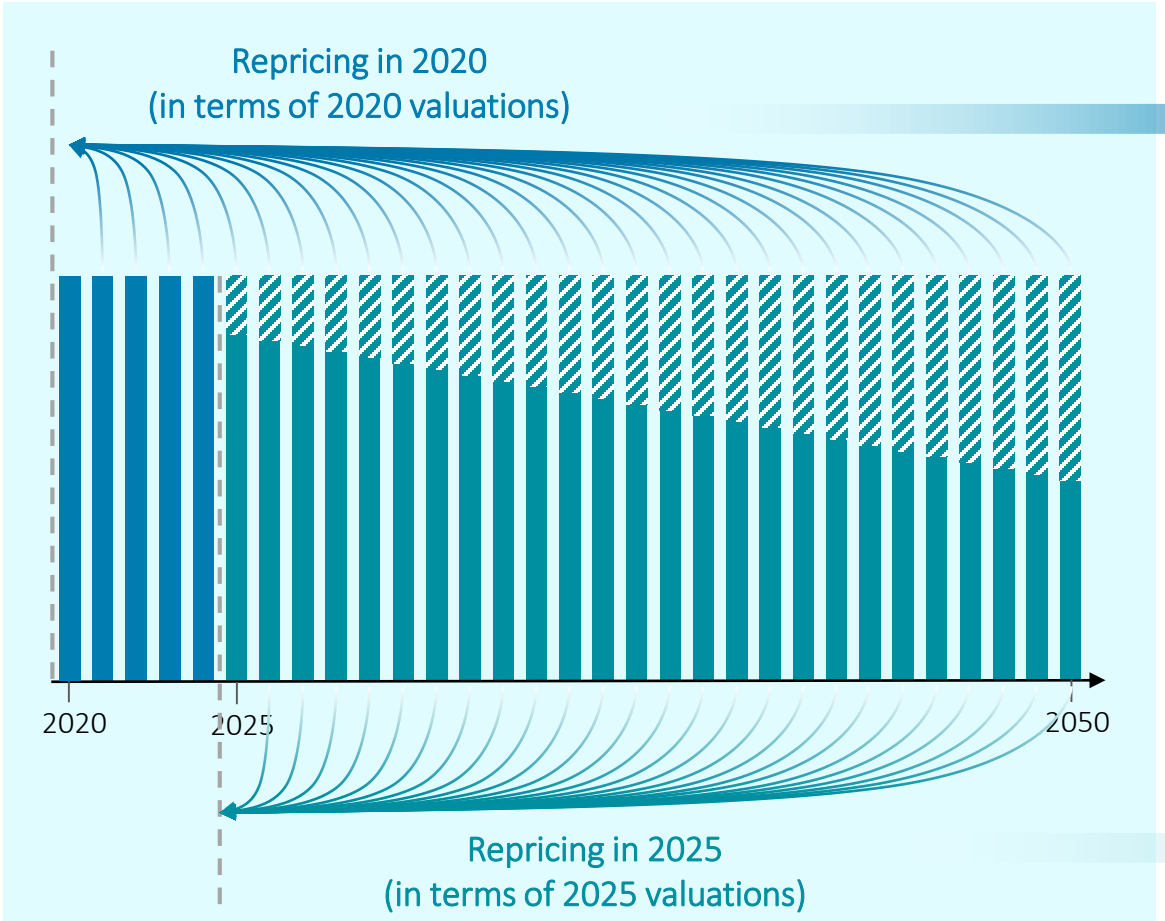
Source: Vivid Economics Net Zero Toolkit

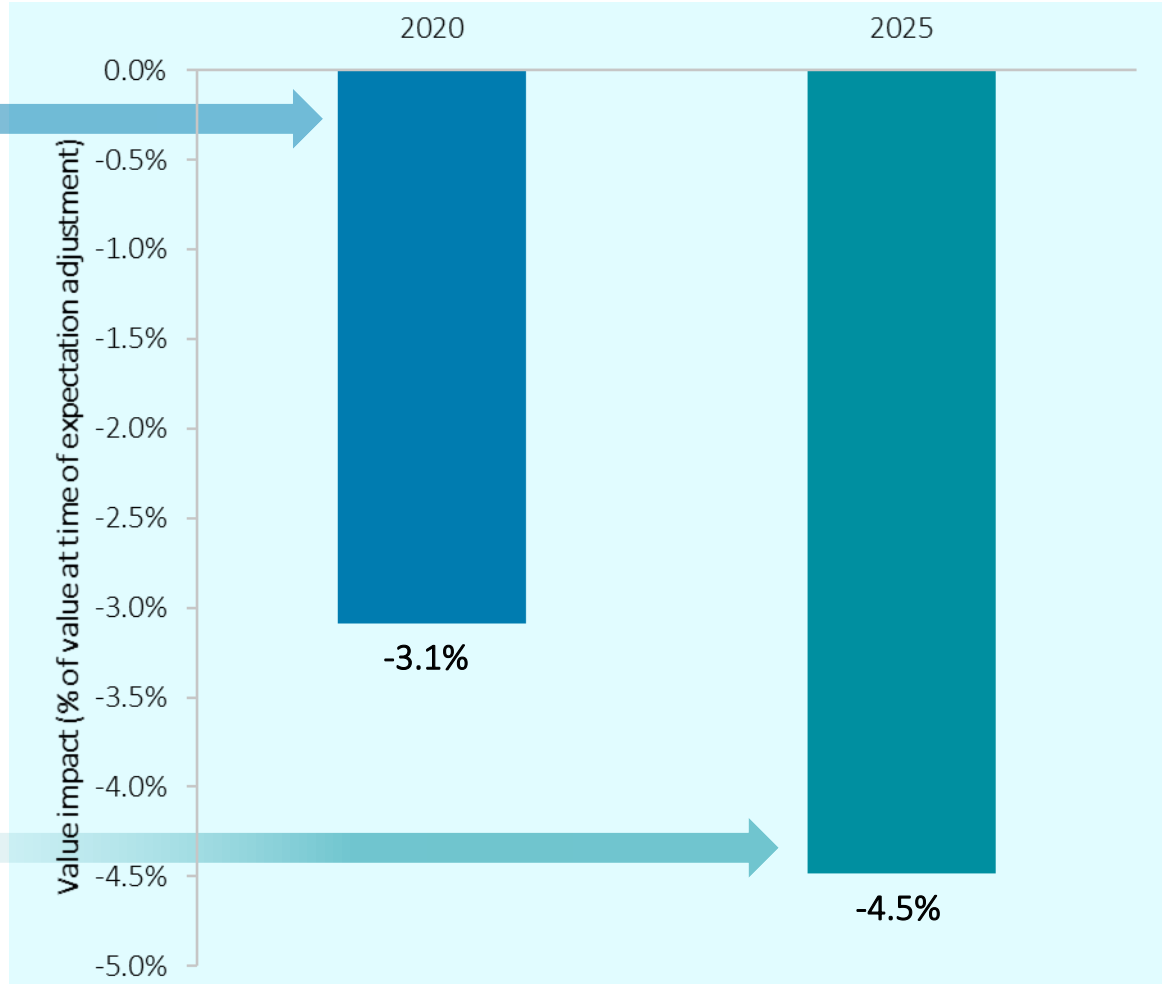
Timing of repricing: The magnitude of transition risk impact depends on when repricing occurs– if markets only reprice at the last minute the impact could be 1.5 times larger

- Under the FPS, coordinated policy action will only come into effect closer to 2025, when it will start affecting company cash flows
- However, there may be different pathways for asset valuations until 2025:
  - At one extreme, **repricing could occur immediately**, even though cash flows are only affected starting in 2025, and repricing occurs immediately
  - At the other extreme, **repricing only takes place in 5 years' time**
- **The remainder of this report shows the impact on *current* valuations (including all cashflows between 2020 and 2050) were repricing to occur immediately**
- However**, sensitivity analysis around a delayed adjustment of expectations and a repricing in 2025 shows that the impact on valuations *in 2025* on the MSCI ACWI* would be about 1.5 times higher than under immediate repricing**
- This implies that **the earlier credible policy announcements can be made before implementation, the better**, as this allows investors and companies more time to adjust, and reduces the risk of a sudden and larger impact on valuations

Notes: *In this presentation, we use the iShares MSCI ACWI ETF as representative of the MSCI ACWI

Timing of repricing: The magnitude of transition risk impact depends on when repricing occurs– if markets only reprice at the last minute the impact could be 1.5 times larger





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Key sector impacts explored further (Vivid Economics)

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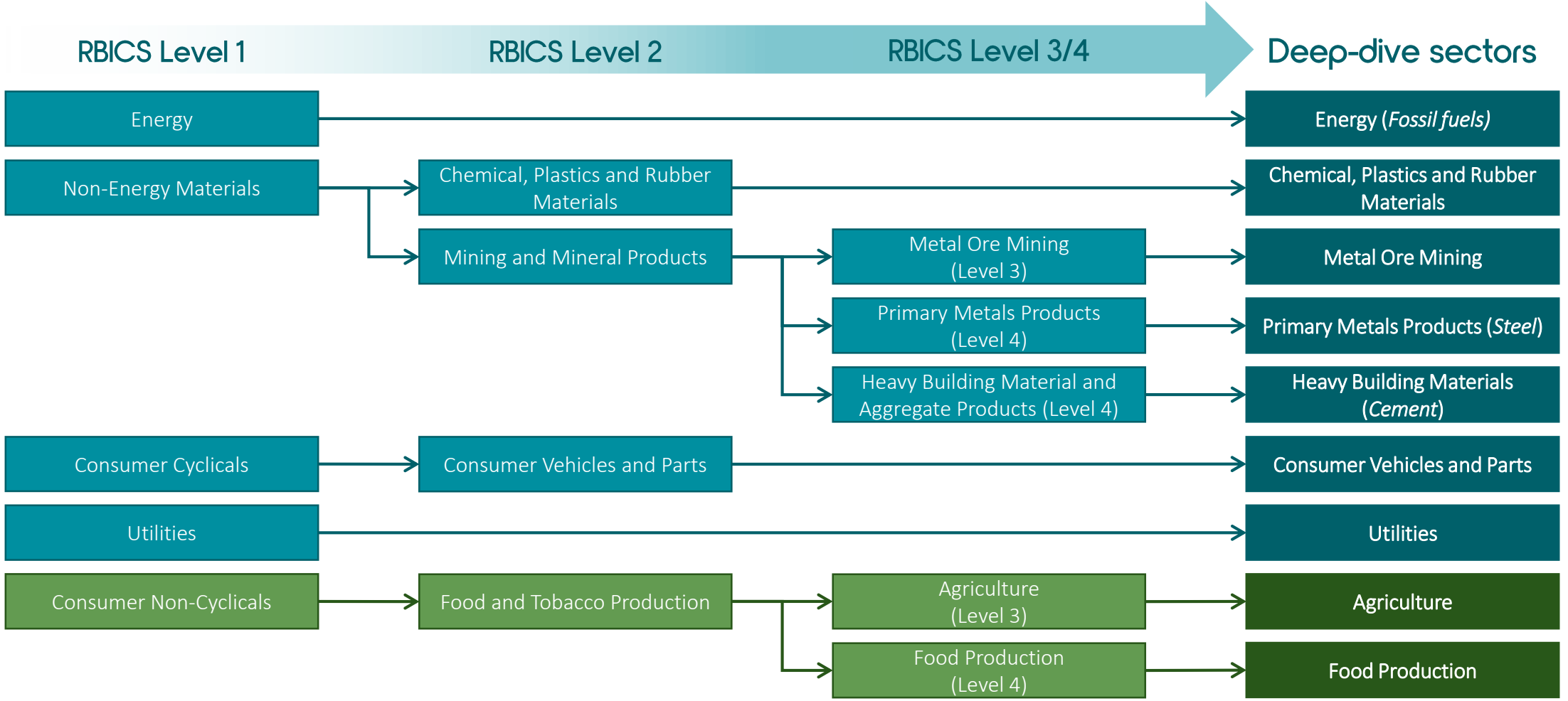
Sectoral: This section provides further analysis for the four most impacted sectors, as well as some additional analysis for agriculture

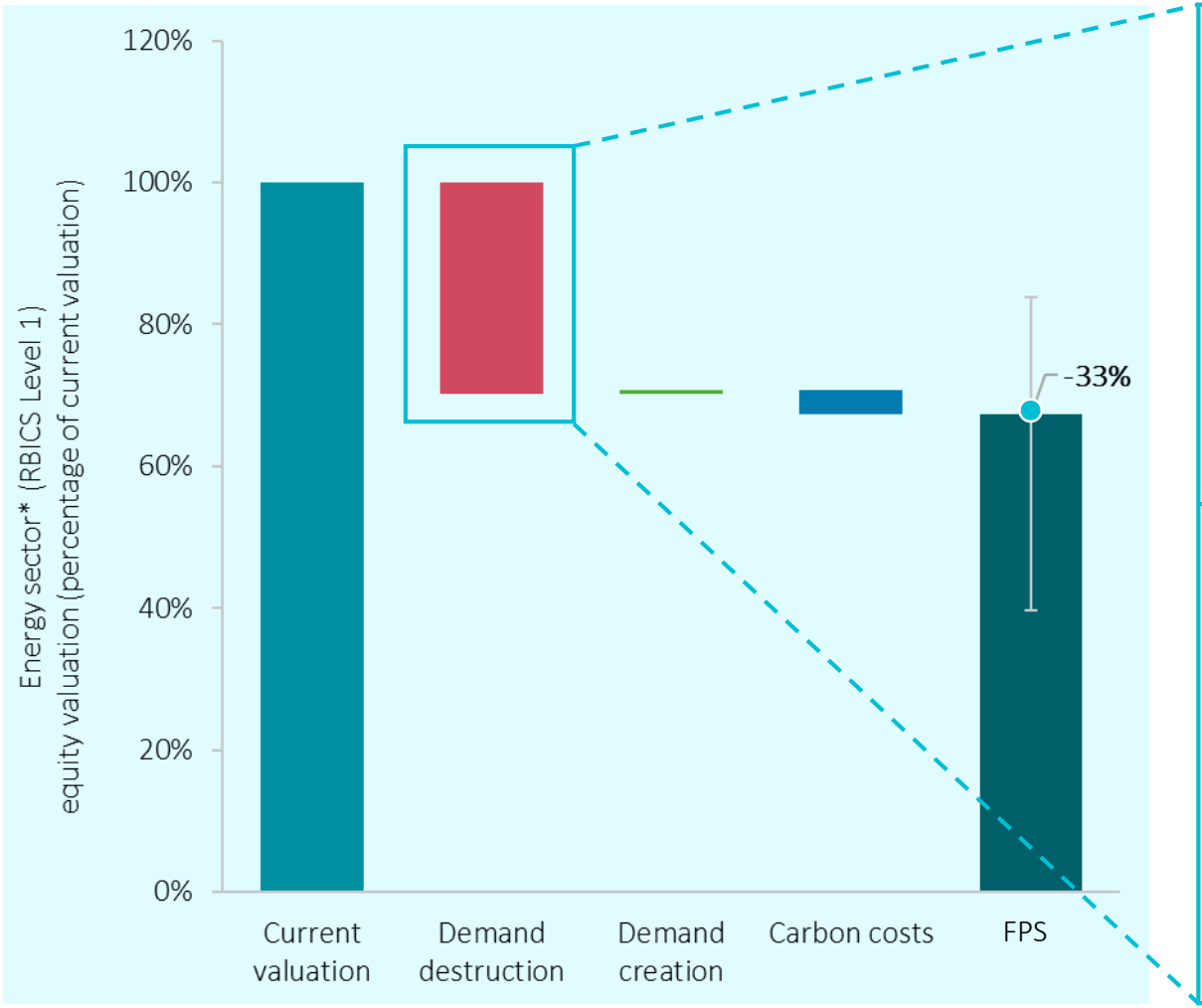


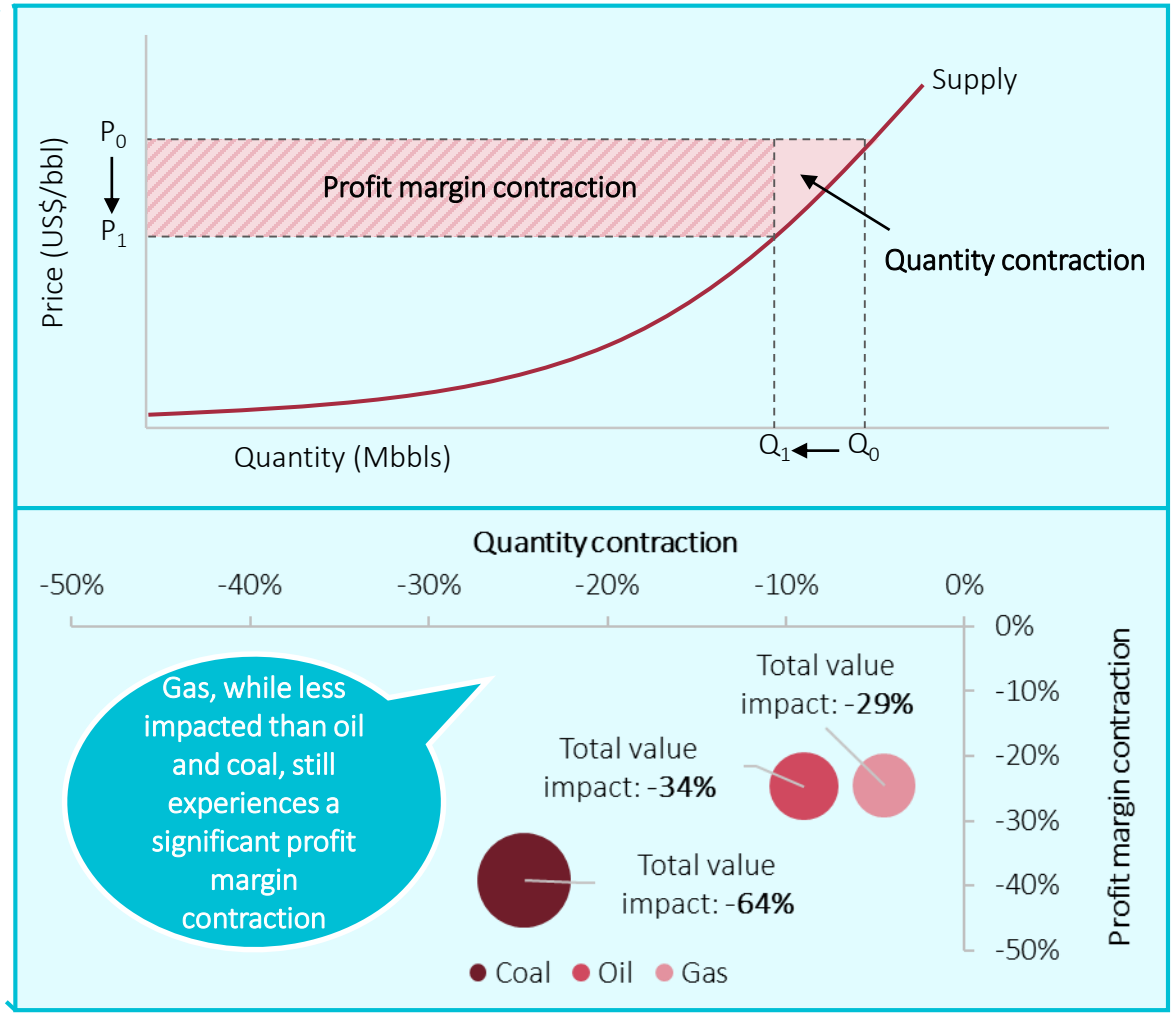
Fossil fuels: The majority of impacts on fossil fuels come from squeezed profit margins from falling prices and reductions in the quantity produced

- Carbon pricing and direct policies such as ICE bans mean that **demand for emissions intensive fossil fuel products is expected to fall significantly under the FPS**.
  - As a result, the most significant contributor to impacts in the energy sector* is the **'demand destruction' value stream**
- The fall in demand will lead to a fall in commodity prices received by fossil fuel producers leading to:
  - **Quantity contraction** as producers with breakeven costs above the new market price will become non-operational, and
  - **Profit margin contraction** as received prices are lower across all assets even those that continue to be operational
- The modelling shows that the **contribution of the profit margin contraction to overall impact is larger than that of the quantity contraction**, across coal, oil and gas
- The fall in demand for coal is expected to be greatest, followed by oil and gas – this means **the overall impact is highest on companies with a high share of coal in revenue**

Note: *The energy sector includes upstream, downstream and midstream sectors and cover oil, gas and coal production

Fossil fuels: The majority of impacts on fossil fuels come from squeezed profit margins from falling prices, rather than reductions in the quantity produced





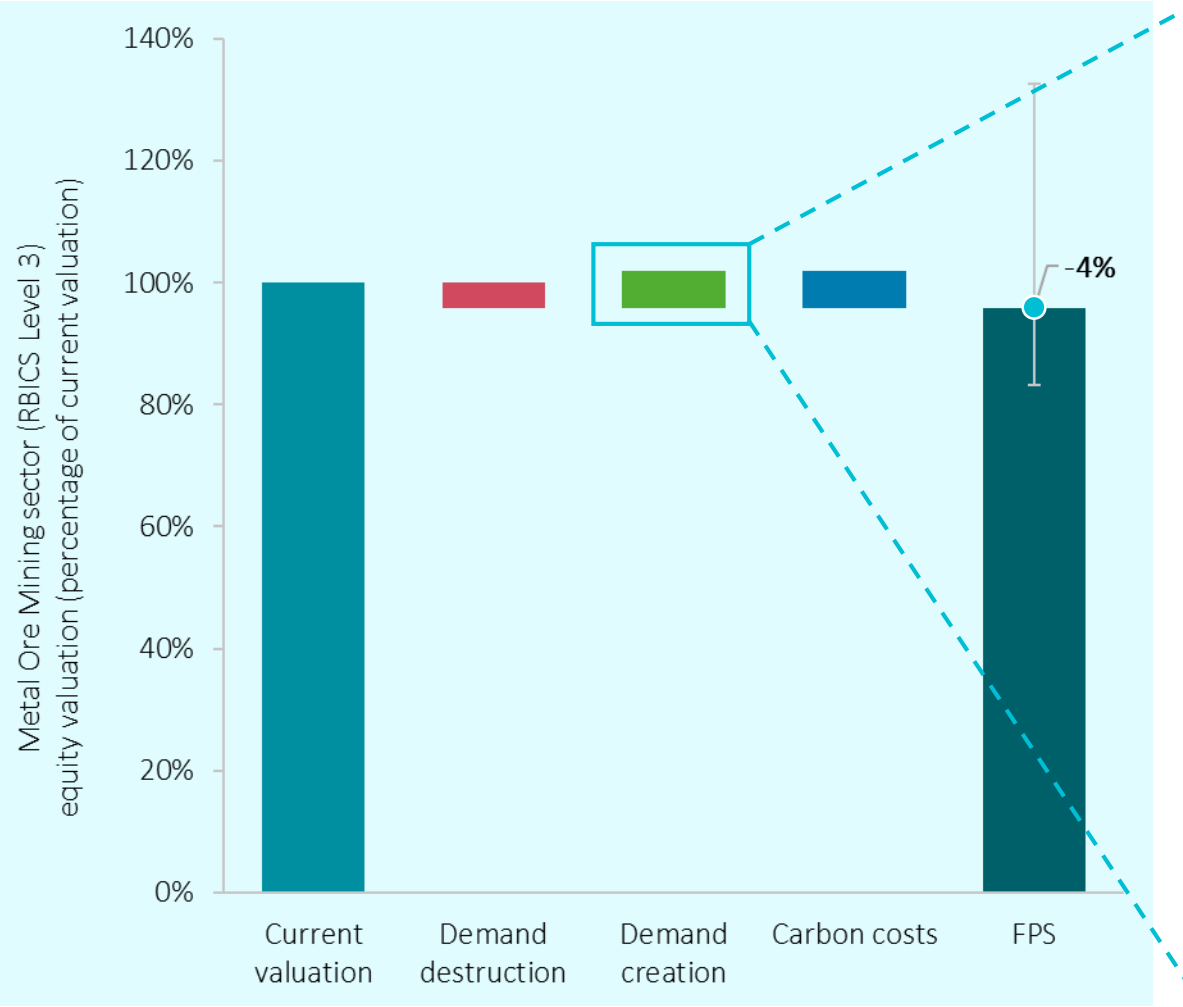
Notes: The error bar on the left graph indicates the 10th and 90th percentiles of impact in the sector. Value of the dot is weighted average impact. *The energy sector includes upstream, downstream and midstream sectors and cover oil, gas and coal production
Source: Vivid Economics Net Zero Toolkit

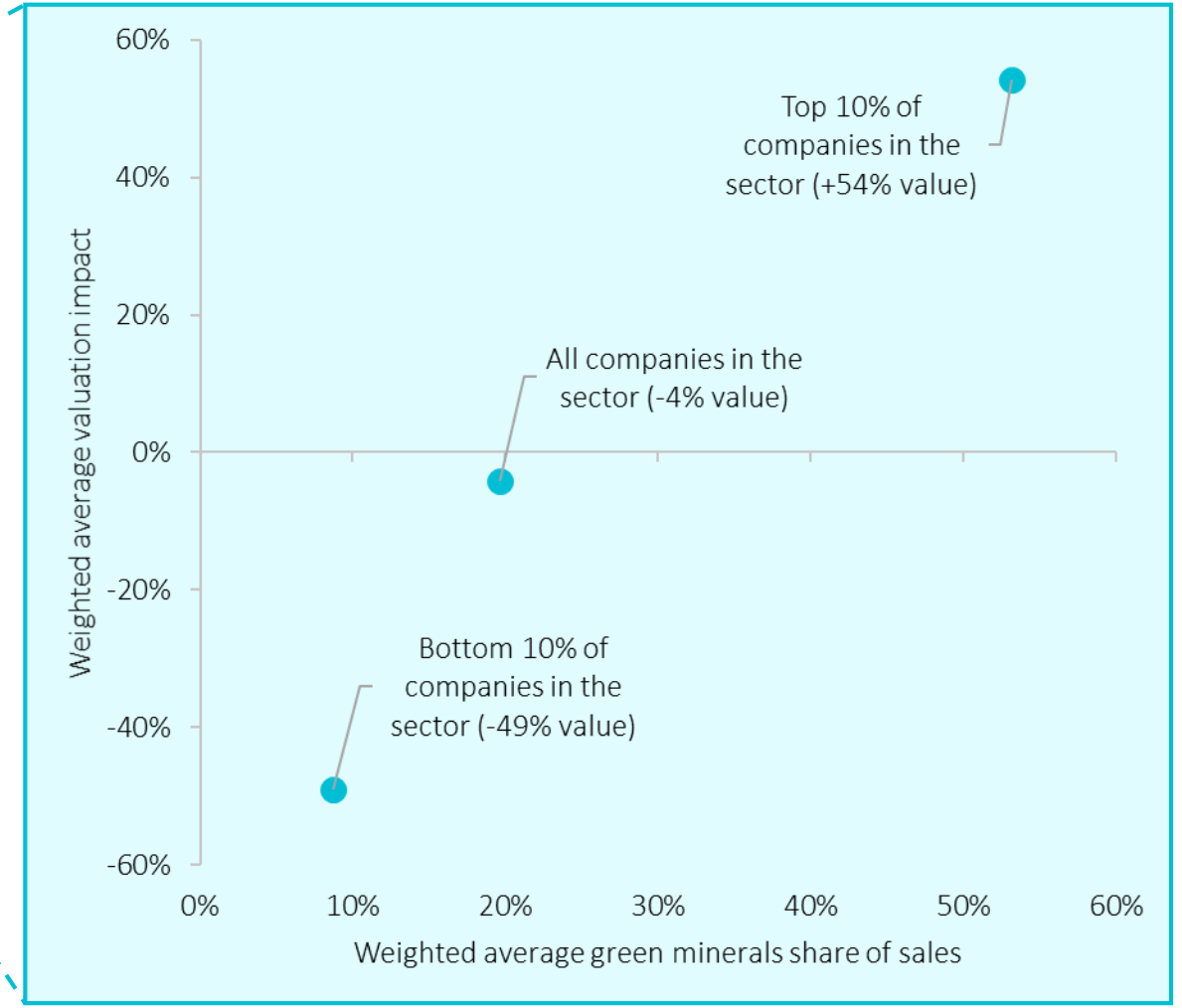
Metal ore mining: Companies with higher exposure to 'green' minerals* experience a surge in demand, providing a potential cushion against carbon cost impacts

- As an emission intensive sector, mining and mineral products experiences a **significant carbon cost burden** under the FPS and the overall impact is therefore negative
- However, growth in deployment of **low carbon energy and products** (such as renewables and EVs) under the FPS leads to **demand creation** in some mineral markets such as cobalt, copper, lithium, nickel and silver (ore)*
  - ◊ This is because these minerals represent important **inputs into several key technologies**, for example, lithium is used in the manufacturing of Li-ion batteries for EVs
- This leads to an increase in future profits for companies involved in the extraction of these minerals, compared to the NPS.
- Across the mining sector, companies with **higher revenue shares of green minerals** therefore experience **higher positive impacts:**
  - ◊ The **top 10%** of companies in the sector experience a weighted average impact of 54% and exhibit a green minerals share of sales of 53% on average
  - ◊ The **bottom 10%** of companies in the sector experience a weighted average impact of -49% and exhibit a green minerals share of sales of 9% on average
- When reviewing the performance of the bottom 10% of companies it should be noted that some mining conglomerates also are engaged in coal which exposes them to demand destruction

Note: * The analysis takes into account possible technological advances that shift mineral requirements in response to expected scarcity

Metal ore mining: Companies with higher exposure to 'green' minerals* experience a surge in demand, providing a potential cushion against carbon cost impacts





INEVITABLE POLICY RESPONSE

Notes: The error bar on the left graph indicates the 10th and 90th percentiles of impact in the sector. Value of the dot is weighted average impact.
* Green minerals are defined as those needed as inputs for low carbon technologies: cobalt, copper, lithium, nickel and silver (ore)
Source: Vivid Economics Net Zero Toolkit

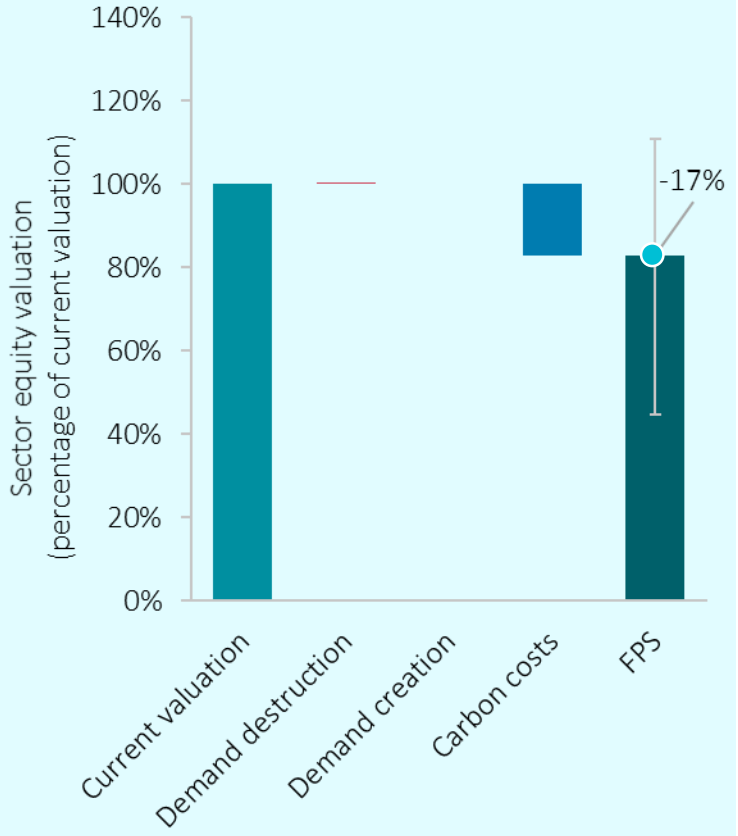
Other non-energy materials: Carbon costs drive impacts in sectors with high process emissions and low abatement potential due to high costs from climate policy, such as cement

- Other non-energy materials sectors, such as cement, chemicals and metals, are primarily affected through the **carbon cost** value stream as all are very **emissions intensive** in production
- As in the power sector, carbon pricing shakes out winners and losers, leading to **large within sector variation** that is **closely linked to relative company carbon intensity**
- **Differences between sectors are driven predominantly by abatement potential**
  - For example, cement is associated with significant process emissions and there are currently no large-scale abatement options available
- It should be noted that there is some **demand creation** in chemicals as some players in the sector are engaged in biofuel production and refining, and in metals because some of these producers are also engaged in low carbon activities such as providing components for electric vehicles manufacturing

Other non-energy materials: Carbon costs drive impacts in sectors with high process emissions and low abatement potential due to high costs from climate policy, such as cement

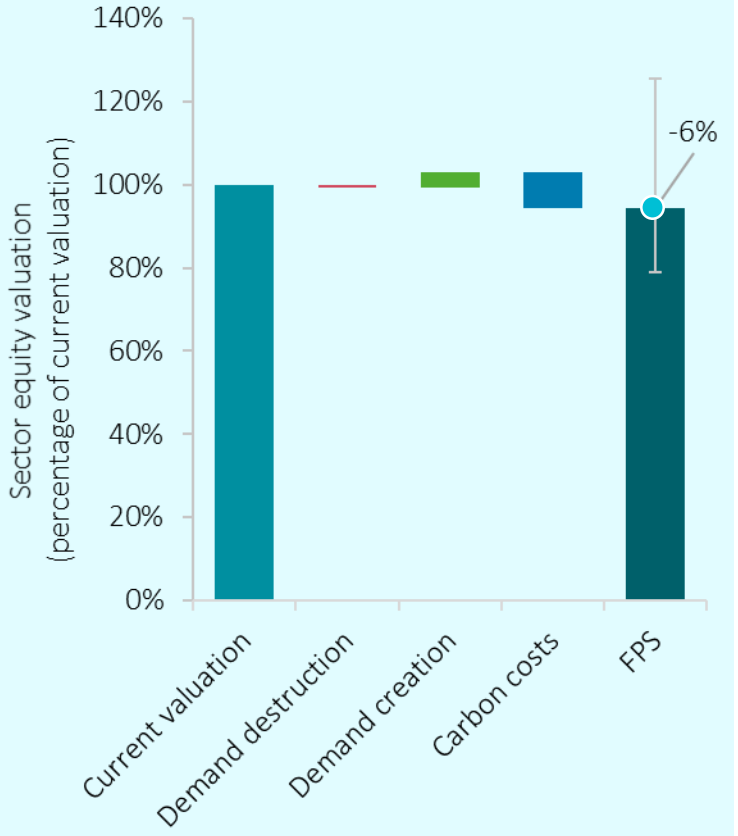
Cement

Heavy Building Material and Aggregate Products (RBICS Level 4)



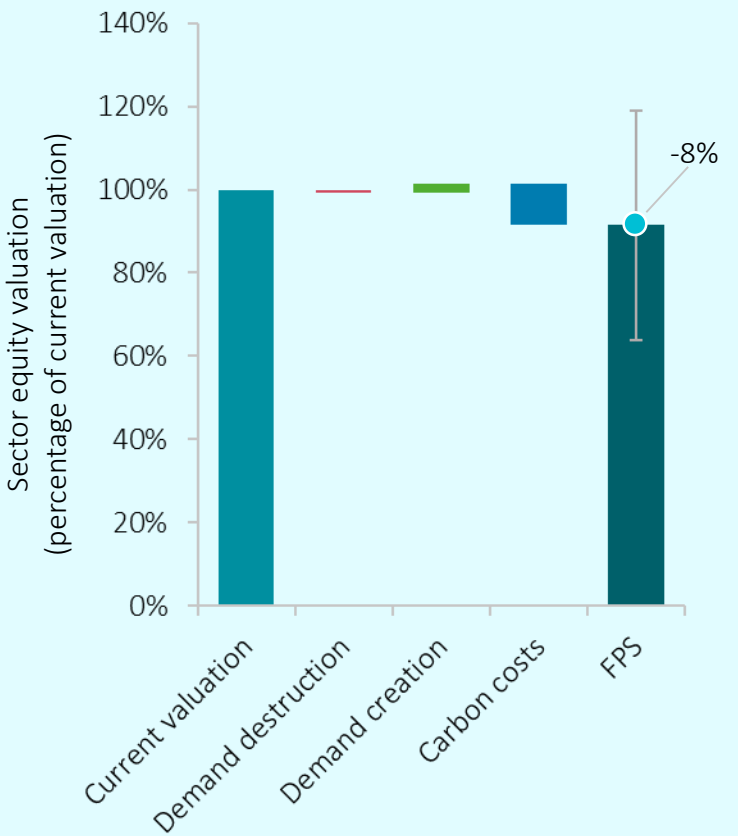
Chemicals

Chemical, Plastic and Rubber Materials (RBICS Level 2)



Metals

Primary metal products (RBICS Level 4)*



INEVITABLE POLICY RESPONSE

Notes: *Primary metal products includes alumina and aluminium production, steel mills, non-ferrous metals production, metal processing and recycling, and includes some oversampling of companies due to the small number of primary metal producing companies in the iShares MSCI ACWI ETF.

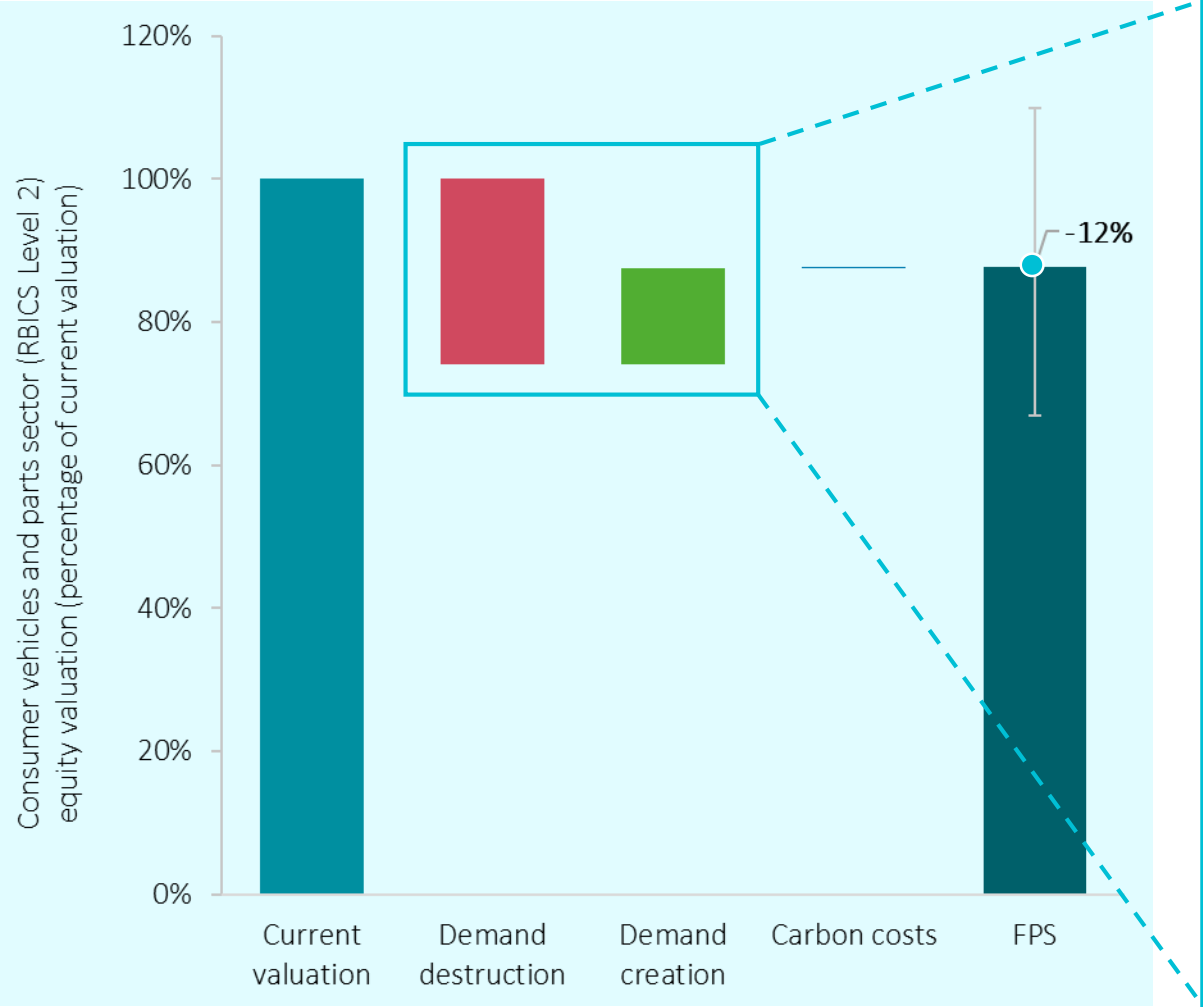
Automobiles: While the demand for ICEs contracts, EVs experience significant market growth and companies with higher EV production benefit

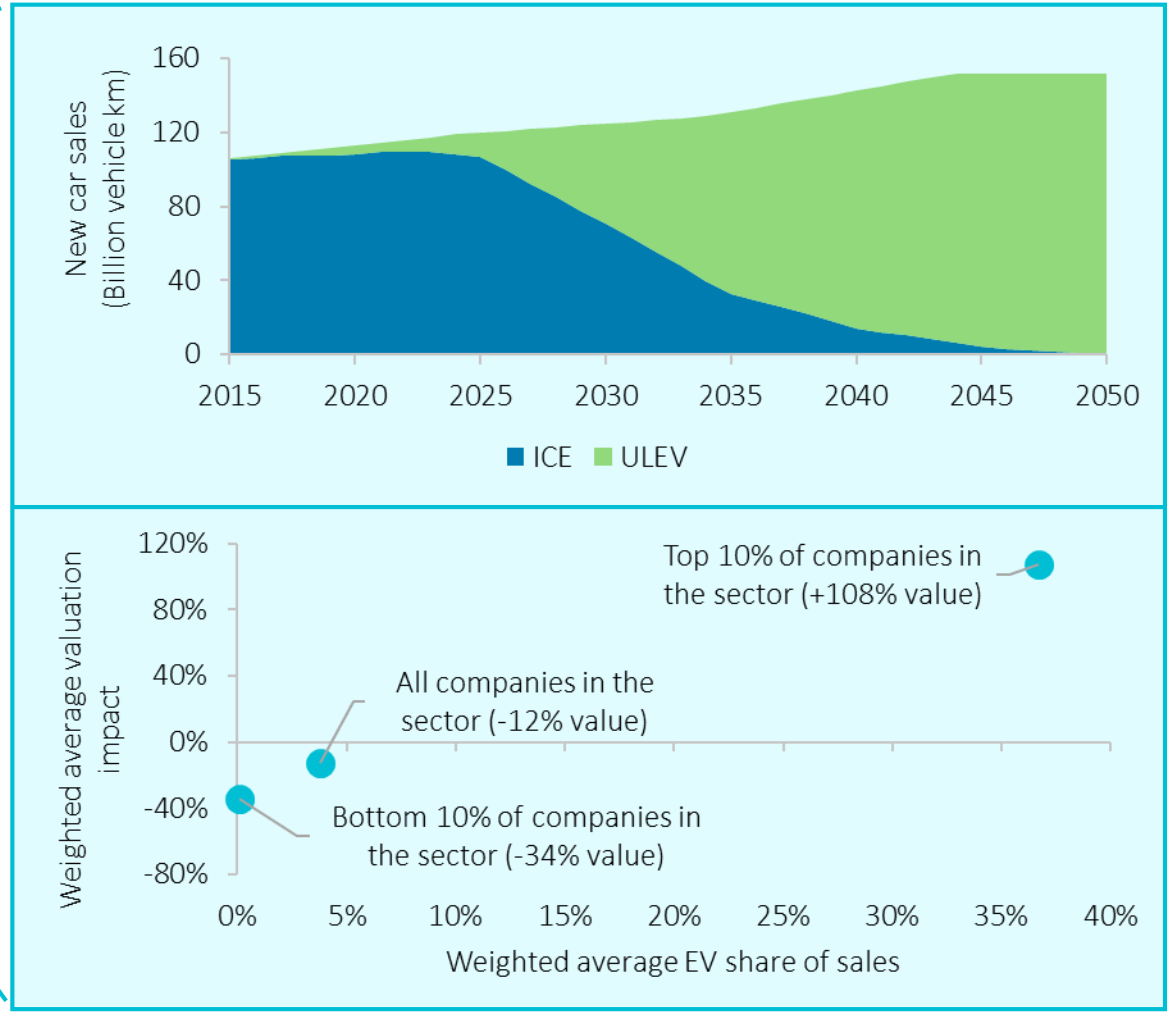
- Sales of new internal combustion engine (ICE) vehicles are expected to decline rapidly, eventually **hitting zero in 2050**
- **All new car sales in 2050 will be comprised of ultra-low emissions vehicles (ULEV)**, which includes battery electric vehicles and (plug-in) hybrid electric vehicles
- Therefore, there is **both demand destruction and demand creation** in the automobile sector, affecting different products
- However, **demand destruction has a greater impact on the sector overall** because the majority of companies in the index have a high ICE share in production and are just starting to ramp up EV production
  - The weighted average impact across all companies in the sector is therefore negative at -12%
- Comparing the top and bottom 10% of companies (in terms of impact) demonstrates the **importance of EV share of current sales** :
  - The **top 10%** of companies experience a weighted average change in valuation of 108% and have a 37% share of EVs on average*
  - The **bottom 10%** of companies experience a weighted average change in valuation of -34% and have a 0% share of EVs on average*

INEVITABLE POLICY RESPONSE

Notes: * Average share of EVs is weighted by total sales.

Automobiles: While the demand for ICEs contracts, EVs experience significant market growth and companies with higher EV production benefit



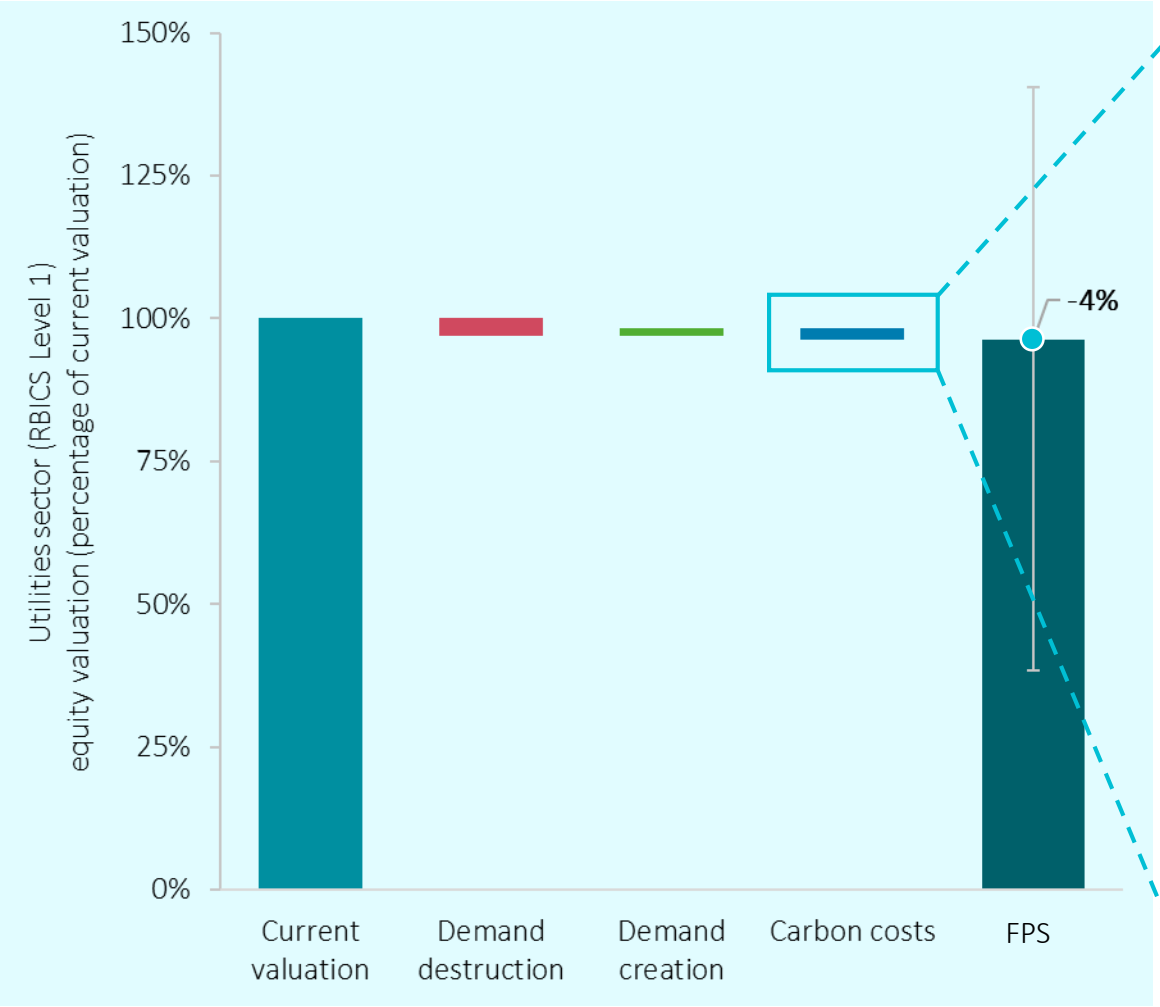


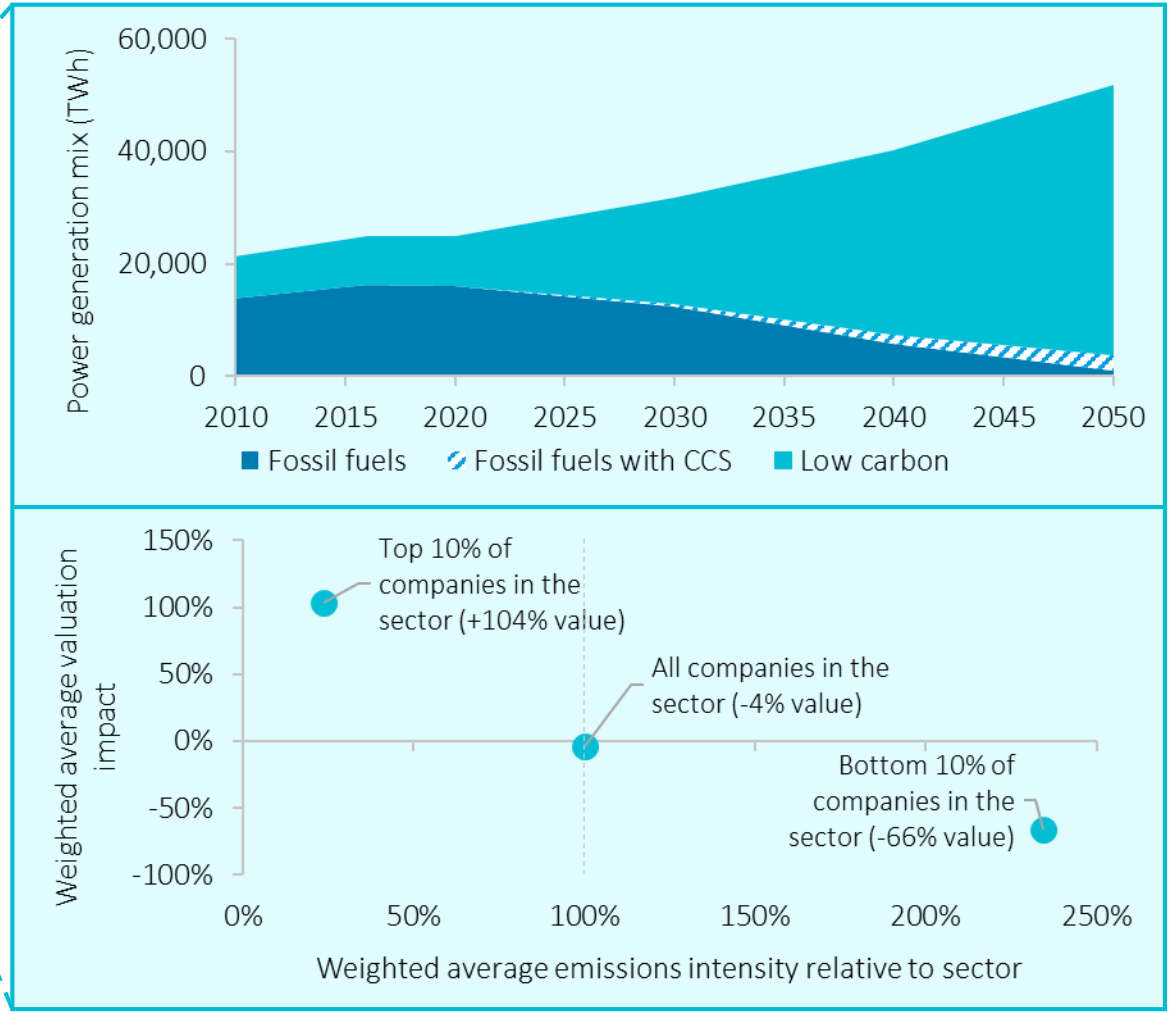
Notes: The error bar on the left graph indicates the 10th and 90th percentiles of impact in the sector. Value of the dot is weighted average impact.
Source: Vivid Economics Net Zero Toolkit

Utilities: Overall impacts on the aggregate Utilities sector are small, which hides the significant amount of variation in impacts across companies

- **By 2050** under the FPS, **93% of total generation will be from low carbon** sources, which include hydro, nuclear, solar, wind, biomass and other renewables
- Companies with significant fossil fuels in generation have **higher emissions intensities** relative to low carbon renewable competitors and experience **large carbon costs** under the FPS
- While **impacts in the utilities sector are small on aggregate** (-4%), relative differences in carbon costs distorts competitiveness leading to a large **variation across companies within the sector, with impacts below -62% for the bottom 10% of companies, but above 41% for the top 10% of companies.**
- This variation can be traced back to the **relative emissions intensities of top and bottom players**:
  - The **top 10%** of companies in the sector exhibit an average impact of 104% and have an average emissions intensity that is 0.24 of the whole sector average
  - The **bottom 10%** of companies in the sector exhibit an average impact of -66% and have an average emissions intensity that is 2.34 times the whole sector average
- In sum, low carbon utilities gain while fossil fuel generators lose from IPR FPS, as detailed in following slides

Utilities: Overall impacts on the aggregate Utilities sector are small, which hides the significant amount of variation in impacts across companies





Notes: The error bar on the left graph indicates the 10th and 90th percentiles of impact in the sector. Value of the dot is weighted average impact.
Low carbon power sources include hydro, nuclear, solar, wind, biomass and other renewables.
Source: Vivid Economics Net Zero Toolkit

Agriculture and food production: Aggregate impacts in these sectors are small, but disguise large upside risk in biofuels (agriculture) and poultry, and downside risk in cattle

In terms of general market risk, the diversity of agricultural sectors means that all value stream channels are important, and that there are significant differences between winners and losers, with the top decile of companies gaining roughly 10% additional value, and the bottom decile losing more than 15%:

- Demand destruction impacts products like cattle and certain crops, as land costs rise from increasing use for biofuels
- Demand creation impacts biofuels, which are undergoing significant growth due to rising clean energy demand; as well as poultry and eggs which substitute for emissions-intensive meats (like cattle) owing to behavioural change and cost incentives
- Carbon costs affect all agricultural sectors, due to the high emissions intensity of some crops, including cattle and agrochemicals and fertilisers

In addition to the market risks discussed above – which result in direct changes to production costs and revenues – there are several other risks associated with deforestation and peatland development that could have material impacts on equity valuations, more than doubling the exposure from general market risks:

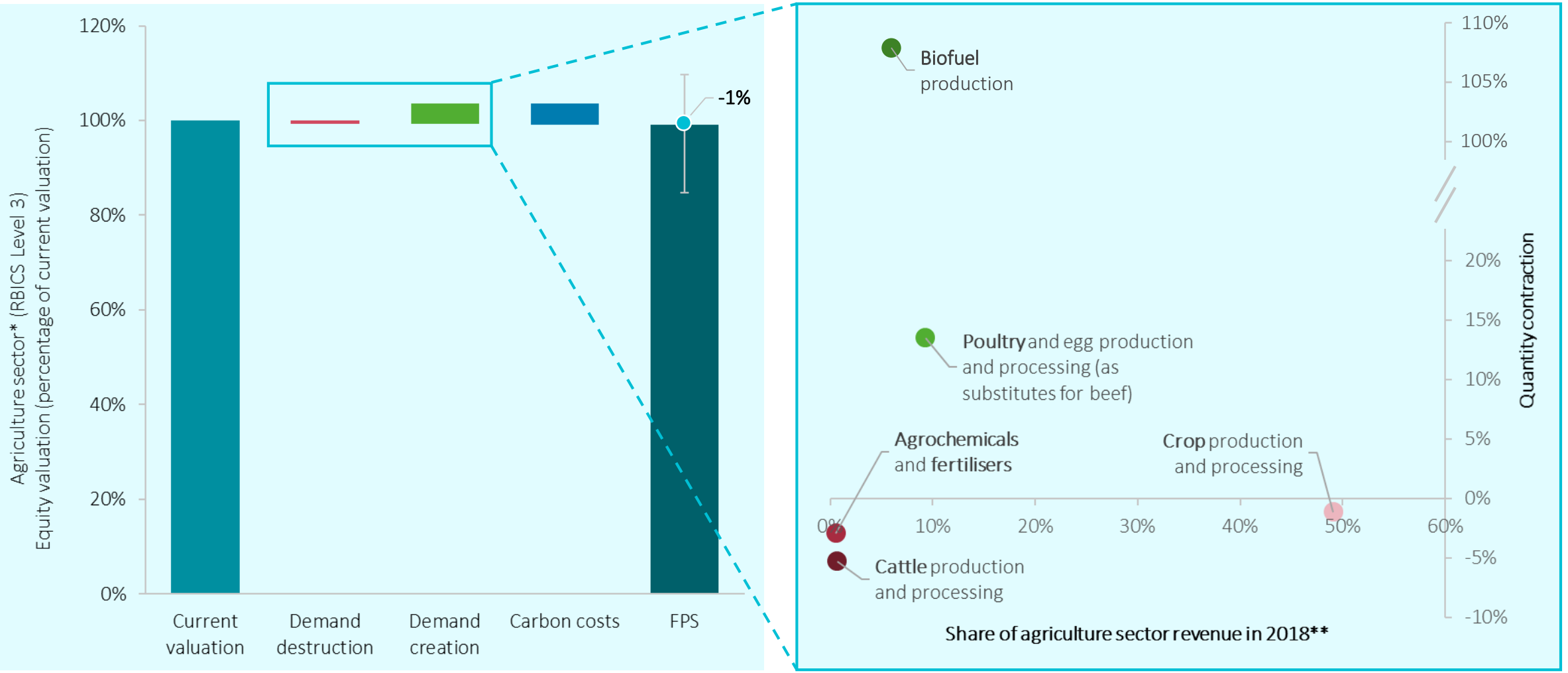
- Legal and operational risk: Government regulations deem current business practices illegal leaving growers or retailers liable to suspensions and financial sanctions. These place companies at risk of dissolution and raise operating costs, hurting profitability and market value.
- Market access risk: Downstream retailers and wholesalers impose sustainability regulations on their suppliers, most commonly NDPE policies (no deforestation, peat or exploitation). Suppliers in breach are suspended resulting in loss of sales, foregone revenues and lower profits.
- Consumer response risk: As consumer awareness and supply chain transparency increases, demand shifts to verified sustainable products. Companies without certification or credible sustainability policies lose market share. If the price point falls, margins can also be hit

In some regions, these risks can be further aggravated by water supply risks, characterised by large-impact, low-likelihood tail risks of mal-adaption and agricultural asset stranding which increase the importance of robust forward planning for exposed companies

Finally, the IPR transformation in land use will create large new green opportunities, particularly nature based solutions, but will require proactive engagement

Overall, the wide geographic variations in both market and non-market risk emphasise the importance of portfolio review of land intensive sectors

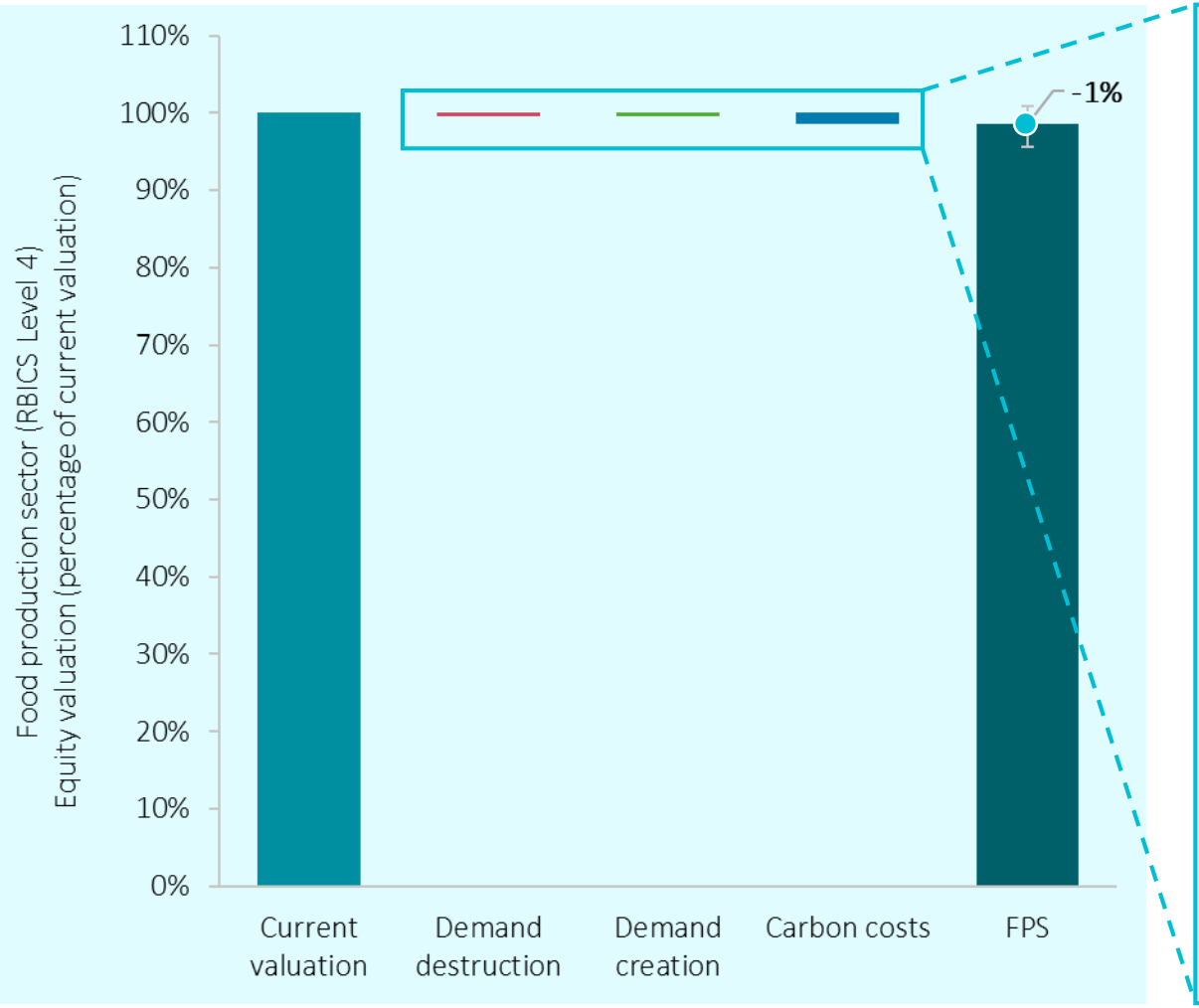
Agriculture*: Aggregate impacts in the agriculture sector are small, but disguise large upside risk in biofuels and poultry, and downside risk in cattle

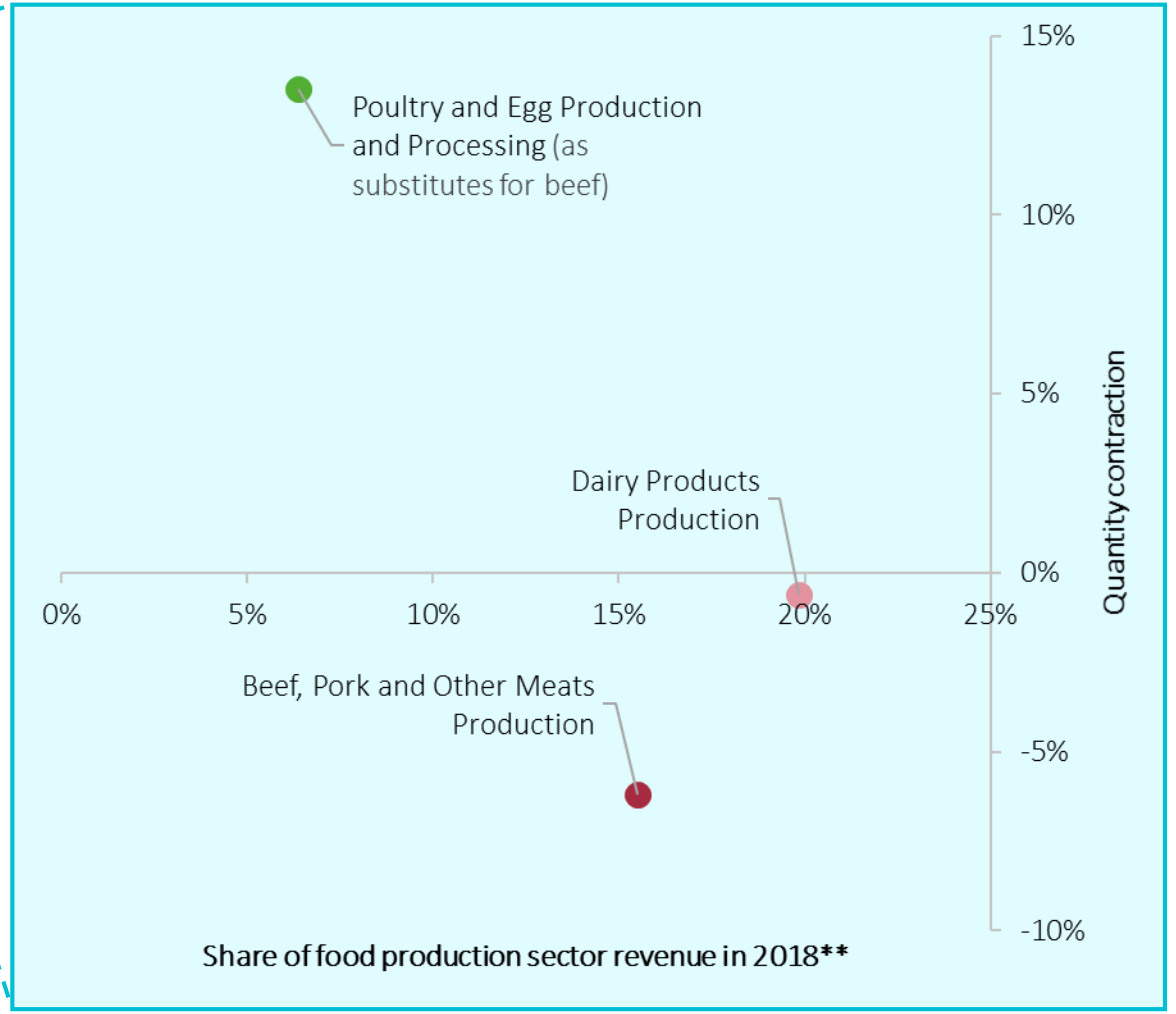


Notes: *Agriculture sector results include some oversampling of companies due to the small number of agri. companies in the iShares MSCI ACWI ETF. ** Revenue shares do not sum to 1 because some agri. company revenue lies outside of the 5 sectors shown

Source: Vivid Economics Net Zero Toolkit

Food production: Due to smaller revenue shares in highly impacted segments, this sector experiences very small aggregate impacts





Notes: *Agriculture sector results include some oversampling of companies due to the small number of agri. companies in the iShares MSCI ACWI ETF. ** Revenue shares do not sum to 1 because some food production company revenue lies outside of the sectors shown

Source: Vivid Economics Net Zero Toolkit

We estimate total equity value at risk as a result of supply chain exposure by region and commodity

1 Region-commodity level risk

We first assign a risk rating to each region-commodity combination. This is a product of:

(i) the scale of deforestation projected in the region and

(ii) the commodity's share of agricultural land expansion

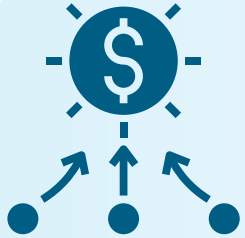
2 Company-level exposure

We then assign an exposure rating to each producer in the region. This is based on qualitative analysis of companies' combined with their share of exports of the given commodity from the given region

3 Impact calculation

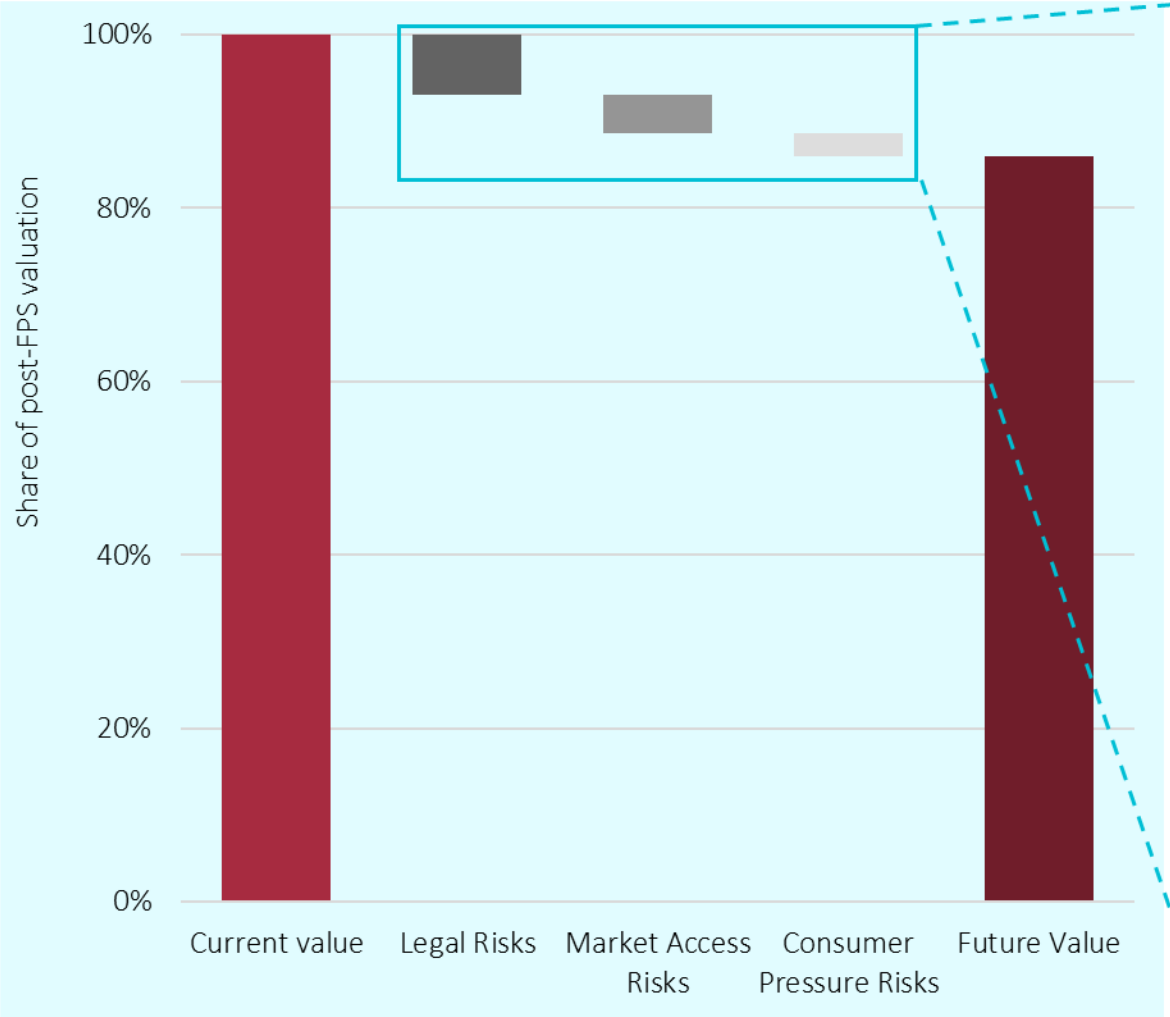
We then map the region-commodity level risk and the company-level exposure onto the range of possible financial impacts defined by past case studies of business risks. This produces impacts at the region-commodity-company level.

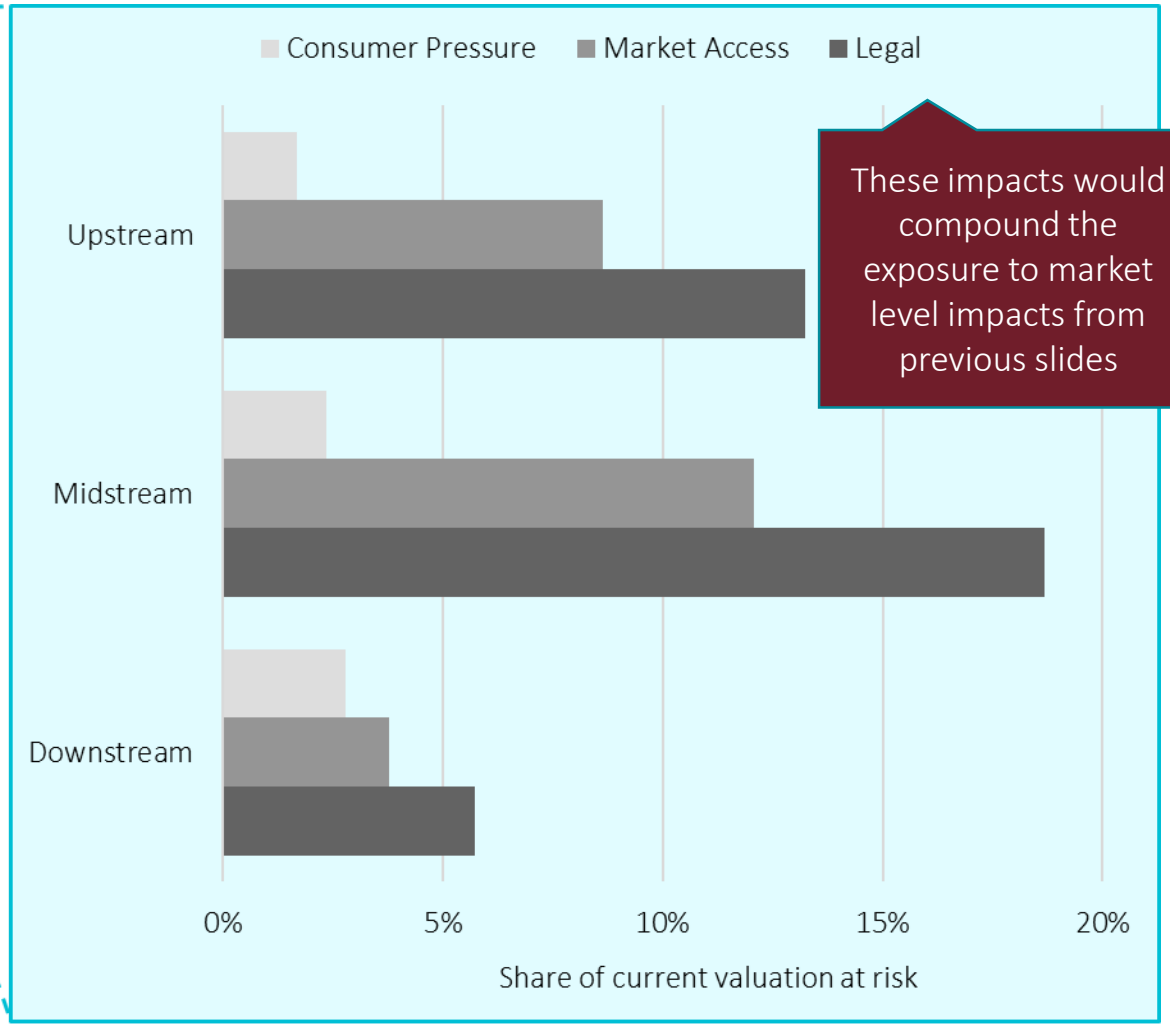
4 Analysis and aggregation of results



We then examine the distribution of impacts across companies' areas of operation, and aggregate results to calculate total and average impacts at the region-commodity and region level.

Supply chain: Additional risks associated with land-use sectors could impact companies whose activities can be linked to deforestation across the supply chain





Notes: Case studies from the Chain Reaction Research and Ceres provided information on maximum threshold for consumer pressure, market access and legal risks as a share of current valuation.

Water risks: Increasing water stress comes with tail risks for the private sector that require forward planning and ongoing management

Water stress in which demand for water is likely to exceed supply is expected to put 45% of economic growth at risk by 2050 in business-as-usual scenarios. Baseline stress is mostly driven by increasing population and agricultural activity.

Water supply and demand will both become more volatile as a result of climate change and the additional demands on land-use resulting from the IPR, which increase investment needs and the risk of mal-adaption and infrastructure asset stranding

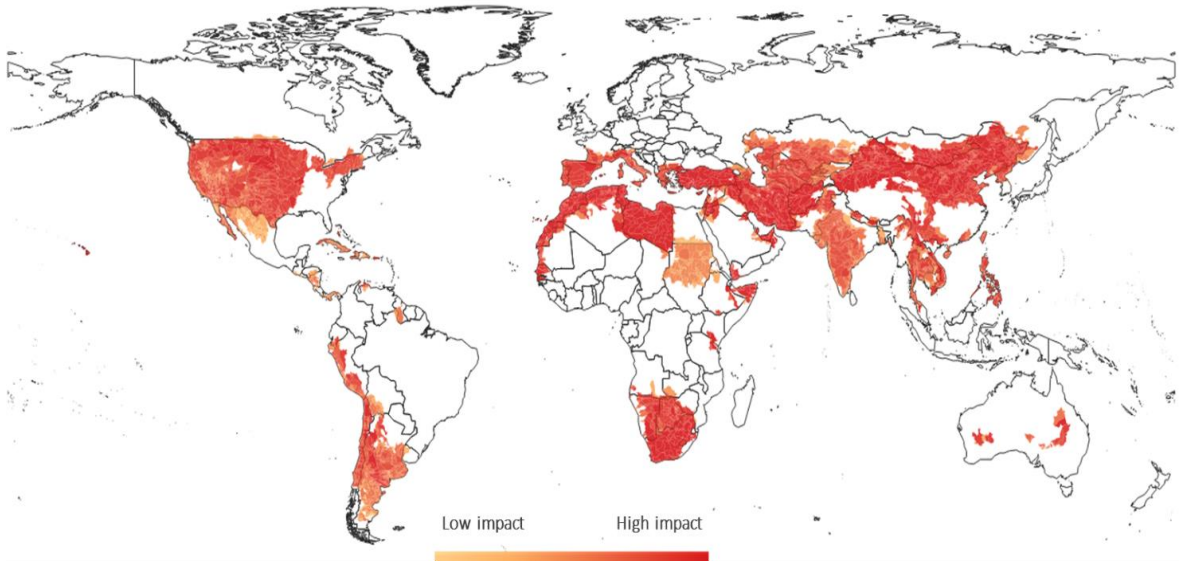
- Shifting weather patterns will change the timing and distribution of water supply
- Land use changes from IPR FPS, including expansion of forest land and agricultural intensification, change patterns of water demand

The consequences of lack of forward business planning will become more frequent and severe.

- Substantial supply chain disruptions resulting from droughts
- Business service interruptions, particularly in tropical developing countries due to water supply disruptions
- Increased risk of migration and political instability

Additional due diligence is required for land-intensive investments in regions of increasing stress. The public sector is under-investing in water infrastructure, meaning private businesses bear extra risk in stressed regions

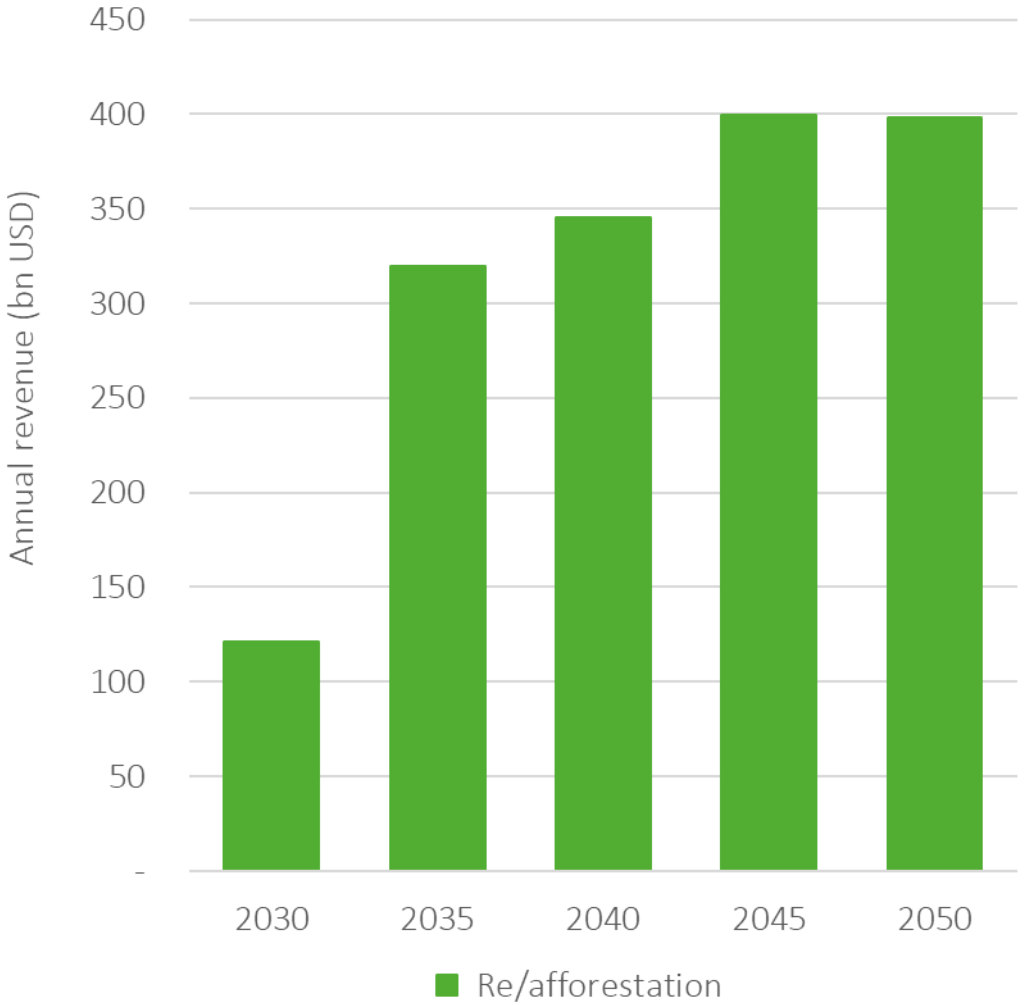
Increase in 2050 water stress from mitigation policy (IPR FPS)



INEVITABLE POLICY RESPONSE

Source: High and Dry - World Bank Group 2016

Nature Based Solutions: Pricing land-based carbon unlocks an estimated US$2.8 tr in forestry investment opportunities and new revenue streams for land-owners.



Nature based solutions (NBS) are opportunities to restore or expand the extent of carbon-rich ecosystems, such as peat bogs or tropical forests, to provide negative CO_2 emissions

- Annual revenues, representative of growth in market size, total **US$2.8 trillion** through 2050.
- Land owners and developers can **monetise sequestration potential by selling offsets** to emitters, such as oil and gas
- Opportunities concentrated in areas with historically wide ranging forest lands - Africa, Brazil, Central and South America, and Other Developing Asia
- Avoided deforestation from IPR FPS represents an extra US$4.8 trillion if fully compensated. Finance will largely be public, but green bonds may offer private sector some opportunities
- Existing agriculture interests are a surprising co-beneficiary of pricing land-based carbon. Appropriate valuation of land increases commodity prices and incentivises productivity investment

INEVITABLE POLICY RESPONSE

Nature Based Solutions: Exposure to this large green upside will require market developments currently outside of the mainstream market channels

The NBS market, while potentially very large, is still extremely young and currently dominated by public climate finance. In the context of the IPR FPS, that market will deepen rapidly, with the largest and most investible opportunities channelling finance from:

- **Large agriculture or Oil and Gas players with carbon liabilities to offset.** Oil and Gas companies may view a viable offsets market as a way to extend the life of 'transition' natural gas assets, and some may choose to invest in and deliver their own NBS offsets
- **Specialist funds**, either equity or debt, that grow to support NBS project developers
- **Local agricultural sector banks** could support loans to individual land-owners aiming to transition their holdings through green bonds or securitisation vehicles

Institutional investors could gain exposure to this green upside by:

- Encouraging well-positioned companies to invest strategically
- Buying into specialist funds
- Encouraging banks to securitise NBS developer loans and sell them on capital markets

Actions for investors

INEVITABLE POLICY RESPONSE

Adoption of IPR

IPR will support signatories in understanding where their portfolio is heading under a delayed, forceful, disruptive transition by 2025. This has the objective of leading to adoption of IPR as the base case for signatory activities via the following process:

1. Signatory review of IPR drivers for 2025 - https://www.unpri.org/inevitable-policy-response/what-is-the-inevitable-policy-response/4787.article
2. Signatory review of IPR Forecast Policy Scenario - https://www.unpri.org/inevitable-policy-response/forecast-policy-scenario-macroeconomic-results/4879.article
3. Feedback to PRI on above
4. Review of equity sector valuation methodology
5. Review of equity sector valuation results
6. Governance sign off of IPR FPS as a base case or close in-house version
7. Development of portfolio strategy for IPR FPS

INEVITABLE POLICY RESPONSE

Investor actions - internal

There are several actions signatories can undertake following the equities release:

- Internal Actions
  - Asset owners can use FPS as a likely central business case and define a risk mitigation strategy and timing of transition for exposed equities
  - Asset owners may want to review equity asset allocation strategies and the proportion of passive and active mandates
  - Active investors can consider climate as a factor potentially creating alpha
  - Passive investors can consider the relevance of existing benchmarks and explore development of benchmarks informed by IPR

Investor actions - external

IPR will help signatories in understanding where their portfolio is heading under a delayed, forceful, disruptive transition by 2025.

Appropriate actions for investors now include:

- External Actions
  - Engage with Asset Managers managing exposed sectors or sub-sectors
  - Asset owners may want to integrate IPR valuation findings into Asset Manager selection
  - Asset owners can engage with service providers on index creation, proxy recommendations, impairment tests, etc.
  - All investors can use IPR to engage with companies in exposed sectors on policy
  - Continue to advocate and engage for earlier and more ambitious climate action to minimize the disruption from a disorderly transition and from physical impacts resulting from global mean temperatures exceeding 1.5°C

Investors should consider transitioning ahead of major policy triggers

- There is a natural spread of probabilities for the 2025 trigger date
- The FPS is a high conviction forecast that BY 2025 the response will be priced by markets
- It could be sooner. Hence the base case modelled in this study has been the impact as at today on an equity portfolio.
- Repricing in 2025 causes a higher shock in year, indicating the importance of early credible policy announcements and repricing
- Investors may want to consider an earlier transition from exposed sectors and a re-allocation of capital to cleaner assets.

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Annex: Technical methodology notes

INEVITABLE POLICY RESPONSE

Annex: Table of Contents

This Annex provides further documentation on the underlying technical methodology. It is structured as follows:

1. Sources of uncertainty by value stream model
2. Importance of conglomerates in the MSCI ACWI index*
3. Additional detail on within-sector variation
4. Additional information on disaggregation of RBICS codes

Notes: *In this presentation, we use the iShares MSCI ACWI ETF as representative of the MSCI ACWI

There are broadly three sources of uncertainty that could affect the robustness of IPR valuation estimates

These are:

- **Pathway uncertainties** affecting inputs to the asset level modelling. These include uncertainty around policy type, timing and coverage as well as future technology development and deployment costs.
- **Modelling uncertainties** which relate to the assumptions underpinning the value stream quantification. These include uncertainties around rationality of economic agents, the nature of industrial competition, and the extent of product differentiation.
- **Data uncertainties** which relate to the quality of the underlying security level data. This includes uncertainty around the ability of the data to capture actual exposure as well as general measurement error.

The three value streams are not uniformly exposed to each of the above sources of uncertainty:

Variable	Demand destruction	Demand creation	Carbon cost
Pathway uncertainties	Low	Medium	Medium
Modelling uncertainties	Low	High	Medium
Data uncertainties	Low	High	Medium

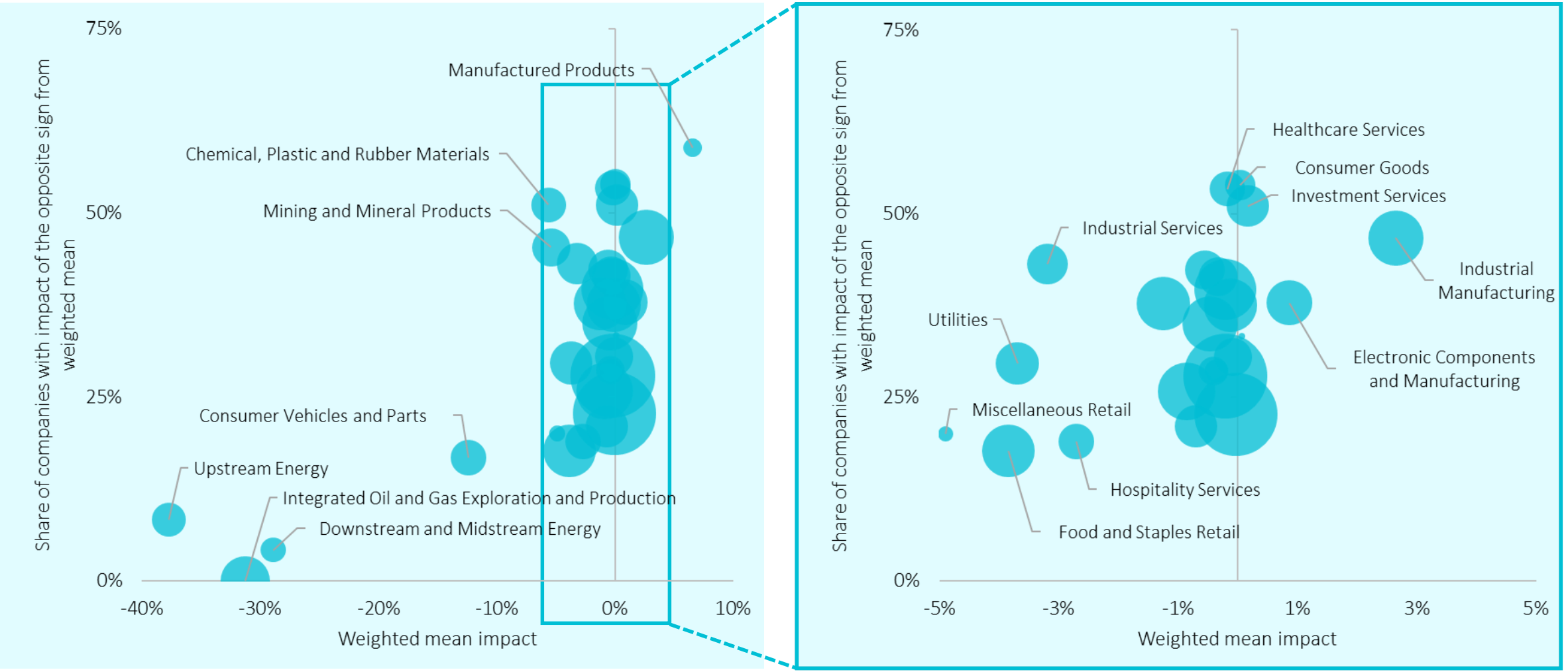
INEVITABLE POLICY RESPONSE

There is significant variation not only across sectors, but also within sectors, demonstrating that there are winners and losers even in declining sectors

- To demonstrate the high degree of within sector variation, we have calculated the **share of companies going 'against the tide' in each RBICS Level 2 sector** and exhibit impacts of the opposite sign of the sector mean
  - For example, if 5 out of 20 companies in sector A exhibit positive impacts, while the sector weighted average impact is negative, this would mean 25% of companies go 'against the tide'
- This measure shows that there are **a few sectors** where the **vast majority of companies experience negative impacts**
  - These are the 'pure losers' and consist mainly of energy sectors: upstream energy, integrated oil and gas exploration and production, and downstream and midstream energy
- However, **for most sectors, there is a considerable share of companies going against the tide:**
  - For example, 59% of the manufactured products sector experience negative impacts even thought the weighted average impact in the sector is positive, and 51% of the chemical, plastic and rubber materials sector experience positive impacts even though the weighted average impact is negative
- This means there can be **winners even in declining sectors and losers in winning sectors**, and it is important to consider the individual companies in a sector rather than the averages when stock picking

INEVITABLE POLICY RESPONSE

There is significant variation not only across sectors, but also within sectors, demonstrating that there are winners and losers even in declining sectors



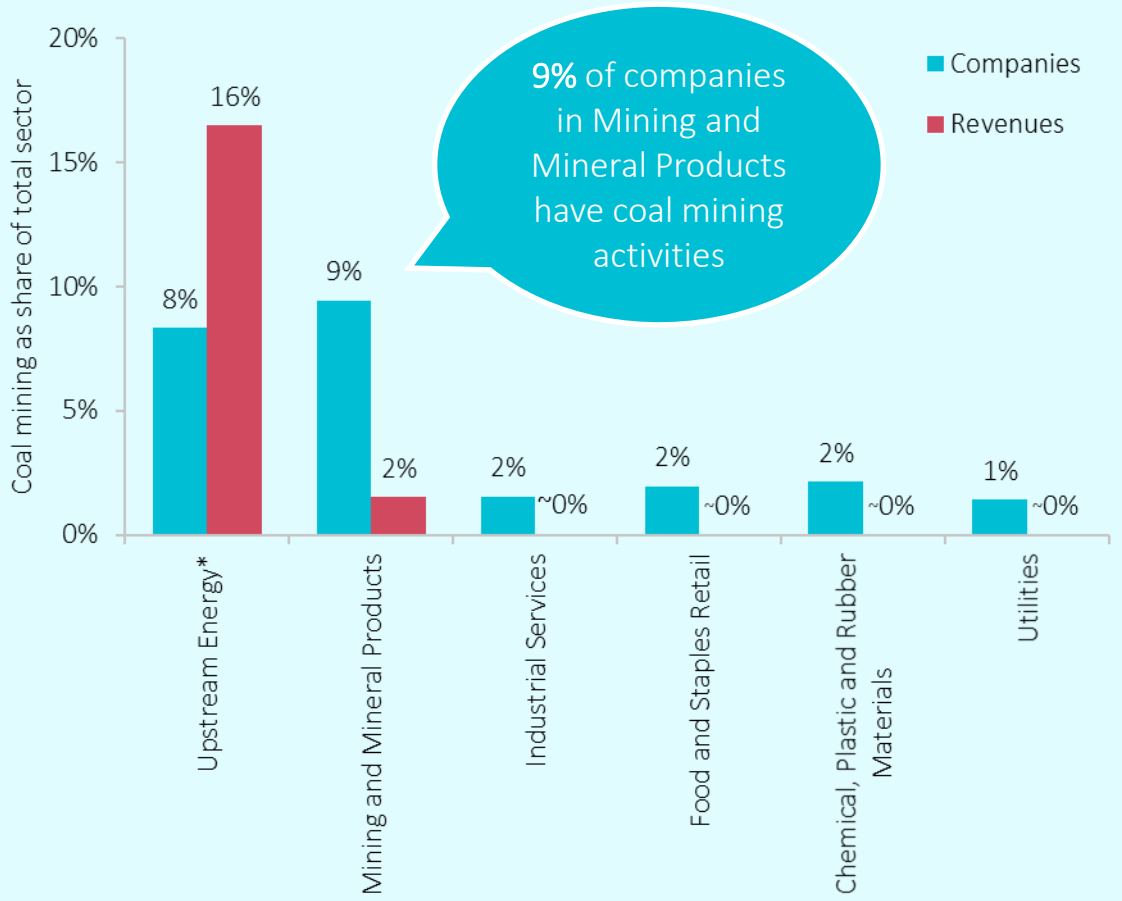
INEVITABLE POLICY RESPONSE

Notes: Companies are classified as "going against the tide" when they experience impacts of the opposite sign as the weighted mean. Sectors: RBICS level 2.
Source: Vivid Economics Net Zero Toolkit

As many companies in the index are conglomerates, relying on the primary activity sector identifier may tell only a partial story of overall company exposure

- Many companies are conglomerates and therefore engaged across several sectors
- However, all equities are assigned a single sector code based on primary activity
- Conventional sector classifications therefore only tell a partial story of exposure
  - Companies may be exposed to the low carbon transition even if their primary sector does not appear to be at risk
  - For example, tracing coal mining reveals that exposure is not limited to upstream energy but also present in less obvious sectors such as utilities
- This presentation focuses on what is investable and all results are therefore presented according to primary sector classification
  - Investors should acknowledge this when reviewing results

Example: Coal mining is split across sectors



Note: *Upstream Energy includes coal mining in the RBICS sector taxonomy

RBICS sector structure

RBICS Level 1 sectors	RBICS Level 2 sectors	RBICS Level 3-5 special interest sectors
Business Services	Business services	
Consumer Services	Hospitality Services Media and Publishing Services	
Consumer Cyclicals	Consumer Goods Miscellaneous Retail Consumer Vehicles and Parts Consumer Retail	Consumer Vehicle Parts Manufacturing (Level 3) Consumer Vehicle Manufacturing (Level 3)
Energy	Upstream Energy Downstream and Midstream Energy Integrated Oil and Gas Exploration and Production	Coal and Uranium mining (Level 3) Fossil Fuel Exploration and Production (Level 3) Integrated Oil and Gas Exploration and Production (Level 3)
Finance	Banking Insurance Investment Services Real Estate Specialty Finance and Services	
Healthcare	Biopharmaceuticals Healthcare Services Healthcare Equipment	

RBICS sector structure

RBICS Level 1 sectors	RBICS Level 2 sectors	RBICS Level 3-5 special interest sectors
Industrials	Industrial Manufacturing Industrial Services	
Non-Energy Materials	Chemical, Plastic and Rubber Materials Mining and Mineral Products Manufactured Products	Metal Ore Mining (Level 3) Primary Metals Products (Level 4) Heavy Building Material and Aggregate Products (Level 4)
Consumer Non-Cyclicals	Food and Staples Retail Food and Tobacco Production Household Products Household Services	Agriculture (Level 3) Food production (Level 4)
Technology	Electronic Components and Manufacturing Hardware Software and Consulting	
Telecommunications	Telecommunications	
Utilities	Utilities	Energy Utilities (Level 3) Water Utilities (Level 3)